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B V Dairy, Shaftesbury

Anaerobic Digestor

Operation Environmental Noise Assessment

09 Sep 2024

Quality Management

Job No	EMT-09910		
Project	B V Dairy, Shaftesbury		
Location	Newcastle upon Tyne Office		
Title	Permit Application Anaerobic Digestor Operation Environmental Noise Survey		
Prepared for	B V Dairy, Wincombe Lane, Shaftesbury, SP7 8QD		
Document Ref	EMT-09910_Rev0	**Issue / Revision**	Rev0
Date	09 Sep 2024		
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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked
Rev0	09/09/2024	First issue	DC	SW

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1. Executive Summary

Element Materials Technology were commissioned to undertake an on-site boundary and offsite environmental sound survey at identified locations surrounding the B V Dairy (BVD), Wincombe Lane, Shaftesbury, SP7 8QD, Anaerobic Digestor (AD) installation (herein referred to as 'Site').

The site is located at grid reference (ST8755423633, Easting 387554, Northing 123633.

The Environment Agency (EA) requested the operator, BVD, to undertake a site-specific noise assessment of the AD installation as a requirement of the Environmental Permitting Regulations (EPR) Permit.

1.1 Environmental Permitting Regulations (EPR)

The Site is registered on the Waste Carriers and Brokers Public Register for England; Ref: CBDU490528[1], dated 22 June 2023.

The Site is currently listed on the EPR Waste Operations for England Ref: EPR/HP3492EZ[2], registered as category A23: Biological Treatment Facility.

The Permit allows the operator to carry out anaerobic digestion of wastes and use of the biogas in compression and spark ignition engines with an aggregate rated thermal input of up to 3 megawatts. The total quantity of waste that can be accepted at the site must not exceed 90,000 tonnes per year.

1.2 Noise Assessment Summary

To assist in the understanding of technical aspects referred to in this report, a glossary of acoustic terms can be found in **Appendix A**.

To inform the noise impact assessment, existing levels of noise have been quantified through a day and night-time sound measurement survey to establish site boundary and off-site operational sound levels.

Measurements were obtained at representative receptor locations, between 30 July 2024 and 1 August 2024.

The sound survey was conducted over typical weekday and night operations. On-site sound source measurements were also taken of key fixed and mobile plant identified during a site walkover, located within the AD installation boundary and around the BVD wider site.

On arrival at Site 30 July 2024, the AD plant was confirmed to be operating in a 'flaring' state; with the containerised gas generator off due to maintenance requirements. Operating conditions were

[1] Available at URL: https://environment.data.gov.uk/public-register/waste-carriers-brokers/registration/CBDU490528?__pageState=result-all. Accessed 23/07/24.

[2] Available at URL: https://environment.data.gov.uk/public-register/waste operations/registration/HP3492EZ?__pageState=result-waste-operations. Accessed 23/07/24.

confirmed to be ‘typical’ from 13:00hrs on 31 July 2024 through until the completion of the attended and unattended site-specific surveys.

The soundscape during the daytime reference periods is influenced by intermittent road traffic along Wincombe Lane, vehicular movements into residential housing estates, agricultural sound sources and general neighbourhood activity. The Site process forms part of the existing soundscape.

The BS4142 assessment of the AD installation considers ‘Low impact depending on the context’ at all NSRs during the reference daytime and night-time periods.

The noise survey data presented in this report demonstrates that BVD AD operation on a day and night do not present an adverse impact on the noise levels at the surrounding residential receptors.

Additional noise mitigation measures are not deemed necessary.

There is no perceptible vibration arising at the site boundary due to the site operations. No mitigation is required.

Therefore, in conclusion, through taking all pertinent factors into consideration, the context and the absolute sound level for each of the identified receptors, the impact is not considered significant.

1.2.1 Recommendations

It is recommended that the noise management strategy is continued to be enforced by site personnel. Where applicable, sub-contractors or transport suppliers are informed of the site specific NMP requirements. BVD should routinely review the Noise Management Plan (NMP).

Site maintenance and walkovers should be conducted regularly to ensure that equipment is functioning properly, and any mitigation measures remain effective. If a noise complaint is received, BVD should investigate and monitor noise levels from the site at the receptors.

Procurement of new or replacement plant should follow Best Practice Measures (BPM) and demonstrate Best Available Technology (BAT) in line with EA permit requirements.

2. Introduction

2.1 Project background

Element Materials Technology Environmental UK Limited was commissioned by B V Dairy (BVD) to undertake an environmental noise survey and assessment during 'typical' site operations at the Wincombe Lane, Shaftesbury, SP7 8QD site, (herein referred to as 'Site').

The site is located at grid reference (ST8755423633, Easting 387554, Northing 123633.

2.2 Environmental Permitting Regulations (EPR)

The Site is registered on the Waste Carriers and Brokers Public Register for England; Ref: CBDU490528, dated 22 June 2023.

The Site is currently listed on the EPR Waste Operations for England Ref: HP3492EZ, with site category A23: Biological Treatment Facility.

The Permit allows the operator to carry out anaerobic digestion of wastes and use of the biogas in compression and spark ignition engines with an aggregate rated thermal input of up to 3 megawatts. The total quantity of waste that can be accepted at the site must not exceed 90,000 tonnes per year.

2.3 Noise and Vibration Requirements

The Environment Agency (EA) requested the operator, BVD to undertake a site-specific sound assessment of the AD installation only, as a requirement of the Environmental Permitting Regulations (EPR) Permit.

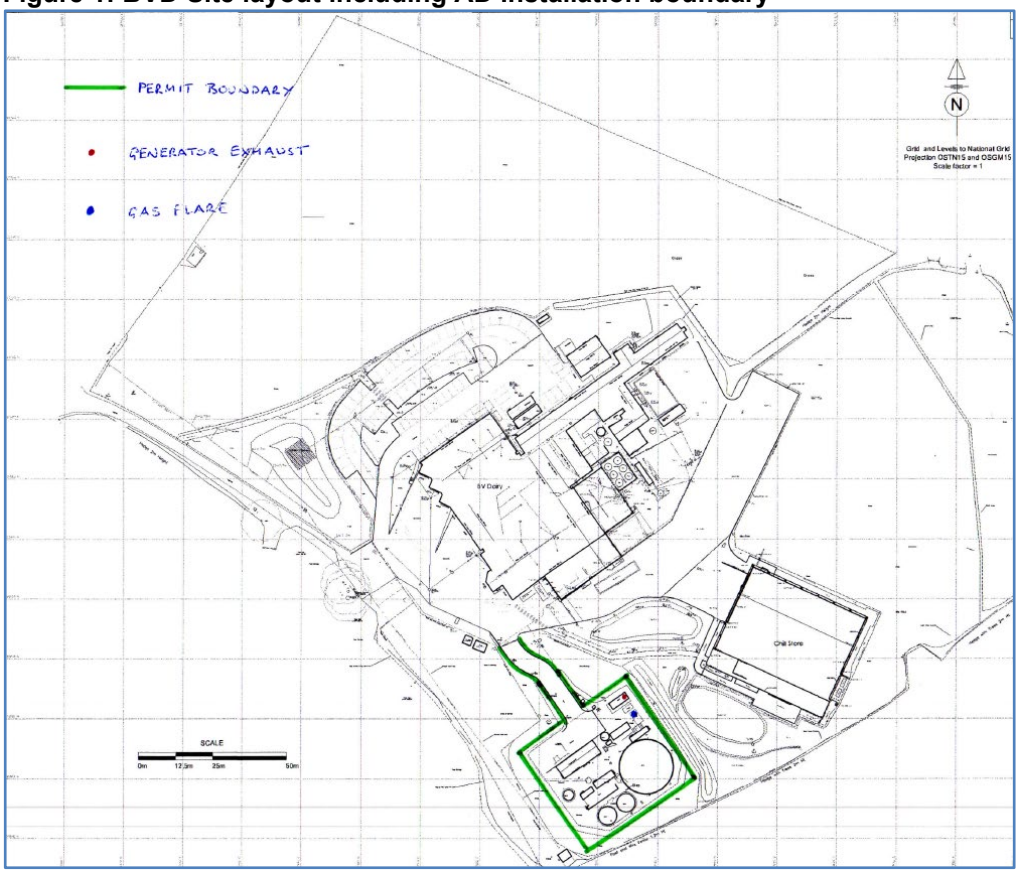
2.4 Site Description

The AD installation is located at the BVD site Wincombe Lane, Shaftesbury, SP7 8QD with the process operational 24hrs per day, 7 days a week.

The AD installation site is detailed in **Figure 1**. Fixed plant comprises the containerised gas generator, cooling plant, flare package, pumps, silo pumps, a laboratory, compressor room, and boiler room. Mobile plant within the AD boundary consists of occasional Forklift Trucks (FLTs) and Heavy Goods Vehicles (HGVs) tanker deliveries/collections.

Across the main BVD site, site-specific mobile plant comprises of FLTs used to load/unload HGVs and distribute materials to/from storage areas, tanker deliveries, and employee vehicular movements. The main BVD site also comprises fixed plant, specifically, chiller/cooler units, refrigerated reefer trailers and air handling plant.

Figure 1: BVD Site layout including AD installation boundary



Source: Supplied by BVD. Drawing No. 21314-500-01-REV D (Site Level) Brunel Surveys Ltd, Feb 2020.

The site is set in a mixed-use location, off Wincombe Road, which is also the main access route. The A350 Christy's Lane is approximately 850m distance which leads onto Longmead Industrial Estate, comprising of various industrial and commercial premises.

Shaftesbury C of E school playing fields are located along Wincombe Road, some 220m from the site entrance, with the school main buildings >400m from the BVD site boundary.

Newly formed residential dwellings are located >240m from the AD installation boundary to the north-west. Additional residential properties are situated at Great Ground, 190m to the west and at Maple Road (200m) from the AD site boundary, separated by agricultural fields.

The soundscape within the locale of NSRs comprises of contributions from other notable sound sources including residential area traffic, neighbourhood activities and low level operational fixed and mobile plant noise from the main BVD site.

2.5 Scope of Works

The scope of works was determined as:

- Determine the full requirements of the noise assessment including methodology, duration and locations for the baseline noise survey.
- Obtain unattended and attended source noise measurements for up to 24hrs at the AD installation boundary.
- Based on the measured background noise levels obtained during the survey, and with reference to the guidance in BS 4142:2014+A1:2019 assess plant noise emissions from the AD installation only.
- Advise on methods for acoustic controls, as appropriate.
- Report findings of assessment.

3. Policy and Guidance

The following relevant legislation and guidance documents were considered whilst undertaking this survey assessment.

3.1 Legislative and policy background

This noise survey assessment takes account of the following national legislation:

- The Environmental Protection Act 1990[3].
- The Control of Pollution Act 1974 (CoPA)[4].
- National Planning Policy Framework (NPPF), 2023[5]
- Noise Policy Statement for England, 2010[6]
- National Planning Practice Guidance (NPPG)[7]

3.2 Guidance

3.2.1 British Standard (BS) 7445-1:2003[8]

This Standard provides details of the instrumentation and measurement techniques to be used when assessing environmental noise and defines the basic noise quantity as the continuous A-weighted sound pressure level (L_{Aeq}). Part 2 of BS 7445 replicates ISO standard 1996-2.

3.2.2 British Standard 7445-2:1991[9]

Part 2 of the BS7445 series was prepared under the direction of the Environment and Pollution Standards Policy Committee and is identical with ISO 1996-2:1987, “Acoustics — Description and measurement of environmental noise — Part 2: Acquisition of data pertinent to land use,” published by the International Organization for Standardization (ISO).

3.2.2.1 British Standard 3740:2019[10]

[3] Environmental Protection Act 1990 c.43. Available at URL: https://www.legislation.gov.uk/ukpga/1990/43/contents. Accessed 20 March 2024.
[4] Control of Pollution Act 1974 c.40. Available at URL: https://www.legislation.gov.uk/ukpga/1974/40. Accessed 20 March 2024.
[5] Department for Levelling Up, Housing and Communities (DLUHC), (2023). National Planning Policy Framework (NPPF). Available at URL: https://assets.publishing.service.gov.uk/media/65a11af7e8f5ec000f1f8c46/NPPF_December_2023.pdf. Accessed 04/04/24.
[6] Department for Environment Food and Rural Affairs (DEFRA), (2010). Noise Policy Statement for England (NPSE). Available at URL: https://assets.publishing.service.gov.uk/media/5a7956e0ed915d0422067947/pb13750-noise-policy.pdf. Accessed 04/04/24.
[7] Ministry of Housing, Communities & Local Government (2019). National Planning Practice Guidance for Noise.
[8] BSI (2003). British Standards Institution BS7445-1 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures. BSI, London.
[9] BSI (1996). British Standards Institution BS7445-2 Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use. BSI, London.
[10] BS (2019). British Standards Institution BS EN ISO 3740:2019 Acoustics. Determination of sound power levels of noise sources. Guidelines for the use of basic standards. BSI, London.

ISO 3740 gives guidance for the use of a set of twelve basic International Standards describing various methods for determining sound power levels from all types of machinery, equipment and products.

3.2.2.2 British Standard 3746:2010[11]

This International Standard specifies methods for determining the sound power level or sound energy level of a noise source from sound pressure levels measured on a surface enveloping a noise source (machinery or equipment) in a test environment for which requirements are given. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source with frequency A-weighting applied is calculated using those measurements.

3.2.3 ISO9613-2:1996[12]

ISO9613-2 consists of the general method of calculation for the attenuation and propagation of sound outdoors.

3.2.4 British Standard (BS) 4142:2014+A1:2019 – Method for rating and assessing industrial and commercial sound[13]

BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.2.5 British Standard (BS) 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings[14]

Provides a methodology to calculate the noise levels entering a building through facades and façade elements and provides details of appropriate measures for sound insulation between dwellings. It includes recommended internal noise levels which are provided for a variety of situations.

Table 1: BS 8233:2014 – Indoor ambient noise levels for dwellings

Activity	Location	Day time 07:00 to 23:00	Night-time 23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining Room / area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

[11] BS (2010). British Standards Institution BS EN ISO 3746:2019 Acoustics. Determination of sound power levels and sound energy levels of noise sources using sound pressure. Survey method using an enveloping measurement surface over a reflecting plane. BSI, London.

[12] ISO (1996). International Standards Organisation ISO 1996-2:1987, "Acoustics — Description and measurement of environmental noise — Part 2: Acquisition of data pertinent to land use. ISO, Switzerland.

[13] BSI (2019). British Standards Institution [BS] 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound, BSI, London.

[14] BSI (2014). British Standards Institution [BS] 8233: Sound Insulation and Noise

In terms of levels in areas used for external amenity space BS 8233:2014 states the following:

> *"...it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."*

3.2.6 *World Health Organisation (WHO) (1999) Guidelines for community noise*[15]

These guidelines present health-based noise limits intended to protect the population from exposure to excess noise. They present guideline limit values at which the likelihood of effects, such as sleep disturbance or annoyance, may increase. The guideline values are 50 or 55 dB L_{Aeq} during the day, related to annoyance, and 45 dB L_{Aeq} or 60 dB L_{Amax} at night, related to sleep disturbance.

3.2.7 *World Health Organisation 'Noise Guidelines' 2018*[16]

Sections of the Guideline Values table presented in the 1999 WHO document Guidelines for Community Noise which are referenced in this 2018 publication as still being valid are indicated as:

i. 50-55 dB $L_{Aeq,(16\ Hour)}$ in outdoor living environments during day and evening periods;
ii. 35 dB $L_{Aeq,(16\ Hour)}$ in indoor living areas during day and evening periods; and
iii. 30 dB $L_{Aeq,(8\ Hour)}$ in bedrooms during the night-time period.

3.2.8 *Environment Agency Guidance - Noise and vibration management: environmental permits (January 2022)*[17]

This guidance presents how The Environment Agency will assess noise from certain industrial processes. It provides advice on what the law says an operator must do to manage noise and vibration and provides guidance on how to manage noise emissions. In particular, guidance is provided on how to conduct a noise impact assessment and what operators should include in a noise management plan.

3.2.9 *Environment Agency Guidance – Method Implementation Document (MID) for BS4142 (March 2023)*[18]

MIDs set out how to use the relevant standards and guidance for regulatory monitoring when you are applying for a permit or demonstrating compliance with permit conditions. This latest MID (published

[15] Berglund et al. (1999) - Guidelines for Community Noise. Geneva, World Health Organisation (WHO)

[16] WHO (2018) - Noise Guidelines for the European Region, World Health Organisation (WHO)

[17] Environment Agency Guidance - Noise and vibration management: environmental permits (January 2022). Available at URL: https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits/noise-and-vibration-management-environmental-permits. Accessed 19 March 2024.

[18] Environment Agency Guidance – Method Implementation Document (MID) for BS4142 (March 2023). Available at URL: https://www.gov.uk/government/publications/method-implementation-document-mid-for-bs-4142. Accessed 19 March 2024.

27 March 2023) supplements BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound (BS4142).

3.2.10 Pollution Prevention and Control (PPC) - Noise

Best practice suggests that the following procedure is adopted:

- Identify sensitive receptors;
- Review complaint history;
- Generate an inventory of the installation noise sources;
- Assess the breakout of noise from the installation and the impact of noise at the sensitive receptors;
- Identify noise sources relevant to the complaints or receptors;
- Demonstrate that Best Available Techniques (BAT) are being employed on the installation to control noise; and
- Measure and review the installation noise sources and overall installation impact on a regular basis.

4. Environmental noise survey

4.1 Operation sound survey

4.1.1 Survey details

Environmental sound measurements were collected between 30 July 2024 to 1 August 2024 using equipment listed in **Table 2** at survey locations shown in **Figure 2** and described in **Table 3**.

Table 2: Noise survey equipment

Item	Manufacturer	Model	Serial Number	Calibration due date	Certificate Number
Sound Level Meter	Brüel and Kjær	2270	3027608	May 2025	UCRT23/1681
Sound Level Meter	Brüel and Kjær	2250	2507239	May 2025	UCRT23/1679
Calibrator	Brüel and Kjær	4231	2542233	May 2025	UCRT23/1661
Sound Level Meter	Rion	NL-52	00809316	November 2024	UCRT22/2332
Sound Level Meter	Rion	NL-52	00709261	November 2024	UCRT22/2321
Sound Level Meter	Rion	NL-52	00809317	November 2024	UCRT22/2333

Field calibration checks were performed before and after the measurement periods. Details of these calibration checks are provided in **Appendix B**, **Table 1**.

The calibration of the sound level meters was checked before and after each survey period, with no significant change in sensitivity observed (<0.1 dB).

For all static environmental measurements, the Sound Level Meter (SLM) was tripod mounted at approximately 1.5m above ground level and 3.5m away from any other reflective surface, i.e., in free field conditions, in accordance with BS 7445:1991 *"Description and Measurement of Environmental Noise"*. For all surveys the microphone was covered with a windshield.

The time response of the SLM was set to fast (F), and the A-weighted sound pressure level and equivalent continuous A-weighted sound pressure level (L_{eq}) were measured. The SLM also measured spectral data in 1/3rd octave bands and statistical parameters including L_{A90}, L_{A10}, L_{AFmax}.

Following an initial site walkover, a measurement was obtained at an additional AD site boundary position (LT2). A third SLM was placed at the boundary in proximity to docked refrigerated reefer trailers within the operational BVD main site (LT3).

Attended survey measurements were taken at off-site locations representative of Noise Sensitive Receptors (NSRs) during the BS4142 daytime and night-time reference periods.

All measurements taken during the environmental sound survey were considered representative of the noise climate under 'typical' Site operations.

4.1.2 *Measurement locations*

Figure 2: Sound survey measurement locations

Source: "B V Dairy Limited, Shaftesbury." 51°00'41.22" N and 2°10'44.24"W. **Google Earth**. 18/07/21. 4 September 2024.

4.1.3 *Description of survey soundscape*

Observations of the soundscape and weather conditions at the sound level meter were taken during the environmental sound survey, detailed in **Table 3**.

A measurement representative of receptor NSR1 was obtained on public access land at location L1 (as indicated on **Figure 2**). Location L1 is considered characteristic of the soundscape at NSR1.

The measurement representative of receptor NSR3 was obtained on public access land at location L3 (as indicated on **Figure 2**). Land adjacent to NSR3 dwellings was enclosed by a closed boarded timber

fence and signed as a residents' private car park. Location L3 is considered characteristic of the soundscape at NSR3.

A background sound measurement representative of all NSRs was obtained on public access land at location B1 (as indicated on **Figure 2**). The AD installation could not be turned off; therefore, the background survey location B1 was deemed suitable to determine the ambient and residual sound levels.

During survey planning, it was considered that the background survey location should contain sound contributions from the operational BVD main site as this forms part of the existing soundscape. Furthermore, the measurement location should minimise the contribution from the operational specific sounds at the AD installation. A site walkover determined the BVD main site buildings provided sufficient screening of the AD plant. Location B1 is considered characteristic of the background sound at all NSRs, without additional contributions from vehicular movements.

An SLM was installed at the BVD site entrance during the night-time off-site surveys to determine the contribution of operational sound at the nearest boundary to the NSRs.

Table 3: Description of sound survey measurement locations

Location Name	Location Description	BS4142 Reference Period	Description of soundscape and weather
LT1	AD compound site boundary	Daytime	AD plant audible, specifically, pumps, flare stack and pumps, cooler. EPCS coolers and refrigerated trailers from BVD main site audible. Dry, Sunny, 23 to 26°C, 101.3 to 101.6kPa, 0% to 100% cloud cover, NW, WNW, E, ENE, ESE, breeze, up to <2m/s.
LT2	AD compound site boundary	Daytime	AD plant audible, Engine cooler and pumps. EPCS coolers and refrigerated trailers from BVD main site audible. Dry, Sunny, 23 to 26°C, 101.3 to 101.6kPa, 0% to 100% cloud cover, NW, WNW, E, ENE, ESE, breeze, up to <2m/s.
LT3	BVD main site west boundary	Daytime	BVD main site dominant including refrigerated trailers, vehicular movements, HGV loading, coolers. Dry, Sunny, 23 to 26°C, 101.3 to 101.6kPa, 0% to 100% cloud cover, NW, WNW, E, ENE, ESE, breeze, up to <2m/s.
		Night-time	BVD main site dominant including refrigerated trailers, vehicular movements, occasional HGV loading. Dry, Sunny, average 25°C, 1kPa, north, west and south-south-east breeze, mostly still up to <2m/s.
NSR1	Off-site residential dwelling nearest to south-western site boundary	Daytime	Bird calls, car into housing estate, clunks at houses, aircraft, dog barks. No site specific sound perceptible. Dry, breeze NW to WNW up to 2.5m/s (measured) generally <2m/s, 101.3kPa, 24 to 25°C, 5 to 32% cloud cover.

Location Name	Location Description	BS4142 Reference Period	Description of soundscape and weather
		Night-time	31/07/24 Low level BVD main site noise audible, fan whine. Dry, breeze E to NNE <2m/s (measured), 101.6kPa, 20°C, 2% cloud cover. 01/08/24 Occasional low level clunk, low level fan whine, distant traffic. Dry, light breeze ENE to SE <1m/s (measured), 101.3kPa, 19°C, 100% cloud cover.
NSR2	Off-site residential dwelling nearest to western site boundary	Daytime	Bird calls, dog barks, clunks at houses, vehicular movements and aircraft. Low level hum audible from refrigerated trailers, HGV into/out of site main gate. Dry, breeze NW to WNW up to 2m/s (measured), 101.3kPa, 24 to 26°C, 1 to 68% cloud cover.
		Night-time	31/07/24 Low level BVD main site noise audible, fan whine, occasional HGV into site. Animal calls. Dry, breeze E to NNE up to 2.3m/s (measured), 101.6kPa, 20°C, 2% cloud cover. 01/08/24 Very low-level constant whine, possibly refrigerated trailers, occasional clunk from site direction, loading. Car along Wincombe lane into housing estate. Dry, breeze ESE to ENE up to 2.3m/s (measured), 101.3kPa, 19°C, 100% cloud cover.
NSR3	Off-site residential dwelling nearest to North-western site boundary	Daytime	Aircraft, vehicles along Wincombe lane into residential estate. Occasional low frequency hum from site direction, HGV and vans into/out of site. Reversing bleeper at building site, heavy plant into housing estate. Dry, breeze NW to WNW up to 2m/s (measured), 101.3kPa, 23 to 25°C, 25 to 27% cloud cover.
		Night-time	30/07/24 BVD main site noise not constantly discernible, occasional squeak site direction. Animal calls. Dry, breeze E to NNE up to 2.3m/s (measured), 101.6kPa, 20°C, 2% cloud cover. 31/07/24 HGV to main gate and onto Wincombe Lane. Very low-level whine occasionally audible, thought to be from refrigerated trailers. Dry, mainly still, SE to E wind up to <1m/s (measured), 101.3kPa, 20°C, 99% cloud cover.
B1	Off-site background sound level measurement	Daytime	Bird calls, site noise not perceptible, occasional distant construction sound, van along Wincombe Lane to farm. Dry, breeze NW to WNW up to 1m/s (measured), 101.3kPa, 23°C, 26% cloud cover.
		Night-time	30/07/24 BVD main site noise low level, no AD installation site noise perceptible.

Location Name	Location Description	BS4142 Reference Period	Description of soundscape and weather
			Dry, breeze E to NNE up to 2.3m/s (measured), 101.6kPa, 20°C, 0% cloud cover. 31/07/24 No significant site noise audible, occasional clunk. Very low-level distant hum possibly refrigerated trailers/fan noise. Dry, mainly still, ESE to S wind up to <1m/s (measured), 101.3kPa, 20°C, 99% cloud cover.
ST1	Site main gate sound level measurement	Night-time	BVD main site dominant including refrigerated trailers, vehicular movements, occasional HGV loading. AD site not perceptible.

4.1.4 Measured sound level summary

The results of the sound measurements conducted at on-site boundary and off-site locations are shown in **Table 4**.

Table 4: Measured sound levels

Measurement Location	BS4142 Reference Period	Date (dd/mm/yy) Start time	Duration (hrs:mins:sec)	$L_{Aeq,T}$ dB	L_{Amax}, dB	L_{A90}, dB
LT1 (Flaring)	Daytime	30/07/24 19:00 to 23:00 and 31/07/24 07:00 to 13:00	10hrs	60.3	82.8	57.5
	Night-time	30/07/24 23:00 to 07:00	8hrs	57.5	73.8	56.6
LT1 (Normal)	Daytime	31/07/24 13:00 to 23:00 and 01/08/24 07:00 to 17:00	20hrs	60.5	86.3	58.3
	Night-time	31/07/24 23:00 to 07:00	8hrs	58.1	84.2	57.4
LT2	Daytime	31/07/24 15:00 to 23:00 and 01/08/24 07:00 to 17:00	18hrs	54.4	73.1	53.4
	Night-time	31/07/24 23:00 to 07:00	8hrs	53.9	70.9	53.1
LT3	Daytime	31/07/24 15:00 to 23:00 and 01/08/24 07:00 to 17:00	18hrs	58.6	89.8	55.8

Measurement Location	BS4142 Reference Period	Date (dd/mm/yy) Start time	Duration (hrs:mins:sec)	$L_{Aeq, T}$ dB	L_{Amax}, dB	L_{A90}, dB
	Night-time	31/07/24 23:00 to 07:00	8hrs	58.5	89.1	56.6
NSR1	Daytime	01/08/24 12:38:05	00:30:00	41.6	68.1	38.0
		01/08/24 15:46:32	00:30:00	42.6	66.1	39.1
	Night-time	31/07/24 00:47:52	00:15:00	39.9	50.1	37.3
		31/07/24 23:04:09	00:15:00	36.1	45.0	34.8
NSR2	Daytime	01/08/24 11:23:29	00:30:00	40.7	63.8	35.2
		01/08/24 14:33:24	00:30:00	43.3	63.6	37.2
	Night-time	31/07/24 00:00:53	00:15:00	44.9	57.7	43.1
		01/08/24 00:07:27	00:15:00	36.4	51.3	34.4
NSR3	Daytime	01/08/24 10:14:18	00:30:00	50.2	76.7	34.2
		01/08/24 13:55:48	00:30:00	57.3	84.2	36.2
	Night-time	30/07/24 23:40:15	00:15:00	39.0	50.6	37.5
		31/07/24 23:39:59	00:15:00	37.7	57.9	32.1
B1	Daytime	01/08/24 10:47:32	00:30:00	45.6	71.2	39.3
		01/08/24 13:51:28	00:30:00	49.5	69.1	43.9
	Night-time	30/07/24 23:08:52	00:15:00	39.3	49.1	36.8
		31/07/24 23:04:49	00:15:00	36.1	45.0	34.8
ST1	Night-time	30/07/24 23:35:53	02:00:00	60.4	78.4	58.1
		31/07/24 23:36:31	00:20:00	60.5	80.7	55.1

4.2 Sound source survey

Access to parts of the AD installation is controlled by the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR), with some zones being limited access.

The guidance provided in BS3746 was followed in principle, with required deviations due to accessibility and site specific safety procedural requirements.

4.2.1 Instrumentation

The instrumentation system, including the microphones, cables and windscreen, shall meet the requirements of IEC 61672-1:2002, class 2. It is recommended to use class 1 instrumentation.

Before and after each series of measurements, a sound calibrator meeting the requirements of IEC 60942:2003, class 1 shall be applied to each microphone to verify the calibration of the entire measuring system at one or more frequencies within the frequency range of interest.

Without any adjustment, the difference between the readings made before and after each series of measurements shall be less than or equal to 0.5dB. If this value is exceeded, the results of this series of measurements shall be discarded.

The calibration of the sound calibrator, and the compliance of the instrumentation system with the requirements of IEC 61672-1 shall be verified at intervals in a laboratory making calibrations traceable to appropriate standards.

4.2.2 Operation of source during test

The source shall be tested, wherever possible, under conditions that are reproducible and representative of the noisiest operation in typical usage.

Measurements were undertaken during representative conditions i.e. normal parameters or during bypass conditions for the bypass valve only.

4.2.3 Test Environment

BS3746 Annex A specifies procedures for determining the magnitude of the environmental correction, K_{2A}, to account for deviations of the test environment from the ideal condition. Measurements in accordance with BS3746 International Standard are only valid where $K_{2A} \leq 7$dB.

The K_{2A} was calculated for all measurements were

4.2.4 Reference Box

In order to facilitate the selection of the shape and dimensions of the measurement surface, the reference box shall first be delineated. The reference box is a hypothetical surface defined by the

smallest right parallelepiped that just encloses the source under test. When defining the dimensions of the reference box, elements protruding from the source which are known not to be significant radiators of sound may be disregarded.

The locations of the reference box, the measurement surface, and the microphone positions for measurements are defined with respect to a co-ordinate system with origin O in the ground plane.

The point O is the middle point of a box consisting of the reference box and its images in the adjoining reflecting plane(s). The horizontal axes x and y of the co-ordinate system also lie in the ground plane, parallel to the length and width of the reference box. The characteristic source dimension, d0, is used to determine the dimensions of the measurement surface.

Measurements were taken at 1m or 2m distances, depending on proximity to the Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) zone. Measurements were taken for the refrigerated reefer trailers at 1m, 2m, 5m, 10m and 20m.

4.2.5 *Measurement Surface*

BS3746 gives specifications relating to the shape of the measurement surface. The microphone positions, or traverses, at which the sound pressure levels are measured lie on the measurement surface, a hypothetical surface of area S which envelops the reference box and terminates on the reflecting plane(s).

For the AIUKL measurement survey a right parallelepiped measurement surface with sides parallel to the reference box was used. Each side comprised of a distance *d* (the measurement distance) from the corresponding side of the reference box.

The microphone was oriented normal to the measurement surface.

4.2.6 *Background Correction*

The determination of the background correction method K_{1A} is calculated:

$$K1A = 10log[1 - 10^{-0.1\Delta L_{pA}}]dB$$

Where:

$\Delta L_{pA} = L'_{pA(ST)} - L_{pA(B)}$
$L'_{pA(ST)}$ = A-weighted time averaged sound pressure level from the array of microphone positions over the measurement surface, with the noise source in operation, in decibels
$L_{pA(B)}$ = A-weighted time averaged sound pressure level from the array of the background sound level from the array of microphone positions over the measurement surface, in decibels

Section 8.3.3 of BS3746 states:

> "*If ΔL_{pA} <3 dB, the accuracy of the result(s) is reduced and the value of K_{1A} to be applied in this case is 3 dB (the value for ΔL_{pA} <3 dB). In this case, it shall be clearly stated in the text of*

the report, as well as in graphs and tables of results, that the data from the test represent an upper boundary to the sound power level of the noise source under test."

For all measurements, the background sound level was not measured as the plant was in full operation. Therefore, a 3dB correction, in accordance with BS3746 guidance was applied.

4.2.7 *Environmental Correction*

The determination of the environmental correction method K_{2A} is calculated:

$$K2A = 10log[1 + 4(S/A)]dB$$

Where:
A = equivalent sound absorption area in square metres of the room
S = area in square metres of the measurement surface

$$A = \alpha Sv$$

Where:
α = mean sound absorption coefficieint, given for A-weighted quantities
Sv = total area in square metres of the boundary surfaces of the test room (walls, ceiling and floor)

This correction is not applicable as the sound sources were all outside.

4.2.8 *Attended sound measurement survey summary*

The measured sound levels during the 'typical' operational sound survey are detailed in **Table 5**.

Table 5: Measured sound levels from typical operational measurement survey

Site Location	Plant Item	Date (dd/mm/yy)	No. of measurements	Measurement Distance (m)	Calculated L_{pA} dBA
AD Installation	BAM Cool Water Pump	31/07/24	1	1	80
	Containerised Engine		4	1.5	81
	Digestor Blower		2	2	78
	Digestor Blower Outlet		2	2	69
	Effluent Station Mixer Pump		4	2	85
	Containerised Engine Cooler		1	2	89

Site Location	Plant Item	Date (dd/mm/yy)	No. of measurements	Measurement Distance (m)	Calculated L_{pA} dBA
	Flare Stack and Pumps		4	2	89
	FlyGT Mixer Plinth Pumps		2	2	73
	Grundfos Cool Water Pump		1	1	74
	CAF Thickener Pump		1	2	90
	Chopper Pump		2	2	85
	Sludge Transfer Pump		2	2	79
	Tanker Loading		1	3	91
	Forklift*	n/a	2	6	95
	Boiler Room*	n/a	n/a	n/a	90
	Compressor Room*	n/a	n/a	n/a	83
Main Site	EPCS Cooler Large	31/07/24	4	1	97
	EPCD Cooler Small		2	1	95
	Refrigerated Reefer Trailer		5	1, 2, 5, 10, 20	97

*taken from Element sound library

5. Environmental noise assessment

5.1 Background to Assessment

Noise and vibration management: environmental permits published by the EA recommends the implementation of BS4142 for the purposes of assessing industrial and commercial sound.

5.2 BS4142 Guidance

Noise sensitive receptors as defined in BS4142 are any occupied premises outside the site used as a dwelling, public houses, places of worship, educational establishments, hospitals and similar institutions or any other property likely to be adversely affected by an increase in noise levels.

The sound from the industrial/commercial source is rated by considering the sound level of the source, known as the specific sound level, and its characteristics, such as tonal, impulsive or intermittency of the source, and applying an appropriate correction to give the rating level of the sound source. To gain an initial estimate of the potential impacts of the sound source, its rating level is compared to the background sound level (L_{A90}), and the level by which it exceeds the background sound level indicates the following potential impacts:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB 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 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.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

In terms of establishing the rating level, acoustic character corrections for the specific noise should be taken into consideration based on their perceptibility at the receptor location. These acoustic characteristics include the following factors:

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6dB for tonality.

Subjectively, this can be conceded to a penalty of +2dB for a tone which is just perceptible at the noise receptor, +4dB where it is clearly perceptible and +6dB where it is highly perceptible.

Impulsivity

A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be conceded to a penalty of +3dB for impulsivity which is just perceptible at the noise receptor, +6dB where it is clearly perceptible and +9dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3dB can be applied.

Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be considered. If one feature is dominant, then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

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. This can necessitate measuring the specific sound over a number of sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3dB can be applied.

The reference measurement periods detailed in BS4142 are summarised as:

- Daytime – between 07:00 – 23:00 hours, 1 hour sample period.
- Night-time – between 23:00 – 07:00 hours, 15-minute sample period.

5.3 BS4142 Assessment

Section 8.1.3 of BS4142 states the sound survey should:

> "*Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.*"

Furthermore, Section 8.1.4 of BS4142 highlights:

> *"The monitoring duration should reflect the range of background sound levels for the period being assessed. In practice, there is no "single" background sound level as this is a fluctuating*

parameter. However, the background sound level used for the assessment should be representative of the period being assessed."

The sound levels measured during the attended March 2024 survey are deemed representative of 'typical' site operational conditions and cover the BS4142 daytime (07:00hrs to 23:00hrs) and night-time (23:00hrs to 07:00hrs) reference periods.

5.3.1 *Derived $L_{A90,T}$ for assessment*

The representative background $L_{A90,T}$ sound levels determined from the 2024 environmental sound survey for the closest NSRs (NSR1, NSR2, and NSR3) are detailed in **Table 6** with the corresponding locations relative to the BVD site detailed on **Figure 2**.

Table 6: $L_{A90,T}$ sound levels from July 2024 survey

Receptor Identifier	Representative Background ($L_{A90,T}$) Measurement Location	Reference Period	Measured $L_{A90,T}$ 2024 survey (dB)
NSR1 **NSR2** **NSR3**	B1	Daytime (07:00 to 23:00hrs)	42
		Night-time (23:00 to 07:00hrs)	36

5.3.2 *Calculation of Specific Noise Levels*

The source noise levels obtained during the site-specific survey (detailed in **Table 5**) were used to create a 3D noise model using Computer Aided Noise Abatement (CadnaA) software. Modelling parameters are detailed in **Table 7**.

Table 7: Modelling parameters used in assessment

Parameter	Details
Ground effect co-efficient (G)	• G=0.6 *0= Hard ground, 1= Soft Ground* • Buildings are reflecting G=0 • Roads/Parking Lots are reflecting G=0
Propagation	• ISO9613
Order of Reflections	• 3 • Maximum search radius Source - Receiver 1000m • Maximum search radius Source – 100m
Meteorology	• 10°C Temperature • 70% Relative Humidity • 3.0m/s windspeed for direction
Topography	• Lidar composite DTM-2022-1-ST82SE (1m resolution) • Source: Available at https://environment.data.gov.uk/survey

Parameter	Details
Buildings and Infrastructure	• OS Vectormap District (ST) • OS OpenMap Local (ST) • Building Heights: BVD Site Industrial Buildings 6m to 8m Height BVD Admin Building 4.5m Height BVD Huts 3m Height BVD Silos 6m Height AD Site Permeate Waste Water Tank 6.18m Height AD Site Trader Waste Water Tank 6.18m Height AD Site Sludge Storage Tank 2.72m Height AD Site Digester Tank 8m Height AD Site Caustic Tank 2.72m Height AD Site Waste Skip 2m Height • Off-site Residential Buildings 8m Height, 2 Storey, each Storey 2.5m Height Receptors modelled at 1.5m height daytime (Ground Floor level), 4m night-time (1st floor level).
Imagery	• Google Earth Source: "B V Dairy Limited, Shaftesbury." 51°00'41.22" N and 2°10'44.24"W. Google Earth. 18/07/21. 4 September 2024.
Sound sources	• Mobile plant modelled at 0.5m height (aligned with CRTN) • FLTs modelled as moving point sources, 10km/h. • Internal reverberant sound levels Boiler and Compressor Rooms assumed to be 100% on-time. • All plant based on 100% on-time, except Flare Stack and Pumps, 50% daytime 37.5% night-time. • HGV Tanker delivery to AD installation 2 daytime, 1 night-time, duration 30 minutes each. • FLT servicing AD installation, 31% daytime, 25% night-time, based on site observations and sound survey profile data. • Operational hours for site 24hrs.

CadnaA 3D model calculated the specific noise level at the noise sensitive receptors based on the inputs.

Measured sound levels at boundary locations LT1, LT2 and LT3 were analysed to obtain representative values complying to BS4142 reference time periods for daytime and night-time. BS4142 daytime reference period is 07:00 to 23:00hrs and night-time 23:00 to 07:00hrs.

Data was screened for compliance with BS4142 criteria, namely no precipitation and windspeeds <5m/s.

During the measurement survey it was observed that the BVD main site EPCS coolers and refrigerated trailers contributed to the measured sound levels at the AD installation boundary positions, LT1 and LT2.

The calibration of the CadnaA model included the contributions from these plant items, along with the source sound levels of the AD installation plant.

The CadnaA model was calibrated to the baseline survey data by placing receivers in the model at the measurement locations and considering the inputted measured source sound levels in the 3D model. The model calibration is detailed in **Table 8**.

Table 8: Modelling calibration

Location	Measured Level Daytime ($L_{Aeq,T}$)	Calibrated Model Level (dBA)	Difference (dBA)	Measured Level Night-time ($L_{Aeq,T}$)	Calibrated Model Level (dBA)	Difference (dBA)
LT1	60.5	60.5	0	58.1	58.2	+0.1
LT2	54.4	54.4	0	53.9	53.9	0
LT3	58.6	58.6	0	58.5	58.5	0

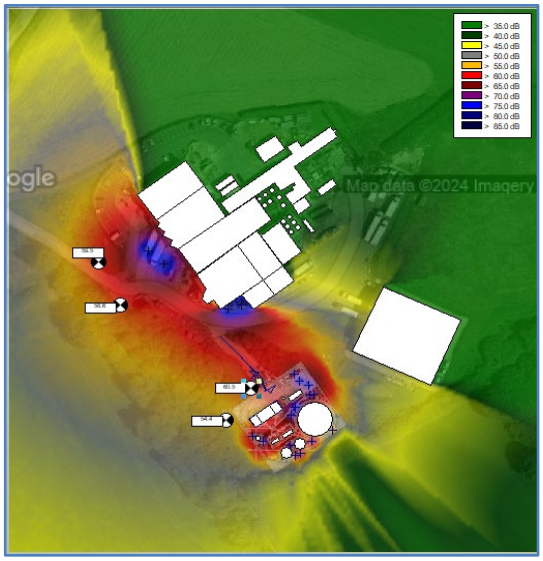


Figure 3: Daytime Model Calibration

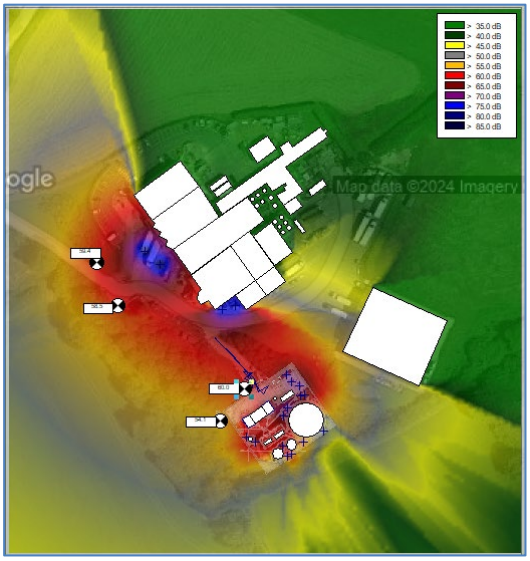


Figure 4: Night-time Model Calibration

5.3.3 Acoustic characteristic penalties for assessment

BS4142 stipulates that the application of an acoustic characteristic penalty of the specific sound source are assessed and then applied as appropriate, depending on the perceptibility at the receptor location.

For this assessment only sound emanating from the AD installation site is considered.

5.3.3.1 Tonal acoustic character correction

Measured data collected at LT1, LT2 and LT3 was screened for tonality in accordance with the objective method detailed in Annex C (informative) of BS4142. No tones were identified for each of the datasets following this methodology. Therefore, an acoustic characteristic correction for tonality is not applicable.

5.3.3.2 Impulsivity acoustic character correction

The AD installation does not contain any sound sources with impulsive characteristics; therefore, no acoustic characteristic correction is applied.

5.3.3.3 Intermittency acoustic character correction

The AD installation does contain sound sources with intermittent operation, including the air coolers for the containerised engine, pumps and compressors. The AD installation is situated in a bund surrounded by berm walls. Due to the separation distance between the AD site and NSRs, along with screening provided by buildings, masking from sound sources operational at the BVD main site, no acoustic characteristic correction for intermittency is applied.

5.3.3.4 Other acoustic character correction

No other acoustic characteristic correction is deemed applicable for the operational AD installation.

5.3.4 Initial BS4142 assessment

An initial BS4142 assessment considered the rating level, including specific noise from the AD installation site with the significance of impact based on BS4142 criteria detailed in **Table 9**. Full assessment tables and noise propagation contour plots are presented in **Appendix D**.

Table 9 details the BS4142 assessment as 'Low impact depending on the context' for all NSRs or groups of NSRs.

Table 9: BS4142 Assessment – AD installation only

BS4142 Assessment	Reference Period	Low Impact depending on the context	Adverse Impact depending on the context	Significant adverse impact depending on the context
NSR1	Daytime			
	Night-time			
NSR2	Daytime			
	Night-time			

BS4142 Assessment	Reference Period	Low Impact depending on the context	Adverse Impact depending on the context	Significant adverse impact depending on the context
NSR3	Daytime			
	Night-time			

6. Summary

An operation noise measurement survey was conducted at locations surrounding the BVD, Shaftesbury site. The offsite survey was conducted during typical daytime and night-time operations.

The BS4142 assessment of the AD installation considers ‘Low impact depending on the context’ at all NSRs during the reference daytime and night-time periods.

The noise survey data presented in this report demonstrates that BVD AD operation on a day and night do not present an adverse impact on the noise levels at the surrounding residential receptors.

Additional noise mitigation measures are not deemed necessary.

There is no perceptible vibration arising at the site boundary due to the site operations. No mitigation is required.

Appendix A Glossary of Terms

A-WEIGHTED LEVELS

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A). For clarity and convenience, the 'A' is often included in the acoustic descriptor, e.g., L_{Aeq}, rather than in brackets after the units. For example, A-weighted levels can be quoted as 55 dB L_{Aeq}.

DECIBEL

The ratio of sound pressures which we can hear is a ratio of 10^6:1 (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

FREQUENCY

The repetition rate of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the Hertz (Hz), which is identical to cycles per second. A thousand hertz is often denoted kHz, e.g., 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20 kHz. For design purposes, the octave bands between 63 Hz to 8 kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it.

NOISE INDICES

$L_{Aeq, T}$	The A-weighted equivalent continuous sound pressure level over a period of time, T.
$L_{Amax, T (F, S)}$	The A-weighted maximum sound pressure level over period of time T, with fast or slow time weighting.
L_{A10}	The arithmetic mean of the A-weighted sound pressure level exceeded for 10% of the measurement period, T. L_{A10} is the index generally adopted to assess traffic noise.
$L_{A90, T}$	The A-weighted sound pressure level exceeded for 90% of the measurement period, T. L_{A90} is widely accepted as indicative of the background noise level.
SEL	Sound Exposure Level is a measure of the total sound energy during an event such as a train pass-by.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A,' e.g., L_{A90}) to approximate the frequency response of the human ear.

AIRBORNE SOUND

Sound in the air is generated by a material vibrating which in turn causes air molecules to vibrate and create a sound wave. For example, sound produced by a loudspeaker in a room can be classified as 'airborne' sound.

Appendix B Noise Survey Calibration Table

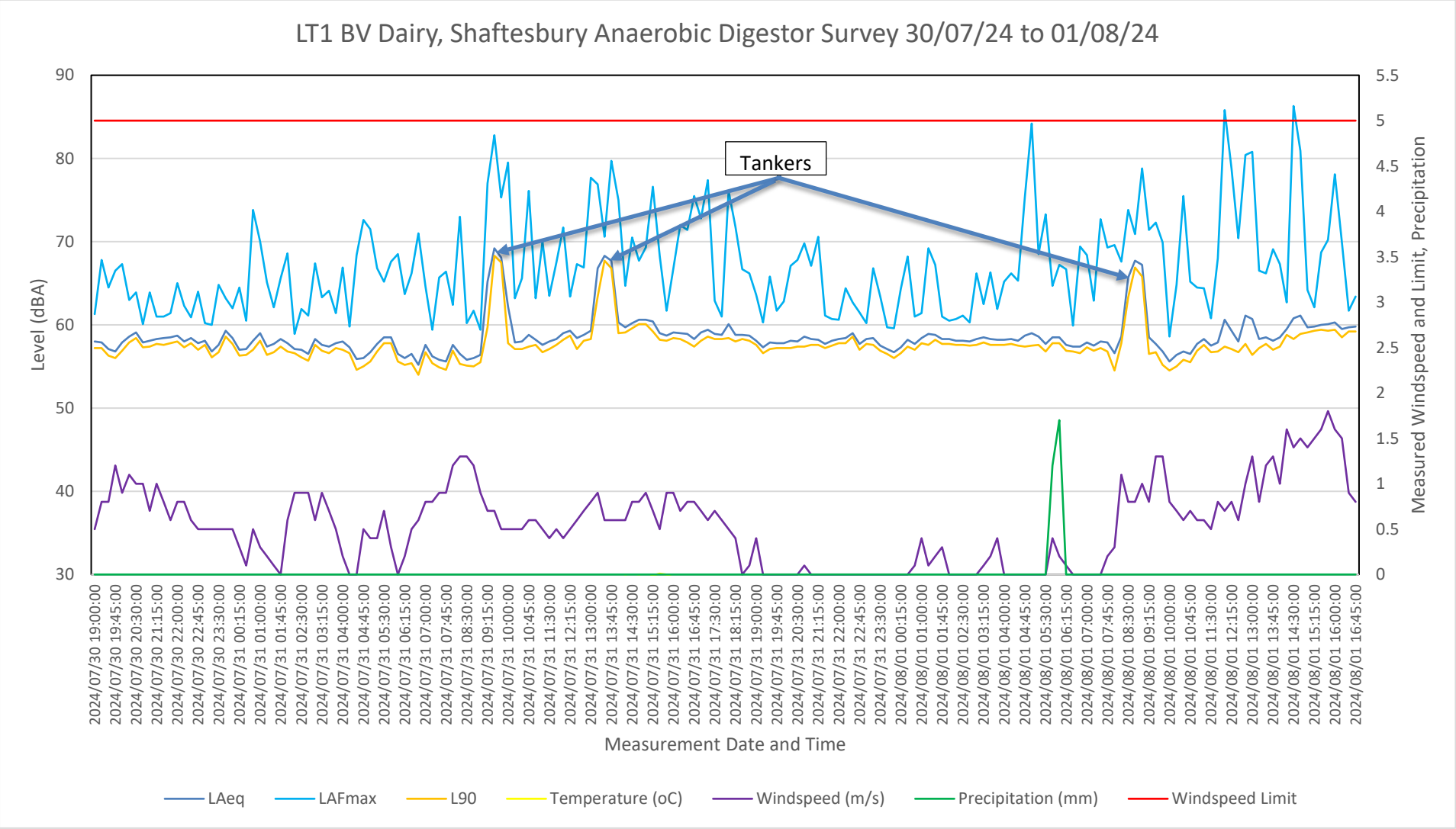
Appendix B, Table B1: Field calibration check sound survey equipment

Date	SLM Serial Number	Meter Calibration Level (dB)	Line Check (dB)	Notes
30/07/24	3027608	45.78 mV/Pa -0.01 dB deviation 93.8 dB	93.8	Pre night-time survey meter calibration/line check
31/07/24		n/a	93.8	Post night-time survey meter line check
		45.83 mV/Pa 0.01 dB deviation 93.8 dB	-	Pre daytime survey meter calibration/line check
		n/a	93.8	Post daytime survey meter calibration/line check
		45.87 mV/Pa 0.01 dB deviation 93.8 dB	93.8	Pre night-time survey meter line check
01/08/24		n/a	93.8	Post night-time survey line check
		46.02 mV/Pa 0.03 dB deviation 93.8 dB	93.8	Post night-time survey meter calibration/line check
30/07/24	2507239	47.04 mV/Pa 0.00 dB deviation 93.9 dB	93.9	Pre night-time survey meter calibration/line check
31/07/24		n/a	93.7	Post night-time survey meter line check
		45.93 mV/Pa -0.03 dB deviation 93.9 dB	93.9	Pre daytime survey meter calibration/line check
		n/a	93.9	Post daytime survey meter calibration/line check
		45.99 mV/Pa 0.03 dB deviation 93.9 dB	93.9	Pre night-time survey meter calibration/line check
01/08/24		n/a	93.9	Post night-time survey meter line check
		45.84 mV/Pa -0.03 dB deviation 93.9 dB	93.9	Post night-time survey meter calibration/line check
30/07/24	809316	94.0dB	93.7dB	Pre-survey calibration/line check
01/08/24		93.9dB	93.6dB	Post survey line check/calibration.
31/07/24	709261	94.0dB	93.7dB	Pre-survey calibration/line check
01/08/24		94.0dB	93.6dB	Post survey line check/calibration.
31/07/24	809317	94.0dB	93.7dB	Pre-survey calibration/line check

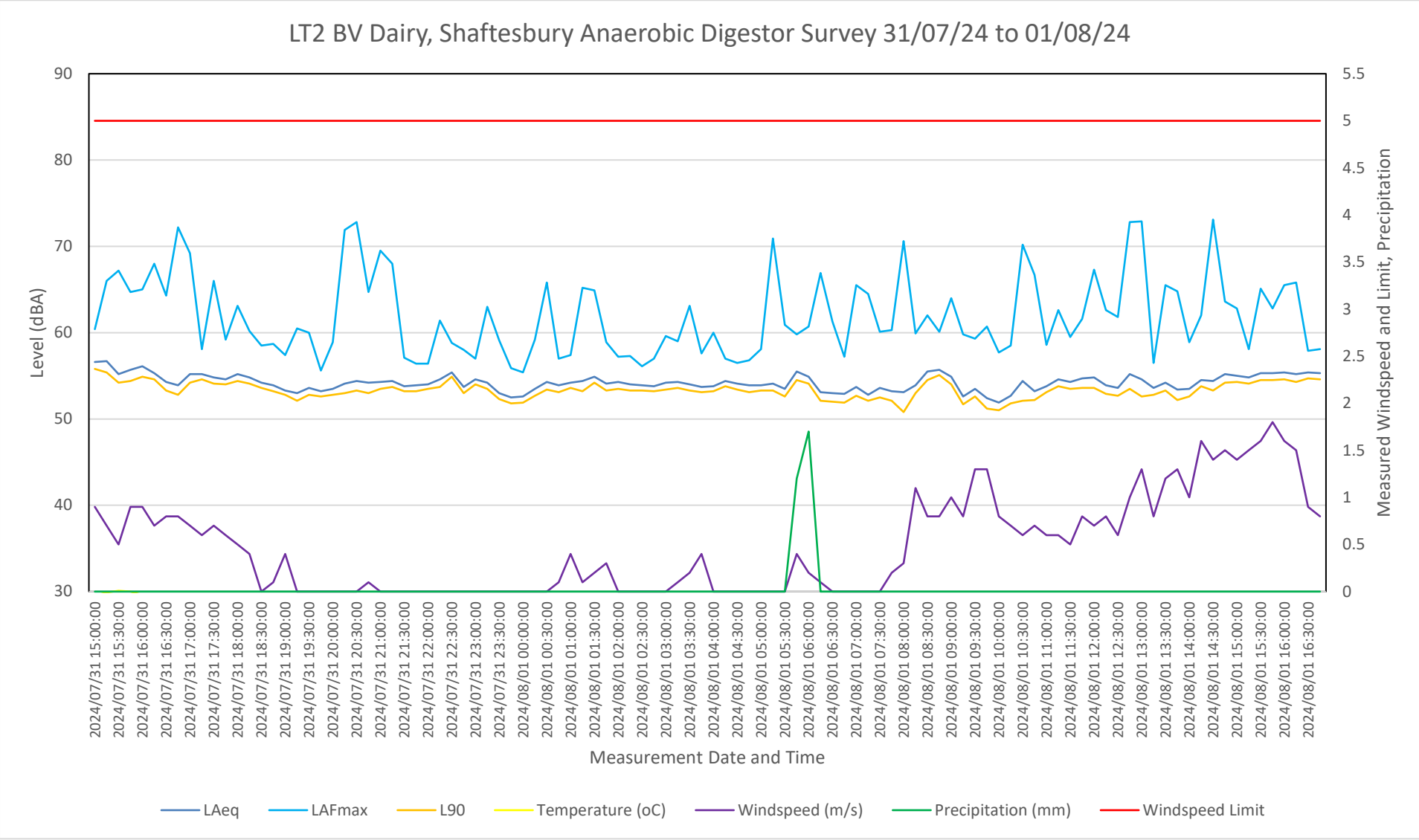
Date	SLM Serial Number	Meter Calibration Level (dB)	Line Check (dB)	Notes
01/08/24		94.0dB	93.7dB	Post survey line check/calibration.

Appendix C Noise Measurement Location Sound Profiles

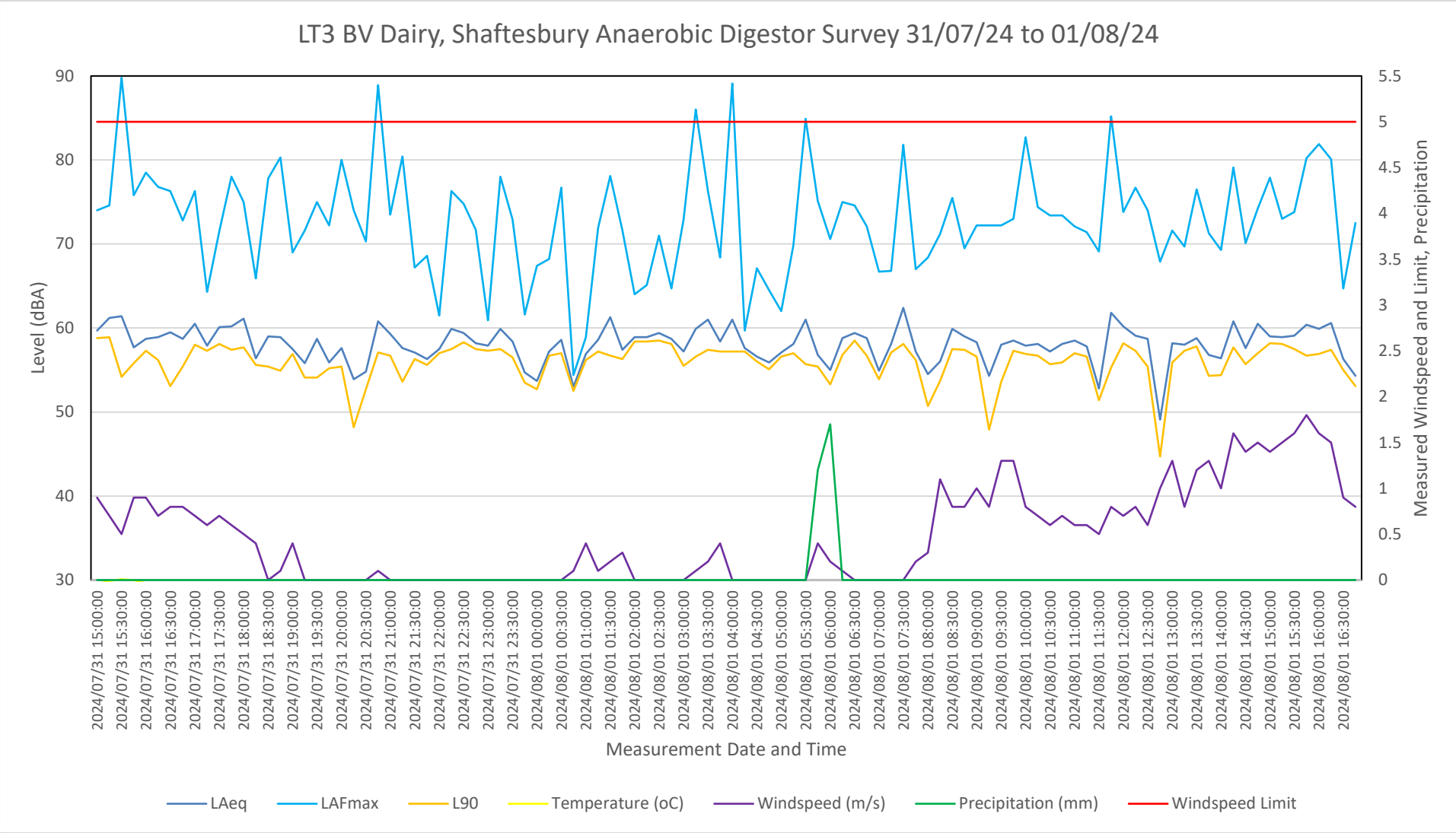
Appendix C, Figure C1: Measurement Location LT1 Profile



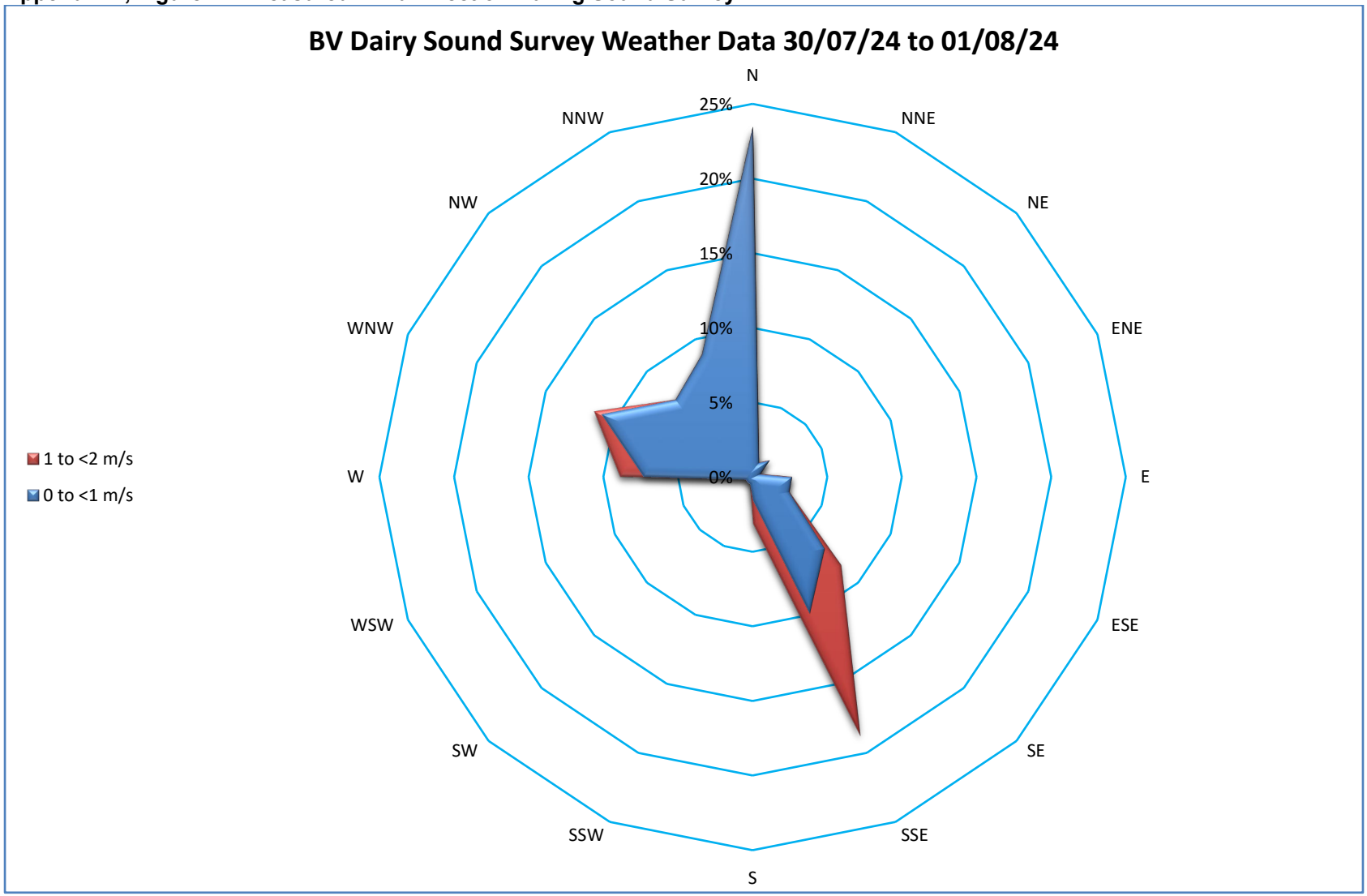
Appendix C, Figure C2: Measurement Location LT2 Profile



Appendix C, Figure C3: Measurement Location LT3 Profile



Appendix C, Figure C4: Measured Wind Direction During Sound Survey



Appendix D BS4142 Assessment Tables

Appendix D, Table D1: BS4142 assessment daytime NSR1

	Location NSR1 – Daytime Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	42	7.1, 7.2 7.3.1	Measured at location NSR1ALT considered representative of receptor NSR1 with Road Traffic movements removed. Site process operating under typical conditions. 1hr daytime reference period, measurements taken between 07:00hrs to 23:00hrs. 2 x 30 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	42	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	31	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	31	9.2	Rating level at NSR1 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	42	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-11**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms and outdoor amenity space.			

Appendix D, Table D2: BS4142 assessment night-time NSR1

	Location NSR1 – Night-time Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	38	7.1, 7.2 7.3.1	Measured at location NSR1ALT considered representative of receptor NSR1 with Road Traffic movements removed. Site process operating under typical conditions. 15minutes night-time reference period, measurements taken between 23:00hrs to 07:00hrs. 2 x 15 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	37	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	31	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	31	9.2	Rating level at NSR1 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	36	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-5**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms.			

Appendix D, Table D3: BS4142 assessment daytime NSR2

	Location NSR1 – Daytime Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	42	7.1, 7.2 7.3.1	Measured at location NSR2 considered representative of receptor NSR2 with Road Traffic movements removed. Site process operating under typical conditions. 1hr daytime reference period, measurements taken between 07:00hrs to 23:00hrs. 2 x 30 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	42	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	31	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	31	9.2	Rating level at NSR2 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	42	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-11**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms and outdoor amenity space.			

Appendix D, Table D4: BS4142 assessment night-time NSR2

	Location NSR1 – Night-time Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	42	7.1, 7.2 7.3.1	Measured at location NSR2 considered representative of receptor NSR2 with Road Traffic movements removed. Site process operating under typical conditions. 15minutes night-time reference period, measurements taken between 23:00hrs to 07:00hrs. 2 x 15 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	42	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	30	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	30	9.2	Rating level at NSR2 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	36	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-6**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms.			

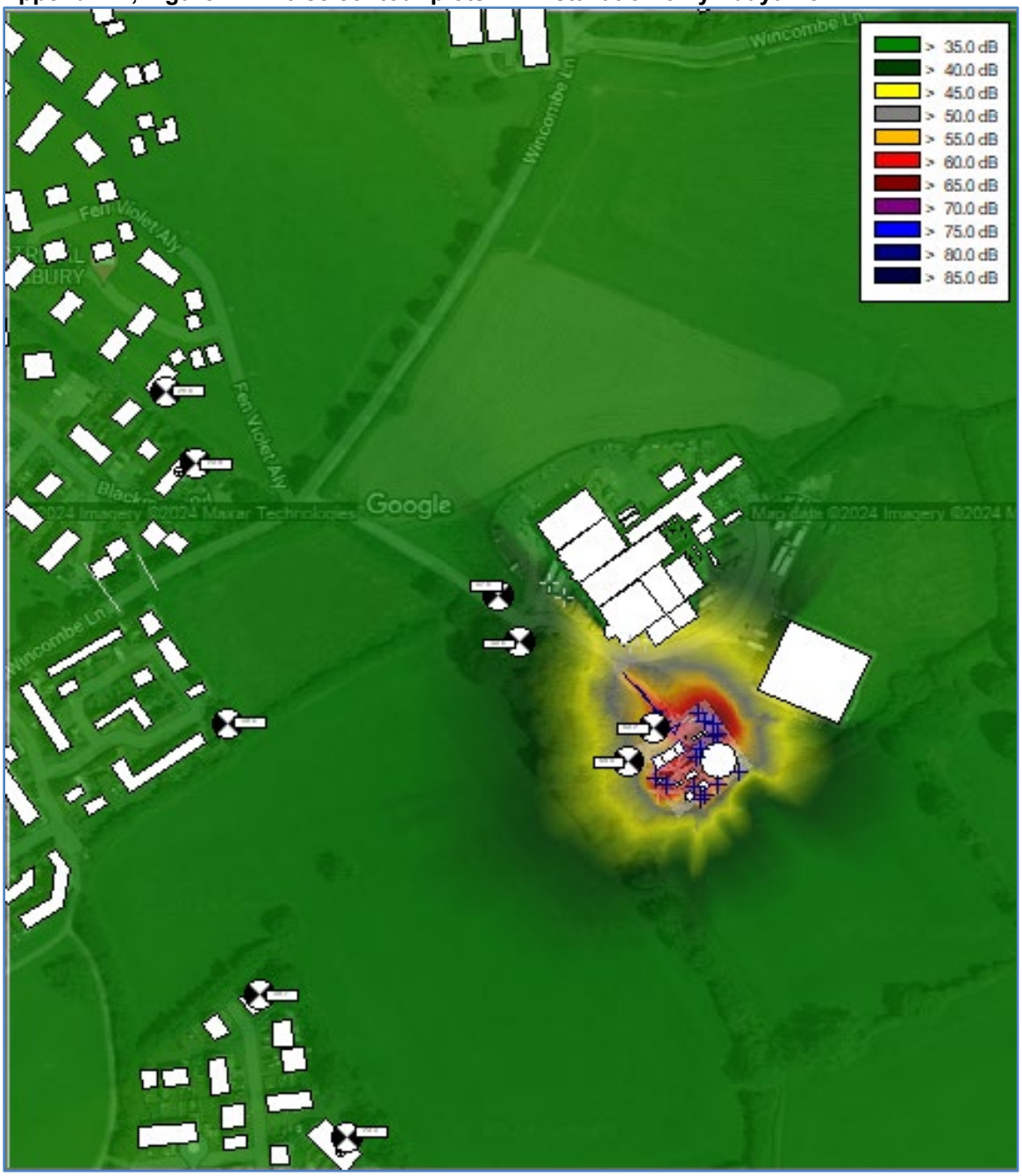
Appendix D, Table D5: BS4142 assessment daytime NSR3

	Location NSR1 – Daytime Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	43	7.1, 7.2 7.3.1	Measured at location NSR3 considered representative of receptor NSR3 with Road Traffic movements removed. Site process operating under typical conditions. 1hr daytime reference period, measurements taken between 07:00hrs to 23:00hrs. 2 x 30 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	43	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	29	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	29	9.2	Rating level at NSR3 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	42	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-13**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms and outdoor amenity space.			

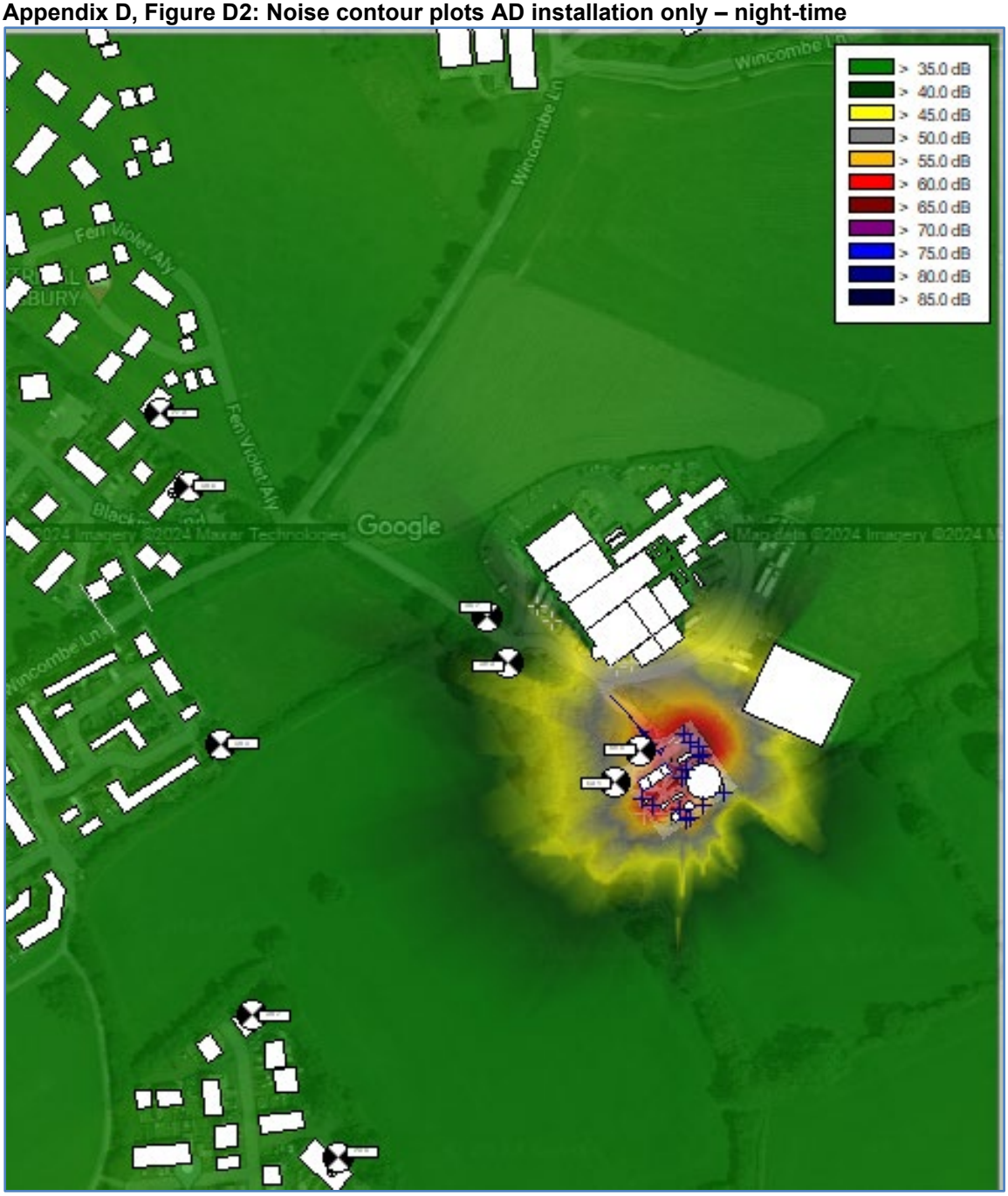
Appendix D, Table D6: BS4142 assessment night-time NSR3

	Location NSR1 – Night-time Assessment – BS4142 Calculations	Result dB(A)	Relevant Clause	Commentary
a)	Measured ambient sound level $L_{Aeq(1hr)}$	37	7.1, 7.2 7.3.1	Measured at location NSR3 considered representative of receptor NSR1 with Road Traffic movements removed. Site process operating under typical conditions. 15minutes night-time reference period, measurements taken between 23:00hrs to 07:00hrs. 2 x 15 minute measurements, logarithmically averaged.
b)	Residual sound level $L_{Aeq, (1hr)}$	36	7.3.2	Residual sound calculated from the ambient sound minus predicted specific sound of the AD plant.
c)	Specific sound level $L_{Aeq, (1hr)}$	31	7.3.6	Specific sound measured at AD installation, modelled using CadnaA 3D software. The resultant specific noise (L_{Aeq}) was based on measuring source plant and predicting propagation to receptors.
d)	Acoustic Feature Correction (tonality, impulsivity, intermittency, other)	0	9.2	Acoustic characteristic correction at receptor location. No acoustic corrections required.
e)	Rating Level (c + d)	31	9.2	Rating level at NSR3 based on attended survey measurement data from site location.
f)	Measured background sound level $L_{A90, (1hr)}$	36	8.1.1, 8.12, 8.1.3, 8.1.4	Determined from location B1.
g)	Excess of Rating Level over Background Sound Level (e – f)	**-5**	11	
h)	**BS4142 Initial Estimate** *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.*		11d	
j)	Uncertainty of the Assessment	**Minor**	10	
k)	• The measurements were taken under repeatable conditions suitable for environmental noise survey. • Class 1 sound level meters used. • Field calibration showed no significant drift before and after measurement period. • Site sound sources were operating under typical conditions. • Measurements taken during suitable weather conditions as described in Section 6.4 of BS4142. • Measurements rounded to the nearest whole number as per BS4142. • Uncertainty is considered to be a minor significant factor. • Predicted rating level is based on an external location. Attenuation from a partially openable window is approximately 15dBA; therefore, internal specific noise predicted to be within BS8233 levels for habitable rooms.			

Appendix D, Figure D1: Noise contour plots AD installation only - daytime



Appendix D, Figure D2: Noise contour plots AD installation only – night-time



Appendix E Equipment Calibration Certificates

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 18 May 2023

Certificate Number: UCRT23/1679

Calibrated at & Certificate 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	Element Materials Technology Environmental UK Limited Shields Road Newcastle-upon-Tyne Tyne and Wear NE6 2YD United Kingdom
ORDER No	GB05100077PO Job No UKAS23/05337
DATE OF RECEIPT	11 May 2023
PROCEDURE	Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49
IDENTIFICATION	Sound level meter Brüel & Kjær type 2250 serial No 2507239 connected via a preamplifier type ZC 0032 serial No 9294 to a half-inch microphone type 4189 serial No 2595580. Associated calibrator Brüel & Kjær type 4231 serial No 2542233 with one-inch housing and adapter type UC 0210 for half-inch microphone.
CALIBRATED ON	18 May 2023
PREVIOUS CALIBRATION	Calibrated on 22 April 2021, Certificate No. U37735 issued by a UKAS accredited calibration laboratory No. 0789

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 18 May 2023

Certificate Number: UCRT23/1681

Calibrated at & Certificate 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	Element Materials Technology Environmental UK Limited Shields Road Newcastle-upon-Tyne Tyne and Wear NE6 2YD United Kingdom
ORDER No	GB05100077PO Job No UKAS23/05337
DATE OF RECEIPT	11 May 2023
PROCEDURE	Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49
IDENTIFICATION	Sound level meter Brüel & Kjær type 2270 serial No 3027608 connected via a preamplifier type ZC 0032 serial No 28577 to a half-inch microphone type 4189 serial No 3195872. Associated calibrator Brüel & Kjær type 4231 serial No 2610258 with one-inch housing and adapter type UC 0210 for half-inch microphone.
CALIBRATED ON	18 May 2023
PREVIOUS CALIBRATION	Calibrated on 21 April 2021, Certificate No. U37723 issued by a UKAS accredited calibration laboratory No. 0789

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 07 November 2022 **Certificate Number: UCRT22/2321**

Calibrated at & Certificate 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	Element Materials Technology Ltd Shields Road Newcastle Upon Tyne Tyne and Wear NE6 2YD
Order No.	PO E220N22000159
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00709261
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09552
Rion	Microphone	UC-59	17690
Brüel & Kjær	Calibrator	4231	2326201
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 03 November 2022 ANV Job No. UKAS22/11685

Date Calibrated 07 November 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

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

CERTIFICATE OF CALIBRATION

Certificate Number
UCRT22/2321

UKAS Accredited Calibration Laboratory No. 0653

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES	
Specified or equivalent Calibrator	Equivalent	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	UC 0210	
Calibrator cal. date	07 November 2022	
Calibrator cert. number	UCRT22/2315	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	94.00 dB	Calibration reference sound pressure level
Calibrator frequency	999.97 Hz	Calibration check frequency
Reference level range	Single dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	22.86	23.30	± 0.30 °C
Humidity	52.6	57.9	± 3.00 %RH
Ambient Pressure	99.18	99.16	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	94.1 dB	Adjusted indicated level	94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10 dB

Self Generated Noise				
Microphone installed -	Less Than	18.6	dB	A Weighting
Microphone replaced with electrical input device -	UR = Under Range indicated			

Weighting	A			C			Z		
	12.4	dB	UR	17.4	dB	UR	21.4	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

…… END ……

Calibrated by: B. Bogdan

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 08 November 2022 **Certificate Number: UCRT22/2332**

Calibrated at & Certificate 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	Element Materials Technology Ltd Shields Road Newcastle Upon Tyne Tyne and Wear NE6 2YD
Order No.	PO E220N22000159
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00809316
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09608
Rion	Microphone	UC-59	17765
Brüel & Kjær	Calibrator	4231	2326201
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 03 November 2022 ANV Job No. UKAS22/11685

Date Calibrated 08 November 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

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

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT22/2332

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES	
Specified or equivalent Calibrator	Equivalent	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	UC 0210	
Calibrator cal. date	07 November 2022	
Calibrator cert. number	UCRT22/2315	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	94.00 dB	Calibration reference sound pressure level
Calibrator frequency	999.97 Hz	Calibration check frequency
Reference level range	Single dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	23.16	23.27	± 0.30 °C
Humidity	53.3	58.0	± 3.00 %RH
Ambient Pressure	98.42	98.40	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	93.8 dB	Adjusted indicated level	94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10 dB

Self Generated Noise				
Microphone installed -	Less Than	18.2	dB	A Weighting
Microphone replaced with electrical input device -				UR = Under Range indicated

Weighting	A			C			Z		
	11.6	dB	UR	15.6	dB	UR	22.9	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

…… END ……

Calibrated by: B. Bogdan

R 3

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 08 November 2022 **Certificate Number: UCRT22/2333**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
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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	Element Materials Technology Ltd Shields Road Newcastle Upon Tyne Tyne and Wear NE6 2YD
Order No.	PO E220N22000159
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	00809317
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	09609
Rion	Microphone	UC-59	17767
Brüel & Kjær	Calibrator	4231	2326201
	Calibrator adaptor type if applicable		UC 0210

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 03 November 2022 ANV Job No. UKAS22/11685

Date Calibrated 08 November 2022

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

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

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number
UCRT22/2333

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		

	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes

Total expanded uncertainties within the requirements of IEC 61672-1:2013	YES	
Specified or equivalent Calibrator	Equivalent	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	UC 0210	
Calibrator cal. date	07 November 2022	
Calibrator cert. number	UCRT22/2315	
Calibrator cal cert issued by Lab	0653	
Calibrator SPL @ STP	94.00 dB	Calibration reference sound pressure level
Calibrator frequency	999.97 Hz	Calibration check frequency
Reference level range	Single dB	

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.

Environmental conditions during tests	Start	End	
Temperature	22.81	22.62	± 0.30 °C
Humidity	52.2	55.7	± 3.00 %RH
Ambient Pressure	98.43	98.48	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	93.9 dB	Adjusted indicated level	94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±			0.10 dB

Self Generated Noise				
Microphone installed -	Less Than	18.7	dB	A Weighting
Microphone replaced with electrical input device -			UR = Under Range indicated	

Weighting	A			C			Z		
	12.1	dB	UR	15.7	dB	UR	23.3	dB	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* =2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

…… END ……

Calibrated by: B. Bogdan

element

Element Materials Technology
Shields Road
Newcastle-upon-Tyne
NE6 2YD