LLWYNGWILYM POULTRY FARM EXTENSION

NOISE ASSESSMENT

Acoustics Report A1627 R01
12th November 2020

Report for:	H & E Powell Llwyngwilym Farm Rhayadar Powys LD6 5NS
Issued to:	Berrys Beech House Anchorage Avenue Shrewsbury Business Park Shropshire SY2 6FG Attention: Mandy Seedhouse
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1 Introduction

Ion Acoustics is appointed by Berrys on behalf of H & E Powell to provide advice on external noise associated with a proposed extension to a consented poultry farm at Llwyngwilym Farm, Rhayader, Powys. The site already has permission for a single poultry rearing shed with capacity for 55,000 birds per crop. This application is seeking permission for a second shed to be added to the site, raising the capacity to 110,000 birds per crop.

This assessment has been informed by a baseline noise survey, undertaken between the 8th and 10th September 2020 and a noise modelling assessment.

Calculations and computer modelling software have been used to predict the noise levels from the proposed development to the nearest noise-sensitive receptors (dwellings) in the vicinity of the site. The effect of the existing poultry shed is also considered. The predictions have been compared to noise limits set to protect amenity derived from the baseline survey and guidance on acceptable noise standards.

2 Site and Development

2.1 Site Location

The proposed poultry farm is to be located on land at Llwyngwilym farm near Rhayader, Powys. The site is in a predominately rural area, with agricultural land in all directions. There are a number of residential receptors in the area at various distances from the site boundary. One property is known to be linked to the land owner; others have no known connection with the landowner or proposed development. The nearest receptors are identified in Table 1 below and presented in further detail in Figure 1 below

Table 1: Assessment Locations

Location	Relationship to Farm	OS Grid Reference	Approximate Distance from Application Boundary (m)
AL01 – Coed yr Ardd	None	297453, 269263	230
AL02 – Rhayader Nursery	None	297343, 269612	315
AL03 – Beili Gof	Relation	297874, 269268	190
AL04 – Bryn Pedol	None	298014, 269388	230

The site is approximately 150m to the north-west of the B4518 which runs broadly south-west / north-east between Rhayader and St Harmon. The A470 is approximately 1km to the south-west of the site and the A44 is 1km to the south.

Figure 1 below presents the site location, red line boundary, noise monitoring locations and the nearest receptor locations.

Figure 1: Site, Monitoring and Receptor Location Plan © Google Earth

2.2 Existing Planning Consent

As indicated above, the site already has planning consent for a single poultry shed, granted under application reference 18/0463/FUL in June 2020. The extant consent permits construction of a single shed to accommodate 55,000 birds per crop.

The application includes a noise management plan and further considers noise within the design and access statement. No specific noise assessment report was submitted with the application and no noise related conditions were attached to the planning consent.

No construction works for the extant planning consent had been started at the time of the site survey.

2.3 Proposed Poultry Farm Extension

This application is to seek consent for an additional shed at the poultry farm to double the overall capacity of the site to 110,000 birds per crop. The additional shed is to be built alongside the consented shed and will operate the same ventilation strategy; utilising gable end, air scrubbing fans and ridge mounted fans for additional ventilation.

The new poultry shed will include the following plant:

- 1 no. Gable end ammonia scrubbing fan unit;
- 14 no. Ridge mounted extraction / ventilation fans; and,
- Feed bins located between the sheds.

Further information on the plant complement and operational phases is presented in Section 6 below.

The site is located on a hillside, running downhill towards the main road. The site is to be cut in to the hill, with the site area levelled for construction of the sheds. Within the scope of this assessment, the site assumed to be levelled at 318m. This results in a moderate level of screening of the site when viewed from the west (towards Coed-yr-ardd).

Access to the site is to be gained by a new road linking the site with the main road (B4518) at the existing field access. The access road will run through the adjacent field, following the field boundary.

The location and layout of the existing and proposed sheds, and the path of the access road are presented in Figure 2 for reference.

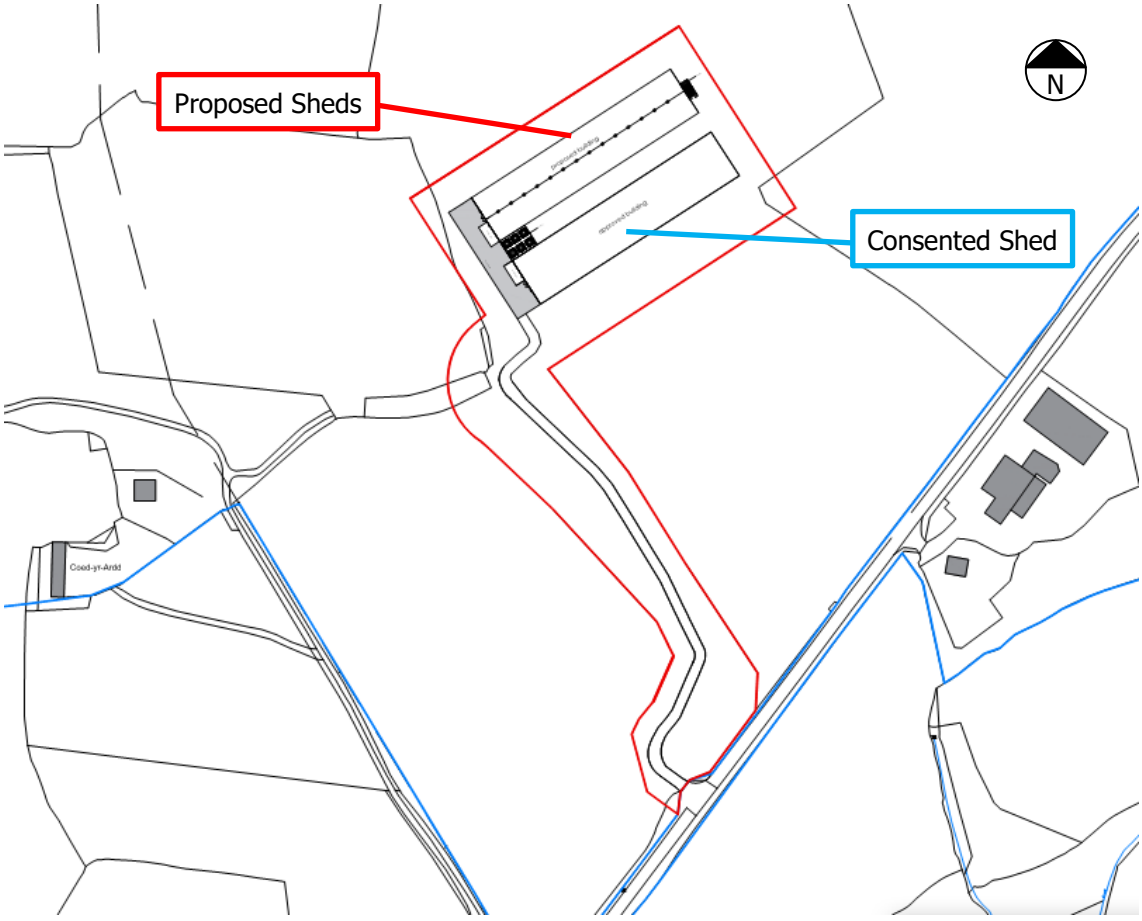


Figure 2: Poultry farm layout plan

It is reiterated that the assessments presented in this report centre primarily on the proposed, new shed. The consented shed already has planning permission and, though not constructed yet, has permission regardless of this application.

3 Planning Policy and Other Guidance on Noise

3.1 Technical Advice Note (Wales) 11 – October 1997

The current planning guidance in respect of planning and noise in Wales is TAN 11. The document provides guidance on noise sensitive and noise generating developments. With specific regard to noise generating developments, paragraph eight states the following:

> *8. Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.*

Annex B of the document details the assessment of noise from a number of different sources including: road traffic; railway and aircraft. It does not provide specific information on agricultural activities though does reference noise from commercial and industrial developments which are considered to be suitable in this instance. In paragraph B17 the guidance references British Standard 4142:1990. The 1990 iteration of the standard has been replaced by a number of more recent versions, with the most recent being BS4142:2014 +A1:2019.

This latest version has been used to assess noise from the development together with absolute standards given in British Standard BS 8233: 2014 and World Health Organisation (WHO) guidance.

3.2 BS4142: 2014 +A1: 2019 – Assessment Principles

The standard method for assessing industrial / commercial noise affecting nearby housing is British Standard BS 4142 "Method for rating and assessing industrial and commercial sound". A BS 4142 assessment is made by determining the difference between the commercial / industrial noise under consideration and the background sound level as represented by the L_{A90} parameter, determined in the absence of the commercial / industrial noise. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time. Therefore, it represents the underlying noise in the absence of short-term events.

The industrial / commercial noise under consideration is assessed in terms of the ambient noise level, L_{Aeq}, but a character correction penalty can be applied where the noise exhibits certain characteristics such as distinguishable tones, impulsiveness or, if the noise is distinctively intermittent. The ambient noise level, L_{Aeq} is defined as the steady-state noise level with the same energy as the actual fluctuating sound over the same time period. It is effectively the average noise level during the period. The plant noise level (L_{Aeq}) with the character correction (if necessary) is known as rating level, L_{Ar}, and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The standard then states:

a) *"Typically, the greater the difference, the greater the magnitude of the impact;*
b) *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
c) *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;*
d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound 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 the context."

The standard outlines a number of methods for defining appropriate 'character corrections' to determine the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency.

BS 4142 states that the 'typical' background noise level should be used, in making the assessment specifically:

"In using the background sound level … it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."

BS 4142 further states the following with relation to low background and rating levels:

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant that the margin by which the rating level exceeds the background. This is especially true at night."

The standard also highlights the importance of considering the context in which a sound occurs. The standard indicates that factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise impact.

3.3 BS 8233: 2014 and WHO criteria

British Standard BS 8233: 2014[1] and the World Health Organisation (WHO) also provide external noise criteria to protect residential amenity. These are detailed in Table 2 below.

Table 2: WHO / BS 8233: 2014 Guideline Noise Levels (Free-field)

Location	Critical Health Effect	07:00 to 23:00	23:00 to 07:00
Outside Bedroom Windows	Sleep Disturbance (Windows Open)	--	42dB $L_{Aeq,\ 8hours}$ (1)
Amenity Spaces (Gardens / Patios)	Moderate Annoyance Serious Annoyance	50dB $L_{Aeq,\ 16\ hours}$ (2) 55dB $L_{Aeq,\ 16\ hours}$ (2)	--
Notes: From WHO Community Noise Guidelines (1999) reduced by 3dB so it is stated as a free-field value BS 8233: 2014 and WHO Community Noise Guidelines			

The WHO guideline of 45 dB $L_{Aeq,\ 8hr}$ represents an 8-hour L_{Aeq} outside noise-sensitive rooms to prevent sleep disturbance. The WHO limit is a level at 1m from the façade. Therefore, equivalent free field level would be approximately 3dB lower, that is 42 dB L_{Aeq} as shown in the table above.

The limits apply to relatively anonymous noises without character and are commonly applied to traffic noise.

[1] British Standards Institution (2014) BS 8233:2014: Guidance on sound insulation and noise reduction for buildings

3.4 Linked Property / Receptor

The property identified as AL03 (Beli Gof) on Figure 1 above is known to be in the ownership of a relative of the land owner. As such, it is considered to be linked to the proposed development. In this instance, the response to noise from the facility would not conform to the impact criteria detailed in BS4142:2014. Given this, the noise impact at the landowner property has been assessed in line with the noise limits determined to protect sleep and amenity in line with the guidance from the World Health Organisation (WHO) and BS 8233: 2014, detailed in Table 2 above.

3.5 Absolute Noise Level Assessment

In instances of low background and rating noise levels, BS4142 indicates that assessment in line with absolute noise limits might be as, or more, appropriate than a relative assessment.

In these instances, to ensure the proposed development is not a significant or prohibiting factor in achieving the relevant WHO guideline values at sensitive receptors, noise generated by the development should aim to be approximately 10dB below the guidance levels in Table 2. In achieving this criterion, the facility is considered to be consistent with a rating of a low impact in accordance with BS 4142.

4 Baseline Noise Survey

A baseline noise survey was carried out from 8th to 10th September 2020. This was undertaken by means of unattended logging of background and ambient noise levels at one location representative of the receptor location, Coed yr Ardd (AL01).

The survey was undertaken using a Rion NL52 sound level meter fitted with a WS-15 wind shield. The microphone and windshield were mounted on a small pole at a height of 1.4m above soft ground, relatively close to the surrounding undergrowth. The meter was set up to log various noise parameters in 15-minute periods, including L_{Aeq} and L_{A90} values. The meter was calibrated before and after the survey using a Brüel & Kjær 4231 calibrator. No significant drift in calibration was noted. The noise monitoring station was unattended apart from the set up and collection periods. The audio signal was recorded (as .wav files) at intervals to enable sound sources to be identified during post-processing.

The sound level meter was located within the land ownership of Llwyngwilym Farm towards the boundary with Coed yr Ardd (Receptor AL01). Photographs of the noise measurement location are shown in Figure 3, below.

Monitoring location looking towards AL01

Location looking towards B4518

Figure 3 - Photograph of noise measurement location

The noise climate at this location was governed by distant road traffic noise which included sporadic movements on the B4518 and the surrounding A roads (A470 and A44). Some noise from livestock (horses) was evident in the adjacent field however this was low level noise and stopped once the site engineer vacated the area (as is evident in the audio recordings).

Occasional bird song was noted however, no other significant noise sources were noted during the attended portions of the survey. The monitoring location was underneath power lines which follow the field boundary between Llwyngwilym farm and the adjacent property. No noise from the power lines was evident during either the attended period of the survey or in the audio recordings made.

4.1 Weather Data

Weather conditions during the set-up period were noted to be reasonably warm, with an ambient air temperature of 19°C. Roads were damp in patches though mostly dry. Wind speeds were light / still. Cloud cover was 100%. No rain was recorded prior to or during the attended portion of the survey.

No direct weather monitoring was undertaken at the site, during the unattended portion of the survey however, historical weather data available on the internet[2] indicates the ambient air temperature ranged between 14°C and 16°C. Winds were relatively high between the evening of the 8th and early morning of the 9th though dropped during daytime hours on the 9th to around 1-2m/s. No indication of precipitation was recorded in the available weather data however, analysis of the audio files indicates two periods on the 8th September where rain may have been a factor. These are evident as elevated L_{Aeq} values in the time history charts (appendix A) at 13:00 to 13:30 and again at 15:45 to 16:45.

During the collection period the ambient air temperature was 13°C. Roads were dry with no rain falling before or during the site visit. Winds were considered to be low / still and cloud cover was 100%.

[2] https://www.timeanddate.com/weather/@2639470/historic

5 Measured Noise Data

5.1 Results of the Unattended Logging

The noise levels measured at the monitoring location are summarised in Table 3 below. The data is presented over the typical daytime (07:00 to 23:00) and night-time (23:00 to 07:00) periods for each day. The data is presented as the logarithmic average of the ambient, L_{Aeq} values and both the arithmetic mean and mode (most common) values for the background noise (L_{A90}). The data summarised in Table 3 omits periods when rain was recorded on the 8th September. Time history charts and tabulated data are included in Appendix A.

Table 3: Noise Monitoring Data Summary

Period		Duration hh:mm	L_{Aeq}, dB	Mean L_{A90}, dB	Mode L_{A90}, dB
8th September	Daytime	09:45*	39.8*	32	32
	Night	08:00	34.7	27	26
9th September	Daytime	16:00	38.4	28	30
	Night	08:00	31.9	25	23
10th September	Daytime	04:00	38.7	33	33
* Omits period of suspected rain fall					

The data in Table 3 above indicates that the prevailing ambient noise climate falls within the range L_{Aeq} 32dB and 40dB. Noise levels are higher during periods of rainfall however these have been omitted from the table above. The mean and mode of the background sound level ranges between L_{A90} 23dB and 33dB and would be considered low in both instances. Generally speaking, the prevailing noise climate would be considered typical of a relatively tranquil, rural setting, with sporadic vehicle noise evident from the surrounding road network.

5.2 Analysis of Measured Sound Levels

BS 4142 requires the use of the 'typical' background sound level though does not stipulate how the typical level is derived. The analysis presented below identifies appropriate 'typical' noise levels for both the daytime and night-time periods at each location.

Typical Background Sound Level - Daytime

The daytime period covers the hours 07:00 to 23:00 and is expressed as the arithmetic average of the 15min periods over each one-hour period.

Table 4: Background Sound Level Analysis - Daytime

	Measured Background Sound Level, $L_{A90, 1hr}$
Minimum Measured Value	23
Mean (Arithmetic Average)	30
Integer Mode (most common)	30

The analysis above indicates that the background sound level at the monitoring location is low, with a mean and mode value of L_{A90} at 30dB. The distribution of $L_{A90, 1hr}$ values during daytime hours is presented below.

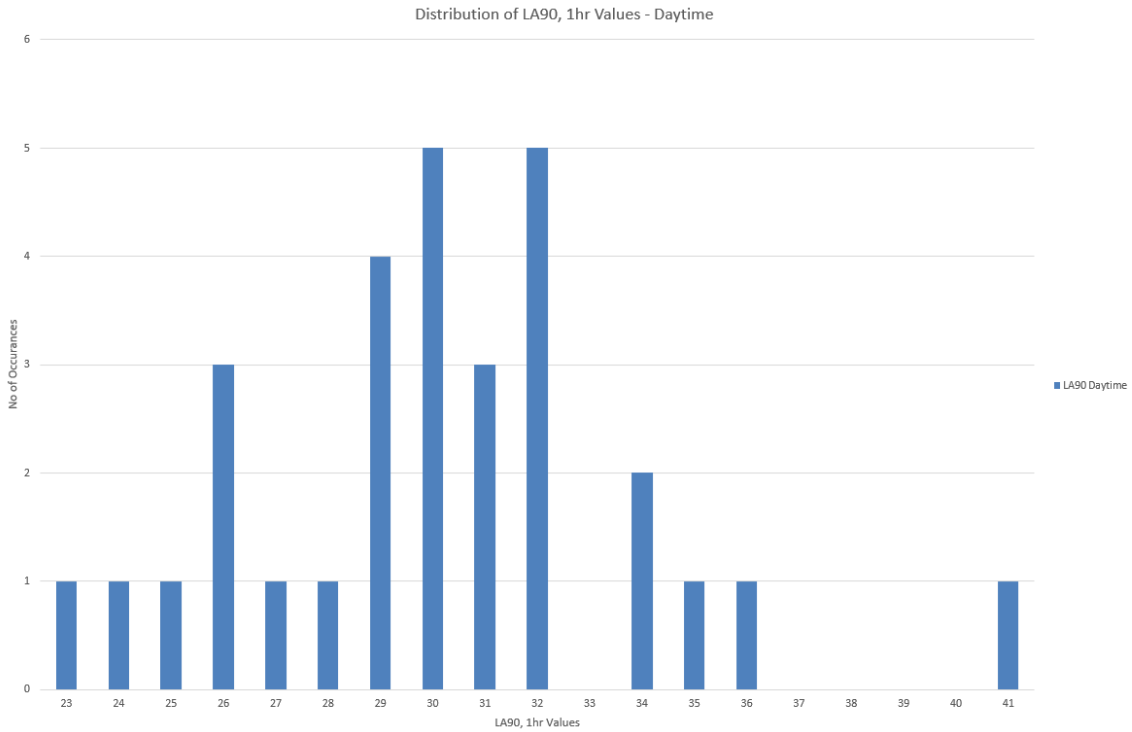


Figure 4: Distribution of $L_{A90,\ 1hr}$ Values - Daytime

The distribution of L_{A90} values during daytime hours indicates two peaks: one at L_{A90} 30dB and a second at L_{A90} 32dB. As such, the representative background sound level is 30 – 32 dB L_{A90}.

Typical Background Sound Level - Night

The night-time period covers the hours 23:00 to 07:00 and is expressed in 15-minute periods during these hours.

Table 5: Background Sound Level Analysis - Night

	Measured Background Sound Level, L_{A90}
Minimum Measured Value	21
Mean (Arithmetic Average)	26
Integer Mode (most common)	26

The distribution of $L_{A90,\ 15min}$ night-time values falls entirely within the range L_{A90} 21dB and 32dB with a mode of L_{A90} 26dB. The distribution of the background sound values is detailed in the chart below:

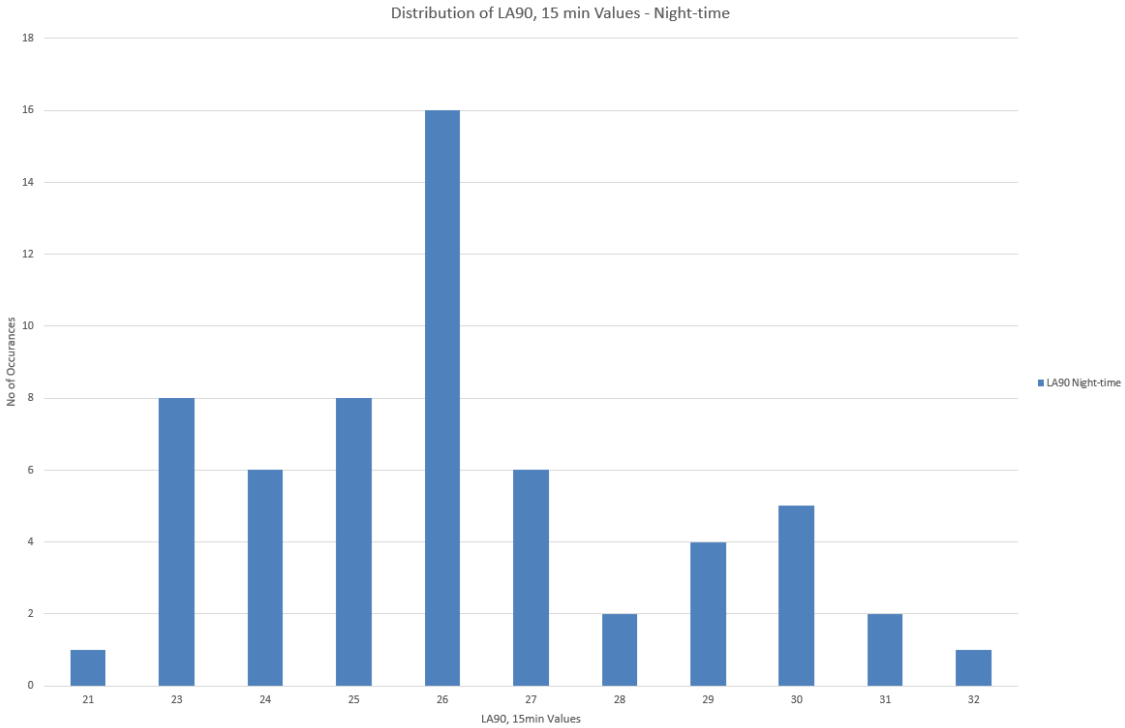


Figure 5: Distribution of $L_{A90,\ 15min}$ Values – Night-time

Given the above, a value of $L_{A90,\ 15min}$ 26dB is considered typical during the night-time period.

5.3 Noise Targets

The noise climate in the vicinity of the site is considered to be low during both the daytime and night-time periods. As such, the absolute noise limit discussed in section 3.5 above has been adopted for all third-party receptor locations; that is 32dB(A). This is set on the basis of the WHO night-time noise guidance to ensure that sleep is protected. The values is representative of the daytime background noise levels. The night-time noise target is the more important of the two periods and, in achieving this target, the daytime values will also be acceptable.

For the linked property, related to the land owner (AL03), a more relaxed noise target of 42dB(A) is proposed based on the WHO sleep protection guidelines (converted to a free field value).

The rating level will apply to the plant noise level plus any specific character corrections which need to be applied in line with BS4142:2014.

6 Noise Modelling Assessment and Predictions

As part of this assessment a noise model was constructed using IMMI noise mapping software to predict noise levels to the nearest noise sensitive receptor locations in accordance with ISO 9613-2. The input parameters have been assumed:

- Downwind propagation (noise levels under crosswind and upwind conditions will be less);
- Soft ground (G = 1) between the noise source and receiver locations;
- Ambient air temperature of 10°C and 70% Relative Humidity; and,
- Barriers and screening influence in calculated in accordance with ISO 9613-2.

The noise sources associated with the computer model are identified below.

6.1 Foundation of the Model

The noise model was constructed utilising the following information:

- Ordnance Survey Open Data topographical data;
- Site layout information provided by Berry's as per Figure 2 of this report; and,
- Noise information sourced from manufacturers' data sheets.

6.2 Noise Source Information

Ventilation Fans

The majority of the fixed/ static plant associated with the proposed poultry shed would be fans/ extract units to provide adequate air flow for the livestock. The information provided indicates that the shed would typically be ventilated by means of the air scrubbing, gable end fans located on the western gable of the shed. Additional, ventilation for use towards the end of the crop cycle and during periods of higher ambient air temperatures will be provided by ridge-mounted fans. The externally mounted fans for the proposed shed are detailed in Table 6 below:

Table 6: Proposed Plant Compliment

Plant	Description	Number	Noise Data
Fancom Type3680	Ridge Fans	14 per shed	L_{pA} 70dB @2m per fan
IPT Ventmax 1200 Air Scrubbers	Gable End Fans	1 per shed	L_{pA} 65dB @3m per fan

The ventilation requirements of the birds within the sheds vary depending on the age of the brood, internal environmental factors (temperature, air quality, relative humidity etc) and external environmental factors (external ambient air temperature etc). Generally speaking, the ventilation characteristics fall in to two categories as follows:

Minimum ventilation

Minimum ventilation is required whenever a brood is within the house to ensure adequate internal environmental conditions prevail throughout the growing period. Minimum ventilation exhausts any stale air from the sheds via the air scrubbers, removing moisture and harmful gases while maintaining an appropriate internal air temperature. The minimum level of ventilation varies though out the life cycle of the birds with older, larger birds requiring greater ventilation. As such, as the brood grows, more demand is put on the fans to provide adequate ventilation.

The ventilation requirements during the night-time period are lower than the daytime periods due to the reduced activity of the birds and the generally lower external ambient air temperatures etc. To that end, a lower level of demand is put on the ventilation systems during the night-time.

Full ventilation

The full ventilation scenario approximates a scenario where both ridge fans and air scrubbers are running, providing ventilation during periods of higher external air temperatures when birds are older and more able to withstand chill factors.

Given the lower external ambient air temperatures during the night-time period and the reduced activity levels of the livestock, it is considered highly unlikely that full ventilation would be required during the overnight period.

6.3 Assessment Scenarios

As detailed above, the ventilation requirements, and by extension operational demand on the fans, vary as a function of the age of the birds. The older and larger the birds the greater the ventilation requirements and the more demand is placed on the fans.

The minimum ventilation requirements of the birds can be calculated using the following formula:

$$\text{Total Minimum Ventilation } (m^3/\text{hour}) = \text{Minimum ventilation rate per bird} \times \text{Number of birds in the house}$$

The minimum ventilation rate per bird varies as a function of the bird's age / weight. Details were obtained from the Arbor Acres Broiler Management Handbook.

Using the total minimum ventilation rate, and the maximum capacity of the fans (both air scrubbing and ridge), the demand placed on the fans, in terms of the percentage 'on time', can be calculated using the following formula:

$$\text{Percentage 'On time'} = \frac{\text{Total minimum ventilation required}}{\text{Maximum capacity of the fans}} \times 100$$

Using the calculated 'on time' and the standard correction formula detailed in BS5228[3], a correction factor was applied to each of the noise sources within the noise model. The ventilation is typically provided by the gable end, air scrubbers. This can be augmented towards the end of the crop cycle with ventilation by the ridge fans when external conditions require it.

Given the variation of the noise sources and the ventilation requirements of the shed, the following scenarios have been assessed within the scope of this study.

[3] BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites

Table 7: Assessment Scenario

Assessment Scenario	Operational Phase		Description	Assessment Period
Scenario A	Minimum Ventilation	Week 1 Ventilation	Ventilation requirements up to the end of day 7 of flock cycle. 20% on time for air scrubbers. Ridge fans off.	Daytime hours
		Week 3 Ventilation	Ventilation requirements up to the end of day 21 of flock cycle. 23 % on time for air scrubbers. Ridge fans off.	
		Week 6 Ventilation	Ventilation requirements up to end of day 42 of the flock cycle. 37% on time for air scrubbers. Ridge fans off.	
	Minimum Ventilation	Night Ventilation	Minimum ventilation during the night-time period. 23% on time for air scrubbers. Ridge fans off.	Night-time
Scenario B	Full Ventilation	Ridge Fans and Air Scrubbers	Maximum ventilation requirements assuming 100% ventilation requirements are provided by both the air scrubbers and ridge fans. 50% on time for air scrubbers; 50% on time for ridge fans	Daytime only
Scenario C	HGV Movements	De-population	Final clearance of the poultry sheds. No fans	Night-time only

For the purposes of the assessment scenarios, the daytime and night-time periods are defined as follows:

Daytime Hours	07:00 to 23:00
Night-time Hours	23:00 to 07:00

7 Operational Assessment

The assessments summarised within this section of the report have been undertaken to the locations detailed within Figure 1 and Table 1 presented above. It is reiterated that the receptor identified as AL03 is linked to the land owner and as such has been assessed against alternate criterion.

The calculations undertaken within this section of the report consider the noise generated by the ventilation requirements and noise generated by vehicle movements separately. In both instances, the assessments have been undertaken for both the daytime and night-time periods where appropriate.

The assessments summarised below primarily consider the noise impact of the new, proposed shed for Scenarios A & B. The consented shed has been included as a cumulative consideration; however, the primary focus is the noise impact of the new shed.

Vehicle movements are discussed in Section 8.

7.1 Scenario A – Minimum Ventilation Requirements

The indicative noise contours below present the worst-case assessment of the week 6 ventilation, with the air scrubbers operating for the appropriate on time during the assessment period.

Figure 6: Predicted Daytime Noise Contours – Scenario A (Week 6)

Using the noise model, levels have been calculated to the receptor locations detailed above. These predicted levels have been used to evaluate the noise impact in accordance with the methodology detailed in BS 4142: 2014.

The noise emitted by the ventilation fans is generally considered to be broadband in nature with no distinguishable tones or impulsive characteristics. That said, fan noise is not generally a part of the typical noise climate in the area and could be considered 'readily distinctive' against the prevailing noise climate in the vicinity of the site. As such, a +3dB rating level correction has been applied in accordance with the BS4142 assessment methodology for 'other sound characteristics'.

It is reiterated that the noise impacts summarised below relate to the new, proposed shed, operating in isolation. Further consideration is given to the noise impact of the consented shed below.

Table 8: Noise Impact – Typical Ventilation

Ventilation Stage	Receptor	Operational Period	Predicted Specific Level, dB	Rating Level, L_{Ar} dB*	Noise Target, dB	Difference, dB
Week 1 Ventilation	AL01	Daytime	17.2	20	32	-12
	AL02		17.7	21	32	-11
	AL03		18.3	21	42	-21
	AL04		12.4	15	32	-17
Week 3 Ventilation	AL01	Daytime	17.9	21	32	-11
	AL02		18.4	21	32	-11
	AL03		19.0	22	42	-21
	AL04		13.1	16	32	-16
Week 6 Ventilation	AL01	Daytime	19.8	23	32	-9
	AL02		20.3	23	32	-9
	AL03		20.9	24	42	-18
	AL04		15.0	18	32	-14
Night-time Ventilation	AL01	Night-time	17.9	21	32	-11
	AL02		18.4	21	32	-11
	AL03		19.0	22	42	-20
	AL04		13.1	16	32	-16
* NOTE: with +3dB penalty as described above and rounded to the nearest integer						

The assessments presented above, representing typical activities at the proposed poultry shed, indicate that noise levels would be very low when predicted to the nearest receptor locations, rarely exceeding a specific noise level of L_s 20dB. The rating noise levels would fall between 9dB and 21dB below the noise targets derived in section 5.3 above. This is considered to indicate a low noise impact at all of the receptors considered in accordance with BS 4142:2014.

7.2 Scenario B – Full Ventilation

Full ventilation is only required during the daytime hours towards the end of the crop cycle when the birds are of sufficient size to withstand any chill generated by the increased air flow. Full ventilation utilises both the gable end air scrubbers and the ridge mounted fans. In the assessment below, the fans are considered to be operating at 50% of their maximum capacity which is more than adequate to provide excessive ventilation and cooling through the shed.

Table 9: Noise Impact Assessment – Full Ventilation

Ventilation Stage	Receptor	Operational Period	Predicted Specific Level, dB	Rating Level, L_{Ar} dB*	Noise Target, dB	Difference, dB
Full Ventilation	AL01	Daytime	25.8	29	32	-3
	AL02		27.6	31	32	-1
	AL03		30.5	34	42	-8
	AL04		28.9	32	32	+/-0
* NOTE: with +3dB penalty as described above and rounded to the nearest integer						

The predicted levels detailed in Table 9 above indicate that noise generated by the proposed facility would not exceed the proposed noise targets. This would indicate a low impact in accordance with BS4142:2014.

7.3 Cumulative Consideration

As detailed above, the assessments presented in this report centre primarily on the noise impact of the new, proposed poultry shed, given that the first shed already has planning consent with no noise constraints detailed in the planning consent.

That being said, there is the potential for cumulative noise impacts to arise from the operation of the two sheds at the site which, it is assumed, would operate in parallel with each other.

No noise assessment was undertaken in the original planning application however, the consented shed is understood to utilise the same ventilation strategy as the new shed i.e. gable end air scrubbers augmented with ridge fans when necessary. To that end, it is possible to consider the noise impact associated with the operation of the two sheds to quantify the potential cumulative noise impact.

The assessment summarised below considers both the typical ventilation at week 6; and the full ventilation scenario when both the ridge fans and gable end fans are operating to provide ventilation and cooling. The assessment assumes each shed would operate the plant items detailed in Table 6 above.

Table 10: Cumulative Noise Impact Assessment

Ventilation Stage	Receptor	Operational Period	Predicted Specific Level, dB	Rating Level, L_{Ar} dB	Noise Target, dB	Difference, dB
Week 6 Ventilation (cumulative)	AL01	Daytime	23.9	27	32	-5
	AL02		22.4	25	32	-7
	AL03		23.7	27	42	-15
	AL04		19.0	22	32	-10
Full Ventilation (Cumulative)	AL01	Daytime	30.2	33	32	+1
	AL02		29.6	33	32	+1
	AL03		34.3	37	42	-5
	AL04		32.3	35	32	+3
* NOTE: with +3dB penalty as described above and rounded to the nearest integer						

The assessment summarised above indicates that, during typical operation at the site, with both sheds operating, the predicted noise level from the ventilation fans would fall significantly below the proposed noise targets. This is considered to indicate a low noise impact at all of the receptors considered in accordance with BS 4142:2014.

During the full ventilation scenario (during the hottest daytime periods), noise levels would exceed the proposed targets by between 1dB and 3dB at the third-party receptor locations. BS4142 would consider this *'the less likely it is that the specific sound source will have an adverse or significant adverse impact'*.

It is noted that the noise levels, in absolute terms are low and would be masked by typical daytime activities in the area i.e. road traffic movements, farming activities etc. In addition, noise from ventilation fans are considered to be generally broadband in nature with no particularly

identifiable characteristics. As such, while noise from the facility may occasionally be audible, it is not likely to be particularly intrusive and would not result in any loss of amenity for the nearest receptor locations.

8 Vehicle Movements

The poultry sheds are accessed from the main road, via the existing field access and along a new, purpose-built access road to the site. The access road is positioned approximately 180m from the nearest third-party receptor (AL01) and will join the main road approximately 125m to the south west of Beili Gof (AL03).

The access road is already consented as part of the extant planning consent for the single shed. No transport assessment was undertaken as part of the original application however, the transport assessment prepared for this application (Berrys' Transport note ref SA38626 dated Oct 2020), indicates that doubling the capacity of the poultry farm will double the vehicle movements on the access road.

General vehicle movements to and from the development, including feed and bedding deliveries etc, would only occur during the daytime period, between the hours of 07:00 to 20:00. The exception to this would occur during the thinning and de-population process which happens at night, from 02:00, at the end of each flock cycle. Vehicle movements to the poultry farm, including those consented and the additional vehicles proposed for the new shed are detailed in Table 11 below.

Table 11: Vehicle Movement Numbers

	Vehicle Type	2 Way Movements	When in the cycle
Bedding Delivery	HGV	2	Day 48
Chick Delivery	HGV	2	Day 1
Feed Delivery	HGV	14	Ongoing throughout the crop cycle
Fuel Delivery	HGV	3	Days 1 and 18
Mortality Collection	LGV	6	Ongoing throughout the crop cycle
Bird thinning	HGV	4	Day 30 - 31
Bird depopulation	HGV	10	Day 37 – 38
Manure removal	Tractor and Trailer	16	Day 39 - 42
Ongoing maintenance	Light vehicles	12	Ongoing
Total		**69**	

The transport assessment indicates that the waste bedding and manure would be used elsewhere on the farm and would be removed from the site via tractor and trailer at the appropriate point in the crop cycle. Movements of this nature are not uncommon in an agricultural setting and, as such, have been omitted from the assessment below.

The thinning and depopulation activities occur during the night-time period. Of the remaining vehicle movements, the information indicates that over a single crop cycle, 39, two-way vehicle movements occur during the daytime period. This would average to around one vehicle delivery per day between the hours detailed above.

The thinning and depopulation processes start during the night-time hours: commencing from 02:00 and continuing until the task is completed. Typically, this may run in to portions of the daytime period i.e. beyond 07:00. During the depopulation scenario, the site would expect one vehicle to arrive at the site, be loaded and leave within an hour.

Given the specifics of the site and the route of the access road, it is considered appropriate to assess the noise generated by HGV movements to and from the site in line with the Haul road methodology detailed in BS5228-1. The following attributes have been used in the calculations:

- The source noise of an HGV under acceleration is a sound power level of 105.5dB(A)[4]; and,
- Vehicle speeds are limited to 10mph (16kph or 4.4m/s).

It is noted that the calculations below centre on the receptors AL01 and AL03, being the most significantly affected by vehicle movements on the site access road.

8.1 Daytime Vehicle Movements

The daytime scenario assumes one HGV visits the site during a one-hour assessment period as a typical assessment. This would equate to two vehicle movements on the access road in a 1-hour assessment period i.e. one vehicle in and one vehicle out.

Table 12: Vehicle Noise Assessment - Daytime

Receptor	Distance from Source[1], m	Predicted L_{pA}, dB	On time correction[2], dB	Resultant $L_{pA,\ 1hr}$, dB	Noise Target, dB	Difference, dB
AL01	180	40.9	-18.9	22	32	-10
AL03	125	42.5	-16.6	26	42	-16
1 Distance taken from the centre of the access road to the receptor location at the closest approach 2 On time correction calculated by using the vehicle speed and the path distance of the road segment						

The assessment above indicates that, when averaged over a one-hour assessment period, noise from vehicle movements on the access road would fall significantly below the noise target. This would indicate that noise associated with vehicle movements would be of low impact during the daytime period.

8.2 Night-time Vehicle Movements - Depopulation

Information from the transport consultant indicates that, during the depopulation scenario, the site would expect one HGV per hour. The transport assessment further states that the vehicles are timed so as one empty vehicle arrives at site as a full vehicle is ready to leave, minimising any transitional period in between.

For the purposes of this assessment it is assumed that this would result in two vehicle movements on the access road in a 15-minute assessment period i.e. one HGV coming in as a full vehicle departs.

[4] Maximum permissible noise level for a vehicle under acceleration as defined by EC directive 92/97/EC.

Table 13: Vehicle Noise Assessment – Night-time

Receptor	Distance from Source[1], m	Predicted L_{pA}, dB	On time correction[2], dB	Resultant $L_{pA,\ 1hr}$, dB	Noise Target, dB	Difference, dB
AL01	180	40.9	-12.9	28	32	-4
AL03	125	42.5	-10.6	32	42	-10
1 Distance taken from the centre of the access road to the receptor location at the closest approach 2 On time correction calculated by using the vehicle speed and the path distance of the road segment						

The assessment above indicates that, during a 15-minute, night-time assessment period, noise from HGV movements would fall below the noise target at both receptor locations.

The depopulation scenario only occurs once per crop cycle that is between days 37-38 of the crop.

8.3 Uncertainty

BS 4142 requires an assessment of uncertainty. The prediction methodology in ISO 9613[5] is thought to be accurate to ±3dB but further uncertainty can occur in the source noise levels. That said, the predicted noise levels are generally low in absolute terms and would remain low even if uncertainty is considered. There is also uncertainty in the background noise measurements. Note however that the survey was carried out over more three consecutive days reducing uncertainty in the measured noise levels. As such, it was not been deemed necessary to include for an uncertainty margin in respect of the background sound levels and derived limits.

Therefore, uncertainty is not considered to have a significant impact on the assessment outcomes.

9 Summary

A noise assessment has been carried out for the proposed extension to the consented poultry farm at Llwyngwilym farm, Rhayader, Powys. The site already has planning consent for one poultry shed though this shed has not been constructed as yet. The extension will see a second poultry shed added to the site, increasing the proposed capacity from 55,000 birds per crop to 110,000.

The assessments have been informed by a baseline and ambient noise survey undertaken between the 8th and 10th September 2020. The noise survey indicates that the existing noise climate in the area is very low therefore noise targets have been derived from guidance detailed in BS8233 and the World Health Organisation Guidelines for Community Noise. These noise targets have been used to assess the noise impact arising from activities at the site in line with BS 4142: 2014.

The assessment indicates that, under the various operational scenarios considered within this report, noise generated by the proposed extension would fall below the noise targets. This is considered to demonstrate a low noise impact in accordance with BS4142.

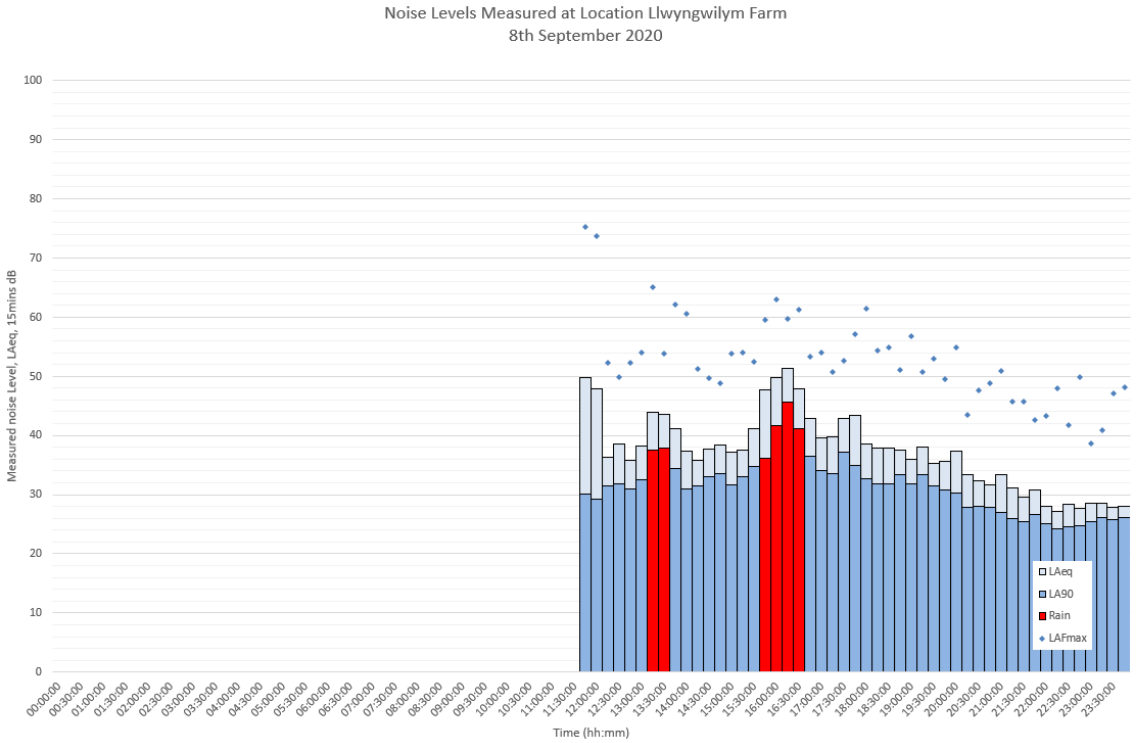
Further assessment of the cumulative scenario, including the proposed and consented sheds, indicates that, under typical operation, noise from the two sheds would, again, fall well below the noise targets. During the full ventilation scenario noise levels do exceed the daytime targets

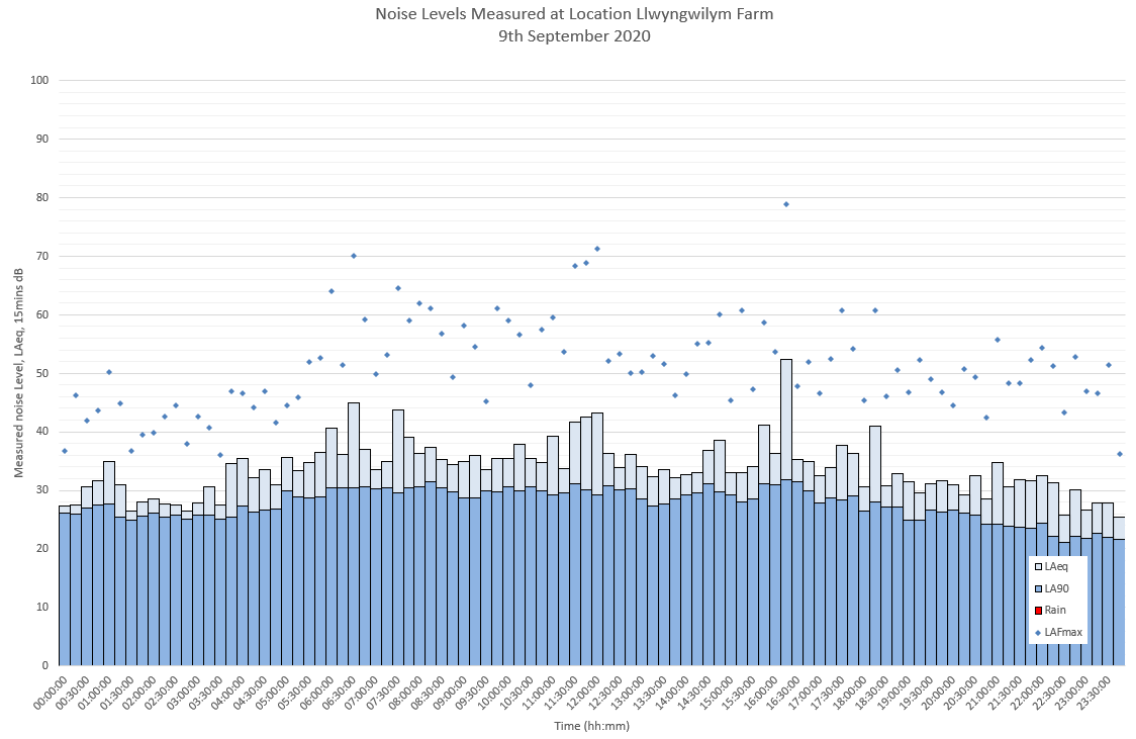
[5] ISO 9613:1996 Acoustics – Attenuation of sound propagation outdoors

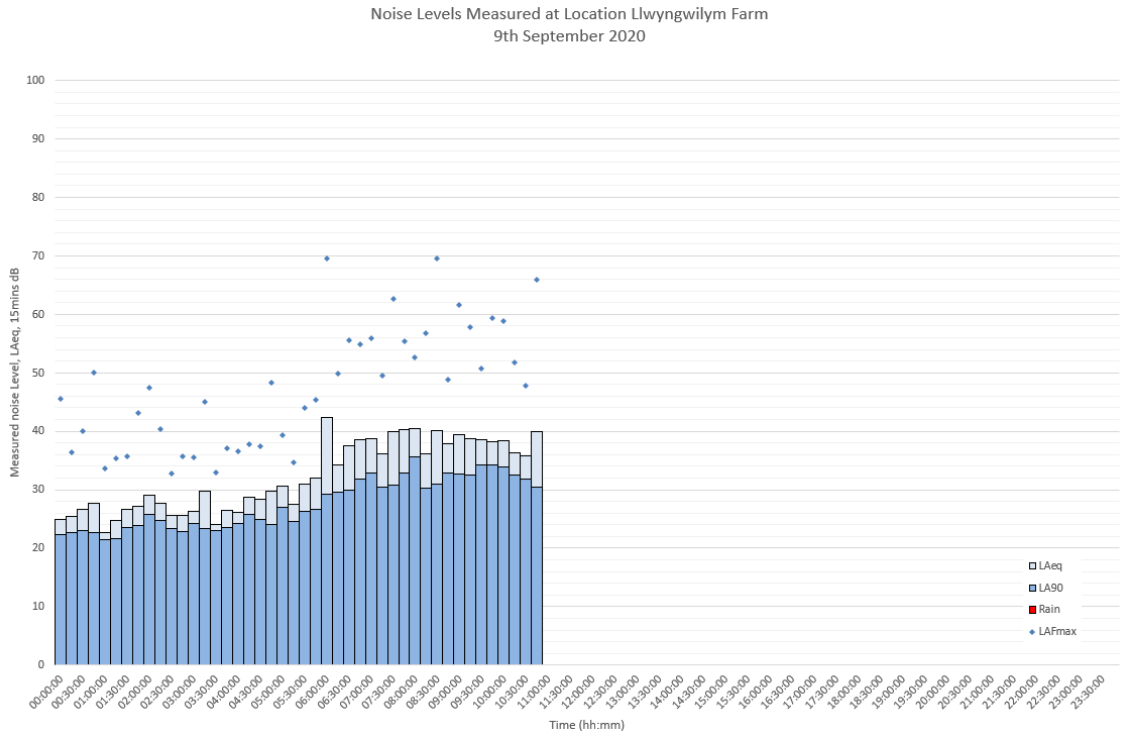
however the impact is considered to be less than adverse and, under normal conditions is likely to be masked by the prevailing daytime ambient noise climate.

Additional consideration of the noise associated with vehicle movements indicates that, generally noise from HGVs would fall below the proposed noise targets during both the daytime and night-time periods. This is considered to be an indication of a low noise impact in accordance with BS4142.

Based on the above, it is considered that there are no noise-related issues associated with the proposed extension to the consented poultry farm at Llwyngwilym farm which would prevent the proposals being granted planning permission.


Noise Levels Measured at Location Llwyngwilym Farm
8th September 2020
Measured noise Level, LAeq, 15mins dB
Time (hh:mm)
LAeq
LA90
Rain
LAFmax


Noise Levels Measured at Location Llwyngwilym Farm
9th September 2020
Measured noise Level, LAeq, 15mins dB
Time (hh:mm)
LAeq
LA90
Rain
LAFmax


Noise Levels Measured at Location Llwyngwilym Farm
9th September 2020
Measured noise Level, LAeq, 15mins dB
Time (hh:mm)
LAeq
LA90
Rain
LAFmax

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
08/09/2020 11:45	49.7	75.3	30.1	08/09/2020 23:45	28.0	48.1	26.1	09/09/2020 11:45	42.6	68.8	30.1
08/09/2020 12:00	47.9	73.7	29.3	09/09/2020 00:00	27.3	36.7	26.1	09/09/2020 12:00	43.3	71.2	29.3
08/09/2020 12:15	36.4	52.3	31.5	09/09/2020 00:15	27.5	46.2	25.9	09/09/2020 12:15	36.3	52.2	30.8
08/09/2020 12:30	38.5	49.8	31.8	09/09/2020 00:30	30.7	41.9	27.0	09/09/2020 12:30	33.9	53.4	30.1
08/09/2020 12:45	35.8	52.3	30.9	09/09/2020 00:45	31.6	43.7	27.5	09/09/2020 12:45	36.1	50.1	30.3
08/09/2020 13:00	38.2	54.1	32.6	09/09/2020 01:00	35.0	50.3	27.6	09/09/2020 13:00	34.1	50.2	28.6
08/09/2020 13:15	43.9	65.1	37.6	09/09/2020 01:15	31.0	44.8	25.4	09/09/2020 13:15	32.4	52.9	27.4
08/09/2020 13:30	43.6	53.9	37.9	09/09/2020 01:30	26.5	36.7	25.0	09/09/2020 13:30	33.6	51.6	27.6
08/09/2020 13:45	41.1	62.2	34.5	09/09/2020 01:45	28.0	39.5	25.6	09/09/2020 13:45	32.1	46.2	28.6
08/09/2020 14:00	37.3	60.5	30.9	09/09/2020 02:00	28.6	39.8	26.1	09/09/2020 14:00	32.7	49.9	29.2
08/09/2020 14:15	35.8	51.3	31.4	09/09/2020 02:15	27.6	42.6	25.5	09/09/2020 14:15	33.1	55.0	29.6
08/09/2020 14:30	37.7	49.7	33.1	09/09/2020 02:30	27.5	44.6	25.8	09/09/2020 14:30	36.9	55.3	31.2
08/09/2020 14:45	38.4	48.9	33.5	09/09/2020 02:45	26.4	37.9	25.1	09/09/2020 14:45	38.6	60.1	29.8
08/09/2020 15:00	37.2	53.8	31.7	09/09/2020 03:00	27.8	42.6	25.7	09/09/2020 15:00	33.1	45.3	29.2
08/09/2020 15:15	37.5	54.1	33.0	09/09/2020 03:15	30.7	40.8	25.7	09/09/2020 15:15	33.1	60.8	28.0
08/09/2020 15:30	41.1	52.5	34.8	09/09/2020 03:30	27.5	36.0	25.1	09/09/2020 15:30	34.0	47.2	28.5
08/09/2020 15:45	47.7	59.6	36.2	09/09/2020 03:45	34.6	46.9	25.4	09/09/2020 15:45	41.1	58.6	31.2
08/09/2020 16:00	49.8	63.0	41.6	09/09/2020 04:00	35.5	46.6	27.3	09/09/2020 16:00	36.4	53.7	31.0
08/09/2020 16:15	51.3	59.8	45.6	09/09/2020 04:15	32.1	44.1	26.3	09/09/2020 16:15	52.4	78.9	31.8
08/09/2020 16:30	47.8	61.3	41.2	09/09/2020 04:30	33.5	47.0	26.6	09/09/2020 16:30	35.2	47.8	31.4
08/09/2020 16:45	42.9	53.4	36.5	09/09/2020 04:45	31.0	41.6	26.8	09/09/2020 16:45	34.9	51.9	30.0
08/09/2020 17:00	39.6	54.1	34.1	09/09/2020 05:00	35.6	44.5	29.9	09/09/2020 17:00	32.6	46.6	27.9
08/09/2020 17:15	39.7	50.7	33.6	09/09/2020 05:15	33.4	45.9	28.9	09/09/2020 17:15	33.9	52.5	28.7
08/09/2020 17:30	42.9	52.6	37.1	09/09/2020 05:30	34.7	51.9	28.7	09/09/2020 17:30	37.7	60.7	28.3
08/09/2020 17:45	43.4	57.1	34.9	09/09/2020 05:45	36.5	52.7	28.9	09/09/2020 17:45	36.4	54.2	29.1
08/09/2020 18:00	38.6	61.4	32.7	09/09/2020 06:00	40.6	64.0	30.4	09/09/2020 18:00	30.7	45.4	26.5
08/09/2020 18:15	37.9	54.4	31.9	09/09/2020 06:15	36.1	51.4	30.5	09/09/2020 18:15	41.0	60.7	28.1
08/09/2020 18:30	37.9	54.8	31.8	09/09/2020 06:30	45.0	70.1	30.4	09/09/2020 18:30	30.8	46.1	27.1
08/09/2020 18:45	37.6	51.1	33.3	09/09/2020 06:45	37.0	59.2	30.6	09/09/2020 18:45	32.8	50.5	27.1
08/09/2020 19:00	35.9	56.7	31.8	09/09/2020 07:00	33.6	49.8	30.2	09/09/2020 19:00	31.5	46.7	24.9
08/09/2020 19:15	38.1	50.8	33.4	09/09/2020 07:15	35.0	53.1	30.4	09/09/2020 19:15	29.6	52.3	25.0
08/09/2020 19:30	35.3	52.9	31.4	09/09/2020 07:30	43.8	64.5	29.5	09/09/2020 19:30	31.1	49.0	26.7
08/09/2020 19:45	35.6	49.6	30.8	09/09/2020 07:45	39.1	59.0	30.5	09/09/2020 19:45	31.7	46.8	26.3
08/09/2020 20:00	37.4	54.9	30.2	09/09/2020 08:00	36.4	61.9	30.6	09/09/2020 20:00	31.0	44.6	26.7
08/09/2020 20:15	33.3	43.5	27.8	09/09/2020 08:15	37.3	61.1	31.5	09/09/2020 20:15	29.3	50.8	26.2
08/09/2020 20:30	32.3	47.6	28.1	09/09/2020 08:30	35.3	56.7	30.4	09/09/2020 20:30	32.5	49.3	25.7
08/09/2020 20:45	31.7	48.9	27.9	09/09/2020 08:45	34.4	49.3	29.8	09/09/2020 20:45	28.5	42.5	24.2
08/09/2020 21:00	33.4	50.9	27.0	09/09/2020 09:00	35.0	58.1	28.8	09/09/2020 21:00	34.8	55.8	24.2
08/09/2020 21:15	31.1	45.7	25.9	09/09/2020 09:15	35.9	54.5	28.8	09/09/2020 21:15	30.6	48.3	23.9
08/09/2020 21:30	29.5	45.7	25.4	09/09/2020 09:30	33.6	45.2	29.9	09/09/2020 21:30	31.8	48.4	23.7
08/09/2020 21:45	30.8	42.6	26.6	09/09/2020 09:45	35.4	61.1	29.8	09/09/2020 21:45	31.6	52.3	23.5
08/09/2020 22:00	28.0	43.3	25.1	09/09/2020 10:00	35.5	59.0	30.6	09/09/2020 22:00	32.5	54.3	24.4
08/09/2020 22:15	27.2	48.0	24.3	09/09/2020 10:15	37.8	56.6	30.0	09/09/2020 22:15	31.3	51.2	22.2
08/09/2020 22:30	28.4	41.7	24.5	09/09/2020 10:30	35.4	48.0	30.6	09/09/2020 22:30	25.8	43.3	21.1
08/09/2020 22:45	27.7	49.9	24.7	09/09/2020 10:45	34.7	57.5	30.0	09/09/2020 22:45	30.1	52.8	22.1
08/09/2020 23:00	28.5	38.6	25.5	09/09/2020 11:00	39.3	59.6	29.3	09/09/2020 23:00	26.6	46.9	21.8
08/09/2020 23:15	28.6	40.9	26.2	09/09/2020 11:15	33.7	53.6	29.6	09/09/2020 23:15	27.8	46.6	22.6
08/09/2020 23:30	27.8	47.1	25.7	09/09/2020 11:30	41.6	68.4	31.1	09/09/2020 23:30	27.9	51.5	22.0

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
09/09/2020 23:45	25.4	36.2	21.7
10/09/2020 00:00	24.9	45.6	22.4
10/09/2020 00:15	25.4	36.4	22.6
10/09/2020 00:30	26.7	40.0	23.1
10/09/2020 00:45	27.6	50.0	22.6
10/09/2020 01:00	22.6	33.6	21.4
10/09/2020 01:15	24.8	35.3	21.7
10/09/2020 01:30	26.7	35.7	23.6
10/09/2020 01:45	27.2	43.1	23.9
10/09/2020 02:00	29.0	47.4	25.8
10/09/2020 02:15	27.6	40.4	24.8
10/09/2020 02:30	25.6	32.7	23.4
10/09/2020 02:45	25.6	35.7	22.8
10/09/2020 03:00	26.3	35.5	24.2
10/09/2020 03:15	29.7	45.1	23.4
10/09/2020 03:30	24.1	32.9	23.0
10/09/2020 03:45	26.4	37.1	23.5
10/09/2020 04:00	26.2	36.6	24.3
10/09/2020 04:15	28.7	37.8	25.8
10/09/2020 04:30	28.4	37.4	25.0
10/09/2020 04:45	29.7	48.4	24.0
10/09/2020 05:00	30.6	39.3	27.0
10/09/2020 05:15	27.5	34.7	24.5
10/09/2020 05:30	31.0	44.0	26.3
10/09/2020 05:45	32.0	45.3	26.7
10/09/2020 06:00	42.4	69.6	29.3
10/09/2020 06:15	34.3	49.9	29.5
10/09/2020 06:30	37.5	55.5	30.0
10/09/2020 06:45	38.5	54.8	31.9
10/09/2020 07:00	38.7	56.0	32.9
10/09/2020 07:15	36.1	49.5	30.5
10/09/2020 07:30	39.9	62.7	30.8
10/09/2020 07:45	40.3	55.4	32.9
10/09/2020 08:00	40.5	52.6	35.6
10/09/2020 08:15	36.1	56.7	30.2
10/09/2020 08:30	40.1	69.6	31.0
10/09/2020 08:45	37.8	48.8	32.8
10/09/2020 09:00	39.4	61.6	32.7
10/09/2020 09:15	38.8	57.9	32.6
10/09/2020 09:30	38.6	50.7	34.2
10/09/2020 09:45	38.3	59.3	34.3
10/09/2020 10:00	38.4	58.9	33.9
10/09/2020 10:15	36.4	51.8	32.6
10/09/2020 10:30	35.8	47.8	31.9
10/09/2020 10:45	~~40.0~~	~~66.0~~	~~30.5~~
10/09/2020 11:00			
10/09/2020 11:15			
10/09/2020 11:30			