

Appendix 15-3: Substation Noise Impact Assessment

Calderdale Energy Park

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A specialist energy consultancy

Substation Noise Impact Assessment Calderdale Energy Park

Calderdale Windfarm Ltd

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- Appendix C – Noise Modelling Data
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1 Introduction

1.1 Overview

TNEI has been commissioned by Calderdale Windfarm Ltd ('The Applicant') to undertake a Noise Impact Assessment (NIA) for the operation of a substation, which forms part of the proposed Calderdale Energy Park (the 'Proposed Development').

The method of assessment when considering operational noise from developments such as a substation is different to that used for the assessment of operational noise from a wind turbine, and as such the two assessment types cannot be combined. Accordingly, the assessment of operational noise attributable to the proposed substation is presented separately to the assessment of operational wind turbine noise. The operational wind farm noise assessment is provided separately within Technical Appendix 15.2: Operational Noise Report. Potential cumulative effects of operational wind farm and substation noise are considered within Chapter 24: Cumulative Effects Assessment of the Preliminary Environmental Information Report (PEIR).

The Proposed Development is located north of Hebden Bridge, at approximate Ordnance Survey coordinates 396025, 433765. The substation is situated in the southern part of the Proposed Development, at approximate Ordnance Survey coordinates 395090, 432350.

The local area around the proposed substation is rural in nature, predominantly consisting of open moorland and agricultural land. The nearest receptor (residential property) is approximately 275 m south of the proposed substation. There are also a small number of standalone residential receptors located along Widdop Road, which is located approximately 1 km to the south of the proposed substation.

The aims of the NIA are to:

- Identify potential noise sensitive receptors (NSRs) in the vicinity of the proposed substation;
- Describe the existing noise environment around the NSRs;
- Identify the dominant sound sources associated with the operation of the proposed substation;
- Calculate the likely levels of operational noise at the nearest NSRs to determine the noise impacts associated with the development; and,
- Indicate any requirements for mitigation measures, if required, to provide sufficient levels of protection for nearby NSRs.

All work undertaken to produce this report has been carried out by members of the TNEI Environment and Engineering Team, all of whom are affiliated with the Institute of Acoustics (IOA). Specifically, the following members of staff have been involved in the project:

- Mark Tideswell, BSc, IOA Diploma in Acoustics and Noise Control, MIOA: **Baseline sound level survey.**
- Mark Tideswell, BSc, IOA Diploma in Acoustics and Noise Control, MIOA: **Noise propagation modelling.**
- Mathew Robinson, BEng, MSc, IOA Diploma in Acoustics and Noise Control, AMIOA: **Assessment and reporting.**
- **Gemma Clark**, BSc, MSc, MIOA: **Quality assurance.**

1.2 Nomenclature

Please note the following terms and definitions, which are used throughout this report:

- **Emission** refers to the noise level emitted from a noise source, expressed as either a sound power level or a sound pressure level;
- **Immission** refers to the sound pressure level received at a specific location from a noise source;
- **Rating Level** refers to the immission level after consideration of the character of the sound. The Rating Level is the Immission Level plus any required character corrections, if this is deemed necessary.
- **SWL** indicates the sound power level in decibels (dB);
- **SPL** indicates the sound pressure level in decibels (dB);
- **NML** (Noise Monitoring Location) refers to any location where noise levels have been measured;
- **NSRs** (Noise Sensitive Receptors) are all identified receptors that are sensitive to noise; and;
- **SNAL** (Substation Noise Assessment Location) refers to any location where the immission levels are calculated and assessed.

All figures referenced within the report can be found in Appendix D.

Unless otherwise stated, all noise levels refer to free field levels i.e. noise levels without influence from any nearby reflective surfaces.

All grid coordinates refer to the Ordnance Survey grid using Eastings and Northings

2 Proposed Substation Description

A substation principally consists of three main elements: switchgear, transformers, and control equipment. Incoming and outgoing circuits are routed through switchgear, which provides isolation and protection, while transformers step voltage up or down between different parts of the network.

A substation typically includes several switchgear bays and one or more transformer units, along with auxiliary systems. Additional equipment such as shunt reactors and auxiliary transformers may also be installed to manage voltage levels and support network stability.

The transformers within a substation connect to the wider grid network, often linking High Voltage (HV) and Medium Voltage (MV) systems. Depending on the design, these transformers may be located within the substation itself or may utilise existing HV infrastructure in a nearby facility.

2.1 Proposed Layout

An indicative layout for the proposed substation is included in Appendix A. The candidate plant for the layout is based on the provided layout drawing, which uses a layout configuration consisting of HV transformers, shunt reactors and auxiliary transformers. An updated assessment will be undertaken for the ES, based on a fixed specification of the proposed substation.

Based on the candidate plant layout, the primary sound sources considered within the NIA are:

- HV transformers - 2x;
- Shunt reactors - 2x; and
- Auxiliary transformers - 2x.

The sound level output of any auxiliary infrastructure included as part of the proposed substation, for example, switch gear, will be insignificant in comparison to the primary sound sources detailed above. Accordingly, no other items of plant have been considered within the NIA.

2.2 Study Area

NSRs are properties that are sensitive to noise and, therefore, require protection from nearby noise sources. The study area for the assessment of environmental noise is usually defined through the identification of the closest NSRs to the development.

The assessment of noise attributable to the proposed substation considers the nearest and most sensitive NSRs only, on the assumption that if sound levels at these receptors are within the defined limits, then sound levels at NSRs at greater distances should also be within acceptable levels.

The nearest identified NSRs that have a high level of sensitivity are existing residential properties located to the east, south and west of the proposed substation. These are referred to henceforth as Substation Noise Assessment Locations (SNALs). Table 2-1 details the locations of the nearest identified NSRs, which can also be seen on Figure 1 (Appendix D).

Table 2-1: Nearest Identified NSRs

SNAL ID - Name	Comment
SNAL01 - Holme Ends	Residential property approximately 420 m to the east of the proposed substation

SNAL ID - Name	Comment
SNAL02 - Well Hole Cottage	Residential property approximately NSR 275 m to the south of the proposed substation
SNAL03 - Cloughfoot Farm	Residential property approximately NSR 500 m to west of the proposed substation

2.3 Consultation

As part of the response to the Scoping Opinion provided by the Planning Inspectorate (PINS) in October 2025, the comments received from Calderdale Council recommended the use of British Standard (BS) 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

In relation to noise from the proposed substation, Calderdale Council's Environmental Health Officer also provided the following comments:

'In addition to BS 4142:2014+A1:2019 methodology, Low frequency noise from the BESS and substation should be considered in one third octave bands, as previously mentioned. BS 4142 standard will give a rating level and although this consider tones, given the sensitivity of the application and the close proximity of the noise sensitive receptors and the distance that lower frequency wavelengths can travel, this needs to be considered.'

As summarised in Section 5, the NIA has been undertaken in line with BS 4142, using one third octave band data for all modelled plant.

3 Methodology

3.1 Calculation Method

3.1.1 ISO 9613-2:2024

To predict the noise immission levels attributable to the proposed substation, a noise propagation model was created using the propriety noise modelling software, CadnaA. Within the software, complex models can be produced to simulate the propagation of noise according to a range of international calculation standards.

For the NIA, noise propagation was calculated in accordance with ISO9613-2:2024 *Acoustics — Attenuation of sound during propagation outdoors: Engineering method for the prediction of sound pressure levels outdoors*⁽¹⁾, using the following input parameters:

- Temperature is assumed to be 10°C and relative humidity as 70%;
- A ground attenuation factor of 1 (soft ground) has been used except for specific areas of developed ground (including the proposed substation), which are modelled with a ground attenuation factor of 0 (hard ground); and
- Receiver heights have been set to 4 m to represent the height of a first-floor bedroom window.

3.1.2 Uncertainties and Limitations

The noise propagation model is designed to give a good approximation of the specific sound level and the contribution of each individual sound source; however, it is expected that measured levels are unlikely to be matched exactly with modelled values. As such, the following limitations in the model should be considered:

- In accordance with ISO 9613, all assessment locations are modelled as downwind of all sound sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. These conditions are favourable to noise propagation;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for; and
- The model assumes all sound sources are operating continuously, simultaneously and at maximum anticipated operating capacity.

With due regard to the above, noise level predictions are likely to be higher than what will occur during normal operation.

Note that the modelled sound sources represent candidate plant and an associated proposed substation layout. The location, operating conditions, number of, and noise output of individual items of plant may vary from what is presented in this report after final plant specification. An updated assessment will therefore be undertaken for the ES, based on a fixed specification of the proposed substation. An assessment of the final plant specification cannot be undertaken without a tendering process that would occur after DCO consent has been granted. As such, it is expected that an additional NIA will be undertaken upon final specification of plant, as part of a DCO requirement.

3.2 Assessment Method

A number of standards and guidelines are available for the assessment of environmental noise from proposed new industrial developments or activities on residential receptors.

There are no fixed noise level limits for industrial noise in the UK, and consideration of the context in which the noise generation occurs is considered with more importance than simply meeting an absolute noise level to determine the likelihood of an adverse impact. This form of assessment is set out in British Standard (BS) 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*⁽²⁾, hereafter referred to as BS 4142.

3.2.1 BS 4142 Assessment Method

The BS 4142 form of assessment is based on the predicted or measured levels of an assessed sound source compared to the measured background sound levels without the specific sound source present and uses “*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*”.

In reference to the existing baseline conditions i.e. before a proposed development, BS 4142 uses the following terms:

- **Residual Sound Level:** The sound level of all noise sources in an area, except the sound source to be assessed, over a given time interval, t . Described using the metric $L_{Aeq(t)}$.
- **Background Sound Level:** This is also the sound level of all noise sources in an area except the sound source to be assessed, however, it is quantified by determining the sound level that is exceeded for 90% of the given time interval. Described using the metric $L_{A90(t)}$.

The next two noise metrics (below) represent noise attributable to a proposed development only.

- **Specific Sound Level:** The equivalent continuous A-weighted sound pressure level (SPL) produced by the specific sound source at the assessment location over a given reference time interval, i.e. the sound level of just the sound source to be assessed. Described using the metric $L_{Aeq(t)}$.
- **Rating Level:** The Specific Sound Level adjusted for the characteristics of the sound. The Rating Level is calculated by adding a character correction(s), if required, to the Specific Sound Level when the sound source contains audible characteristics at the receptor location, such as tonal, impulsive or intermittent components. Described using the metric, $L_{Aeq(t)}$.

The final noise metric represents the future noise level during the operational phase of a proposed development and can be thought of as the ‘Total Sound’ i.e. the existing baseline + a proposed development.

- **Ambient Sound Level:** Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far i.e. the sound level of all noise sources in an area, including the sound source to be assessed. Described using the metric, $L_{Aeq(t)}$.

BS 4142, Section 11, requires that the assessment considers the context in which the sound occurs, and as such there is no definitive pass/fail element to the standard. Rather, the assessment outcome is an indication as to the likelihood for adverse impact.

Additional guidance on the BS 4142 assessment methodology is provided in the Association of Noise Consultants’ (ANC) BS 4142: Technical Note⁽³⁾, which has been authored by the ANC Good Practice

Working Group (ANC, 2020). The guide is “*designed to assist readers with a reasonable interpretation and application of BS 4142 as a whole.*”

The BS4142 assessment is a two-stage process. Initially, an estimate of the impact is made by subtracting the measured Background Sound Level from the calculated or measured Rating Level. The second part of the assessment is to then consider the context in which the sound occurs, which may modify the findings of the initial estimate.

The BS4142 states:

“Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following...”

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.”

For the second stage of the assessment there are many elements of context that can be considered. The following list¹, which is not exhaustive, gives some examples that could be relevant to the assessment:

- the absolute level of sound;
- the character and level of the residual sound compared to the character and level of the specific sound;
- whether specific sound insulation and noise control measures have already been incorporated into a receptor (which would lower the sensitivity of the receptor);
- former uses, at or close to a proposed development;
- the legitimacy of the industrial use, e.g. planning permissions or environmental permits;
- implementation of best practicable means for a given process or activity; and
- whether the Rating Level represents typical levels, realistic worst case, unlikely worst case etc.

3.2.2 Guideline Noise Levels

It is acknowledged that some Planning Authorities refer to fixed guideline noise levels for different receptor types, which can be useful to assess noise impacts on non-residential receptors or to provide additional context during the BS 4142 qualitative assessment stage. In particular it is noted that BS 8233 *Guidance on Sound Insulation and Noise Reduction for Buildings* ⁽⁴⁾ is often referred to, however, BS 8233 is a standard that provides advice on how to design buildings with regards to internal acoustics – it is not a standard for the assessment of external environmental noise.

BS 8233:2014 does not provide guidance on acceptable noise levels from industrial noise and does not provide any recommendations whatsoever on the selection of industrial noise limit values for

¹ Examples of contextual issues to consider can be found in the BS4142 standard, the ANC BS 4142 Technical Note and Method Implementation Document (MID) for BS 4142 (5).

residential receptors. Rather, it states: “Where industrial noise affects residential or mixed residential areas, the methods for rating the noise in BS 4142 should be applied.” Accordingly, the assessment of noise levels for residential receptors is undertaken in accordance with BS 4142 only.

4 Baseline Sound Level Survey

4.1 Monitoring Locations

TNEI undertook an operational noise assessment for the wind turbines of the Proposed Development. As part of that assessment, TNEI undertook continuous background sound level monitoring for the period between 12th March 2025 – 7th May 2025 at nine Noise Monitoring Locations (NMLs), chosen to be representative of nearby NSRs. The dataset collected during the survey was used for the purpose of this assessment to characterise the noise environment at the nearest NSRs, and to determine representative daytime and night-time background sound levels. Further information on the nine NMLs can be found in Section 5 of Technical Appendix 15.2.

Of the nine NMLs, NML01 and NML02 are considered to be the most representative of the nearest NSRs to the proposed substation. NML01 and NML02 are the closest NMLs to the NSRs, and are similarly located along the southern slope of Walshaw Moor.

The NMLs are summarised in Table 4-1 and shown on Figure 1 (Appendix D).

Table 4-1: Noise Monitoring Locations

NML		Coordinates	
ID	Descriptor	Eastings	Northings
NML01	Adjacent to Widdop Reservoir Lodge	393595	433000
NML02	New Laithe Farm	396619	431719

4.2 Survey Equipment

All measurements were made with sound level meters (SLMs) mounted approximately 1.2 m above the ground and away from nearby reflective surfaces i.e. building façades and fences. Photographs of the NMLs are included in Appendix B.

The noise monitoring equipment consisted of a Rion NL-52 and a Rion NL-53 SLM fitted with appropriate environmental wind shields. All noise monitoring equipment (calibrator, SLM and microphones) used for the study are categorised as Class 1, as specified in IEC 61672-1 ‘*Electroacoustics. Sound level meters. Specifications*’⁽⁵⁾. The equipment was calibrated on-site at the beginning and end of each measurement period, with no significant deviations noted. Appendix B contains the equipment and laboratory calibration details for the SLMs and microphones.

As the survey was originally undertaken for the assessment of operational wind turbine noise, the SLMs were set to log in 10-minute measurement periods in accordance with ETSU-R-97⁽⁶⁾, which defines how baseline monitoring should be undertaken for wind farm assessments. It is noted that for BS 4142 assessments, often a 1-hour logging period is reported for the daytime and 15-minute period is used for night-time, however, the Association of Noise Consultants (ANC) publication ‘BS 4142:2014+A1:2019 Technical Note’ states: *“In this context, any measurement time interval is considered acceptable under the terms of BS 4142, providing the assessor can justify that it appropriately represents the background sound climate.”*

Given that the survey ran for several weeks, the measured data obtained are considered to appropriately represent the background sound climate at the NSRs.

4.3 Meteorological Conditions

Wind speed and direction data was measured continuously during the baseline noise survey using a LIDAR unit, which was temporarily installed on-site. For wind farm operational noise assessments, the measured noise data is organised into wind speed ‘bins’ to determine wind-speed specific noise limits. In contrast, BS 4142 states, “Exercise caution when making measurements in poor weather conditions, such as wind speeds greater than 5 m/s.” Accordingly, for the purposes of the NIA, the measured noise data was filtered to remove any data points that were measured during periods of high wind speeds and rain. In this particular case, all noise data measured with wind speeds at or above 5 m/s have been removed. Time history charts are provided in Appendix B for each of the NMLs, which present the measured 10-minute L_{Aeq} and L_{A90} values, the measured wind speed (m/s) and any data points that have been removed from the analysis, including for precipitation events as well as the 20 minutes immediately preceding and 20 minutes immediately following any recorded precipitation events.

It should be noted that the wind speed data used in this assessment is based on measurements obtained by a LIDAR unit located on-site. Wind speeds at the highest proposed turbine hub height (114 m) were derived from measurements at 110 m and 120 m; this was then standardised to a height of 10 m. This process is dictated by the relevant wind turbine noise assessment methodology. In contrast, BS 4142 suggests that wind speed measurements should be undertaken at (or as near as practicable to) the NMLs, at comparable measurement heights to the SLMs (approximately 1.5 m). In practice, the data filtering undertaken has been based upon wind speeds of 5 m/s or more but measured at a height of 10 m (standardised). If wind speeds had been measured at a height of 1.5 m for the same given time period, the values would likely have been lower due to the effects of wind shear. As such, the filtering has likely removed more noise data than is necessary from the dataset, which will provide a conservative approach (i.e. filtering out higher noise level data).

4.4 Existing Noise Environment

Subjective observations made during the installation and collection of equipment, and during a site visit for equipment maintenance, noted the following:

- At NML01, observed sound sources included wind induced noise in vegetation, birdsong, infrequent passing cars and activity at the property involving power tools; and
- At NML02, the sound environment was typically composed of wind induced noise from nearby foliage, birdsong and distant road traffic noise. During the equipment collection, the surveyor noted that noise from activity in/around a nearby barn was audible, but low level.

Table 4-2 presents the derived representative Background Sound level and the Residual Sound Level for daytime and night-time at each NML.

The Background Sound Levels were determined with reference to the time-history charts, statistical analysis charts and distribution analysis charts included in Appendix B, following the guidance presented within the ANC technical note and BS 4142, which states:

“A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.”

The Residual Sound Levels were determined through consideration of the range, mean and modal values of the daytime and night-time measured L_{Aeq} values, which are detailed in Appendix B.

Table 4-2: Measured Sound levels

SNAL		Background Sound Level, dB L _{A90} (10mins)		Residual Sound Level, dB L _{Aeq} (10mins)	
ID	Descriptor	Day	Night	Day	Night
NML01	Adjacent to Widdop Reservoir Lodge	27	25	42	33
NML02	New Laithe Farm	26	24	40	32

5 Operational Noise Impacts

5.1 Modelling of Noise Sources

The noise model considers all of the primary sound sources detailed within Section 2 of the report. The following section describes how each sound source has been incorporated into the noise model for the proposed substation.

All sound sources associated with the proposed substation are assumed to be operating concurrently, continually and with a constant sound level output.

As noted above, noise modelling is based on candidate plant typical for the size of the proposed substation. It should be noted that final plant specifications may vary during the final tendering process.

Where possible, noise modelling data is shown within Appendix C, however, where data cannot be published due to confidentiality reasons, TNEI would be happy to discuss this data in more detail with the Planning Inspectorate (or any relevant stakeholders), if required.

5.1.1 HV Transformers

Two HV Grid Transformers have been assumed to be located within the proposed substation and a candidate ABB transformer has been selected for use within the noise model. Each transformer has been modelled as a cuboid with five area sources (one for each façade and one for the top) and the broadband SWL for the overall unit equates to 88 dBA.

The relevant data sheets for this plant are included within Appendix 3.

5.1.2 Shunt Reactors

Two shunt reactors, each with a rated power of 250 MVAR have been assumed to be located within the proposed substation. The dominant sound source from this item of plant would be the reactor unit and the sound level output from any ancillary equipment is anticipated to be insignificant in comparison. For the purposes of the NIA, it has been assumed that the reactor would have an Oil Natural Air Natural (ONAN) cooling system, which does not require the operation of fans.

The shunt reactor has been modelled as a cuboid with five area sources (one for each façade and one for the top). In the absence of reported spectral noise data, the unit has been modelled using one-third octave band noise data for a similar model of shunt reactor, which has then been adjusted such that the broadband SWL for the overall unit equates to the quoted SWL of 71 dBA.

5.1.3 Auxiliary Transformer

Auxiliary transformers have been assumed as part of the proposed substation, and sound power level data has been derived for a 100 kVA rated transformer following the guidance outlined in *Engineering Noise Control, Theory and Practice (2023)*⁽⁷⁾. Each transformer has been modelled as a cuboid with five area sources (one for each façade and one for the top) and the broadband SWL for the overall unit equates to 71 dBA.

5.1.4 Source Noise Levels

Table 5-1 presents the octave band sound power levels (SWL) used in the noise model for each noise source.

Table 5-1: Octave Band Sound Power Levels of Modelled Noise Sources, dBA

Noise Source	Broad band	Octave band							
	dBA	63	125	250	500	1000	2000	4000	8000
ABB HV transformer*	88	64	80	82	83	82	75	71	65
Shunt reactor*	71	38	59	70	62	55	51	39	-
Auxiliary transformer*	71	47	62	65	65	64	58	54	48

* Indicates a noise source that has been modelled using one third octave band data. Full one third octave spectra are included within Appendix C.

5.2 Incorporation of Additional Mitigation Measures

The model assumes that no additional mitigation measures, for example, noise-attenuating fencing or bunds, will be included as part of the proposed substation.

5.3 Calculated Immission Levels

Noise immission levels have been calculated at three SNALs, which have been selected to represent the closest NSRs to the proposed substation. Each SNAL has been set on the side of the property facing the proposed substation. The SNALs are detailed in Table 5-2 alongside its associated representative NML. NML02 was considered the representative NML for all SNALs, as the quieter dataset is more conservative than the baseline data collected at NML01. SNALs are also shown on Figure 1 and Figure 2 in Appendix D.

Table 5-2: Substation Noise Assessment Locations (SNALs)

Substation Noise Assessment Location		OS Grid Reference		Representative NML
SNAL ID	SNAL Descriptor	Eastings	Northings	
SNAL01	Holme Ends	395509	432161	NML02
SNAL02	Well Hole Cottage	394900	432064	NML02
SNAL03	Cloughfoot Farm	394554	432438	NML02

The immission levels (Specific Sound Level) have been calculated assuming all plant is operating continuously and concurrently. The model assumes, as a worst case, that noise levels do not fluctuate and remain the same throughout the daytime and night-time assessment periods.

The noise immission levels are detailed in Table 5-3 and are also illustrated as a noise contour plot shown in Figure 2 of Appendix D.

Table 5-3: Calculated Immission Levels, dB LAeq(t)

Substation Noise Assessment Location		Immission Level	
SNAL	SNAL Descriptor	Daytime	Night-time
SNAL01	Holme Ends	21	21
SNAL02	Well Hole Cottage	22	22
SNAL03	Cloughfoot Farm	20	20

6 Noise Impact Assessment (BS 4142)

6.1 BS 4142 Rating Level

To assess the immission levels in accordance with BS 4142, the Specific Sound Level must be converted into a Rating Level. The Rating Level allows for character corrections to be added to account for particular characteristics of the sound that may be perceived as more annoying. In particular, the Rating Level considers tonality, impulsivity and intermittency of the sound, as well other sound characteristics that are neither tonal, impulsive, or intermittent, but are otherwise readily distinctive against the residual acoustic environment.

Note: Character corrections consider the noise at the receiver location, not the source location.

6.1.1 Tonality

With regards to tonality, BS 4142 states:

“For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.”

Electrical plant, such as power transformers, are often tonal at source, typically in the 100 Hz frequency band. BS 4142 corrections, however, are only applied if the noise characteristics are present at the receptor location, not at the source location. In this instance, the highest predicted noise level in the 100 Hz third octave band is 9 dBA, which is substantially lower than the residual sound level and as such, no tonality would be perceptible.

As such, no tonal character correction is required.

6.1.2 Impulsivity

With regards to impulsivity, BS 4142 states:

‘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 converted 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.’

Impulsivity is not considered to be a relevant sound characteristic of a substation as when operational, the noise level will be predictable and consistent.

6.1.3 Intermittency

The intermittency of the sound source needs to be considered when it has identifiable on/off conditions with regards to intermittency, BS 4142 states:

‘If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.’

As with impulsivity, intermittency is not considered to be a relevant sound characteristic in this case. Once operational, noise levels may fluctuate by a small amount over long periods of time, but no step changes in noise level are anticipated.

6.1.4 Other Sound Characteristics

With regards to other sound characteristics, BS 4142 states:

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

Based on TNEI's understanding and experience of this type of plant, it is not anticipated that any additional sound characteristics would be considered readily distinctive against the residual acoustic environment.

6.1.5 Calculation of the Rating Level

With due regard to the above, no character corrections are required. Therefore, the BS 4142 Rating Levels are equal to the Specific Sound Levels.

Table 6-1: BS 4142 Rating Levels

SNAL		Specific Sound Level		Character Corrections		Rating Level	
ID	Descriptor	Day	Night	Day	Night	Day	Night
SNAL01	Holme Ends	21	21	0	0	21	21
SNAL02	Well Hole Cottage	22	22	0	0	22	22
SNAL03	Cloughfoot Farm	20	20	0	0	20	20

6.2 BS 4142 Stage 1 Assessment – Initial Estimate of Impact

Stage 1 of the assessment compares the Rating Levels against the Background Sound Level, as detailed in Table 6-2.

Table 6-2: BS 4142 Initial Estimate of Impact

SNAL		Rating Level		Background Sound Level		Difference (+/-)	
ID	Descriptor	Day	Night	Day	Night	Day	Night
SNAL01	Holme Ends	21	21	26	24	-5	-3
SNAL02	Well Hole Cottage	22	22	26	24	-4	-2
SNAL03	Cloughfoot Farm	20	20	26	24	-6	-4

During both daytime and night-time, the Rating Level is below the Representative Background Sound Level at all SNALs. This is an "indication of the specific sound source having a low impact, depending on the context."

6.3 BS 4142 Stage 2 Assessment – Consideration of Context

Although there are other elements of context that may be relevant to the assessment, BS 4142 requires the following three contextual elements to be considered:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and the level of the specific sound; and
- the sensitivity of the receptor.

Each of these is considered in turn below, alongside other contextual elements that are relevant for the proposed substation.

6.3.1 Context: Absolute Level of Sound

BS 4142 suggests that in instances where the existing sound environment is considered either particularly low or particularly high then absolute levels may be more relevant than the initial estimate of impact. The standard states:

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

The ANC BS 4142 Technical Note provides additional guidance on this, providing indicative values that could be used to describe ‘low’ background sound levels and ‘low’ rating levels. Specifically, the Technical Note states:

“BS 4142 does not define ‘low’ in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB LA90, and low rating levels as being less than about 35 dB LAR,Tr”.

In this case, the background sound levels are below 30 dB for both daytime and night-time at all SNALs, which could be described as ‘very low’. The Rating Levels are similarly ‘low’, remaining below 35 dB LAeq(15mins) at all receptors. As such, **consideration of the absolute level of sound suggests that the initial estimate of impact could be reduced.**

6.3.2 Context: Character and Level of Residual Sound

The character and level of the residual sound should be compared to the character and level of the specific sound, and consideration should be given to whether the specific sound would be incongruous within the existing environment. Table 6-3 compares the Specific Sound Level with the Residual Sound Level and also indicates the estimated level of change.

Table 6-3: Residual (Existing) and Ambient (Future) Sound Levels, dB LAeq(15mins)

SNAL		Specific Sound Level		Residual Sound Level		Ambient Sound Level		Change (+/-)	
ID	Descriptor	Day	Night	Day	Night	Day	Night	Day	Night
SNALO 1	Holme Ends	21	21	40	32	40	32	0	0
SNALO 2	Well Hole Cottage	22	22	40	32	40	32	0	0

SNAL		Specific Sound Level		Residual Sound Level		Ambient Sound Level		Change (+/-)	
ID	Descriptor	Day	Night	Day	Night	Day	Night	Day	Night
SNALO 3	Cloughfoot Farm	20	20	40	32	40	32	0	0

At all SNALs the increase in noise level for both day or night is 0 dB. To put this into context, it is generally considered that an overall change in noise level of 3 dB is just perceptible. Therefore, for all SNALs, the overall noise level increase is likely to be imperceptible.

As such, **consideration of the character and level of residual sound does not materially change the initial estimate of impact.**

6.3.3 Context: Sensitivity of Receptor

BS 4142 suggests that the sensitivity of the receptor may be lessened if design measures that secure good internal and/or outdoor acoustic conditions are already implemented within the receptor. An example of this could be where a residential building has been fitted with non-openable windows in an already high noise environment. This is not relevant to this assessment, where it is assumed that all nearby NSRs do not incorporate any specific noise control measures. As such, **the sensitivity of the receptor remains high, and this contextual element does not materially affect the initial estimate of impacts.**

6.4 BS 4142 Assessment Conclusion

The Stage 1 Initial Estimate of Impact indicated that the Rating Level at all SNALs is equal to or below the background sound level, which suggests the initial estimate of impact was an *“indication of the specific sound source having a low impact, depending on the context.”*

Detailed consideration of the context suggests that the initial estimate of impacts could be reduced even further, however the outcome is not changed from the initial estimate as it had already concluded low impact.

Accordingly, the BS 4142 assessment concludes that there would be no adverse impacts on residential receptors from the operation of the proposed substation.

7 Summary

In order to determine the potential impact of noise emissions from the operation of the proposed substation within the Proposed Development, TNEI has undertaken an assessment in accordance with BS 4142.

A noise propagation model in accordance with ISO 9613-2:2024 was produced that predicted the noise immission levels at the nearest identified residential receptors. Predictions are based on an indicative layout and candidate plant that is typical for the type and class of proposed substation.

A baseline noise survey was undertaken for the operational wind farm noise assessment and data measured at one of the closest monitoring locations to the proposed substation has been used to inform the BS 4142 assessment. The baseline survey location is considered representative of the existing noise environment at the nearest dwellings.

Three NALs were defined, representative of the closest individual residential NSRs, and the noise levels predicted at these locations was assessed in accordance with BS 4142:2014+A1:2019.

The predicted Rating Levels from the proposed substation (based on a candidate plant layout and specification) range from 20 to 22 dBA.

Noise level limit criteria have been proposed by TNEI, that would offer appropriate levels of protection against noise to the nearest residential receptors, and these can be included in a DCO requirement.

The BS 4142 assessment concludes that there would be no adverse impacts associated with the operation of the proposed substation.

8 References

1. **International Organization for Standardization (ISO)**. *Acoustics — Attenuation of sound during propagation outdoors — Part 2: Engineering method for the prediction of sound pressure levels outdoors*. Geneva : ISO, 2024. ISO 9613-2:2024.
2. **British Standards Institution (BSI)**. *Methods for rating and assessing industrial and commercial sound*. London : BSI, 2019. BS 4142:2014+A1:2019.
3. **Association of Noise Consultants (ANC)**. *BS 4142:2014+A1:2019 Technical Note. Version 1.0*. London : ANC, 2020.
4. **British Standards Institution (BSI)**. *Guidance on sound insulation and noise reduction for buildings*. London : BSI, 2014. BS 8233:2014.
5. **International Electrotechnical Commission (IEC)**. *Electroacoustics – Sound level meters – Part 1: Specifications*. Geneva : IEC, 2013. IEC 61672-1:2013.
6. **ETSU for the DTI (Department of Trade and Industry)**. *The Working Group on Noise from Wind Turbines ETSU-R-97 The Assessment and Rating of Noise from Wind Farms*. 1996.
7. **Bies, David A., et al.** *Engineering Noise Control: Theory and Practice*. s.l. : CRC Press, 2023.
8. **Environment Agency, Natural Resources Wales and Northern Ireland Environment Agency**. *Method Implementation Document (MID) for BS 4142*. London : Environment Agency, 2023.

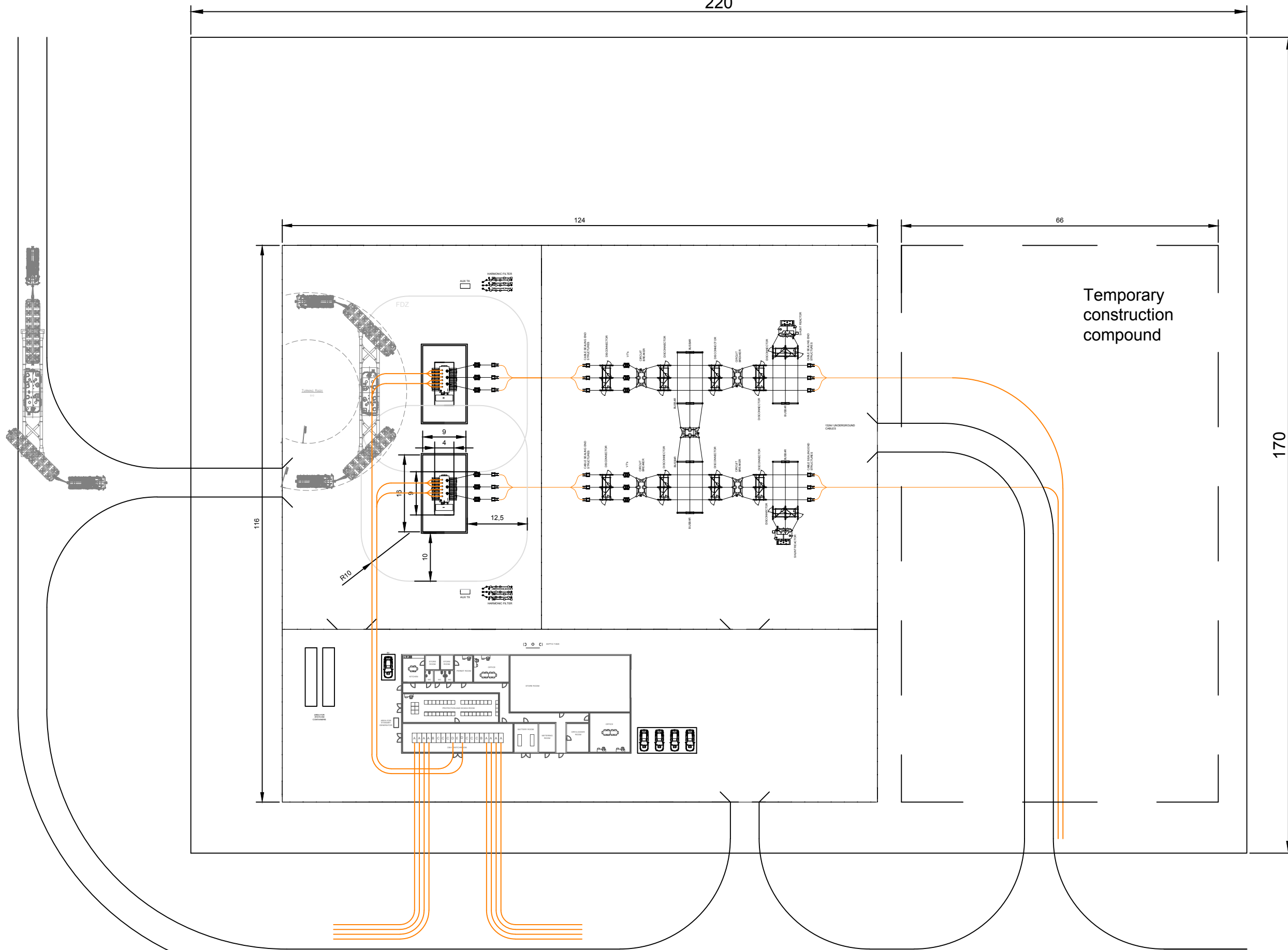
Appendix A – Proposed Substation Details

- Indicative site layout drawing

220

NOTES

- 1. Dimensions for cabling details are not finalised. A subsequent version will be issued when completed.



Temporary construction compound

170

116

124

66

R10

15

10

4

12.5

REVISION	DATE	DRAWN BY	CHECKED BY	APPROVED BY	REVISION DESCRIPTION
1	29/09/2025	Emily Pidcock	Mark Lawson	Don Mackay	Issuing to client



PROJECT	Calderdale
TITLE	Onsite Substation
DOCUMENT NO.	CAL-CWFL-VGED-DRW-022-REV1
REVISION NO.	1

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 www.vektagroup.com
 Registered in Scotland under company no. SC656736

Appendix B – Baseline Survey Data

- Images at NML01 and NML02
- BS 4142 baseline analysis charts
- SLM calibration certificates

Images taken at NML01



NML01: Looking East



NML01: Looking North

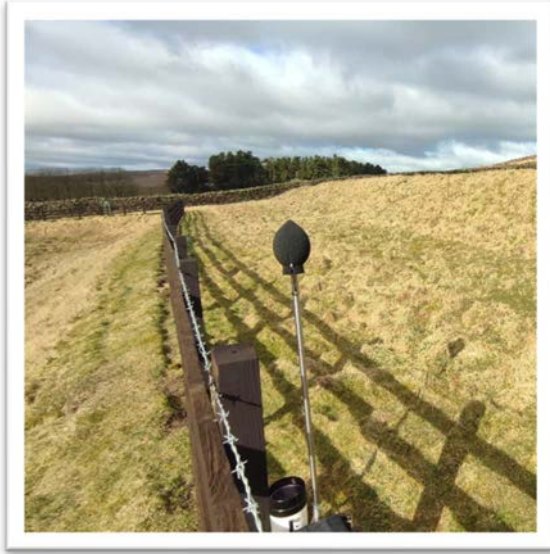


NML01: Looking West

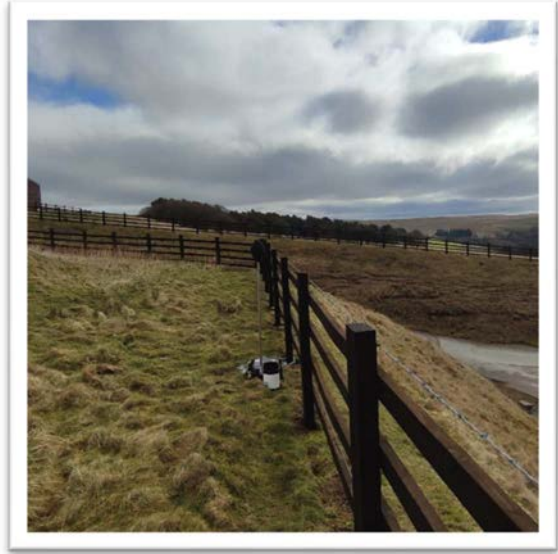


NML01: Looking South

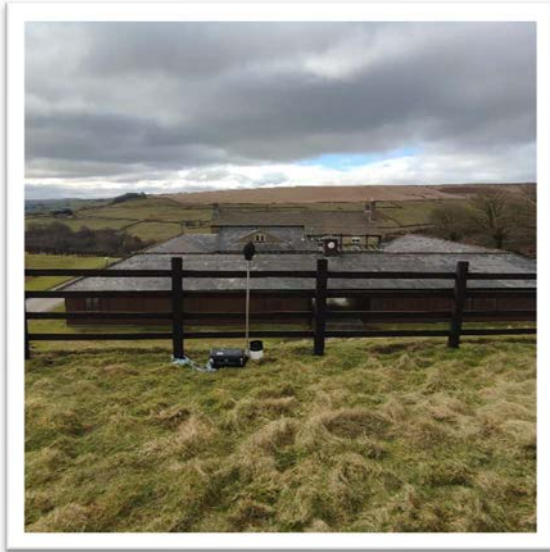
Images taken at NML02



NML02: Looking North West



NML02: Looking East



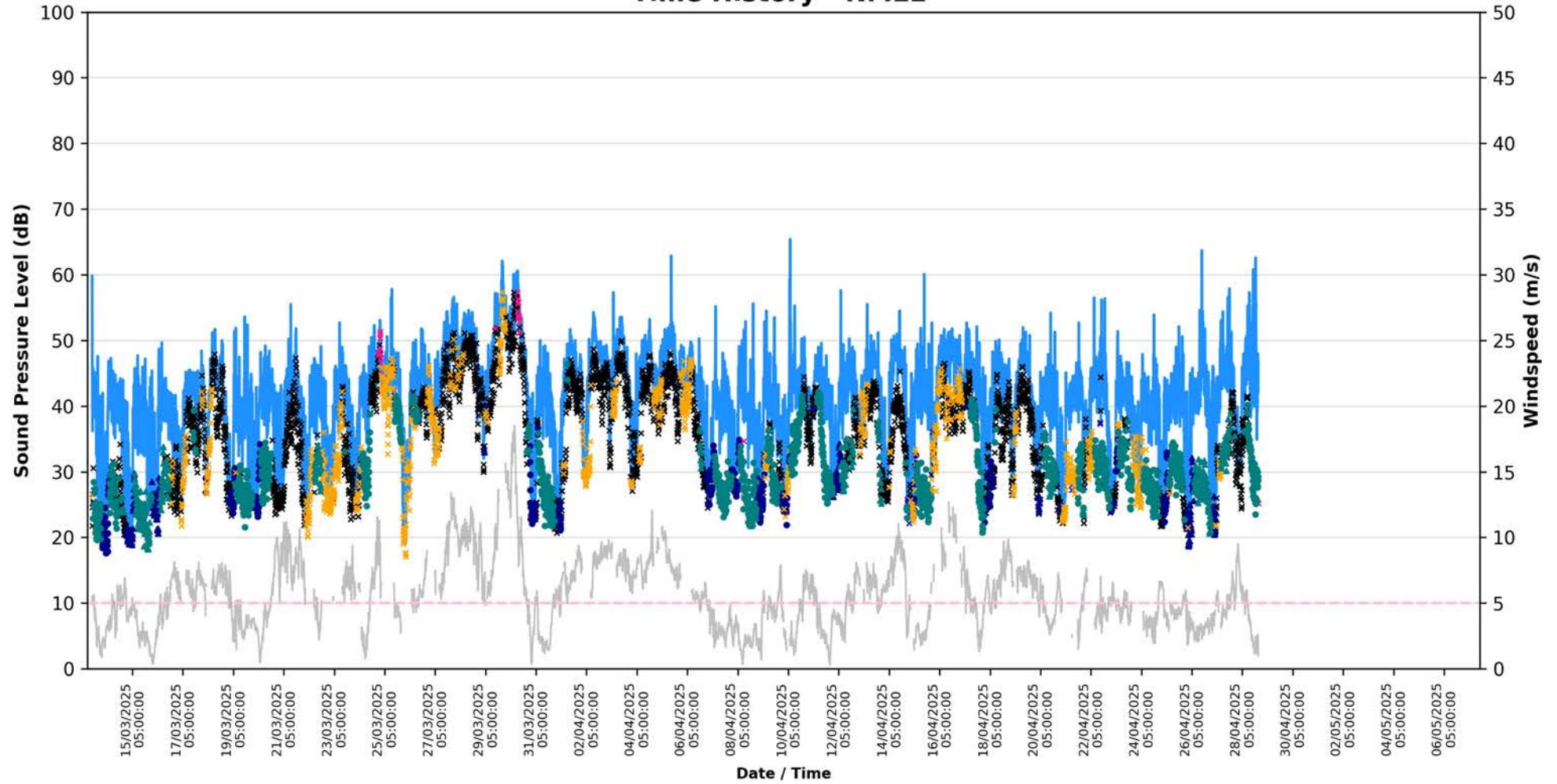
NML02: Looking South



NML02: Looking West

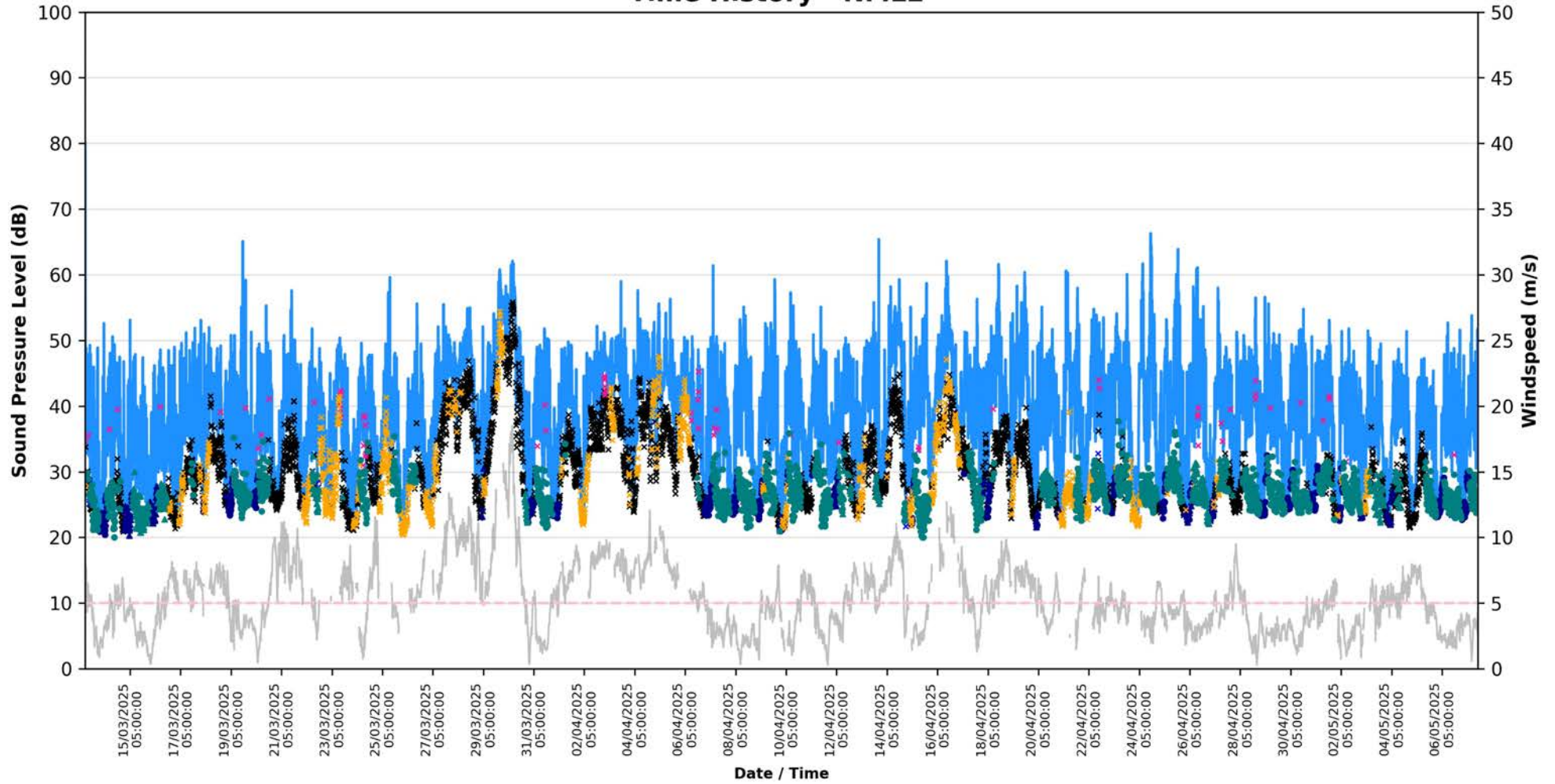
15809 - Calderdale Energy Park - Measured Sound Levels:

Time History - NML1



15809 - Calderdale Energy Park - Measured Sound Levels:

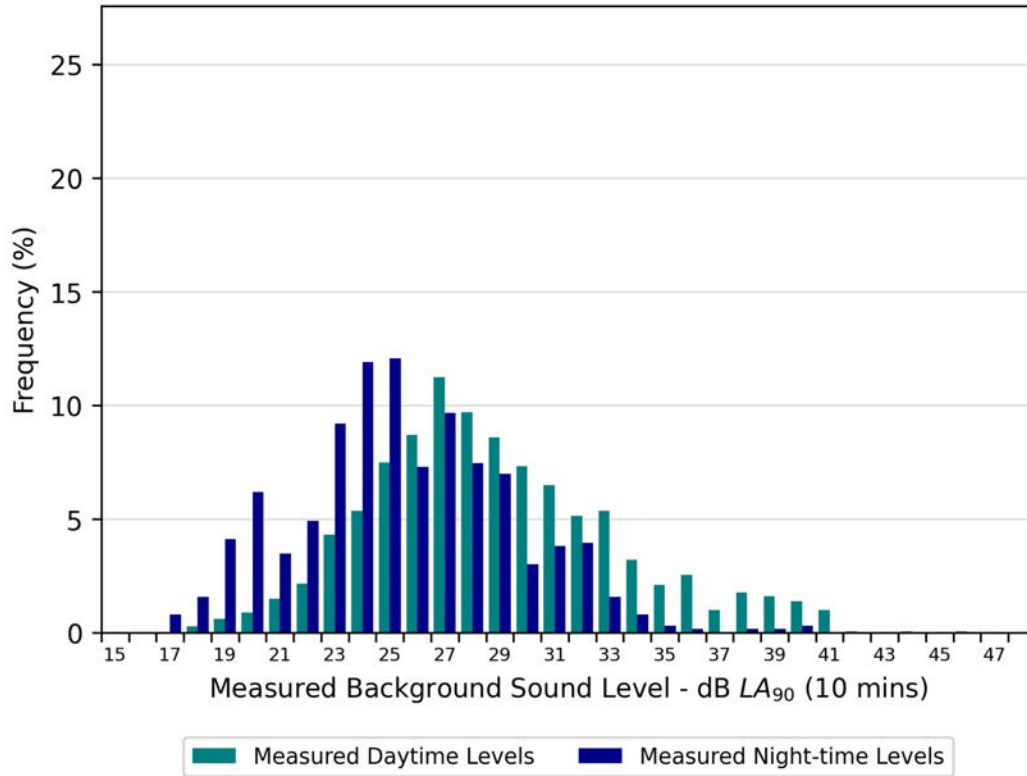
Time History - NML2



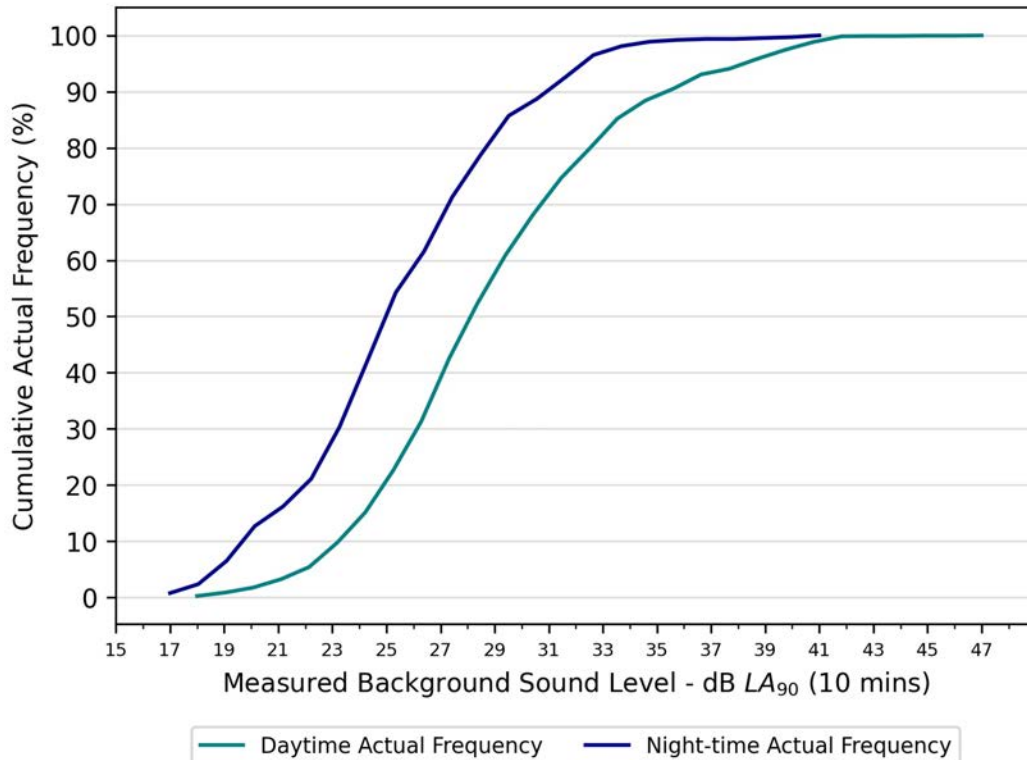
- | | |
|---|--------------------------------------|
| LA _{eq} (10 mins) | Auto Exclusion - Windspeed > 5.0 m/s |
| Weekday - Daytime LA ₉₀ (10 mins) | Manual Exclusion |
| Weekday - Night-time LA ₉₀ (10 mins) | Corrupt/Incomplete Data |
| Weekend - Daytime LA ₉₀ (10 mins) | Windspeed |
| Weekend - Night-time LA ₉₀ (10 mins) | Windspeed Cutoff |
| Auto Exclusion - Precipitation Event | |

15809 - Calderdale Energy Park - Measured Sound Levels:

Statistical Analysis - NML1

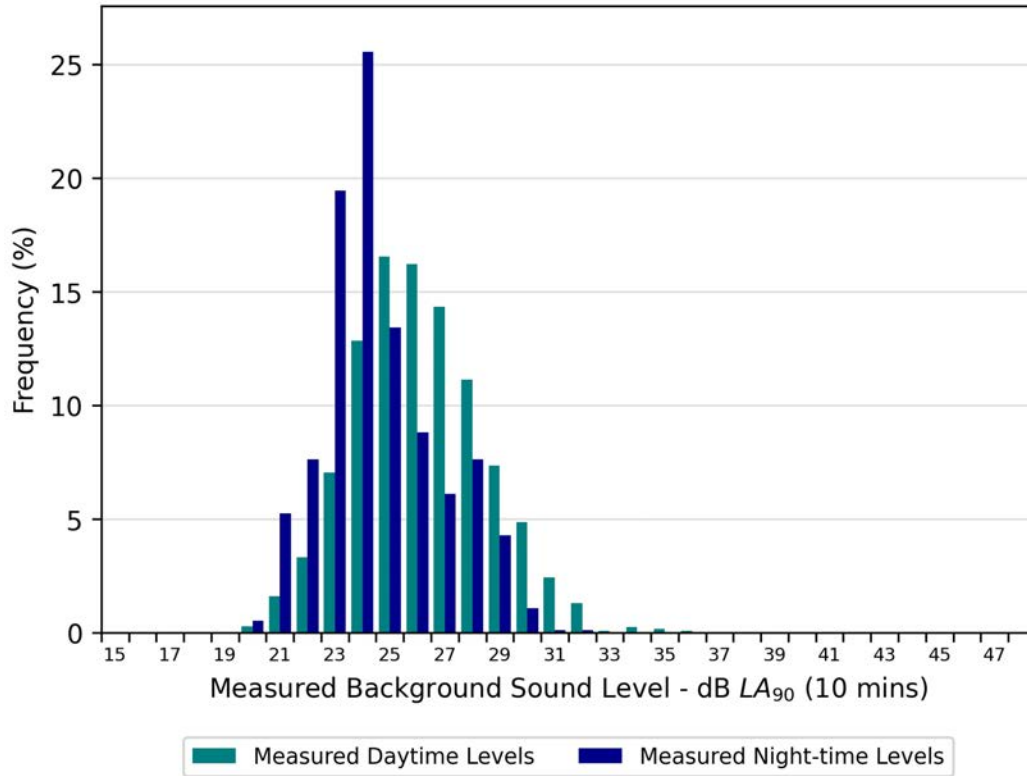


Statistical Analysis - NML1

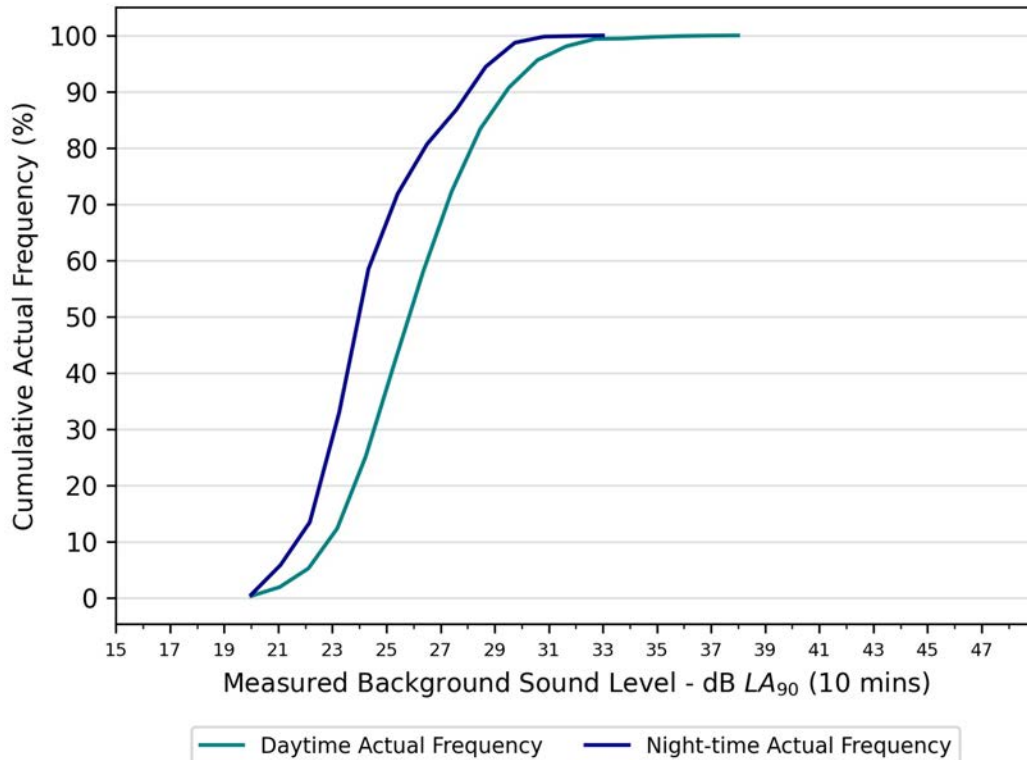


15809 - Calderdale Energy Park - Measured Sound Levels:

Statistical Analysis - NML2



Statistical Analysis - NML2



15809 - Calderdale Energy Park - Measured Sound Levels:

Relevant Statistics

NML1

		COUNT	MEAN	MEDIAN	RANGE
DAYTIME	LA90 (10 MINS)	1804	29	29	18 - 46
	LAEQ (10 MINS)	1804	42	42	23 - 64
NIGHT-TIME	LA90 (10 MINS)	630	26	25	18 - 40
	LAEQ (10 MINS)	630	33	32	19 - 65

NML2

		COUNT	MEAN	MEDIAN	RANGE
DAYTIME	LA90 (10 MINS)	2379	27	26	20 - 38
	LAEQ (10 MINS)	2379	40	40	22 - 66
NIGHT-TIME	LA90 (10 MINS)	931	25	25	20 - 32
	LAEQ (10 MINS)	931	32	30	23 - 57

SLM 71



CERTIFICATE OF CONFORMANCE


Date of Issue **14 August 2024**
Customer **TNEI Services Ltd**
Certificate Number **CONF082410**

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-53	00541102
Preamplifier	Rion	NH-25	34055
Microphone	Rion	UC-59	25636

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2013 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed.......... Position. Calibration Technician Date..... 14/08/2024
 K. Zablocki

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL
 ☎ 01908 642846 📠 01908 642814
 ✉ info@noise-and-vibration.co.uk 🌐 www.noise-and-vibration.co.uk



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 03 January 2024

Certificate Number: UCRT24/1016

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

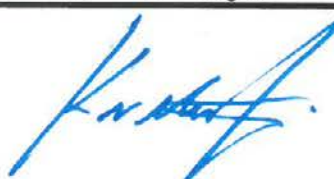
Milton Keynes MK5 8HL

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

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer TNEI
7th Floor West One
Forth Banks
Newcastle Upon Tyne
NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01165338
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	65565
Rion	Microphone	UC-59	10557
Rion	Calibrator	NC-75	34334830
	Calibrator adaptor type if applicable		NC-75-022

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 22 December 2023

ANV Job No.

UKAS23/12873

Date Calibrated 03 January 2024

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
	23 February 2022	TCRT22/1163	ANV Measurement Systems

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

UCRT24/1016

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

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	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-75-022		
Calibrator cal. date	18 December 2023		
Calibrator cert. number	UCRT23/2596		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.01	dB	Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz	Calibration check frequency
Reference level range	Single	dB	
Accessories used or corrected for during calibration - None			

Environmental conditions during tests	Start	End	
Temperature	23.35	22.45	± 0.30 °C
Humidity	51.3	48.9	± 3.00 %RH
Ambient Pressure	97.76	97.78	± 0.03 kPa

Indication at the Calibration Check Frequency						
Initial indicated level	94.2	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	21.5	dB A Weighting			
Microphone replaced with electrical input device - UR = Under Range indicated						
Weighting	A		C		Z	
	11.5	dB UR	15.6	dB UR	21.0	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: K. Zablocki

R 1



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 23 October 2024

Certificate Number: UCRT24/2404

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
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E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk

Page 1 of 2 Pages
Approved Signatory
B. Bogdan

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer TNEI Services Ltd
7th Floor
West One
Newcastle Upon Tyne
NE1 3PA

Order No. 750400

Test Procedure Procedure TP 14 Calibration of Sound Calibrators (60942:2017)

Description Acoustic Calibrator

Identification	<i>Manufacturer</i>	<i>Instrument</i>	<i>Model</i>	<i>Serial No.</i>
	Rion	Calibrator	NC-75	35046102
	Public evidence of Type Approval	Yes	Approved by PTB	

The calibrator has been tested as specified in Annex B of IEC 60942:2017. As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2017, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2017.

ANV Job No. UKAS24/10760

Date Received 22 October 2024

Date Calibrated 23 October 2024

Previous Certificate	<i>Dated</i>	Initial Calibration
	<i>Certificate No.</i>	
	<i>Laboratory</i>	

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Measurements

The sound pressure level generated by the calibrator (averaged over a 20 to 25 second period) in its WS2 configuration was measured five times (rotating the calibrator on the microphone each time) by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below.

The frequency of the sound from the calibrator was measured five times over a 20 to 25 second period and the average frequency calculated.

The total distortion + noise of the sound from the calibrator was measured, using a rejection filter distortion factor meter, five times over a 20 to 25 second period and the average distortion + noise calculated.

Test Microphone	<i>Manufacturer</i>	<i>Type</i>
	Brüel & Kjær	4134

<u>Nominal Setting</u> dB / Hz	<u>Mean Level</u> dB rel 20 µPa	<u>Frequency</u>	<u>Distortion + Noise</u>
94 / 1000	94.00 ± 0.10	1000.00 ± 0.12Hz	(0.10 ± 0.02) %

<u>Environmental conditions during tests</u>	<u>Start</u>	<u>End</u>	
Temperature	23.10	23.10	± 0.30 °C
Humidity	49.9	51.8	± 3.0 %RH
Ambient Pressure	102.138	102.152	± 0.030 kPa

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.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

Note: Calibrator adjusted prior to calibration? NO

Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Calibrated by: K. Zablocki

END

R 1

Appendix C – Noise Modelling Data

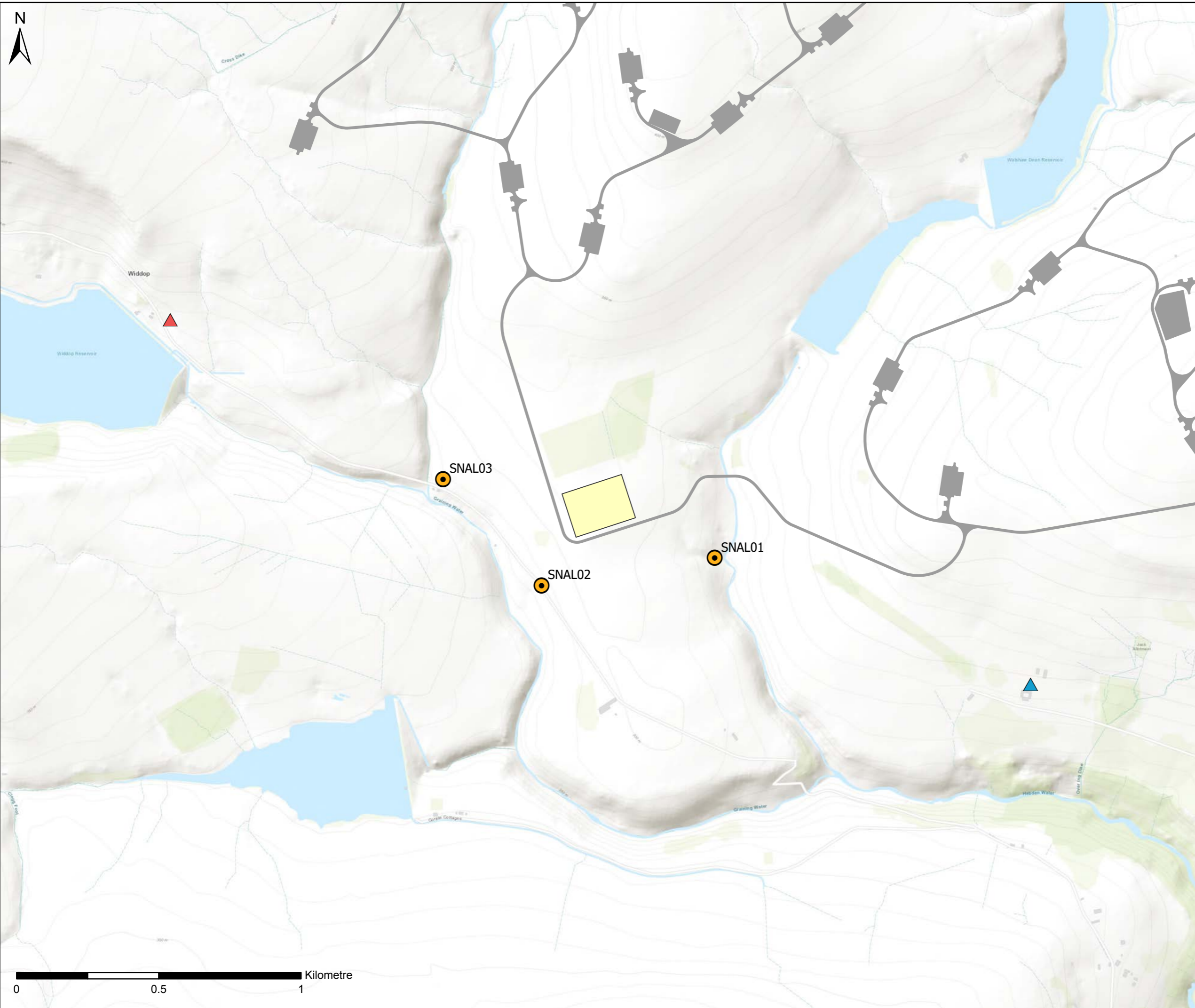
- HV Transformer SWL Data
- Shunt Reactor SWL Data
- Auxiliary Transformer Data

Item	Frequency (Hz)														
	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630
100kVA Transformer (Aux Tx)	-	-	-	46.5	30.5	37.8	54.8	51.3	61.1	56.8	59.2	62.8	59.8	59.8	62
Shunt Reactor	11.9	14.7	21.1	27.7	27.6	37	58.8	43.9	42.2	60.9	53.8	69.3	60.8	54.3	53.4
ABB HV Grid Transformer	-	-	-	63.8	47.8	55.1	72.1	68.6	78.4	74.1	76.5	80.1	77.1	77.1	79.3

Item	Frequency (Hz)												TOTAL	Weight	Type
	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000			
100kVA Transformer	61.3	59.4	57.2	55.1	52.9	51.2	50.3	49.7	47.6	44.6	42.5	40.9	70.9	A	SWL
Shunt Reactor	51.9	50.2	47.7	49	44.1	39.8	37.5	32.5	31.5	-	-	-	71.1	A	SWL
ABB HV Grid Transformer	78.6	76.7	74.5	72.4	70.2	68.5	67.6	67	64.9	61.9	59.8	58.2	88.2	A	SWL

Appendix D – Figures

- Figure 1: Noise Assessment Study Area
- Figure 2: Noise Contour Plot



LEGEND

- Proposed Site Infrastructure
- Proposed Substation Area
- Substation Noise Assessment Locations (SNALs)


Noise Monitoring Locations (NMLs)

- NML1 - Adjacent to Widdop Reservoir Lodge
- NML2 - New Laithe Farm


Rev.	Date	Amendment Details	Drawn	Approved
0	04/02/2026	FIRST ISSUE	MT	JS



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Client

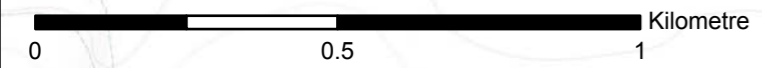


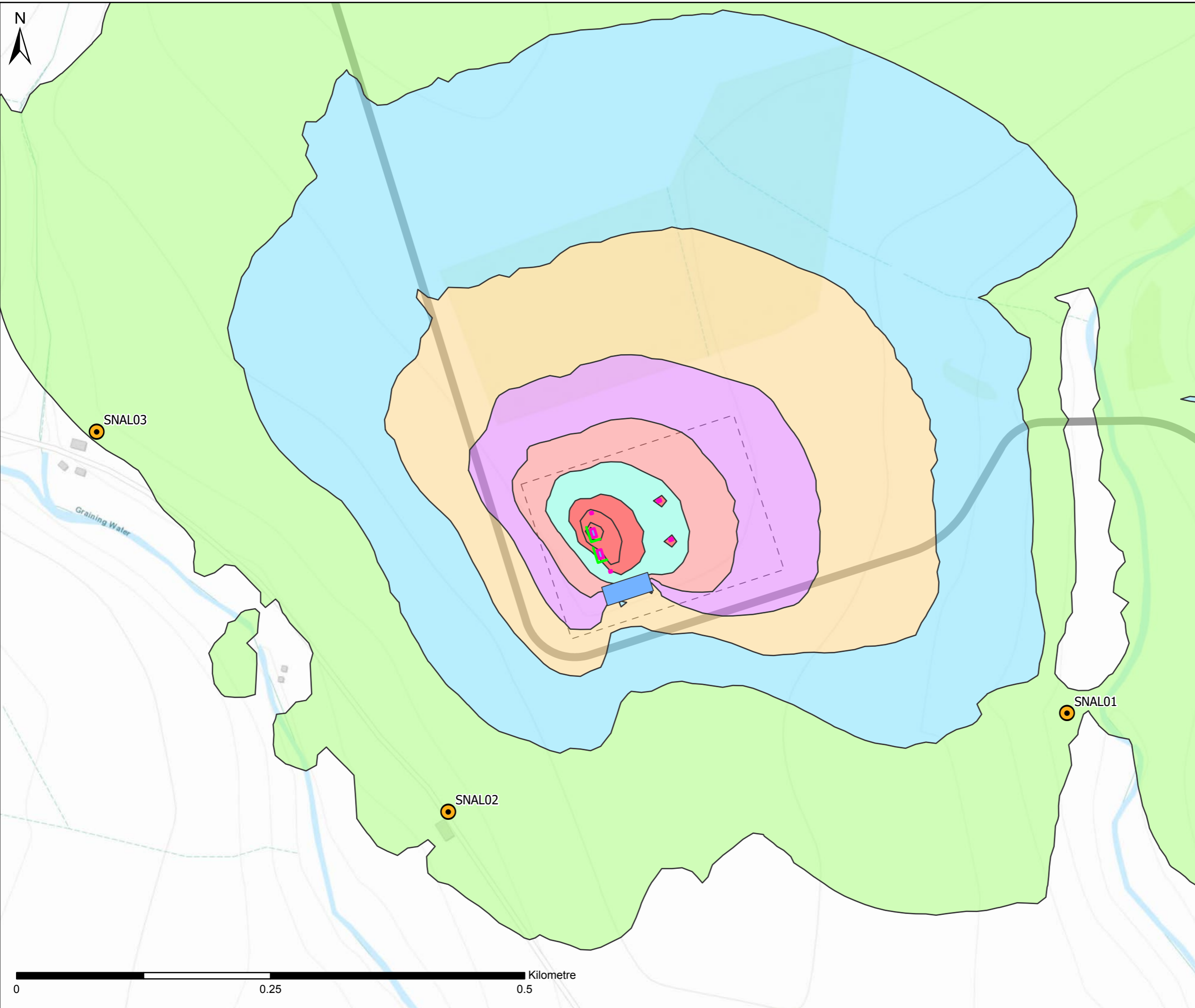
Drawing Status: FOR PLANNING

Project Title: CALDERDALE ENERGY PARK

Drawing Title: FIGURE 1: NOISE ASSESSMENT STUDY AREA

Scale: 1:12,500	Original Size: A3	Spatial Reference: British National Grid
Drawing Number: 15809-030		





LEGEND

- Proposed Site Infrastructure
- Proposed Substation Area
- Substation Noise Assessment Locations (SNALs)
- Modelled Buildings
- Modelled Noise Sources
- Modelled Blast Walls
- Predicted Noise Contours (5dB Increments)

Predicted Noise Level (dBA)

- 20-25
- 25-30
- 30-35
- 35-40
- 40-45
- 45-50
- 50>

Noise contours modelled in accordance with ISO 9613 Part 2: 2024 at a height of 4 m and displayed on a 10 m by 10 m grid. All noise sources are assumed to be operating concurrently. All levels are shown as dB LAeq(t).

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Drawing Status: FOR PLANNING

Project Title: CALDERDALE ENERGY PARK

Drawing Title: FIGURE 2: NOISE CONTOUR PLOT

Scale: 1:3,500	Original Size: A3	Spatial Reference: British National Grid
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Drawing Number: 15809-030