Devon AD Plant, Cullompton

BS 4142:2014+A1:2019 Assessment

20th July 2026

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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to prepare a Noise Impact Assessment for an Anaerobic Digestion (AD) Energy Facility ('the Site') on Hide Market Road, Willand, Cullompton, EX15 2FP.

The site is existing, but does not presently benefit from an Environmental Permit, with the previous operator surrendering it when they ceased trading at the site.

Accordingly, the following technical noise assessment has been produced for submission to the Environment Agency. This report details the sound emissions associated with the operational Development, assessed using a noise propagation model based on data measured at source on-site.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.2. Scope and Objectives

The scope of the noise assessment can be summarised as follows:

- A sound monitoring exercise was undertaken at discrete locations around the Site;
- A 3-dimensional noise modelling exercise, in order to assess the propagation of noise across the Site;
- A detailed assessment of noise emissions from the Site, in accordance with BS 4142:2014+A1:2019[1].

[1] British Standards Institution. BS 4142:2014+A1:2019: Method for Rating and Assessing Industrial and Commercial Sound.

2. Assessment Framework

2.1. National Policy

2.1.1. National Planning Policy Framework, 2024

The *National Planning Policy Framework* (NPPF)[2] sets out the UK Government's planning policies for England. Planning policy requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise.

The NPPF is also a material consideration in planning decisions. It sets out the Government's requirements for the planning system and how these are expected to be addressed.

Under Section 15; *Conserving and Enhancing the Natural Environment*, in Paragraph 187, the following is stated:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.".

Paragraph 198 of the document goes on to state:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider are prized for their recreational and amenity value for this reason"

Paragraph 198 refers to the Noise Policy Statement for England, which is considered overleaf.

2.1.2. Noise and Vibration Management: Environmental Permits

Environmental permits have conditions that require operators to control pollution; this includes controlling noise and vibration. The Environment Agency have released guidance to help holders and potential holders of permits apply for, vary, and comply with their permits. The guidance covers:

- how the environment agencies will assess noise from certain industrial processes;
- what the law says you must do to manage noise and vibration; and
- advice on how to manage noise – in particular, how to carry out a noise impact assessment and what operators should include in a noise management plan.

This guidance replaces these documents which have been withdrawn:

- Environment Agency Horizontal Guidance for Noise (H3) parts 1 and 2.

[2] Ministry of Housing, Communities & Local Government (MHCLG), December 2024. National Planning Policy Framework. HMSO. London.

It involves determining the appropriate controls for industry to protect the environment through a single permitting process. To gain a Permit, Operators have to show that they have systematically developed proposals to apply the 'Best Available Techniques' (BAT) and meet certain other requirements, taking account of relevant local factors.

In terms of noise specifically, the use of BAT has to be considered and balanced within the wider context of other releases to different media (air, land and water) and taking issues such as usage of energy and raw materials into account. Noise cannot therefore be considered in isolation from other impacts on the environment.

The definition of pollution includes *"emissions which may be harmful to human health or the quality of the environment, cause offence to human senses or impair or interfere with amenities and other legitimate uses of the environment"*. Whilst BAT and the 'best practicable means' defence under Statutory Nuisance legislation are distinct concepts arising from different regulatory regimes, the practical measures adopted to prevent or minimise noise emissions are often similar.. However, the lack of complaint should not necessarily imply the absence of a noise problem. In some cases it may be possible, and desirable, to reduce noise emissions still further at reasonable costs and this may therefore be BAT for noise emissions.

Consequently, the aim of BAT should be to prevent or minimise noise and vibration emissions and to ensure that impacts on sensitive receptors are appropriately controlled.

In summary, operators must demonstrate that Best Available Techniques (BAT) have been applied to prevent or minimise noise and vibration emissions. This includes implementing good operational and maintenance practices, undertaking appropriate noise impact assessments, and demonstrating that noise impacts on sensitive receptors have been reduced as far as practicable, taking account of local circumstances and the wider environmental objectives of the permitting regime.

Indeed, because the requirements for noise are likely to be strongly influenced by the local environmental conditions, new installations are expected to meet BAT from the outset and to demonstrate that noise reduction or prevention has been built into the process design. For most existing plant, especially where there are no existing noise limits, the focus is on good practice (BAT) and the need to ensure that noise impacts on sensitive receptors are appropriately controlled. Noise impact assessments may be based on measurement, prediction, or a combination of both, depending on the nature of the installation and the stage of development.

The guidance makes reference to BS 4142:2014+A1:2019 as the basis for the majority of noise impact assessments.

2.1.3. Noise Policy Statement for England, 2010

The underlying principles and aims of existing noise policy documents, legislation and guidance are clarified in *DEFRA: 2010: Noise Policy Statement for England* (NPSE)[3]. The NPSE sets out the *"Long Term Vision"* of Government noise policy as follows:

"Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development".

The NPSE outlines three aims for the effective management and control of environmental, neighbour and neighbourhood noise:

[3] Department for Environment, Food and Rural Affairs (DEFRA), 2010. Noise Policy Statement for England. DEFRA.

- *"Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life".*

The guidance states that it is not possible to have a single objective noise-based measure that defines *"Significant Observed Adverse Effect Level (SOAEL)"* that is applicable to all sources of noise in all situations and that not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

Paragraph 2.15 states, with regard to the third aim of the NPSE, that *"this statement expresses the long-term desired policy outcome, but in the use of "promote" and "good" recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations."*

2.1.4. National Planning Practice Guidance in England: Noise, 2019 (PPGNoise)

Paragraph: 002 of the PPGNoise states the following:

"Can noise override other planning concerns?

It can, where justified, although it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern."

As such, Paragraph: 003 of the NPPG states that:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

In line with the Explanatory note of the NPSE, this would include identifying whether the overall effect of the noise exposure … is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

Consequently, the *National Planning Practice Guidance in England: Noise* (NPPG Noise)[4] summarises the noise exposure hierarchy, based on the likely average response. The following three observed effect levels are identified below, as identified in Paragraph 004::

- **Significant Observed Adverse Effect Level**: This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
- **Lowest Observed Adverse Effect Level**: This is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
- **No Observed Adverse Effect Level**: This is the level of noise exposure below which no effect at all on health or quality of life can be detected.

Importantly, Paragraph: 004 of the PPGNoise states that:

"Although the word 'level' is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs."

Paragraph: 005 of the PPGNoise expands the significant criteria related to each of these levels, which are reproduced in Table 1, below

[4] Department for Communities and Local Government (DCLG), 2019. National Planning Practice Guidance for England: Noise. DCLG.

TABLE 1: SIGNIFICANCE CRITERIA FROM NPPG IN ENGLAND: NOISE

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Noticeable and Not Intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and Very Disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.2. Assessment Criteria

2.2.1. BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* sets out a method to assess the likely effect of sound from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises, on people who might be inside or outside a dwelling or premises used for residential purposes in the vicinity.

The procedure contained in BS 4142:2014+A1:2019 for assessing the effect of sound on residential receptors is to compare the measured or predicted sound level from the source in question, the $L_{Aeq,T}$ *specific sound level*, immediately outside the dwelling with the $L_{A90,T}$ background sound level.

Where the sound contains a tonality, impulsivity, intermittency and other sound characteristics, then a correction depending on the grade of the aforementioned characteristics of the sound is added to the specific sound level to obtain the $L_{Ar,Tr}$ *rating sound level*. The effect of uncertainty in sound measurements, data and calculations should also be considered when necessary.

BS 4142:2014+A1:2019 states: *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs"*. An estimation of the impact of the specific sound can be obtained by the difference of the rating sound level and the background sound level and considering the following:

- *"Typically, the greater this difference, the greater the magnitude of the impact."*
- *"A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context."*
- *"A difference of around +5dB is likely to be an indication of an adverse impact, depending on the 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 the context."*

During the daytime, the assessment is typically carried out over a reference time period of 1-hour, with a reference period of 15-minutes used for the night-time assessment. The periods associated with day or night, for the purposes of the Standard, are considered to be 07.00 to 23.00 and 23.00 to 07.00, respectively.

2.2.2. Relative Change in Ambient Noise Level

The IEMA Guidelines[5] define 'Noise Impact' as the difference in the acoustic environment before and after the implementation of the proposals, also known as the magnitude of change. In circumstances where a noise environment may be altered by addition or removal of a noise source, considered to be largely anonymous or within the prevailing acoustic character of an area, for example, changes to traffic quantum or patterns, it is normal to consider this relative change in ambient noise level. The assessment, therefore, considers this phenomenon to add context.

The impact scale adopted in this assessment is shown in Table 2 below, which relates to established human responses to noise, in line with '*Table 7-12 Effect Descriptors'* of the IEMA Guidelines and set in the context of NPPG.

TABLE 2: IMPACT SCALE FOR COMPARISON OF FUTURE NOISE AGAINST EXISTING NOISE

Noise Level Change dB(A)	Subjective Response	Significance	NPPG Context
Less than 1.0	No perceptible	Negligible	NOEL
1.0 – 2.9	Barely perceptible	Minor impact	NOAEL
3.0 – 4.9	Noticeable	Moderate impact	LOAEL
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact	SOAEL
10.0 or more	More than a doubling or halving of loudness	Major impact	UAEL

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the perception of loudness. The difference between the minimum perceptible change and the doubling or halving of the perceived noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in Table 2 provide a good indication as to the likely significance of changes in noise levels in this case and can be used to inform the context in which the sound occurs in order to assess the impact of noise from the proposed development.

[5] Institute of Environmental Management & Assessment (IEMA), Version 1.2 (November 2014). Guidelines for Environmental Noise Impact Assessment

3. Site Description

3.1. Site and Surrounding Area

The AD Energy Facility is on Land on Hide Market Road, Willand, Cullompton, EX15 2FP

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The location of the Development and the nearest receptors can be seen below in Figure 1.

Figure 1: Location of Site and Surrounding Area



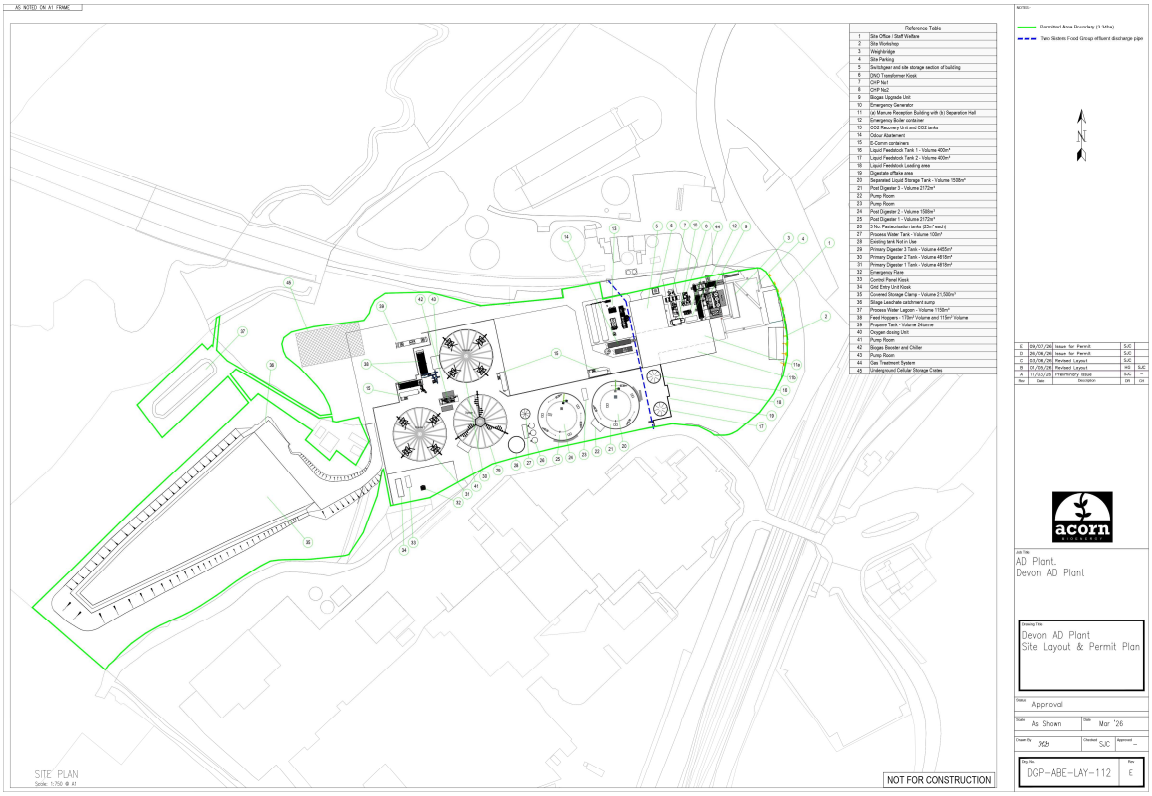
The AD development is situated to the north and north-west of an existing poultry processing and packaging facility, with the existing permit for the Site having departed with the previous operator.

The closest receptors at NSR1 comprise of a residential dwelling, situated 100m to the west of the site boundary. The next nearest off-site receptor is understood to be the dwellings situated along the eastern boundary of the M5 corridor, namely those situated off Sommerville Road (Barnes Close and Sommerville Close), which are marked by NSR2. These are at a distance of approximately 200m from east of the site boundary. The next nearest noise-sensitive receptors are situated to the north of the site boundary, along Willand Road and adjacent to the substation, some 350m away from nearest boundary of the development.

3.2. Operations Overview

The site layout for the Development can be seen below in Figure 2.

FIGURE 2: SITE LAYOUT



In addition to the Proposals provided by the client, a 4-metre acoustic barrier has been incorporated into the design, as part of the built-in mitigation for the scheme. Details of the screen are considered in Section 6.6 and Appendix D.

It is understood that the maximum number of HGV movements to and from the site is 16 per hour (8 in, 8 out), between the hours of 07:00 and 17:30. This would equate to a maximum of 168 movements per day, which has been considered as a worst-case scenario.

The remainder of the plant on the site is static, which (for the exception of emergency equipment) is steady-state and runs continually for 24 hours a day, 7 days a week.

3.3. Noise Generating Elements

The operational noise-generating elements are summarised in Table 3.

TABLE 3: SUMMARY OF NOISE-GENERATING ELEMENTS

Description	Location	Operational Profile	Grid Coordinates	
			Easting	Northing
CHP 1 - 1200 kW (Container)	External	Continuous	303047.01	111246.65
CHP 2 - Flexi 530 - 499 kW (Container)	External	Continuous	303054.00	111254.54
Pumps for Heat System	External	Continuous	303053.74	111240.66
Pump room 1	Internal	Continuous	303006.74	111184.05
Pump room 2	Internal	Continuous	302999.92	111200.87
Pump room 3	Internal	Continuous	302935.97	111172.99
Pump room 4	Internal	Continuous	302921.58	111217.99
Chiller unit	External	Continuous	302927.79	111197.84
Biomethane Upgrade and Co2 recovery unit	External	Continuous	303020.11	111239.61
Emergency Back-up Generator	External	Emergency Operation Only	303045.58	111239.92
Emergency Boiler (Viessmann VITOPLEX 200) Container	External	Emergency Operation Only	303056.53	111242.24
Odour Control unit/Fan (EXEON Unit)	External	Continuous	303021.58	111224.21
Primary digester 1- Wall mounted agitators - 4 Nos.	External	Continuous	302912.37	111179.34
Primary digester 2- Wall mounted agitators - 4 Nos.	External	Continuous	302937.38	111221.01
Primary digester 3- Wall mounted agitators - 3 Nos.	External	Continuous	302944.58	111186.24
Post Digester 1- Roof mounted agitators - 3 Nos.	External	Continuous	302988.17	111188.82

Description	Location	Operational Profile	Grid Coordinates	
			Easting	Northing
Post Digester 2 - Vertical shaft agitator - 1 No.	External	Continuous	302987.75	111193.26
Post Digester 3 - Roof mounted agotators - 3 Nos.	External	Continuous	303016.67	111195.30
Separated Liquid Tank - Vertical shaft agitator - 1 No.	External	Continuous	303016.37	111199.53
Emergency Gas Flare	External	Emergency Operation Only	302914.00	111150.69
Primary Digester - Gas Holder Blowers - 3 Nos.	External	Continuous	302916.21	111193.84
			302951.87	111218.38
			302950.92	111199.79
I-Grind Straw Processing Unit	External	Continuous	302824.15	111175.82

4. Baseline Sound Survey

4.1. Overview

The prevailing acoustic conditions in the area have been determined by an environmental sound survey conducted during both daytime and night-time periods between Thursday 11th to Tuesday 16th June 2026.

4.2. Measurement Details

All sound measurements were undertaken by a consultant certified as competent in environmental sound monitoring, and, in accordance with the principles of British Standard 7445:2003 '*Description and measurement of environmental noise'* [6].

All sound measurement equipment used during the survey conformed to Class 1 specification of British Standard 61672:2013 '*Electroacoustics. Sound level meters*. Part 1 *Specifications'* [7]. A full inventory of this equipment is shown in Table below.

Table 4: Inventory of Sound Measurement Equipment

Position	Make, Model & Description	Serial Number	Calibration Certificate Number	Calibration Due Date
MP1	Brüel & Kjær 2238 Sound Level Meter	2812839	1174714	16/01/2027
	Brüel & Kjær ZC 0030 Preamplifier	-		
	Brüel & Kjær 4188 Microphone	1794946		
MP2	Rion NL-31 Sound Level Meter	00110040	1176252	12/02/2027
	Rion NH-21 Preamplifier	00142		
	Rion UC-53A Microphone	306449		
All	Cirrus CR:515	82501	1141302	07/03/2024

The sound measurement equipment used during the survey was field calibrated at the start and end of the measurement period, with the following results:

- MP1 – Before: 94.0 dB After: 94.0 dB (@ 1kHz)
- MP2 – Before: 94.0 dB After: 94.1 dB (@1 kHz)

The weather conditions during the survey were conducive to environmental noise measurement; it being dry, with low wind speeds. The conditions were locally observed and set out as follows:

- Thursday 11 June – rain and overcast during the morning and early afternoon with temperatures reaching 17 degrees. Weather conditions cleared into the afternoon with rain ongoing until approximately 14:00. Winds averaged 12 km/h from the south-west.

[6] British Standards Institute, British Standard 7445: 2003: *Description and measurement of environmental noise*, 2003.
[7] British Standards Institute, British Standard 61672: 2013: *Electroacoustics. Sound level meters*. Part 1 *Specifications*, 2013.

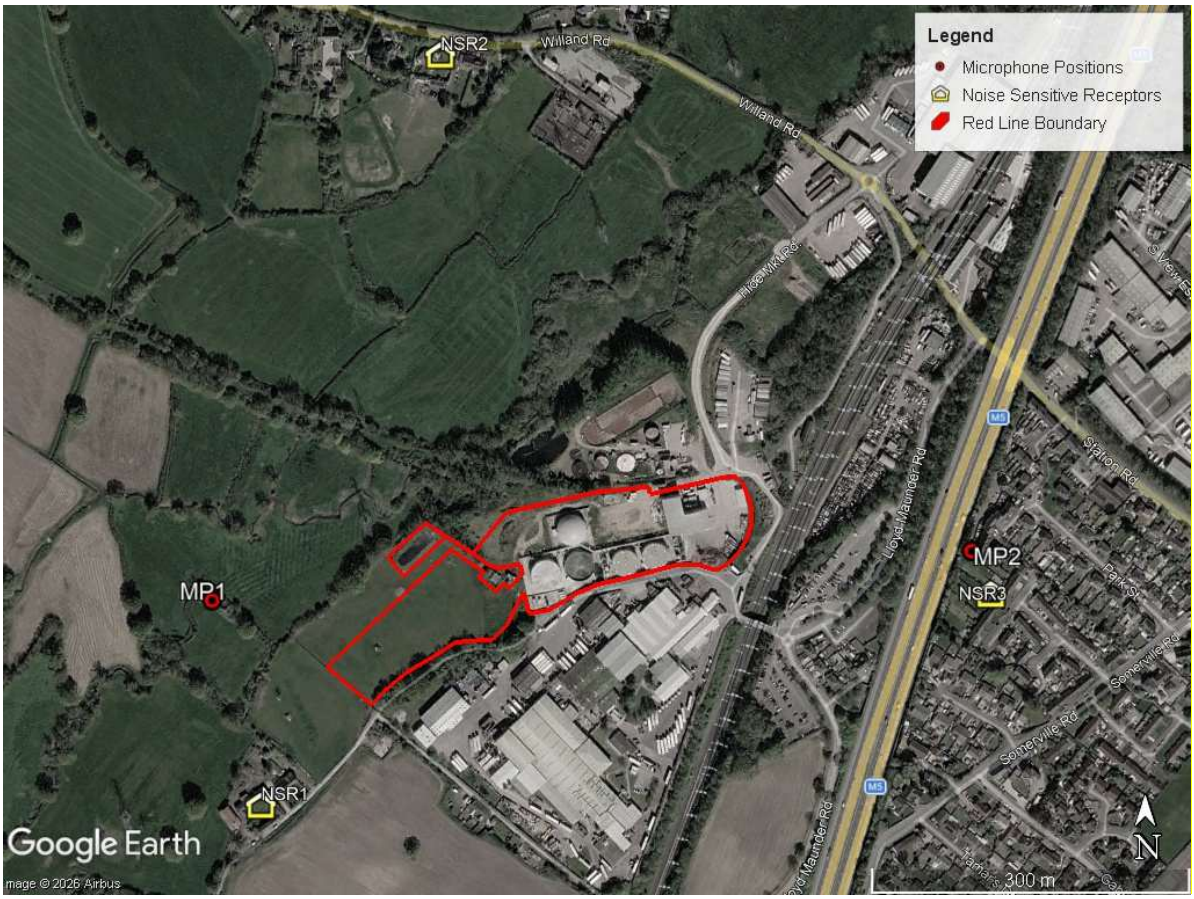
- Friday 12 June – dry and clear with a light breeze – temperatures reaching 20 degrees. Winds averaging 14.8 km/h from the west.
- Saturday 13 June – dry, clear and calm – temperatures reaching 22 degrees. Winds averaging 6.2 km/h from the west.
- Sunday 14 June – dry, clear and calm – temperatures reaching 25 degrees. Winds averaging 4.2 km/h from the south/south-east.
- Monday 15 June – dry, clear and calm – temperatures reaching 20 degrees. Winds averaging 6.9 km/h from the south-west.
- Tuesday 16 June - dry, clear and calm – temperatures reaching 24 degrees. Winds averaging 6.1 km/h from the south/south-west.

The measurement positions are described in Table 5, with an aerial photograph indicating their location shown in Figure 3.

TABLE 5: MEASUREMENT POSITION DESCRIPTIONS

Measurement Position	Description
MP1	Largely unattended daytime and night-time measurement of sound under free-field conditions, at a height of 1.5 metres above local ground level, located beyond the west boundary of the Site. The sound environment at this location was dominated by road traffic noise from the M5 with lesser contributions from more local surrounding roads. Noise from the operation of the poultry processing facility (2 Sisters Food Group Ltd) itself was also audible at this position, and forms part of the everyday background noise profile. Noise from construction and groundworks taking place in the adjacent field to the east was also observed during setup, with the weekday hours between 0800 and 1800 omitted to account for this extraneous noise. MP1 is considered representative of NSR1 and NSR2
MP2	Largely unattended daytime and night-time measurement of sound under free-field conditions, at a height of 1.5 metres above local ground level, located east of the M5 corridor. The sound environment at this location was dominated by road traffic noise from the M5, and to a lesser extent, road traffic travelling on the more immediate surrounding roads. MP2 is considered representative of NSR3.

Figure 3: Measurement Positions



4.3. Sound Indices

The parameters reported are the statistical index (typical) Background Sound Level, $L_{A90,T}$, as well as the average Equivalent Continuous Sound Level, $L_{Aeq,T}$ and the typical Maximum Sound Pressure Level, L_{AFmax}. An explanation of the sound units presented is given in Appendix A.

For clarity, it is noted that the background sound level ($L_{A90,T}$) is an underlying level of sound over a period, T, and might in part be an indication of relative quietness at a given location. It does not reflect the occurrence of transient and/or higher sound level events and is generally governed by continuous or semi-continuous sounds.

The measured L_{Aeq}, L_{AFmax}, and L_{AF90} sound levels are presented as time histories in a graph in Appendix B. Furthermore, the modal distribution of the measured background sound levels to derive the typical representative $L_{A90,T}$ values are presented in a graphical format in Appendix C.

4.4. Summary Results

The summarised results of the environmental sound measurements, during the daytime and night-time periods, can be seen in Table 6. Values have been rounded to the nearest whole number.

For the purposes of this assessment, the daytime period has been defined as 07:00 to 23:00 hours, and the night-time period as 23:00 to 07:00 hours, in accordance with the conventions of BS 4142:2014+A1:2019.

TABLE 6: SUMMARY OF SOUND MEASUREMENT RESULTS

Measurement Position	Period	$L_{Aeq,T}$ (dB)	$L_{AF90,T}$ (dB)	L_{AFmax} (dB)
MP1	Daytime	**48**	**39**	**70**
	Night-time	**41**	**35**	**56**
MP2	Daytime	**59**	**49**	**85**
	Night-time	**55**	**35**	**76**

5. Operational Noise Assessment

5.1. General

The prevailing noise conditions across the operational site have been determined by a partially attended noise source measurement exercise conducted during the daytime and night-time periods between Thursday 11 and Tuesday 16 July 2026. All measurements were undertaken by Archie Byard BSc (Hons) TechIOA.

5.2. Measurement Details

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445[8].

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672[9]. A full inventory of this equipment is shown in Table 7 below.

Table 7: Inventory of Sound Measurement Equipment

Position	Make, Model & Description	Serial Number	Certificate Number	Calibration Expiry Date
MP1	Rion NL-52 Sound Level Meter	01043462	TCRT25/1215	06/03/2027
	Rion NH-25 Preamplifier	43491		
	Rion UC-59 Microphone	07238		
MP2	Rion NL-52 Sound Level Meter	00320618	TCRT23/1554	18/08/2027
	Rion NH-25 Preamplifier	10626		
	Rion UC-59 Microphone	05005		
Both	Cirrus CR:515 Acoustic Calibrator	82501	1197800	17/03/2027

The microphones were fitted with protective windshields for all of the measurements.

5.3. Sound Indices and Procedure

5.3.1. Source Data

The parameters reported are based on the Equivalent Continuous Sound Level, $L_{Aeq,T}$ provided by the client. All noise-generating elements of the site have been considered for the purposes of analysis and noise modelling. An overview of the measured data is provided in Table 8 below.

5.4. Noise Modelling

[8] British Standard 7445: 2003: Description and measurement of environmental noise. BSI
[9] British Standard 61672: 2013: Electroacoustics. Sound level meters. Part 1 Specifications. BSI.

5.4.1. Noise Source Data

The static plant sound levels, as provided by the applicant, can be seen below in Table 8.

TABLE 8: NOISE SOURCE MEASUREMENT RESULTS

Source No.	Source	Sound Power Level, L_{WA} (dB)	Source Comments
1	HGV movements	95	Provided by Applicant
2	CHP 1 - 1200 kW (Container)	94	Technical Data
3	CHP 2 - Flexi 530 - 499 kW (Container)	88	Technical Data
4	Pumps for Heat System	93	Provided by Applicant
5	Pump room 1	94	Provided by Applicant
6	Pump room 2	94	Provided by Applicant
7	Pump room 3	94	Provided by Applicant
8	Pump room 4	94	Provided by Applicant
9	Chiller unit	93	Technical Data
10	Biomethane Upgrade and Co2 recovery unit	96	Provided by Applicant
11	Emergency Back-up Generator	93	Technical Data
12	Emergency Boiler (Viessmann VITOPLEX 200) Container	-	Technical Data
13	Odour Control unit/Fan (EXEON Unit)	78	Technical Data
14	Primary digester 1- Wall mounted agitators - 4 Nos.	57	Provided by Applicant
15	Primary digester 2- Wall mounted agitators - 4 Nos.	73	Provided by Applicant
16	Primary digester 3- Wall mounted agitators - 4 Nos.	73	Provided by Applicant
17	Post Digester 1- Roof mounted agitators - 3 Nos.	73	Provided by Applicant
18	Post Digester 2 - Vertical shaft agitator - 1 No.	73	Provided by Applicant
19	Post Digester 3 - Roof mounted agotators - 3 Nos.	73	Provided by Applicant
20	Separated Liquid Tank - Vertical shaft agitator - 1 No.	73	Provided by Applicant

Source No.	Source	Sound Power Level, L_{WA} (dB)	Source Comments
21	Emergency Gas Flare	78	Technical Data
22	Mobile Equipmet Loader 1	90	Provided by Applicant
23	Mobile Equipment Loader 2	90	Provided by Applicant
24	Primary Digester - Gas Holder Blowers - 6 Nos.	91	Provided by Applicant
25	I-Grind Straw Processing Unit	83	Technical Data

The sound power levels are based on robust assumptions as provided by the applicant, candidate manufacturer data used successfully on comparable developments, and/or generic sound power levels representative of the plant type where specific equipment has not yet been selected.

5.4.2. Calculation Process

Calculations were carried out using Cadna/A, which undertakes its calculations in accordance with guidance given in ISO 9613[10], which considers a worst-case downwind propagation to all receptors.

5.4.3. Model Assumptions

Given that the land between proposed development and nearest receptors is largely soft, the ground factor has been set to 0.85, within the calculation software, with 2 orders of reflection. The site itself, being predominantly concrete has been calculated using a ground factor of 0.2, including all other developed land and large areas of road or tarmac. It has been assumed that all processes will occur simultaneously, representing a worst-case scenario. HGV movements in the daytime (between the hours of 07:00 – 17:30) have been modelled based on the maximum number of HGV movements of 8 deliveries an hour, which allows for 84 inbound and 84 outbound (168 total) to and from the site.

In order to accurately model the land surrounding the development, a geo-referenced model was produced, which was based on data provided by the Ordnance Survey, along with associated LIDAR Composite DTM topographic contours sourced from Defra.

5.4.4. Mitigations by Design

It is also recommended to erect a 4m high noise barrier at the Site boundary facing the closest NSRs as shown by the orange line in Figure 4 below. This is predicted to reduce the noise impact from the Proposed Development at least by 1 dB at the nearest NSR.

The noise barrier should be solid, continuous, sealed at all interfaces and have a surface density in the order of 15 kg/m^2, or provide a minimum sound reduction performance of 15-20 dB.

[10] *ISO 9613-1:1993 and ISO 9613-2:2024: Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere and Part 2: Engineering method for the prediction of sound pressure levels outdoors*

Figure 4: 4m Acoustic Fence Location



These mitigation measures have been incorporated into the calculations taken forward for assessment of residual effects.

5.4.5. Specific Sound Level Maps

The sound map showing the specific sound level emissions from the Proposed Development can be seen in Figure 5 and Figure 6 for daytime and night-time periods respectively.

Figure 5: Specific Sound Level Map - Daytime

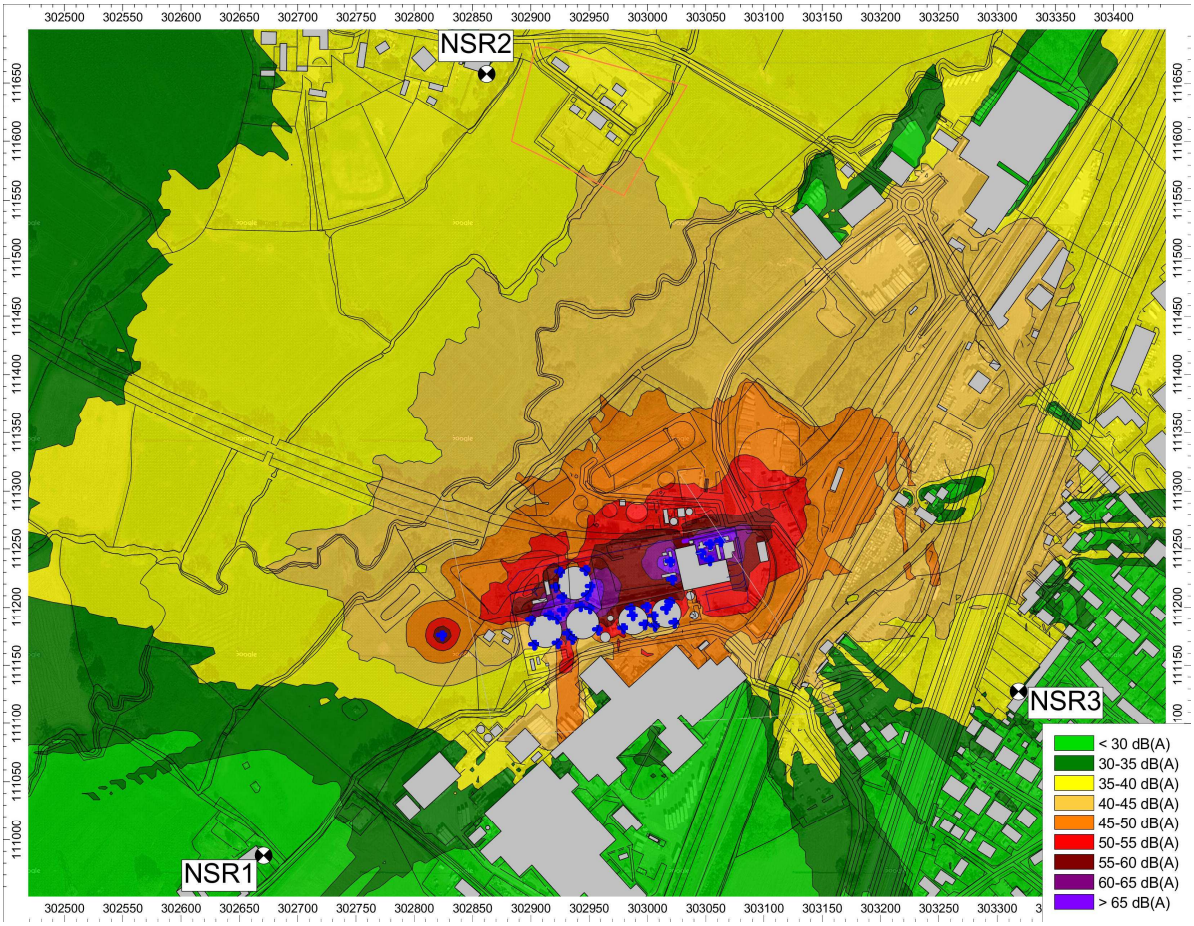
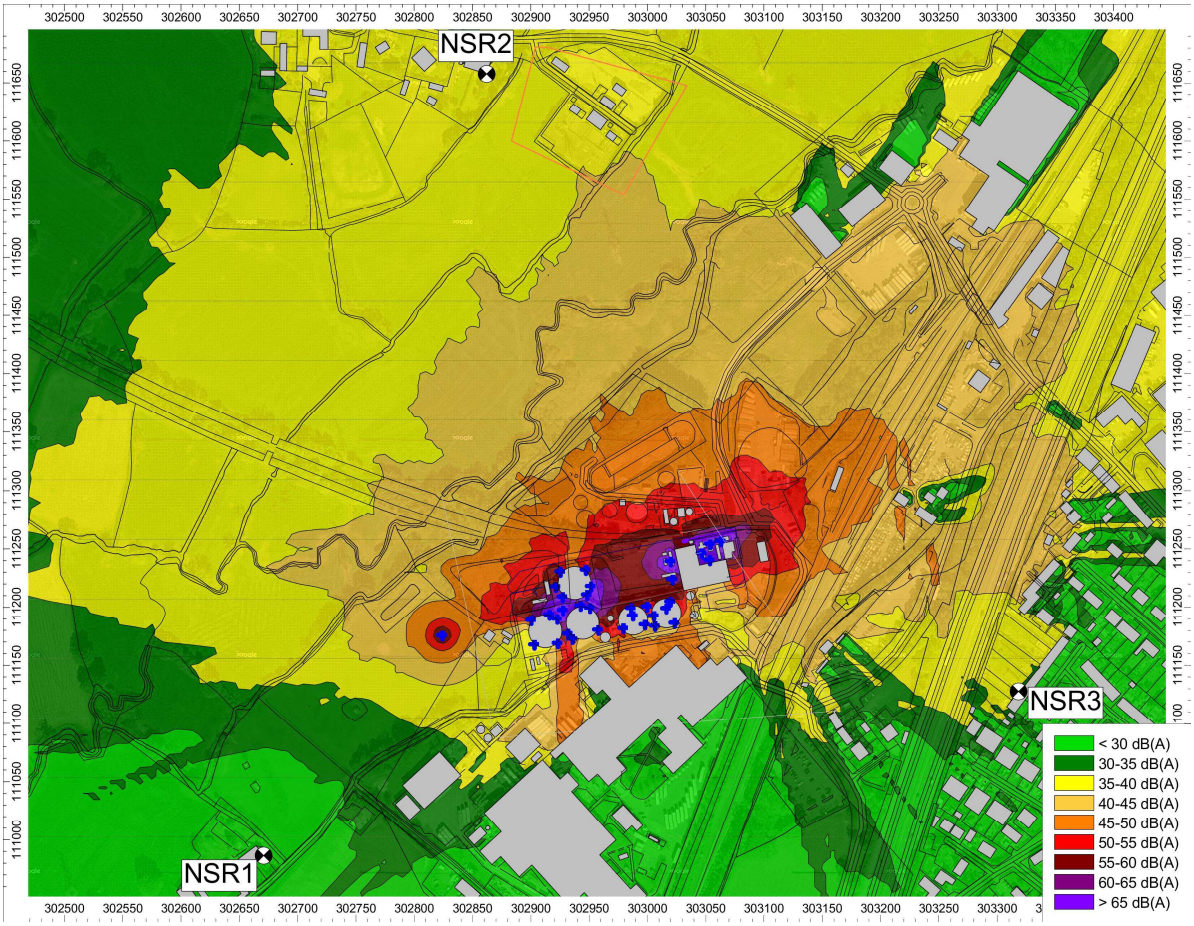

NSR2
NSR3
NSR1
< 30 dB(A)
30-35 dB(A)
35-40 dB(A)
40-45 dB(A)
45-50 dB(A)
50-55 dB(A)
55-60 dB(A)
60-65 dB(A)
> 65 dB(A)

FIGURE 6: SPECIFIC SOUND LEVEL MAP – NIGHT-TIME



5.4.6. Specific Sound Level Summary

A summary of the modelled specific sound levels at the closest NSRs, based on the sound maps shown in Figure 5 and Figure 6 can be seen below in Table 9.

TABLE 9: PREDICTED SPECIFIC SOUND LEVEL SUMMARY

NSR	Period	Specific Sound Level (dB)
1	Day (07:00-23:00)	27
	Night (23:00-07:00)	27
2	Day (07:00-23:00)	37
	Night (23:00–07:00)	37
3	Day (07:00-23:00)	34
	Night (23:00–07:00)	33

The specific levels shown in the table above are based on all of the static plant operating at once. The daytime specific sound level includes the maximum number of HGV movements permitted for this site, constituting a worst-case scenario.

6. ASSESSMENT

6.1. Rating Penalty

Section 9 of BS 4142:2014+A1:2019 describes how the rating sound level should be derived from the specific sound level, by deriving a rating penalty.

BS 4142:2014+A1:2019 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

a) subjective method;
b) objective method for tonality;
c) reference method."

The subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS 4142:2014+A1:2019, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS 4142:2014+A1:2019 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

Tonality

A rating penalty of +2 dB is applicable for a tone which is *"just perceptible"*, +4 dB where a tone is *"clearly perceptible"*, and +6 dB where a tone is *"highly perceptible"*.

Impulsivity

A rating penalty of +3 dB is applicable for impulsivity which is *"just perceptible"*, +6 dB where it is *"clearly perceptible"*, and +9 dB where it is *"highly perceptible"*.

Other Sound Characteristics

BS 4142:2014+A1:2019 states that where *"the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distance against the residual acoustic environment, a penalty of +3 dB can be applied."*

Intermittency

BS 4142:2014+A1:2019 states that when the *"specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time … if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied."*

6.1.1. Rating Penalty Assessment

Considering the content of Section 6.1, an assessment of the various sound sources associated with the Development, in terms of whether any rating penalties are applicable, has been detailed in Table 10 below.

TABLE 10: RATING PENALTY ASSESSMENT

Source	Tonality	Impulsivity	Intermittency	Other Sound Characteristics	Discussion
Anaerobic Digestion Energy Facility (Day)	+2 dB	0 dB	0 dB	+3 dB	Impulsivity is not a characteristic of any static or mobile plant on-site. Owing to the absence of spectral source data, with potential for items of plant to be in any way tonal has been accounted for via a +2 penalty as a conservative assumption. The static plant is not considered to be intermittent (assuming continuous operation) as the dominant noise source on site, and so no penalty has been applied as a result. However, due to their intermittent nature, and the uncertainty surrounding exact arrival and departure times, HGV movements are significant during the daytime period. Although these are not strictly intermittent, the mobile nature of the noise in the arrival and departure of large vehicles has been considered in a +3 dB rating penalty.
Anaerobic Digestion Energy Facility (Night)	+2 dB	0 dB	0 dB	0 dB	Impulsivity is not a characteristic of any static or mobile plant on-site. Owing to the absence of spectral source data, with potential for items of plant to be in anyway tonal has been accounted for via a +2 penalty as a conservative assumption. intermittent were not audible at distance over the dominant noise sources

					on site. The static plant is not considered to be intermittent (assuming continuous operation) as the dominant noise source on site, and so no penalty has been applied as a result. No HGV movements are to occur during the night-time period, so no penalty has been applied.

6.2. Uncertainty

BS 4142:2014+A1:2019 requires that the level of uncertainty in the measured data and associated calculations is considered in the assessment. The Standard recommends that steps should be taken to reduce the level of uncertainty.

6.2.1. Measurement Uncertainty

BS 4142:2014+A1:2019 states that measurement uncertainty depends on a number of factors, including the following, which are applicable to the Development:

"
...
b) the complexity and level of variability of the residual acoustic environment;
...
d) the location(s) selected for taking the measurements;
...
g) the measurement time intervals;
h) the range of time when measurements have been taken
i) the range of suitable weather conditions during which measurements have been taken;
...
k) the level of rounding of each measurement recorded; and
l) the instrumentation used."

Each of the measurement uncertainty factors outlined above have been considered and discussed in Table 11 below.

TABLE 11: MEASUREMENT UNCERTAINTY FACTORS

Measurement Uncertainty Factor Reference	Discussion
b)	Residual acoustic environment is simple and repetitive, in that it is dominated by road traffic sound and operational noise from the poultry processing operations.
d)	All measurements were taken at positions that were considered to be acoustically representative of the nearest noise sensitive receptors.
g)	Measurement time intervals were set in accordance with BS 4142:2014+A1:2019, with ambient, residual and background sound measurements being undertaken over a statistically robust period.
h)	Ambient sound measurements have been undertaken over a statistically robust period over the course of 5 days, including daytime and night-time periods, inclusive of a weekend.

i)	Weather conditions were locally monitored and only one brief weather event was noted (light drizzle during setup, ending by 14:00) resulting in no surveyed periods being unsuitable for analysis.
k)	Measured values were rounded to 0.1 dB, therefore rounding would not have had a significant impact.
l)	The acoustic measurement equipment accorded with Type 1 specification of British Standard 61672, and were deployed with appropriate wind shields.

The overall level of measurement uncertainty would not affect the conclusions of the assessment.

6.2.2. Calculation Uncertainty

BS 4142:2014+A1:2019 states that calculation uncertainty depends on a number of factors, including the following, which are applicable to the Proposed Development:

"
...
b) uncertainty in the operation or sound emission characteristics of the specific sound source and any assumed sound power levels;
c) uncertainty in the calculation method;
d) simplifying the real situation to "fit" the model (user influence on modelling); and
e) error in the calculation process."

Each of the calculation uncertainty factors outlined above have been considered, and the good practice employed for reducing uncertainty is discussed in Table 12 below.

TABLE 12: CALCULATION UNCERTAINTY FACTORS

Calculation Uncertainty Factor Reference	Discussion
b)	Sound source levels are based on robust candidate plant data, to be achieved by the design.
c)	Calculations were undertaken in accordance with ISO 9613-2, which is considered a *"validated method"* by BS 4142:2014+A1:2019. Restricting attention to moderate downwind conditions of propagation, limits the effect of variable meteorological conditions along the propagation path on sound attenuation to reasonable values.
d)	The real situation has not been simplified for the purposes of this assessment.
e)	ISO 9613-2 estimates the accuracy of use of the calculation method, which varies based on the separation distance between the source and receiver, up to a maximum of 1km.

In this instance the level of calculation uncertainty is not expected to affect the conclusions of the assessment. It is also noted that because the assessment considers a worst-case scenario, such as downwind sound propagation (which in reality cannot happen at all NSRs at the same time) the relevance of the uncertainty is further reduced.

6.3. Rating Sound Level

Incorporating the rating penalties detailed in Section 6.1 with the measured specific sound levels, as detailed in Table 9, the rating sound levels have been derived and have been detailed in Table 13 below.

TABLE 13: RATING SOUND LEVELS

NSR	Period	Specific Sound Level (dB)	Rating Penalty (dB)	Rating Sound Level (dB)
1	Day	27	+5	32
	Night	27	+2	29
2	Day	37	+5	42
	Night	37	+2	39
3	Day	34	+5	39
	Night	33	+2	35

6.4. BS 4142:2014+A1:2019 Assessment

The rating sound level, as calculated from the measured specific sound level, has been assessed in accordance with BS 4142:2014+A1:2019, at the NSRs.

The resultant assessment summary, during the daytime period, can be seen in Table 14 below.

TABLE 14: DAYTIME BS 4142:2014+A1:2019 ASSESSMENT SUMMARY

NSR	Rating Sound Level (dB)	Uncertainty (dB)	Daytime Background Sound Level (dB)	Excess of Rating over Daytime Background Sound Level (dB)
1	32	0	39	**-7**
2	42	0	39	**+3**
3	39	0	49	**-10**

During the daytime, it can be seen that the site activities give rise to a *"Low Impact"* at all receptors in BS 4142:2014+A1:2019 terms, depending upon the context.

The resultant assessment summary, during the night-time period, can be seen in Table 15 below.

TABLE 15: NIGHT-TIME BS 4142:2014+A1:2019 ASSESSMENT SUMMARY

NSR	Rating Sound Level (dB)	Uncertainty (dB)	Night-time Background Sound Level (dB)	Excess of Rating over Night-time Background Sound Level (dB)
1	29	0	35	**-6**
2	39	0	35	**+4**
3	35	0	35	**0**

During the night-time, it can be seen that the site activities give rise to a *"Low Impact"* at all receptors in BS 4142:2014+A1:2019 terms, depending upon the context.

6.5. Discussion on Context

The results set out in Table 14 and Table 15 identify that the operation of the scheme, as proposed, can occur without significantly affecting the amenity of the closest residential NSRs to the Site during the daytime and night-time, on the basis of a worst-case operational scenario.

BS 4142:2014+A1:2019, however, recognises the importance of the context in which a sound occurs when assessing impacts.

It is noted that the assessment considers a worst-case scenario, with all equipment operating at the same time and downwind sound propagation to all NSRs.

The area is industrial in nature, with that context being longstanding, with residential development having encroached upon the industrial activity, with residents apparently being habituated to that environment. It is noted that the existing 2 Sisters Food Group Ltd processing site is well established, and the adjacent AD site has previously benefitted from a permit to operate.

The absolute level of the predicted specific sound from typical operations is not high but is reasonably continuous during the working daytime period and not noted to be audibly intrusive, given the overall mixed acoustic character of the area.

Penalties have also been applied for tonality and intermittency to account for the potential audibility of such noise characteristics.

Furthermore, the predicted specific levels presented in Table 9 demonstrate that indoor ambient noise levels would be some 3 to 8 dB below the British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS 8233:2014)[11] criteria of 30 dB $L_{Aeq,T}$ for bedrooms at night, when considering a 10-15 dB sound reduction for a partially open window for ventilation. This ensures that the internal amenity of the closest residential dwellings would not be compromised by sound.

As part of the wider context and benefits of the proposed scheme, it is also important to note the role that these type of energy developments fulfil, in working towards achieving the 'Net Zero Strategy: Build Back Greener' from the Department for Business, Energy & Industrial Strategy, which sets out policies and proposals for decarbonising all sectors of the UK economy to meet the net zero target by 2050.

[11] BSI, British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings,* 2014.

6.6. Discussion on Remediation

The predominant source of noise breakout from the AD site can be attributed to the CO2 Upgrade and PRV systems, CHP, and pumps for the heat system, which are all situated north of the site nearest to the receptors at NSR2.

Mitigation of noise impacts from these elements is achieved through erection of a 4m high noise barrier at the Site boundary facing the closest NSRs. This is predicted to reduce the noise impact from the Proposed Development at least by 1 dB at the nearest NSR.

The noise barrier will be solid, continuous, sealed at all interfaces and have a surface density in the order of 15 kg/m^2, or provide a minimum sound reduction performance of 15-20 dB.

The assessment of the development provided in Section 6 takes account of the mitigative effects of the acoustic screen, based on an outline specification set out above, with further details provided in Appendix D.

7. Best Available Techniques (BAT)

Inherent Plant Selection

The proposed plant has been selected on the basis of either manufacturer technical data or robust candidate sound power level data that is known to be achievable for equipment of this type. Where practicable, preference has been given to inherently quieter equipment, with the assessment adopting maximum sound power levels that must be achieved at design stage. In particular, the CHP units (1200 and Flexi 530) have been specified as containerised systems, which provide a greater degree of acoustic containment than equivalent unenclosed plant. Compliance with the maximum sound power levels adopted within this assessment will ensure that the predicted operational noise impact remains acceptable at nearby noise-sensitive receptors.

Building Orientation and Layout

The proposed development is constrained by the existing poultry processing facility and established anaerobic digestion plant, limiting opportunities to fundamentally alter the site layout. However, arrangement of the proposed equipment provides natural screening afforded by existing and proposed buildings, digesters and other structures, thereby reducing direct noise propagation towards nearby receptors where practicable. In addition, the digestor circulation pumps will be housed within a dedicated pump room, allowing the building envelope to provide significant attenuation of plant noise emissions.

Acoustic Enclosures / Barriers

Where practicable, plant has been specified within purpose-built acoustic enclosures or as containerised units to minimise airborne noise breakout at source. Furthermore, the assessment includes a proposed acoustic barrier positioned to the north of the CO_2 upgrading plant, PRV systems, CHP and associated heating equipment. This barrier provides screening towards the most affected residential receptor (NSR2), contributing to the overall compliance demonstrated within this assessment.

Silencers and Attenuation

The principal items of fixed plant considered within the assessment do not rely upon dedicated acoustic silencers as a primary means of noise control. Instead, noise mitigation is achieved through acoustically considerate plant selection, enclosure within buildings or containerised units, and the use of local acoustic screening. Should any ventilation openings, exhausts or ducted services be introduced during the detailed design stage, these should incorporate appropriately specified acoustic attenuators where necessary to ensure that the maximum sound power levels assumed within this assessment are maintained.

Maintenance of Plant

Plant should be regularly maintained to ensure that no squeaks, rattles or other atypical noise should arise, which may introduce and audible off-site character.

Operational Controls

Where possible, material drop heights should be reduced to a minimum to ensure that site operations do not give rise to additional and unnecessary noise generation.

Where practicable, the scheduling of deliveries and unloading should be coordinated to avoid heavy goods vehicles queuing or arriving in unison, with signage to encourage engines to be switched off when idle, again to avoid unnecessary noise generation.

Strict adherence to permitted operating times for heavy goods vehicles must be enforced, with no deliveries or operations of this sort outside the proposed hours of 07:00 – 17:30.

HGVs operating within the site should be fitted with directional, broad-band reversing alarms, thus reducing the noise impact arising due to tonal characteristics and further reducing potential audibility.

8. Conclusion

inacoustic has been commissioned to prepare a Noise Impact Assessment for an Anaerobic Digestion Energy Facility on on Land off Hide Market Road, Willand, Cullompton (EX15 2FP), as part of an Environmental Agency Permit Application.

At all receptors, during both the daytime and night-time periods, the site activities are likely to give rise to a *"Low Impact"*, in BS 4142:2014+A1:2019 terms.

Noise arising from the operation of the site has been modelled and predicted in the context of the typical background sound conditions in the area and assessed under worst-case scenario conditions.

The low impact identified through modelling and assessment demonstratesthat no further mitigation is required beyond that already incorporated into the design of the non-operational AD facility on the site; however, a range of basic operational measures has also been recommended which will ensure that the noise impact is kept to a minimum during day-to-day operations.

When operated in the manner considered in this report, the Site is considered to be compliant with the requirements of the Noise and Vibration Management: Environmental Permits, demonstrating BAT where possible, as outlined in Section 7

9. APPENDICES

9.1. Appendix A – Definition of Terms

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE A1: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

9.2. Appendix B – Sound Measurement Results

FIGURE 7: MEASURED TIME HISTORY – MP1

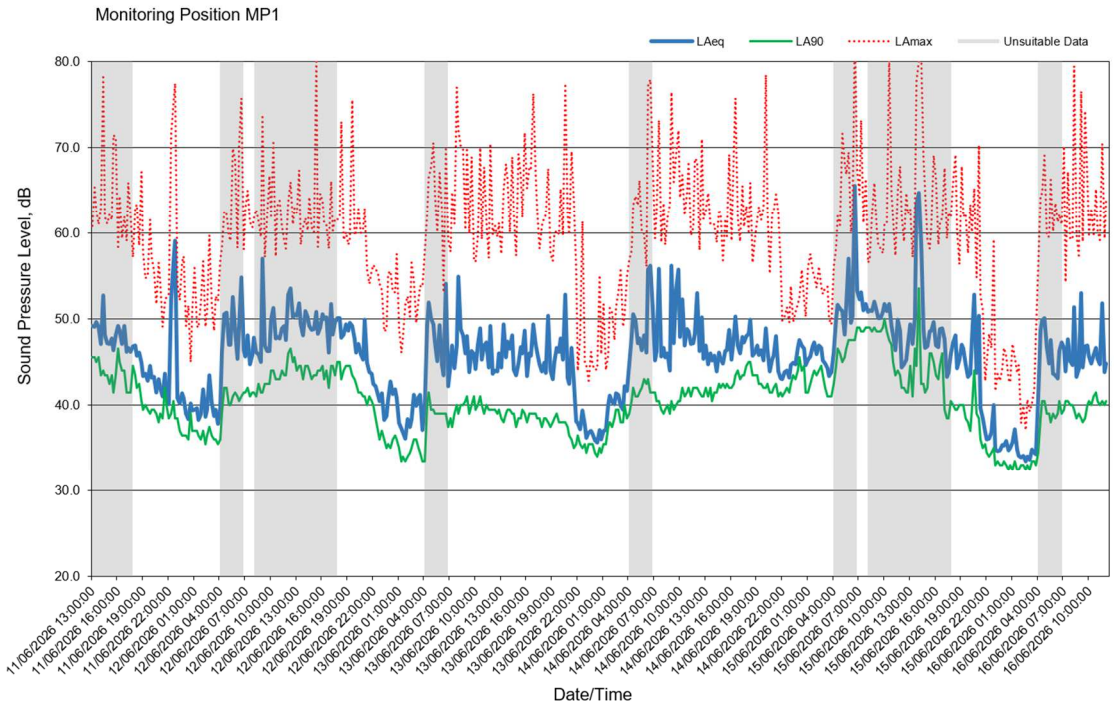
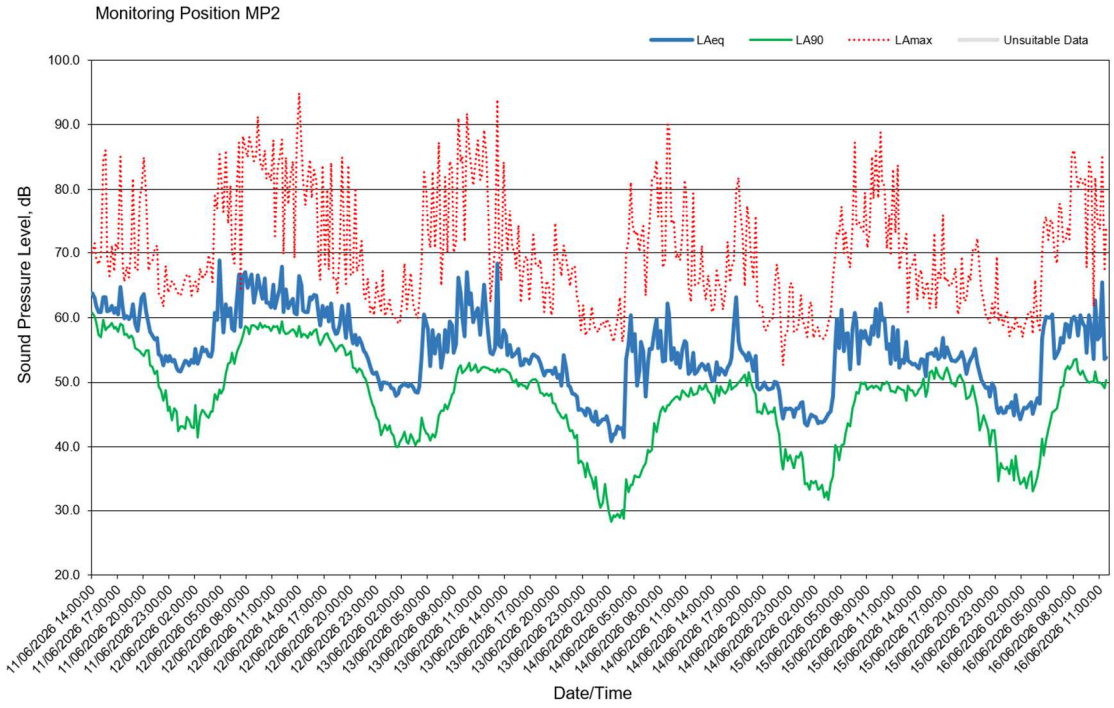


FIGURE 8: MEASURED TIME HISTORY – MP2



9.3. Appendix C – Calibration Certificates

CERTIFICATE OF CALIBRATION

Date of Issue: 06 March 2025 **Certificate Number: TCRT25/1215**

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	Inacoustic Ltd Unit 4 The Dry Mount Wellington Mine Chacewater Truro Cornwall, TR4 8RJ			
Order No.	2025-NL52-REPAIRS			
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator			
Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	01043462
	Rion	Firmware		2.1
	Rion	Pre Amplifier	NH-25	43491
	Rion	Microphone	UC-59	07238
	Rion	Calibrator	NC-75	34334830
		Calibrator adaptor type if applicable		NC-75-022
Performance Class	1			
Test Procedure	TP 2.SLM 61672-3 TPS-49 *Procedures from IEC 61672-3:2006 were used to perform the periodic tests.*			
Type Approved to IEC 61672-1:2002	YES	Approval Number	21.21 / 13.02	
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003			
Date Received	04 March 2025	ANV Job No.	TRAC25/03107	
Date Calibrated	06 March 2025			

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	Initial Calibration		

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY: **CALIBRATION MAINTENANCE & REPAIR LTD**

DATE OF ISSUE: 18 August 2025 CERTIFICATE NUMBER: **1185952**

BS EN ISO 9001:2015 APPROVED BY **LRQA**

CERT No 10045223

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Approved Signatory

Electronically Authorised Document

☐ P K CLARK ☐ R LOMAX
☐ R J WADE ☐ J FRYER
☐ M A FROST ☐ M FOY
☒ M S PARDOE

Customer	**INACOUSTIC (BS8)**
Order No	**250804**
Equipment Description	**SOUND LEVEL METER**
Manufacturer	**RION CO LTD**
Model	**NL-52**
Serial No	**00320618**
Ident No	**NOT KNOWN**
Calibrated By	**Ross Osborne**
Date Of Calibration	**18 August 2025**

INSTRUMENT CONDITION

Adjustments Made	**YES**
Repairs Made	**NO**

ENVIRONMENT

The instrument was placed in the laboratory environment for a minimum period of 4 hours and was operated prior to calibration.

Measurements were made in ambient conditions of 22 ºC ± 3 ºC and 45 %RH ± 15 %RH.

PROCEDURE

Measurements were performed in accordance with the in house laboratory procedure 4642
All equipment used has been calibrated/verified against measurement standards or reference equipment traceable to International or National Measurement Standards as specified in our control procedure WI64
The results attached to this certificate refer to measurements made at the time of test and not to the instrument's ability to maintain calibration.
The attached results are a true record of the levels required to confirm the instrument meets the original stated manufacturer's specification and accuracy where shown.

CERTIFICATE OF CALIBRATION

ISSUED BY: **CALIBRATION MAINTENANCE & REPAIR LTD**

DATE OF ISSUE: 17 March 2026 CERTIFICATE NUMBER: **1197800**

BS EN ISO 9001:2015 APPROVED BY **LRQA**

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☒ M YEATES

Customer	**INACOUSTIC (BS8)**
Order No	**100326**
Equipment Description	**ACOUSTIC CALIBRATOR**
Manufacturer	**CIRRUS RESEARCH PLC**
Model	**CR:515**
Serial No	**82501**
Ident No	**NOT KNOWN**
Calibrated By	**Ross Osborne**
Date Of Calibration	**17 March 2026**

INSTRUMENT CONDITION

Adjustments Made	**NO**
Repairs Made	**NO**

ENVIRONMENT

The instrument was placed in the laboratory environment for a minimum period of 4 hours and was operated prior to calibration.

Measurements were made in ambient conditions of 22 ºC ± 3 ºC and 45 %RH ± 15 %RH.

PROCEDURE

Measurements were performed in accordance with the in house laboratory procedure 2124
All equipment used has been calibrated/verified against measurement standards or reference equipment traceable to International or National Measurement Standards as specified in our control procedure WI64
The results attached to this certificate refer to measurements made at the time of test and not to the instrument's ability to maintain calibration.
The attached results are a true record of the levels required to confirm the instrument meets the original stated manufacturer's specification and accuracy where shown.

9.4. Appendix D – Outline Specification for Acoustic Fence

The following outline advice is provided as indicative specifications for the installation the acoustic barriers presented in Section 6.6, in order to reduce the adverse impact of environmental sound from the proposed plant.

9.4.1. Performance Specification

The acoustic screen shall be constructed from a combination of materials as described below that provide a minimum mass of 15 kg/m^2 or a minimum sound insulation index as specified in the following table when tested in a laboratory in accordance with BS EN ISO 10140-1:2021[12].

TABLE 16: SOUND REDUCTION PERFORMANCE, R (DB)

	Octave Frequency Band (Hz)						Rw
	125	250	500	1000	2000	4000	
	Sound Reduction Performance, R dB						
Minimum Sound Reduction Index of Screen Panel	10	11	16	22	22	22	**20**

The screen could be built from any of the following materials:

- Concrete;
- Masonry block;
- Brick;
- Close boarded timber fence;
- Specialist acoustic barrier design.

[12] ISO 10140-1:2021 Acoustics – Laboratory measurement of sound insulation of building elements 'Part 1: Application rules for specific products'. BSI

9.4.2. Constructional Specification

The core of the screen shall comprise a material with a minimum mass of 15 kg/m^2 or alternative specification achieving the SRI performance requirements identified in Table 16.

Panels, support channels, finishing strips and acoustic infill/lining materials shall be manufactured as necessary to provide adequate protection against external conditions.

Any penetrations of the acoustic screen for ventilation ducts, pipework and electrical cables, etc. shall be sealed to maintain the acoustic integrity of the screen. All doors shall be provided with compressible seals to the door frame and threshold.

All elements of the system shall comply with the required fire safety performance requirements.

9.5. Appendix E – Qualifications etc

The company is directed and led by Antony Best BSc (Hons) MIOA and Neil Morgan MSc MIOA, who have a combined experience of over 30 years in the acoustic industry; covering a range of project types and assessment scenarios, including numerous submissions to the Environment Agency.

Archie Byard BSc (Hons) TechIOAproduced this report, and it was reviewed by Neil Morgan MSc MIOA.

Professional Qualifications for Neil Morgan

- MSc in Applied Acoustics from the University of Derby
- Institute of Acoustics Post Graduate Diploma in Acoustics and Noise Control, Institute of Acoustics, University of the West of England
- BSc (Hons) in Surveying for Resource Development from the University of Glamorgan
- Corporate Member of the Institute of Acoustics (MIOA)

Professional Experience for Neil Morgan

- 2017 to Present inacoustic (Director)
- 2013 to 2017 MLM Acoustics (Technical Director)
- 2009 to 2013 Innovate Acoustics (Associate Director)
- 2007 to 2009 SLR Consulting (Senior Consultant)
- 2006 to 2007 Grontmij (Senior Engineer)
- 1996 to 2006 Capita Symonds (Various Positions)

Professional Qualifications for Archie Byard

- BSc (Hons) in Audio and Music Technologyfrom the University of the West of England
- TechnicalMember of the Institute of Acoustics

Professional Experience for Archie Byard

- 2024 to Present inacoustic (Senior Acoustic Consultant)
- 2021 to 2024 inacoustic(Acoustic Consultant)
- 2019 to 2020 MACHAcoustics (Acoustic Technician)

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