MATRIX ACOUSTIC DESIGN CONSULTANTS

Proposed Additional Poultry Units
Brynthomas
Penybont
Llandrindod Wells
Powys
LD1 5SW

PLANT NOISE ASSESSMENT

Acoustics Report M2129/R01
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1. Introduction

This acoustic report documents a plant noise assessment for the ventilation fans on the proposed additional poultry units at Brynthomas, Penybont; Figures 1 and 2.

The report is divided into the following sections:

- Section 2: Overview of the Development
- Section 3: BS4142
- Section 4: Background Noise Survey
- Section 5: Noise Impact Assessment
- Section 6: Conclusion
- Appendix A: Survey data
- Appendix B: Calculations
- Appendix C: Fan noise data

2. Overview of the Development

The existing poultry development at Brynthomas, Penybont consists of two sheds, labelled 1 and 2 in Figure 2. The proposed scheme is for two additional sheds (3 and 4) to the south of the existing poultry units.

The closest noise sensitive receptors, labelled A and B in Figure 2, are approximately 395m and 355m respectively from the proposed additional poultry units. Receptor A is a single 2-storey house whereas Receptor B are three single storey holiday chalets.

The new sheds will be ventilated by extract fans, consisting of:

- Roof mounted fans: 15 x Fancom 3680 fans per shed, arranged along the ridge of the shed; Figure 2.
- Gable end fans: 8 x Fancom 34130 fans, located on the west gable ends.

The ridge extract fans will typically provide the ventilation requirements on their own; the gable end fans are only needed if the ridge fans are not able to provide the required ventilation due to failure or during periods of high external temperatures.

There will be an unobstructed noise path between all the roof duct terminations/gable end grilles and Receptors A and B. Manufacturers' data sheet for the fans are provided in Appendix B.

The ventilation fan noise emissions from the proposed additional sheds are within context of the existing poultry development.

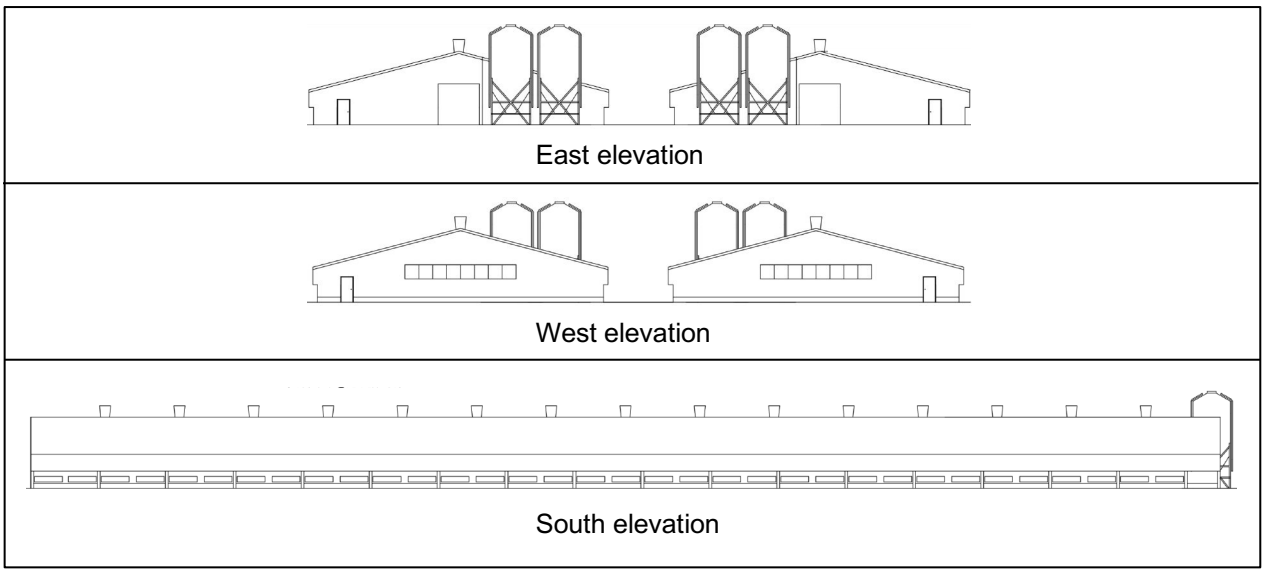


Figure 1. Elevations of proposed additional poultry units 3 & 4

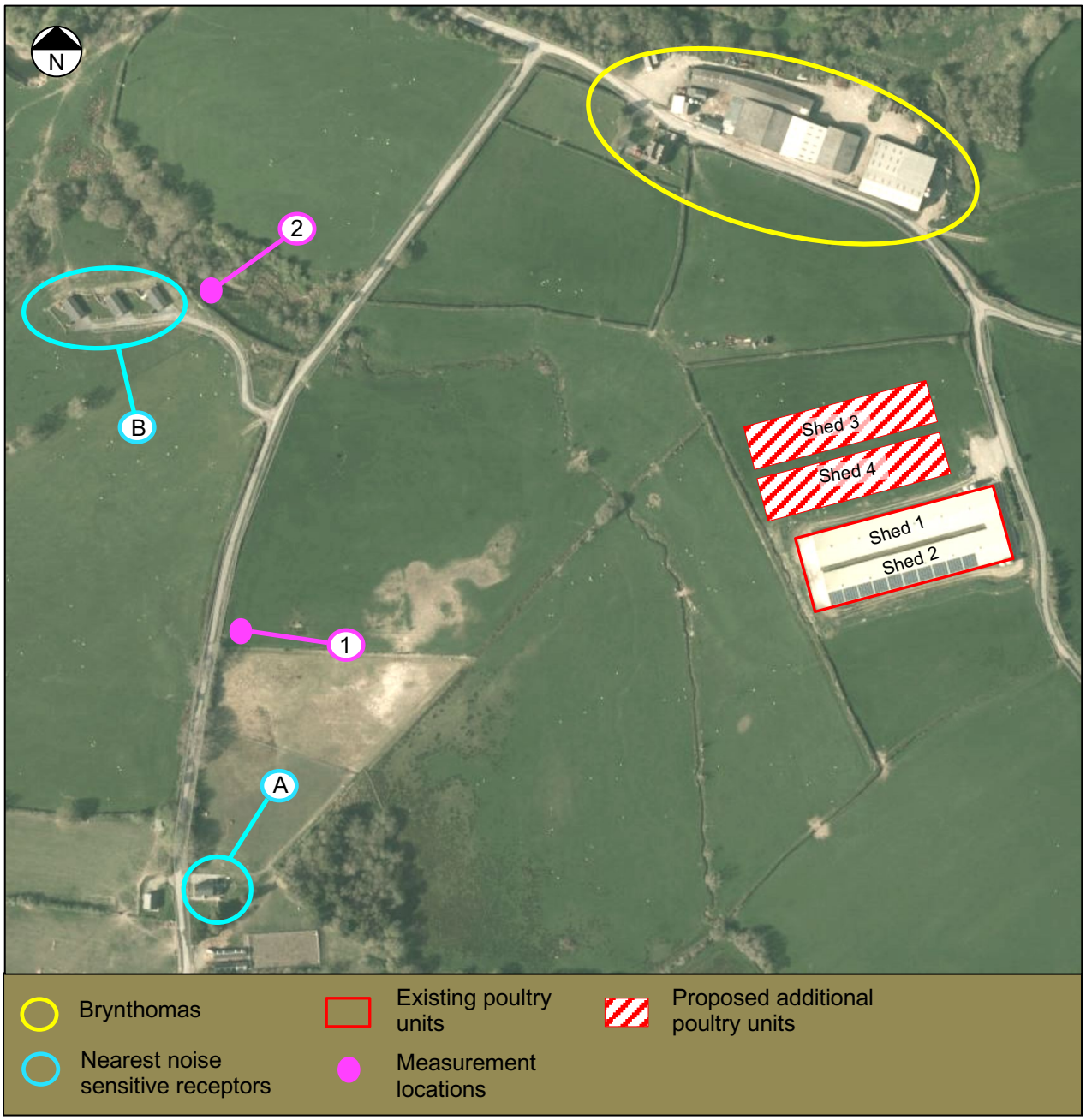


Figure 2. Aerial view (source: www.google.com) showing footprint of existing and proposed additional poultry units, measurement locations and nearest noise sensitive receptors

3. BS4142:2014

The plant noise assessment detailed in this report has been conducted in accordance of BS4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'.

3.1 BS4142:2014

BS4142:2014 provides a methodology to assess the impact of industrial and commercial noise affecting dwellings, whereby the 'typical' background noise level is deducted from the industrial noise Rating Level (industrial noise corrected to account for the 'on-time' and noise character of the noise source; see sections 3.2 and 3.3 below). The following guidance is given based on the established difference:

- A difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on context
- A difference of +5dB is likely to be an indication of an adverse impact, depending on context
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on context

Context, as defined in BS4142:2014, includes the consideration of the following factors:

- The absolute level of the noise emissions
- Character and level of the residual sound compared to the character and level of the Specific Level
- Sensitivity of the receptor and any acoustic design measures (e.g. façade sound insulation, use of mechanical ventilation and acoustic screening) incorporated at premises used for residential purposes

Where background noise and Rating Levels are low, BS4142:2014 states that *'absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night'*. Low background noise and rating levels are not defined. However, in BS4142:1997 it states that '*background noise levels below 30dB and rating levels below about 35dB are considered to be very low'*.

3.2 On-time correction

To take account of industrial/commercial noise sources that do not operate continually an 'on-time' correction is applied using:

$$- 10 \log (r/r_{ref})$$

Where:

$r_{ref.}$ = reference time (1hr between 07:00 – 23:00hrs and 15 minutes between 23:00 – 07:00hrs)

r = total 'on-time' during the reference period

Note that the shorter reference time interval between 23:00 – 07:00hrs is designed to penalise industrial/commercial noise events that occur during the night.

3.3 Noise character correction

BS4142 provides four noise character correction categories with associated penalties that must be applied when determining the Rating Level, namely:

- **Tonality:**
  - Not perceptible = 0dB
  - Just perceptible = +2dB
  - Clearly perceptible = +4dB
  - Highly perceptible = +6dB
- **Impulsivity:**
  - Not perceptible = 0dB
  - Just perceptible = +3dB
  - Clearly perceptible = +6dB
  - Highly perceptible = +9dB

- **Intermittency:** +3dB if the intermittency of operation is readily distinctive against the residual noise environment
- **Other:** +3dB applied if the specific sound is neither tonal or impulsive but features noise characteristics that are readily distinctive against the residual noise environment

4. Background Noise Survey

A 24hr noise survey has been conducted in order to determine the typical background noise levels at the two nearest noise sensitive receptors to the proposed additional poultry units.

During the survey the existing poultry units were operational. The surveyed noise levels will therefore have included the contribution of noise emissions from the existing sheds. In accordance with BS4142 this is considered acceptable as it represents the existing noise environment.

- **Survey dates**: 8th – 9th July 2021
- **Weather;** Table A2, Appendix A:
  - Precipitation: Dry
  - Wind Speed: Highest recorded wind speed of 4.4m/sec, with a median of 0.7m/s
  - Wind direction:
    - 10:00 – 11:00hrs: SW
    - 11:00 - 18:00hrs: W
    - 18:00 – 05:00hrs: NW
    - 05:00 – 13:00hrs: SW
  - The weather conditions will not have adversely affected the noise measurements.
- **Noise monitor locations:** With the microphones attached to tripod the noise monitors were located at Positions 1 and 2 as shown in Figure 2
- **Weather station location:** Weather station, mounted on a tripod, located at Position 1; Figure 2
- **Equipment:**
  - Weather Station: Kestrel type 4500
  - Noise monitors: Brüel & Kjær Type 2238 (Positions 1 & 2)
- **Monitor configuration:**
  - Weather station: Configured to measure the average wind speed and temperature over consecutive 10-minute periods
  - Noise Monitors: configured to measure consecutive 15-minute samples of noise.
- **Calibration:** Noise monitors calibrated before and after the survey using a Brüel & Kjær Type 4231 calibrator with no deviations found

All noise measurements are free-field. Full tabulated results are given in Tables A1 and A2, Appendix A.

4.1 Typical background noise levels

Figures 3 and 4 show the variation in the measured noise levels over the survey period at Positions 1 and 2 respectively.

As can be seen, with the exception of the elevated levels between 01:30 – 08:00hrs at Position 1, the variation in the background noise levels at both measurement positions follow the same pattern with comparable levels being returned. This indicates that the general underlying noise environment is the same at both Positions 1 and 2.

Figure 3. Position 1 noise monitor data (free-field)

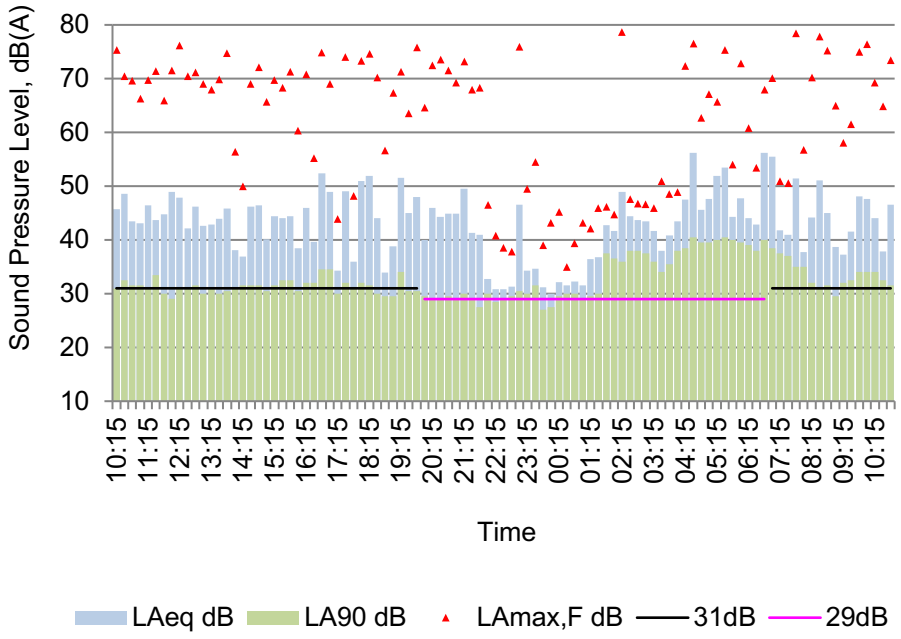
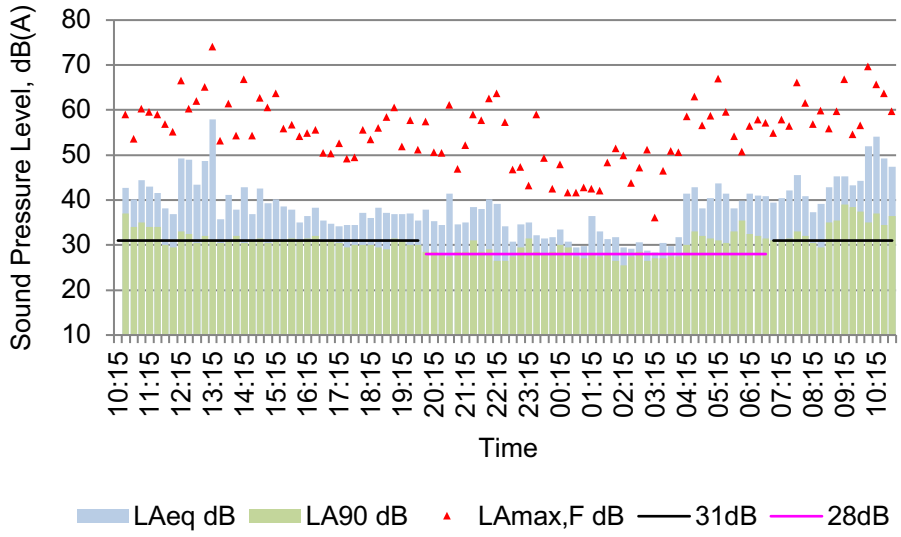


Figure 4. Position 2 noise monitor data (free-field)



Reviewing the survey data typical background noise levels have been established at Positions 1 and 2; Figures 3 and 4:

- Position 1:
  - Day (07:00 – 20:00hrs): L_{A90} 31dB
  - Evening & night (20:00 – 07:00hrs): L_{A90} 29dB
- Position 2:
  - Day (07:00 – 20:00hrs): L_{A90} 31dB
  - Evening & night (20:00 – 07:00hrs): L_{A90} 28dB

The above values are very low, with the day values being equal at both measurement positions and an imperceptible 1dB difference during the evening and night periods.

For the assessment the typical background noise levels determined at Position 2 have been taken to be representative to those that will occur at both Receptors A and B.

5. Noise Impact Assessment

5.1 Calculation of aggregate extract fan noise at Receptors A and B

The full calculations of the extract fan noise emissions are provided in Tables A1 and A2, Appendix A. The resultant aggregate BS4142 Rating and Assessment Levels at Receptors A and B are given in Table 2.

For the calculations attenuators that achieve the minimum insertion losses given in Table 1 have been included for each extract fan (ridge and gable end) on the proposed additional poultry units 3 and 4; Figures 1 and 2.

5.2 Source noise data

- Ridge extract fan type:
  - Type: Fancom 3680
  - Sound pressure level: 70dB(A) at 2m, 45° lateral; see Appendix C for manufacturers data sheet
  - Total number of fans: 15 on both Sheds 3 & 4, arranged along ridge of the poultry unit
  - Duct terminations: ridge mounted ducts, terminating 7.3m above local ground; Figure 2
- Gable end extract fans:
  - Type: Fancom 34130
  - Sound pressure level: 75dB(A) at 2m, 45° lateral; see Appendix C for manufacturers data sheet
  - Total number of fans: 8 on both Sheds 3 & 4
  - Grille locations: West gable end

5.3 Extract fan operation

The temperature within the sheds is determined by a combination of the heat generated by the birds themselves, the external temperature and the ventilation provided by the extract fans.

To provide sufficient ventilation of the bird generated heat, as required to maintain the ideal internal operating temperature of around 20°C, up to 25% of the roof extract fans will be required to operate (either intermittently or on variable speed).

With the influence of the external temperature additional extract fans may be required in order to maintain the ideal operating internal temperature. Here the fans are operated in Stages, triggered with each 1°C rise above the ideal internal temperature. The highest Stage will typically only be triggered when the internal temperature rises above 23°.

Normally the roof extract fans will provide sufficient extraction on their own; the gable end fans are only required during periods of extreme external temperatures or due to failure of the roof extract fans.

The operation of 100% of the roof extract fans, and additionally the gable end fans if required, are only expected to occur during the day period when the external temperatures have the potential to be higher.

During the evening and night, when the external temperature will fall, there will be a corresponding decrease in the number of roof extract fans needed above those for bird generated heat alone; the expected percentage of ridge extract fans required to maintain the set temperature are 50% and 25% for the evening and night periods respectively.

For the assessment the calculations have therefore reviewed the following scenarios:

- Day (07:00 – 20:00hrs):
  - 100% roof and gable end extract fans operating (this is the worst-case scenario; typically, the gable end fans will not be required to operate)
  - 100% roof extract fans operating
- Evening (20:00 – 23:00hrs): 50% roof extract fans operating
- Night (23:00 – 07:00hrs): 25% roof extract fans operating

5.4 Derivation of aggregate extract fan noise emissions

The individual noise level of each noise source has been calculated at Receptors A and B; Figure 1. The following corrections have been applied to the source noise data:

- **Directivity correction:**
  - Ridge fans: correction to convert the fan noise data from the manufacturers stated level at 45° lateral to 90° lateral (the propagation angle for the assessed dwellings), determined using the corrections given in Duct Directivity Index Applications (Day H. Hansen C & Bennett B, Acoustics Australia 96 Vol. 37 December (2009) No. 3). For the calculation a frequency spectra has been used
  - Gable end fans: correction to convert the fan noise data from the manufacturers stated level at 45° from the termination to the propagation angle for the assessed dwellings (ranges between 50° to 90°), determined using the corrections given in Figure 11.2, p322, Noise Control in Building Services, SRL Ltd. For the calculation a frequency spectra has been used
- **Reflections:** 3dB added to account for reflections off the poultry shed roof/façade
- **Attenuators:** For the assessment the fitment of attenuators that meet the insertion losses given in Table 1 to the atmosphere side of each roof and gable end extract fan have been included. These values can be used by an attenuator supplier in order to select a suitable product.

Table 1. Insertion losses for atmosphere side attenuators on each roof and gable end extract fan; Figure 2

Octave Band Centre Frequency			
63Hz	125Hz	250Hz	500Hz
3	5	9	13

- **Distance correction:** 20 x log (d_1/d_0), where d_1 = distance between receptor and the proposed extract fan and d_0 = reference distance.
- **Ground absorption correction:** ISO 9613-2: Attenuation of sound during propagation

$$A_{gr} = 4.8 – (2h_m/d)[17 + (300/d)]$$

Where,

h_m = mean height of the propagation path above ground

d = distance from source to receptor

- **Atmospheric attenuation:** ISO 9613-2: Attenuation of sound during propagation outdoors, Formula 8:

$$A_{atm} = \alpha d/100$$

Where,

α = is the atmosphere attenuation coefficient for a temperature of 10°C and 70% relative humidity

d = distance from source to receptor

In accordance with ISO 9613-2 the attenuation at 500Hz has been used as only the dB(A) value of the extract fans are known

- **On-time correction:** it has been assumed that the fans are operating continuously and consequently no 'on-time' correction has been applied

The full calculations are provided in Appendix B.

5.5 Rating Level

To establish the Rating Level the following BS4142 character corrections have been applied to the Specific Level:

- **Tonality:**
  - Correction: 0dB
  - Reason: the proposed units, like the majority of modern extract fans, are not expected to be tonal.
- **Impulsivity:**
  - Correction: 0dB
  - Reason: The proposed extract fans will not contain an impulsive noise element such as bangs or a very sudden jump in sound output due to quick start-up/change in fan speed.
- **Intermittency:**
  - Correction: 0dB
  - Reason: It is possible on occasion that two or more extract fans will start/stop at the same time. However, the greatest expected increase/decrease in the aggregate fan noise is 3dB, which will only occur if the total number of fans operating doubles/halves. A 3dB increase/decrease is a just perceptible change in noise, which would not incur a BS4142 intermittency penalty (i.e. the change or 'intermittency' would not be 'readily distinctive against the residual noise environment').
- **Other**
  - Correction: 3dB
  - Reason: the extract fans are not expected to have any 'other' adverse noise characteristics. However, as a precautionary measure a 3dB correction has been applied.

The resultant aggregate Rating Levels are provided in Table 2.

5.6 Assessment Level

We define Assessment Level = RL – min L_{A90} dB, where:

RL = aggregate Rating Level, dB(A)

L_{A90} dB = the typical background noise level, L_{A90} (in the case of this assessment the values are assumed levels taking into account the rural location).

Table 2 provides the resultant Assessment Levels at Receptors A and B for the proposed additional poultry units.

With regard to noise impact, BS4142 states that where the Rating Level is at parity with the typical background noise level (Assessment Level = 0 dB) it indicates that the Specific Level will have a low impact depending on context; an adverse impact is indicated where the Rating Level is ≥ 5dB and <10dB above the typical background noise level

With the ventilation system operating at normal capacity, i.e., only the roof extract fans running, the highest aggregate Assessment Level during the day, evening and night is -10dB. For this scenario we therefore conclude that the noise impact will be negligible.

With the contribution of the emergency gable end fans the Assessment Level increases to 1dB. Taking into consideration that a 1dB change in noise level is not perceptible (i.e., an Assessment Level of 1dB would be perceived as the same as 0dB), we conclude that with the operation of the gable end fans the noise impact will be low.

Table 2. Typical background and calculated Rating and Assessment Levels at Receptors A and B; Figure 1

Dwelling; Figure 1	Day: 07:00 - 20:00hrs					Evening: 20:00 - 23:00hrs			Night : 23:00 - 07:00hrs		
		100% roof & gable end extract fans operating		100% roof extract fans operating			50% roof extract fans operating			25% roof extract fans operating	
	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB
A	31	32	1	20	-11	28	17	-11	28	14	-14
B	31	32	1	21	-10	28	18	-10	28	15	-13

5.7 Calculation uncertainty

With all calculations there is a level of uncertainty, which in this case we do not expect to be greater than +/-3dB (3dB is a just perceptible change in noise level). This small level of uncertainty is not considered to have any significance to the outcome of the assessment.

The difference between halving or doubling the number of fans operating (e.g. 50% to 100%) is 3dB. With smaller changes in the number of fans operating, for example, 50% to 70%, the change in aggregate noise emissions will be less than 2dB; this represents an imperceptible change in noise.

We therefore consider the used percentage of fans as suitably robust for the purpose of the assessment; it reflects the percentage of fans used in poultry units as advised by both operators and experts and would not result in a perceptible change in noise emissions with a 20 – 25% increase/decrease in the number of fans operating.

6. Conclusion

A noise survey has been conducted in order to establish representative typical background noise levels at the nearest noise sensitive receptors to the proposed additional poultry units at Brynthomas, Penybont; Figures 1 and 2.

For the assessment the mitigation measure of attenuators fitted to both the roof and gable end extract fans on the proposed additional poultry units (Sheds 3 & 4) that meet the insertion losses given in Table 1 have been included

Via calculation the aggregate ventilation extract fan noise emissions from the proposed poultry units and corresponding BS4142 Rating Levels have been determined by calculation; Appendix B and Table 2.

The resultant Rating Levels are:

- Roof ventilation fans: at least 10dB below the typical background noise level during the day, evening and night, indicating a negligible noise impact

- Emergency gable end fans: with the contribution of the gable end fans, which are only required during periods of hot weather or due to failure of the roof fans, the aggregate Rating Level is an imperceptible 1dB above the typical background noise level during the day. This indicates a low noise impact.

On the basis that the ventilation extract fan noise emission from the proposed additional poultry units (with the fitment of attenuators; Table 1) will not result in an adverse noise impact at the nearest noise sensitive receptors, we conclude that on noise grounds the proposed scheme is acceptable.

Table A1. Noise monitor data (free-field)													
Start Time	Position 1			Position 2			Start Time	Position 1			Position 2		
	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB		$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB	$L_{Amax,F}$ dB	L_{Aeq} dB	L_{A90} dB
10:15	75.4	45.7	31.0				22:45	37.9	31.3	29.5	46.9	30.8	27.5
10:30	70.5	48.6	32.5	59.0	42.7	37.0	23:00	76.0	46.6	30.5	47.4	34.6	29.5
10:45	69.7	43.5	31.5	53.6	40.1	34.0	23:15	49.5	34.3	30.0	43.3	35.0	31.5
11:00	66.3	43.1	31.5	60.3	44.4	35.0	23:30	54.5	34.6	31.5	59.0	32.2	28.5
11:15	69.8	46.4	31.0	59.7	43.0	34.0	23:45	39.1	31.2	27.0	49.4	31.5	28.0
11:30	71.4	43.7	33.5	59.0	41.6	34.0	00:00	43.2	30.0	27.5	42.5	31.8	28.5
11:45	66.0	44.8	30.0	56.9	38.2	30.0	00:15	45.3	32.2	29.5	47.9	33.5	30.0
12:00	71.5	48.9	29.0	55.2	36.9	29.5	00:30	35.0	31.5	30.0	41.7	30.8	29.5
12:15	76.2	47.9	31.0	66.6	49.2	33.0	00:45	39.4	32.3	30.0	41.7	29.5	27.5
12:30	70.5	42.1	31.0	60.3	49.0	32.5	01:00	43.2	31.6	29.0	42.8	29.7	27.0
12:45	71.2	46.2	31.5	62.1	43.4	30.5	01:15	42.2	36.4	29.5	42.5	36.5	28.0
13:00	69.1	42.6	30.0	65.2	48.7	32.0	01:30	46.0	36.8	30.0	42.2	33.1	27.5
13:15	68.0	42.9	31.0	74.2	58.0	31.0	01:45	46.2	42.7	37.5	48.4	31.3	28.0
13:30	69.9	43.9	30.0	53.3	35.8	30.5	02:00	44.8	41.7	36.5	51.5	31.8	26.5
13:45	74.8	45.8	30.5	61.5	41.2	31.0	02:15	78.7	48.9	36.0	49.9	29.5	25.5
14:00	56.4	38.1	31.0	54.4	37.8	32.0	02:30	47.6	44.4	38.0	43.9	29.2	27.5
14:15	50.0	36.9	31.5	66.9	42.8	30.5	02:45	46.8	43.7	38.0	47.2	30.6	28.5
14:30	69.0	46.2	31.5	54.4	36.9	31.0	03:00	46.7	43.4	37.5	51.3	28.8	26.5
14:45	72.1	46.4	31.5	62.8	42.5	31.5	03:15	45.9	41.7	36.0	36.2	28.3	27.0
15:00	65.7	40.1	30.5	60.6	39.3	30.5	03:30	50.9	38.0	34.0	46.6	30.5	27.0
15:15	69.8	44.4	31.5	63.8	40.2	31.0	03:45	48.6	40.8	35.5	51.0	29.7	27.5
15:30	68.4	44.1	32.5	56.0	38.6	31.0	04:00	48.9	43.4	38.0	50.7	31.8	27.5
15:45	71.3	44.4	32.5	56.8	37.8	31.5	04:15	72.4	47.5	38.5	58.7	41.4	30.0
16:00	60.4	38.4	30.5	54.2	35.0	31.0	04:30	76.6	56.2	40.5	63.1	42.9	33.0
16:15	70.8	46.0	32.0	55.0	36.4	31.5	04:45	62.7	45.6	39.5	56.7	38.1	32.0
16:30	55.2	39.6	32.0	55.7	38.3	32.0	05:00	67.1	47.6	39.5	58.8	40.5	31.5
16:45	74.9	52.4	34.5	50.6	35.5	31.0	05:15	65.7	51.9	40.0	67.1	43.7	31.0
17:00	69.0	48.9	34.5	50.4	34.8	31.0	05:30	75.4	53.5	40.5	59.6	41.4	30.5
17:15	43.9	34.3	30.0	52.7	34.1	30.5	05:45	54.0	44.3	40.0	54.3	38.2	33.0
17:30	74.1	49.0	32.0	49.2	34.5	29.5	06:00	72.9	47.7	39.5	50.8	39.9	35.5
17:45	48.2	36.0	31.0	49.6	34.5	30.0	06:15	60.9	44.0	39.0	56.5	41.4	32.5
18:00	73.4	50.9	32.0	55.6	37.1	30.0	06:30	53.4	42.9	38.0	58.0	41.0	32.0
18:15	74.6	51.9	31.5	53.5	36.0	30.0	06:45	68.0	56.2	40.0	57.2	40.9	31.5
18:30	70.3	44.0	30.0	56.1	38.3	29.5	07:00	70.1	55.5	38.5	55.0	39.5	31.0
18:45	56.7	33.9	29.5	58.5	37.2	29.0	07:15	50.9	41.8	37.5	57.9	40.5	31.0
19:00	67.4	38.8	29.5	60.6	36.9	31.5	07:30	50.6	40.9	37.0	56.5	42.1	31.5
19:15	71.3	51.6	34.0	52.0	36.9	31.0	07:45	78.5	51.4	35.0	66.2	45.6	33.0
19:30	63.6	45.0	30.5	57.8	37.0	30.0	08:00	56.8	37.7	35.0	61.6	40.9	32.0
19:45	75.8	48.0	30.5	51.2	35.5	30.0	08:15	70.2	44.2	32.0	56.9	37.3	30.5
20:00	64.7	40.0	29.5	57.5	37.9	28.5	08:30	77.9	51.1	31.0	59.9	39.2	29.5
20:15	72.5	46.0	29.0	50.7	35.3	28.5	08:45	75.2	45.0	31.5	56.0	42.8	35.0
20:30	73.6	44.3	29.0	50.6	34.4	28.0	09:00	65.0	38.7	29.5	59.8	45.3	35.5
20:45	71.5	44.9	29.5	61.2	41.4	27.5	09:15	58.1	37.3	32.0	66.9	45.3	39.0
21:00	69.3	44.9	29.0	47.0	34.6	28.5	09:30	61.6	41.5	32.5	54.6	43.3	38.5
21:15	73.2	49.5	30.0	52.3	35.0	28.5	09:45	75.0	48.1	34.0	56.7	44.2	37.5
21:30	68.0	41.3	29.0	59.0	38.5	31.0	10:00	76.5	47.6	34.0	69.7	52.0	35.0
21:45	68.3	41.0	27.5	57.8	38.0	28.5	10:15	69.3	44.1	34.0	65.8	54.1	37.0
22:00	46.5	32.7	30.0	62.6	40.2	29.0	10:30	64.9	37.9	32.5	63.7	49.3	34.5
22:15	40.8	30.8	28.5	63.8	39.2	26.5	10:45	73.5	46.6	31.5	59.8	47.4	36.5
22:30	38.6	30.8	29.0	57.4	34.2	26.5							

Table A2. Weather station data											
Start Time	Wind Speed, m/s	Temp, °C	Start Time	Wind Speed, m/s	Temp, °C	Start Time	Wind Speed, m/s	Temp, °C	Start Time	Wind Speed, m/s	Temp, °C
10:10	0.4	20.4	16:20	4.1	19.9	22:30	0.0	9.9	04:40	0.8	8.3
10:20	1.0	18.7	16:30	2.1	20.8	22:40	0.0	9.1	04:50	1.0	8.7
10:30	1.7	20.7	16:40	1.7	20.2	22:50	0.0	9.3	05:00	0.0	8.8
10:40	0.7	19.0	16:50	3.7	19.5	23:00	0.0	9.9	05:10	0.0	8.7
10:50	0.9	18.1	17:00	2.7	19.7	23:10	0.0	9.5	05:20	0.0	8.9
11:00	2.0	17.6	17:10	2.1	19.7	23:20	0.0	9.2	05:30	0.0	9.5
11:10	1.1	18.1	17:20	2.0	18.9	23:30	0.0	8.8	05:40	0.0	9.6
11:20	1.3	17.7	17:30	1.4	18.3	23:40	0.0	8.6	05:50	0.0	10.1
11:30	1.2	17.8	17:40	1.2	18.6	23:50	0.0	9.8	06:00	0.0	10.2
11:40	0.9	18.7	17:50	2.1	18.4	00:00	0.0	7.7	06:10	0.0	10.3
11:50	2.1	17.8	18:00	3.2	18.4	00:10	0.0	8.2	06:20	0.0	10.4
12:00	0.9	17.9	18:10	1.4	18.5	00:20	0.0	8.1	06:30	0.0	10.5
12:10	0.6	18.4	18:20	2.6	18.4	00:30	0.0	7.7	06:40	0.0	10.9
12:20	2.0	18.5	18:30	3.7	18.0	00:40	0.0	8.6	06:50	0.0	11.3
12:30	2.5	19.2	18:40	1.6	18.8	00:50	0.0	8.1	07:00	0.0	11.0
12:40	1.7	18.7	18:50	2.6	18.9	01:00	0.0	7.8	07:10	0.3	11.3
12:50	3.0	19.8	19:00	2.4	18.4	01:10	0.0	8.3	07:20	0.4	11.9
13:00	2.5	18.9	19:10	2.6	18.1	01:20	0.0	8.4	07:30	0.0	14.3
13:10	2.3	19.7	19:20	1.6	17.8	01:30	0.0	7.4	07:40	0.0	16.7
13:20	2.4	19.6	19:30	2.0	16.7	01:40	0.0	8.0	07:50	0.0	14.0
13:30	3.7	19.5	19:40	0.8	15.9	01:50	0.0	7.5	08:00	0.7	13.8
13:40	3.4	19.4	19:50	1.4	16.2	02:00	0.0	7.5	08:10	0.0	15.8
13:50	1.3	20.6	20:00	1.3	16.2	02:10	0.0	7.3	08:20	0.0	16.5
14:00	2.2	20.0	20:10	1.0	15.6	02:20	0.0	7.8	08:30	0.0	16.5
14:10	1.3	20.5	20:20	1.6	15.3	02:30	0.0	7.3	08:40	0.8	15.4
14:20	2.1	20.2	20:30	0.7	14.8	02:40	0.0	7.4	08:50	0.4	16.0
14:30	3.3	20.1	20:40	0.5	14.6	02:50	0.0	7.3	09:00	0.0	17.2
14:40	2.6	21.0	20:50	1.3	14.6	03:00	0.0	7.2	09:10	0.0	16.7
14:50	3.4	20.2	21:00	0.8	14.1	03:10	0.0	7.4	09:20	0.0	16.9
15:00	1.7	20.4	21:10	0.0	13.5	03:20	0.0	7.1	09:30	2.2	16.6
15:10	2.2	19.3	21:20	1.0	13.0	03:30	0.0	7.1	09:40	0.4	16.7
15:20	2.6	20.3	21:30	1.2	12.5	03:40	0.0	7.3	09:50	0.0	16.2
15:30	4.4	19.8	21:40	0.8	13.3	03:50	0.0	7.3	10:00	0.9	16.2
15:40	3.8	20.1	21:50	0.0	12.6	04:00	0.0	7.5	10:10	0.6	17.0
15:50	3.3	19.2	22:00	0.0	11.4	04:10	0.0	7.9	10:20	1.1	16.8
16:00	2.0	20.8	22:10	0.0	10.9	04:20	0.0	8.1	10:30	1.5	16.8
16:10	4.2	20.0	22:20	0.0	11.4	04:30	0.0	8.1	10:40	0.6	18.0

Table B1. Calculation of extract fan Rating Levels at Receptor A

	Roof Fans: Fancom 3680	Sheds 1 - 8	Octave Band Centre Frequency, Hz								Gable End Fans: Fancom 34130	Sheds 1 - 4	Octave Band Centre Frequency, Hz							
			63	125	250	500	1k	2k	4k	dB(A)			63	125	250	500	1k	2k	4k	dB(A)
[A] Lp at 2m, 45° lateral:			72	68	66	63	65	63	63	70			84	78	74	74	68	66	62	75
[B] directivity correction:		45° to 90°	0	1.5	3	4.5	9	11	18			45° to 20°	-0.5	-1	-1	-1.5	-1.5	-1.5	-1.5	
[C] Reflection off poultry shed roof/facade:			3	3	3	3	3	3	3				3	3	3	3	3	3	3	
[D] generic attenuator, 40% free area:			3	5	9	13	15	16	11				3	5	9	13	15	16	11	
[A] - [B] + [C] - [D] L_p at 2m:		at 90°	72	64	57	49	44	39	37	54		at 20°	85	77	69	65	58	55	56	68

Fan	Direct distance, m	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Distance correction, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Shielding attenuation, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Ground absorption, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Atmospheric attenuation, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Sound pressure level at dwelling, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable
1		411.2	406.9	400.1	395.3		46.3	46.2	46.0	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.8		2.7	16.6	2.9	16.9
2		417.3	406.4	406.3	394.8		46.4	46.2	46.2	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.8		2.5	16.6	2.8	16.9
3		423.5	405.9	412.6	394.4		46.5	46.1	46.3	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.7		2.4	16.6	2.6	16.9
4		429.6	405.4	418.9	394.0		46.6	46.1	46.4	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.7		2.2	16.6	2.5	16.9
5		435.7	404.9	425.2	393.6		46.8	46.1	46.6	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.7		2.1	16.6	2.3	16.9
6		441.9	404.4	431.5	393.2		46.9	46.1	46.7	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.8	0.8	0.8	0.7		1.9	16.6	2.2	16.9
7		448.1	403.9	437.9	392.8		47.0	46.1	46.8	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.9	0.8	0.8	0.7		1.8	16.6	2.0	16.9
8		454.3	403.4	444.2	392.4		47.1	46.1	46.9	45.9		0	0	0	0		4.3	4.3	4.3	4.3		0.9	0.8	0.8	0.7		1.7	16.7	1.9	16.9
9		460.5		450.6			47.2		47.1			0		0			4.3		4.3			0.9	0.0	0.9	0.0		1.5		1.8	
10		466.7		456.9			47.4		47.2			0		0			4.4		4.3			0.9	0.0	0.9	0.0		1.4		1.6	
11		472.9		463.3			47.5		47.3			0		0			4.4		4.4			0.9		0.9			1.3		1.5	
12		479.2		469.7			47.6		47.4			0		0			4.4		4.4			0.9		0.9			1.1		1.3	
13		485.4		476.1			47.7		47.5			0		0			4.4		4.4			0.9		0.9			1.0		1.2	
14		491.7		482.5			47.8		47.6			0		0			4.4		4.4			0.9		0.9			0.9		1.1	
15		498.0		488.8			47.9		47.8			0		0			4.4		4.4			0.9		0.9			0.7		0.9	

		BS4142 character correction	3
Day (07:00 - 20:00hrs):	100% roof & gable end extract fans operating	Specific Level, dB	29
		Rating Level, dB	32
	100% roof extract fans operating	Specific Level, dB	17
		Rating Level, dB	20
Evening (20:00 - 23:00hrs):	50% roof extract fans operating Note 1	Specific Level, dB	14
		Rating Level, dB	17
Night (23:00 - 07:00hrs):	25% roof extract fans operating Note 2	Specific Level, dB	11
		Rating Level, dB	14

Note 1: Assumed only odd numbered roof fans operating
Note 2: Assumed only 2, 6, 10 & 14 numbered roof fans operating

Table B2. Calculation of extract fan Rating Levels at Receptor B

	Roof Fans: Fancom 3680	Sheds 1 - 8	Octave Band Centre Frequency, Hz							dB(A)	Gable End Fans: Fancom 34130	Sheds 1 - 4	Octave Band Centre Frequency, Hz							dB(A)
			63	125	250	500	1k	2k	4k				63	125	250	500	1k	2k	4k	
[A] Lp at 2m, 45° lateral:			72	68	66	63	65	63	63	70			84	78	74	74	68	66	62	75
[B] directivity correction:		45° to 90°	0	1.5	3	4.5	9	11	18			45° to 30°	0	0	0	0	0	0	0	
[C] Reflection off poultry shed roof/facade:			3	3	3	3	3	3	3				3	3	3	3	3	3	3	
[D] generic attenuator, 40% free area:			3	5	9	13	15	16	11				3	5	9	13	15	16	11	
[A] - [B] + [C] - [D] L_p at 2m:		at 90°	72	64	57	49	44	39	37	54		at 30°	84	76	68	64	56	53	54	67

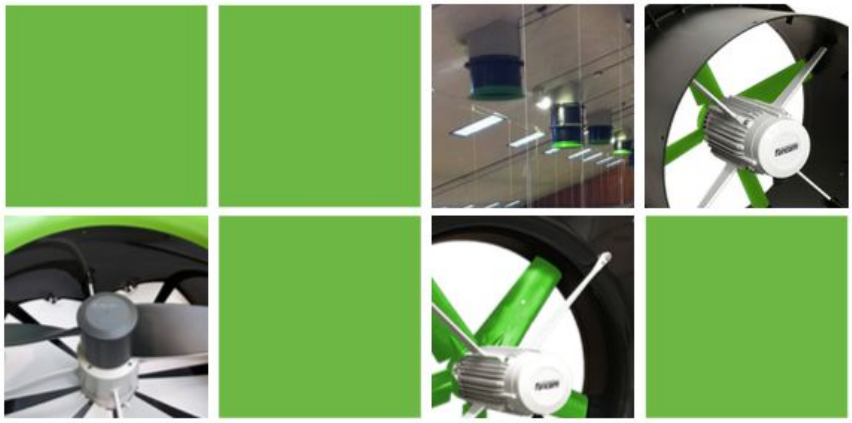
Fan	Direct distance, m	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Distance correction, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Shielding attenuation, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Ground absorption, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Atmospheric attenuation, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable	Sound pressure level at dwelling, dB	Shed 1 Roof	Shed 1 Gable	Shed 2 Roof	Shed 2 Gable
1		356.1	348.2	371.3	363.4		45.0	44.8	45.4	45.2		0	0	0	0		4.2	4.2	4.2	4.2		0.7	0.7	0.7	0.7		4.1	17.0	3.7	16.6
2		362.0	348.8	377.0	364.0		45.2	44.8	45.5	45.2		0	0	0	0		4.2	4.2	4.2	4.2		0.7	0.7	0.7	0.7		3.9	17.0	3.5	16.6
3		368.0	349.3	382.7	364.7		45.3	44.8	45.6	45.2		0	0	0	0		4.2	4.2	4.3	4.2		0.7	0.7	0.7	0.7		3.8	17.0	3.4	16.6
4		373.9	349.9	388.5	365.3		45.4	44.9	45.8	45.2		0	0	0	0		4.2	4.2	4.3	4.2		0.7	0.7	0.7	0.7		3.6	17.0	3.2	16.5
5		379.9	350.4	394.3	365.9		45.6	44.9	45.9	45.2		0	0	0	0		4.2	4.2	4.3	4.2		0.7	0.7	0.7	0.7		3.5	17.0	3.1	16.5
6		386.0	351.0	400.1	366.6		45.7	44.9	46.0	45.3		0	0	0	0		4.3	4.2	4.3	4.2		0.7	0.7	0.8	0.7		3.3	16.9	2.9	16.5
7		392.0	351.6	405.9	367.2		45.8	44.9	46.1	45.3		0	0	0	0		4.3	4.2	4.3	4.2		0.7	0.7	0.8	0.7		3.1	16.9	2.8	16.5
8		398.1	352.1	411.8	367.9		46.0	44.9	46.3	45.3		0	0	0	0		4.3	4.2	4.3	4.2		0.8	0.7	0.8	0.7		3.0	16.9	2.7	16.5
9		404.2		417.7			46.1		46.4			0		0			4.3		4.3			0.8	0.0	0.8	0.0		2.8		2.5	
10		410.3		423.6			46.2		46.5			0		0			4.3		4.3			0.8	0.0	0.8	0.0		2.7		2.4	
11		416.4		429.5			46.4		46.6			0		0			4.3		4.3			0.8		0.8			2.5		2.2	
12		422.5		435.5			46.5		46.8			0		0			4.3		4.3			0.8		0.8			2.4		2.1	
13		428.7		441.5			46.6		46.9			0		0			4.3		4.3			0.8		0.8			2.3		2.0	
14		434.9		447.5			46.7		47.0			0		0			4.3		4.3			0.8		0.9			2.1		1.8	
15		441.0		453.5			46.9		47.1			0		0			4.3		4.3			0.8		0.9			2.0		1.7	

		BS4142 character correction	3
Day (07:00 - 20:00hrs):	100% roof & gable end extract fans operating	Specific Level, dB	29
		Rating Level, dB	32
	100% roof extract fans operating	Specific Level, dB	18
		Rating Level, dB	21
Evening (20:00 - 23:00hrs):	50% roof extract fans operating Note 1	Specific Level, dB	15
		Rating Level, dB	18
Night (23:00 - 07:00hrs):	25% roof extract fans operating Note 2	Specific Level, dB	12
		Rating Level, dB	15

Note 1: Assumed only odd numbered roof fans operating
Note 2: Assumed only 2, 6, 10 & 14 numbered roof fans operating

AGRICULTURAL FANS

Fancom fans are specially developped for the use in livestock buildings and they have an IP66 classification. Fancom fans have an aluminium motor housing, synthetic or coated steel housing and synthetic fan blades. The fans combine high air flow capacity with low energy consumption and noise levels. The low energy consumption and superb controllability mean that the motors run at a lower temperature - which also benefits the durability.



Complete fan

The complete fan from Fancom is extremely easy to mount either in or on a wall. The fans in the 35 to 56cm diameter series are supplied in a robust synthetic housing. Fans with diameters of 63, 71 and 80 cm are solidly housed in steel . The coated housing prevents corrosion.

Modular fan

To mount fans underneath a chimney module Fancom's fans are supplied in a robust, shape retaining synthetic module with the Fancom quick mounting system. Fancom measuring and damping units complete the ventilation system. The control valve and air flow transmitter have been built into the same module which can be directly connected to the fan module.

Central exhaust systems

Fancom has specially developed the 3480P and 3480D fans for central air exhaust systems and other installations which operate with high counter pressures. The maximum counter pressures are 270Pa, resp. 320Pa. This fan is notable for it large air displacement capacity. Noise production and energy consumption are, however, kept to a minimum.

	Diameter	Voltage (+/- 10%)	Revolutions	Motor current (50Pa - Inom)	Power (50Pa)	Axis power (50Pa)	Noise level (0Pa - bereiend)		Control	Airflow in m3/h Pressure in Pa (Pascal)								
TYPE	cm	V	RPM	A	W	W	dBA|2m	dBA|7m		0	30	50	100	150	200	250	300	Débit max/pression max
1435	35	200-240	1404	0.96	211	111	61	50	T, E	3940	3580	3250						2660 / 78
1440	40	200-240	1347	1.19	273	165	64	53	T, E	5040	4630	4250						3300 / 92
1445	45	200-240	1326	1.6	372	235	65	54	T, E	6690	6140	5760	4400					4310 / 102
1450	50	200-240	1317	2.08	474	314	66	55	T, E	8550	7800	7300	5780					5710 / 102
1450P	50	200-240	1381	2.99	720	566	69	58	T, E	9720	9250	8970	7950					6900 / 128
1456	56	200-240	1366	3.16	741	569	70	59	T, E	12060	11260	10830	9250					8520 / 113
1656	56	200-240	954	2.23	486	378	66	55	T, E	10360	9250	8340						6920 / 67
1463	63	200-240	1381	3.1	721	586	68	57	T, E	14600	13200	12380	9070					8980 / 101
1671	71	200-240	901	4.19	924	635	68	57	T, E	18030	16410	15320						11620 / 92
1680	80	200-240	903	4.64	1091	756	69	58	T, E	20750	19050	17820	14160					13020 / 113
1692	92	200-240	905	4.54	1058	778	68	57	T, E	24400	21840	19940	13767					13340 / 103
3435	35	Y400 Δ230	1426	Y0.34 Δ0.59	157	116	61	50	F	3710	3400	3140						2520 / 86
3440	40	Y400 Δ230	1376	Y0.42 Δ0.73	227	175	64	53	F	5120	4750	4370						3430 / 96
3445	45	Y400 Δ230	1297	Y0.55 Δ0.95	312	220	65	54	F	6540	5910	5470						4020 / 99
3450	50	Y400 Δ230	1304	Y0.72 Δ1.25	414	305	66	55	F	8240	7530	7010	5440					5240 / 105
3456	56	Y400 Δ230	1364	Y1.17 Δ2.03	657	567	70	59	F	11830	10920	10260	8490					7700 / 120
3656	56	Y400 Δ230	936	Y1.05 Δ1.82	384	322	65	54	F	10190	9080	8020						6690 / 65
3463P	63	Y400 Δ230	1439	Y2.75 Δ4.76	1351	1224	74	63	F	17530	16740	16270	15150	13930	12370	10240		10240 / 250
3663	63	Y400 Δ230	931	Y1.38 Δ2.58	687	512	67	56	F	14180	12920	12060						9000 / 97
3671	71	Y400 Δ230	949	Y1.89 Δ3.27	884	741	69	58	F	17970	16500	15450	12190					11320 / 110
3680	80	Y400 Δ230	941	Y2.03 Δ3.52	1047	850	70	59	F	22220	20555	19380	15910					14070 / 122
3480P	80	Y400 Δ230	1429	Y4.58 Δ7.93	2268	2150	77	66	F	28650	27582	26870	25290	23580	21225	18655		17440 / 268
3480D	80	Y400 Δ230	1436	Y4.26 Δ7.38	1981	1520	69	58	F	21610	21130	20810	19990	19050	17920	16495	14770	11050 / 380
3692	92	Y400 Δ230	936	Y2.16 Δ3.74	1033	859	68	57	F	24870	22570	20840	15470					14110 / 110
3692P	92	Y400 Δ230	929	Y3.64 Δ6.3	1850	1324	71	60	F	28080	26600	25560	22810	17820				15200 / 167

FANS **GB** **FAN 34130 (400V 50HZ)**

Fan 34130 BOX 400V 50Hz	**4305110**
Fan 34130 BOX KIT 400V 50Hz	**4305140**

Images

KIT

4305110 **4305140**

Technical data

Voltage:	**400**	[⍋V ac] +/-10%
Phase:	**3**	
Frequency:	**50**	[Hz]
Max. current:	**3,08**	[A]
Current (at 50 Pa and 400V):	**3,08**	[A]
Input power (at 50 Pa and 400V):	**1695**	[W]
Max. input power:	**1716**	[W]
Max. air volume:	**44650**	[m^3/h]
Max. pressure:	**70**	[pa]
Max. rotations:	**570**	[RPM]
Poles:	**4**	
Cos phi:	**0,81**	
Controllable:	**On / Off**	
Insulation class:	**F**	
Protection class:	**IP 55**	
Sound production (calculated):	**75 (64)**	[dB(A)]
Impeller:	**10 / 3 / N**	Type / n / system
Weight 4305110 (excl. pack.):	**65,3 / 144**	[Kg] / [lbs]

- Air density 1,2 kg/m3, 1 Pa (Pascal) = 1N/m2 ~ 0,102 mm wk. (20°C).
- Sound production is measured according to "free field method" at a distance of 2 meter. (The value between brackets is the sound production at a distance of 7 meter).
- The above data is from a fully assembled fan with safety grid and shutter..
- According to AMCA 210 / ISO 5801.
- Images may differ slightly from reality.

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