



A specialist energy consultancy

Environmental Noise Impact Assessment

Rossendale BESS

Cubico UK Developments Ltd.

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1 Introduction

TNEI were commissioned by Cubico UK Developments Ltd (henceforth referred to as ‘the client’) to undertake an environmental Noise Impact Assessment (NIA) in support of the planning application for the proposed Rossendale Battery Energy Storage System (BESS) development (henceforth referred to as ‘the Proposed Development’).

The Proposed Development is located approximately 3 km east of Ramsbottom, Bury, Lancashire, BL0 0RS, and the approximate site centre is located at Ordnance Survey coordinates 381970, 416943.

The local area around the site is rural in nature, predominantly consisting of agricultural land and moorland, but with a number of residential properties located nearby to the west, and northwest.

The purpose of this NIA is to:

- Identify the noise sensitive receptors in the vicinity of the Proposed Development;
- Identify the dominant sound sources associated with the operation of the Proposed Development;
- Calculate the likely levels of operational noise at the identified receptors to determine the likely noise impacts associated with the Proposed Development; and,
- Indicate any requirements for mitigation measures, if required, to provide sufficient levels of protection for all noise sensitive receptors.

For clarity, this NIA assesses the potential noise impacts from the operational phase of the development only and does not include an assessment of construction noise. Typically, construction noise for this type of development is temporary in nature and usually dealt with at the post-consent phase via best practice mitigation measures during construction.

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:

- Tom Suddaby, IOA, BA (Hons): Noise Propagation Modelling;
- Eleanor Howcroft, Affiliate IOA, BEng (Hons): Assessment and Reporting
- Mark Tideswell, AMIOA, BSc (Hons), IOA Postgraduate Diploma in Acoustics and Noise Control: Reporting
- Ewan Watson, AMIOA, BEng (Hons), IOA Postgraduate Diploma in Acoustics and Noise Control: Quality Assurance.

1.1 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;
- **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 baseline noise levels have been measured;

- **NSRs** (Noise Sensitive Receptors) are all identified receptors that are sensitive to noise; and
- **NAL** (Noise Assessment Location) refers to any location where the noise immission levels are calculated and assessed.

A Glossary of Terms is also provided as Appendix A of this report.

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

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

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

2 Project Description

The Proposed Development principally comprises a battery energy storage system (BESS) that will charge and discharge electricity from the electrical grid. It consists of multiple externally located battery container units with integrated inverters, which will be connected to Medium Voltage (MV) Transformer Stations, as well as a single High Voltage (HV) grid transformer. The Proposed Development will also include ancillary infrastructure such as an auxiliary transformer.

Considering the above, the dominant sound sources considered within the assessment are:

- Battery Storage Containers (40 of); and,
- MV Transformer Stations (20 of); and,
- HV Grid Transformer (1 of).

The layout assessed is included within Appendix B of this NIA report.

The sound level output of the ancillary infrastructure (e.g. auxiliary transformer, etc.) of the Proposed Development is considered insignificant in comparison to the primary sound sources detailed above. Accordingly, no other items of plant have been considered within the assessment.

2.1 Study Area

Noise Sensitive Receptors (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 Development considers the nearest NSRs only, on the assumption that if sound levels at the closest receptors are deemed acceptable, then sound levels at NSRs at greater distances from the Proposed Development should also be within acceptable levels.

The nearest identified NSRs, which have a high level of sensitivity, are existing residential properties located to the west and northwest of the Proposed Development. The closest residential receptor is approximately 250 m to the west of the nearest noise emitting plant.

Figure 1 within Appendix E details the study area and the closest NSRs considered within the assessment.

3 Assessment Methodology

3.1 Legislation and Policy Context

3.1.1 National Planning Policy Framework, 2025

At a national level, the relevant policy is the National Planning Policy Framework (NPPF)⁽¹⁾. The NPPF states in Paragraph 187(e) that the planning system should contribute to and enhance the natural and local environment by *“preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution...”*.

In addition, paragraph 198a of the NPPF states that all planning policies and decisions should *“mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life”* and *“identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason”*.

No specific guidance on the assessment or acceptability of noise is provided within the NPPF, but further detail is provided in the Noise Policy Statement for England.

3.1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE)⁽²⁾ sets out the long-term vision of Government noise policy and should apply to all forms of noise including environmental noise, neighbour and neighbourhood noise. The NPSE refers to ‘environmental noise’ with the key aims being to:

- *“Avoid significant adverse impacts on health and quality of life while taking into account the guiding principles of sustainable development;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”*

3.2 Assessment Method

3.2.1 BS 4142:2014 +A1:2019

The BS 4142:2014 ‘*Methods for Rating and Assessing Industrial and Commercial Sound*’⁽³⁾ form of assessment is based on a comparison of the predicted or measured levels of a sound source to the measured background sound levels, without the specific sound source present. It 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”*.

BS4142 uses the following definitions:

- **Ambient Sound:** Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far. Described using the metric, $L_{Aeq(t)}$.
- **Ambient Sound Level:** The equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. Described using the

metric $L_{Aeq,T}$. The ambient sound level is a measure of the residual sound and the specific sound (when present).

- **Specific Sound Level:** Equivalent continuous A-weighted sound pressure level produced by the specific sound source (the sound source being assessed) at the assessment location over a given reference time interval, T_r . Described using the metric $L_{Aeq(t)}$. Also referred to in this report as the Immission Level.
- **Residual Sound Level:** Equivalent continuous A-weighted sound pressure level of the residual sound without the specific sound source(s) present at the assessment location over a given time interval, T . Described using the metric $L_{Aeq(t)}$.
- **Background Sound Level:** A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T , measured using time weighting F and quoted to the nearest whole number of decibels. Described using the metric $L_{A90(t)}$.
- **Rating Level:** The Specific Sound Level adjusted for the characteristics of the sound. The Rating Level is calculated by adding a penalty or penalties (if required) to the Specific Sound Level when the sound source contains audible characteristics such as tonal, impulsive or intermittent components. 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.

The 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 standard 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 list, 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 the site;
- 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.

Supplementary information regarding the application of BS 4142 is provided within the Association of Noise Consultants' (ANC) BS 4142 Technical Note (March 2020) ⁽⁴⁾. The technical note provides guidance on the appropriate interpretation and application of the standard and is "designed to assist readers with a reasonable interpretation and application of BS 4142 as a whole", including clarifying the methodology for the derivation of representative background sound levels. Critically, the technical note states the following with regards to the application of the standard in the event measured background sound levels and predicted Rating Levels are low:

"... the absolute level of sound can be of significance, where the residual values are low and where they are high and should be taken into account when determining the overall impact of a particular specific sound source. The second paragraph [of BS 4142] notes that absolute levels may be as, or more, important than relative outcomes where background and rating levels are low. It is important to note that both background and rating levels would need to be low for this particular caveat to apply. BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example, a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels."

With regards to what constitutes 'low', the technical note goes on to state:

"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 L_{A90}, and low rating levels as being less than about 35 dB L_{Af,Tr}. The WG suggest that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a judgement and justify it where appropriate."

Extracts underlined by TNEI for emphasis.

The additional information provided within the ANC technical note has informed TNEI's approach to the NIA assessment criteria with regards to the application of BS 4142. This is discussed further in Section 3.3.

3.3 Consultation

Consultation was undertaken with Rossendale Borough Council's (RBC) Environmental Health Team in July 2024 by Hydrock, a third-party noise consultancy who undertook the baseline noise monitoring survey used to inform the assessment. Details of the survey and assessment methodology were provided to RBC, proposing the use of BS 4142 to assess potential impacts. A response was provided by RBC indicating agreement in principle with the methodology; no further comments were provided.

3.4 Assessment Criteria

Considering all of the above, the assessment is made as follows:

- An assessment is undertaken at the nearest identified NSRs in accordance with BS 4142, taking into consideration the context.

3.5 Calculation Method

3.5.1 Noise Propagation Model (ISO 9613-2)

In order to predict the noise immission levels attributable to the development, a noise propagation model was created using the propriety noise modelling software, CadnaA⁽⁵⁾. Within the software, complex models can be produced to simulate the propagation of noise according to a range of international calculation standards.

For this assessment noise propagation was calculated in accordance with ISO 9613-2: 2024 '*Acoustics – Attenuation of sound during propagation outdoors*'⁽⁶⁾ 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; and
- Receiver heights have been set to 4 m.

3.5.2 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.
- The model assumes all sound sources are operating continuously and simultaneously, at expected operating capacity.

4 Baseline Sound Level Survey

A baseline sound level survey was undertaken by Hydrock at a single Noise Monitoring Location (NML01) between the 18th and 22nd of July 2024. All measurements were undertaken in 15-minute intervals. The exact coordinate location of the noise monitoring equipment is detailed in Table 4-1. The NML is also shown in Figure 1 included within Appendix E.

Table 4-1: Unattended Baseline Noise Monitoring Location

NML	Description	Coordinates	
NML01	NML01 is adjacent to Black Lane and located within the site boundary over 200 m from Rochdale Road (A680)	261831	869003

The raw baseline survey data collected by Hydrock has been provided to TNEI by the client for analysis in order to determine the representative background sound levels. With regards to the selection of representative background sound levels, BS 4142 states:

“To obtain a representative background sound level a series of either sequential or disaggregated measurements should be carried out for the period(s) of interest, possibly on more than one occasion. 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.”

No onsite weather measurements were undertaken during the baseline survey, and as such publicly available data measured at nearby weather stations was used to filter the data for periods of precipitation (as well as any data points 20 minutes prior to rainfall and 60 minutes after) and/or wind speeds exceeding 5 m/s.

Table 4-2 details the range of background sound level values. These have been determined using guidance provided by both BS 4142 and the ANC BS 4142 Technical Note, largely consisting of the consideration of the distribution of data for each measurement period at the NML. TNEI’s time-history, statistical and distribution analysis charts can also be found in Appendix C.

Table 4-2: Overview of the Measured Baseline Sound Levels

NML	Mean Residual Sound L _{Aeq} (15-mins)		Median Residual Sound L _{Aeq} (15-mins)		Range of Residual Sound L _{Aeq} (15-mins)		Range of Background Sound Levels L _{A90} (15-mins)	
	Day	Night	Day	Night	Day	Night	Day	Night
NML01	42	36	42	36	34-56	30-46	28-39	23-36

The representative background sound level for the NML was determined with reference to the time-history charts, statistical analysis charts and distribution analysis charts included in Appendix C, following the guidance in 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.”

With due consideration of the above, Table 4-3 details the representative background sound levels L_{A90} (15mins) at each of the NMLs for the daytime and night-time periods.

Table 4-3: Representative Background Sound Level, dB L_{A90} , Derived Through Statistical Analysis

NML ID	Daytime L_{A90} (15-mins)	Night-time L_{A90} (15-mins)
NML01	34	26

5 Operational Noise Impacts

5.1 Modelling of Individual Sound Sources

The noise model considers the sound sources detailed within Section 2 of the report. The following section describes how each sound source has been incorporated into the noise model. All items of plant have been modelled as area sources, i.e. each side and top of each unit are modelled as individual sound sources and are assumed to be operating concurrently, continually and with a constant sound level output.

Noise modelling is based on candidate plant typical for the size and class of the Proposed Development. It should be noted that final plant specifications may vary during the final tendering process. Where possible, noise modelling data is shown within Appendix D, however, where data cannot be published due to confidentiality reasons, TNEI would be happy to discuss this data in more detail with the Local Authority (or any other relevant stakeholders), if required.

The candidate plant considered in the noise model are Sungrow PowerTitan 2.0 Battery Storage Containers, which will be connected into Sungrow MV Transformer Stations.

5.1.1 Battery Storage Units

The Battery Storage Units considered within the noise propagation model have been represented using the specifications and noise source data for a suitable candidate item of plant, the Sungrow PowerTitan 2.0 (with Noise Reduction).

TNEI hold both 1/3 Octave Band Sound Pressure Level (SPL) and Sound Power Level (SWL) data for this candidate, both with and without the fitting of noise reduction kits. For the purposes of this model, the use of the noise reduction SPL data (as it is specific to each façade of the unit) has been assumed, that represents the unit operating at 80% fan speed, which is representative of an ambient temperature of 25°C. This is believed to be representative of expected typical operation. The noise data has been provided to TNEI from Sungrow through work on another BESS development and cannot be provided in this report. However, the equivalent broadband SWL used to model each façade can be reported, shown in Table 5-1 below.

Table 5-1: SWL Data Used to Model the Sungrow PowerTitan 2.0 (with Noise Reduction) Battery Storage Containers

Sungrow PowerTitan 2.0 with Noise Reduction (80% Power, 25°C)	SWL, dBA
Top Façade	72
Right Façade	67
Left Façade	66
Front Façade	73
Rear Façade	68

5.1.2 Medium Voltage (MV) Transformer Stations

The Battery Storage Units will be connected to multiple MV Transformer Stations. These have been represented within the noise model using the specifications and noise source data for a suitable candidate item of plant: the Sungrow MVS5140-LS.

TNEI hold both 1/3 Octave Band Sound Pressure Level (SPL) and Sound Power Level (SWL) data for this candidate. For the purposes of this model, the SPL data (operating at full power) has been used, as it is specific to each façade of the unit. As with the Battery Storage Container data, the MV Transformer Station noise data cannot be provided in this report. However, the equivalent broadband SWL used to model each façade can be reported, shown in Table 5-2 below.

Table 5-2: SWL Data Used to Model the Sungrow MVS5140-LS

Sungrow MVS5140-LS	SWL, dBA
Top Façade	71
Right Façade	63
Left Façade	70
Front Façade	68
Rear Façade	79

5.1.3 High Voltage (HV) Grid Transformer

The HV Grid Transformer has been modelled using an ABB HV transformer with a broadband sound power level (SWL) value of 88 dBA. The transformer has been modelled as a box consisting of five area sources (four facades and the roof). Each area source has been modelled with 7 dB of attenuation such that the logarithmic sum of the five sources equates to the overall sound power level of 88 dBA. Table 5-3 details the resulting SWL used within the noise model and the relevant data sheets are included within Annex E.

Table 5-3: One-Third Octave Band SWL (dBA) values used to model the HV Grid Transformer

HV Grid Transformer	Frequency (Hz)								
	Hz	50	63	80	100	125	160	200	250
ABB HV Grid Transformer Candidate	dBA	64	48	55	72	69	78	74	77
	Hz	315	400	500	630	800	1000	1250	1600
	dBA	80	77	77	79	79	77	75	72
	Hz	2000	2500	3150	4000	5000	6300	8000	10000
	dBA	70	69	68	67	65	62	60	58

5.2 Mitigation Measures

The model assumes that no additional mitigation measures (in terms of noise-attenuating fencing or bunds) will be included as part of the Proposed Development.

5.3 Calculated Immission Levels

Noise immission levels have been calculated at three Noise Assessment Locations (NALs), which have been selected to represent the closest NSRs to the Proposed Development. Each NAL has been set on the side of the property facing the Proposed Development. The NALs are detailed in Table 5-4 and on Figure 2 in Appendix E.

Table 5-4: Noise Assessment Locations

Noise Assessment Location		OS Grid Reference	
NAL ID	NAL Descriptor	Eastings	Northings
NAL01	Higher Moss	381822	417165
NAL02	Close Nook Farm	381753	416951
NAL03	Kitchen Cottage	381726	416914

The immission levels (Specific Sound Level) were 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 for both daytime and night-time periods. The noise immission levels at the NALs are detailed in Table 5-5 below. The immission levels are also illustrated as a noise contour plot shown in Figure 2 of Appendix E.

Table 5-5: Predicted Immission Levels, dB L_{Aeq(t)}

Noise Assessment Location		Immission Level, dB L _{Aeq(t)}
NAL ID	NAL Descriptor	
NAL01	Higher Moss	26
NAL02	Close Nook Farm	33
NAL03	Kitchen Cottage	31

6 Noise Impact Assessment

6.1 BS 4142 Rating Level

To assess the immission levels against the agreed criteria, 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.

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.

Consideration of the predicted one-third octave band levels at the identified receptors against the assessment criteria presented in BS 4142’s informative ‘One-Third Octave Band Objective Method of Assessment’ indicates that no tonality is likely to be present. Details of the informative tonal analysis is presented in Appendix F. As such, given the results of the informative analysis and TNEI’s experience of noise assessments for BESS sites, no tonal character correction has been applied.

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 BESS 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, we do not anticipate any additional sound characteristics that 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.

6.2 Stage 1 – Initial Estimate

Stage 1 of the assessment is the initial estimate which compares the Rating Level to the Background Sound Levels, and this is detailed in Table 6.1.

Table 6-1: BS 4142 Initial Estimate of Impacts

Noise Assessment Location		Rating Level	Daytime		Night-time	
NAL ID	NAL Descriptor		Representative Background Sound Level, dB L _{A90} (15 mins)	Margin, dB	Representative Background Sound Level, dB L _{A90} (15 mins)	Margin, dB
NAL01	Higher Moss	26	34	-8	26	0
NAL02	Close Nook Farm	33	34	-1	26	7
NAL03	Kitchen Cottage	31	34	-3	26	5

With regard to the data presented in Table 6.1, the initial estimate of impacts is as follows:

- During the daytime, the Rating Level is below the representative background sound levels at all NALs which “... is an indication of the specific sound source having a low impact, depending on the context”.
- During the night-time, the Rating Level is at the representative background sound levels at NAL01, which “...is an indication of the specific sound source having a low impact, depending on the context.”
- At NALs 02 and 03 during the night-time, the Rating Level is 7 dB and 5 dB above the representative background sound level respectively, which is around the level that is “likely to be an indication of adverse impact, depending on the context”.

6.3 Stage 2 – Assessment of Context

BS 4142 requires the following 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 relevant contextual elements.

6.3.1 Context: Absolute Level of the 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. 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.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse”.

Furthermore, the ANC 2020 BS 4142 Guidance Note makes reference to the old version of BS 4142 to provide indicative values that could be used for very low (i.e. below low) background sound levels and low rating levels. The suggested values are found in page 42 of the ANC note, which 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 L_{A90} , and low rating levels as being less than about 35 dB $L_{A,r,Tr}$ ”.

In the area surrounding the Proposed Development, which can be described as rural in nature, the measured existing residual levels are not ‘very high’. However, the background sound levels may be defined as ‘very low’ during the night-time at all NALs (i.e. less than 30 dB L_{A90}). During the daytime, the absolute levels could be considered as an important factor which may reduce the initial estimate findings; however, it is judged that the initial estimate of a ‘low impact’, which is the lowest possible outcome, would remain for all NALs regardless of the context.

During the night-time, however, absolute levels are potentially most consequential, especially at NALs 02 and 03, where relatively low Rating Levels of 33 dB and 31 dB exceed the very low background sound level of 26 dBA by 7 dB and 5 dB respectively. The ANC note, when discussing the use of absolute levels, notes that the initial estimate of impact may be modified by the low rating and background sound levels, and notes that what may otherwise constitute a significant adverse impact may be considered acceptable due to this modifying factor.

As such, consideration of the absolute level of the sound suggests that the initial estimate potential impact would be reduced.

6.3.2 Context: Character and Level of Residual Sound

Sound levels at the NML are influenced mostly by intermittent sound sources such as passing road traffic, farming activity and birdsong, with small contribution from the nearby Scout Moor Wind Farm during high winds. The Proposed Development is not anticipated to have distinguishing character features as discussed within Section 6.1 and is considered to be a fairly continuous and relatively low-

level sound source. As such, it is not anticipated that the Proposed Development will be readily distinctive against the residual acoustic environment at the NALs.

As presented in Table 4-2, the level of the residual sound is variable during both daytime and night-time periods at the NML, ranging from 30-56 dB L_{Aeq} (15 mins). At NML01, the mean residual sound level value during the night-time is 36 dB, and are therefore greater than the Specific Levels which do not exceed 33 dB.

When adding the specific sound levels to the median ambient levels at NAL02 (where predictions are the highest), this would give an ambient sound level of 37.8 dB(A) $\log$ (33 dB + 36 dB), an increase in overall sound level of 1.8 dB. To put this into context, it is generally considered that an overall increase in noise level of 3 dB is the threshold of perceptibility, and such an increase would be unlikely to be clearly perceptible to the human ear.

As such, consideration of the character and level of operational noise with the residual sound suggests that the initial estimate potential impact would be reduced.

6.3.3 Context: Sensitivity of the 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 does not materially affect the impacts.

6.3.4 Context: Operational Scenarios and Calculation of the Rating Level

The calculated Rating Level assumes that all plant will be operating continually and concurrently and with cooling plant running at anticipated operational capacity, as informed by the BESS plant supplier. In reality, not all cooling plant will be required to run concurrently at all times of the day. Consideration of the conservative nature in the way the plant is assumed to be running in the noise model suggests that contextually the impact would be reduced.

6.4 BS 4142 Assessment Conclusion

The Stage 1- Initial estimate predicted that depending on the context there could be a low impact at all receptors in the daytime and NAL1 during the night-time, while there could be an adverse impact at receptors NAL2 and NAL3 during the night.

Detailed considerations of the context clearly indicate that the impacts associated with the operation of the Proposed Development would be less than that found in the initial estimate. Accordingly, **the full BS 4142 assessment process concludes that there would be a low impact at all residential receptors.**

7 Summary

To predict the noise immission levels of the Proposed Development, TNEI has produced a noise propagation model based on candidate plant typical for this type of development. The noise model assumes that all plant will be operating continuously and concurrently, however, this is unlikely to occur for the majority of the time. Accordingly, the noise assessment is inherently conservative. Several residential properties were identified and assessed.

An assessment was undertaken in accordance with BS 4142, in which an initial estimate predicted that depending on the context there could be a low impact at all receptors in the daytime and that there could be an adverse impact at night at two receptors (NAL02 and NAL03). Detailed consideration of the contextual elements of the BS 4142 assessment clearly indicate that the impacts associated with the operation of the Proposed Development would be less than that found in the initial estimate.

Accordingly, the full BS 4142 assessment process concludes that **the Proposed Development is expected to have a low noise impact at all nearby receptors.**

8 References

1. **Department for Communities and Local Government.** *National Planning Policy Framework*. UK : The Crown, 2023.
2. **Department for Environment, Food and Rural Affairs.** *Noise Policy Statement for England*. London : The Crown, 2010.
3. **British Standards Institute.** *Methods for Rating and Assessing Industrial and Commercial Sound*. UK : BSI, 2014. BS4142:2014 + A1:2019.
4. **The Association of Noise Consultants (ANC).** *BS 4142:2014+A1:2019 - Technical Note*. s.l. : The Association of Noise Consultants (ANC), 2020.
5. **Datakustik GmbH.** CadnaA. 2025.
6. **(ISO), International Organization for Standardization.** *Acoustics – Attenuation of Sound During Propagation Outdoors: Part 2 – General Method of Calculation*. Geneva : (ISO), International Organization for Standardization, 2024. ISO 9613-2:2024.

Appendix A – Glossary of Terms

Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Sound Level: the sound level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night-time periods. The LA90 indices (see below) are typically used to represent the background sound level.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in sound level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate sound in the same way as the ear, and to counter this weakness the sound measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). The dB(A) weighting is internationally accepted and has been found to correspond well with people's subjective reaction to sound levels and noise. Some typical subjective changes in sound levels are:

- a change of 3dB(A) is just perceptible;
- a change of 5dB(A) is clearly perceptible; and
- a change of 10dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Emission: the sound energy emitted by a sound source (e.g. a wind turbine).

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound waves with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard ground), 0.5 (mixed ground) and 1 (soft ground).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

Immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Noise: unwanted sound.

L_w: is the sound power level. It is a measure of the total sound energy radiated by a sound source and is used to calculate sound levels at a distant location. The LWA is the A-weighted sound power level.

L_{eq}: is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The L_{Aeq, T} is the A-weighted equivalent continuous sound level over a given time period (T).

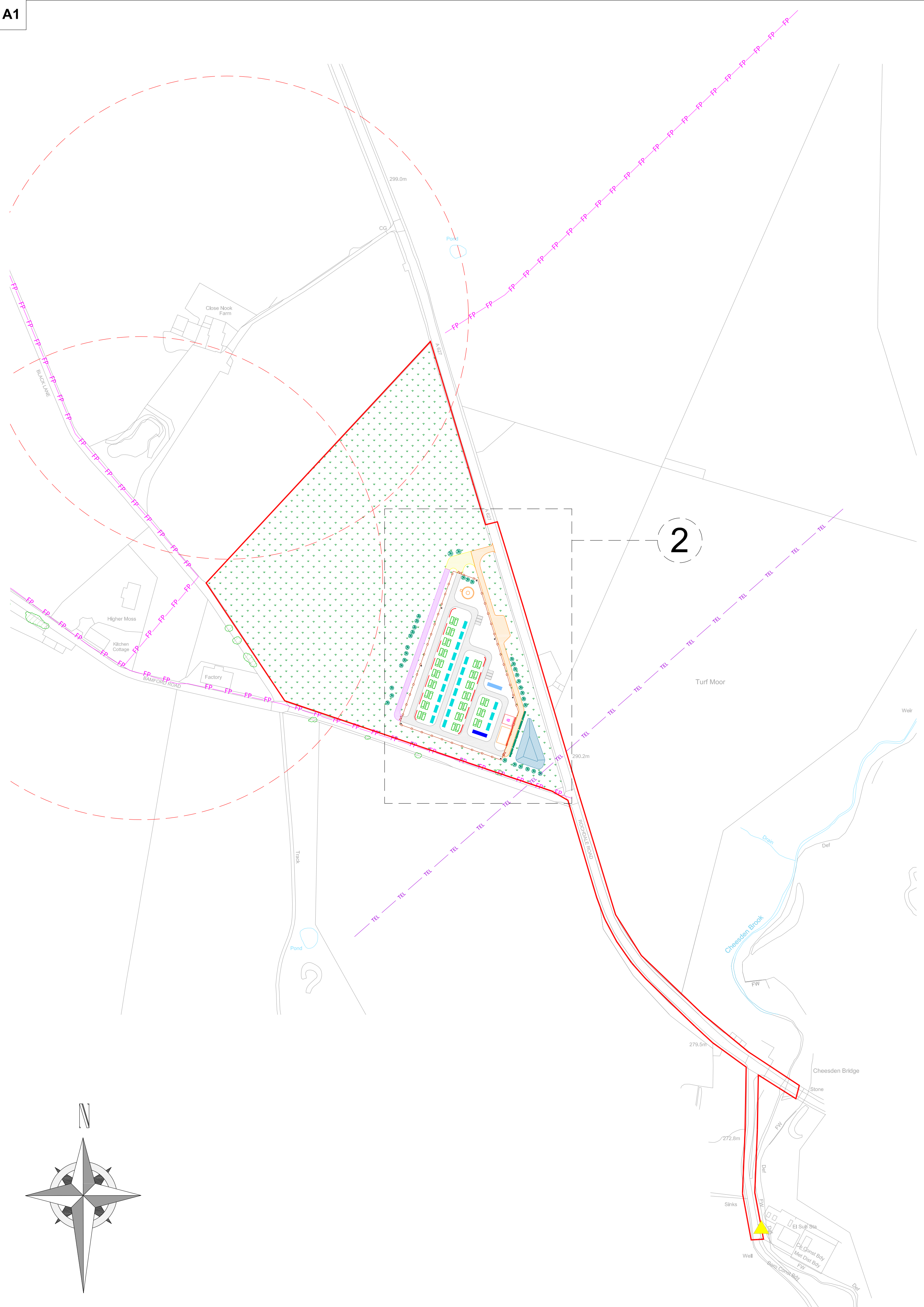
L₉₀: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The L_{A90,10min} is the A-weighted background sound level over a ten-minute measurement sample.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

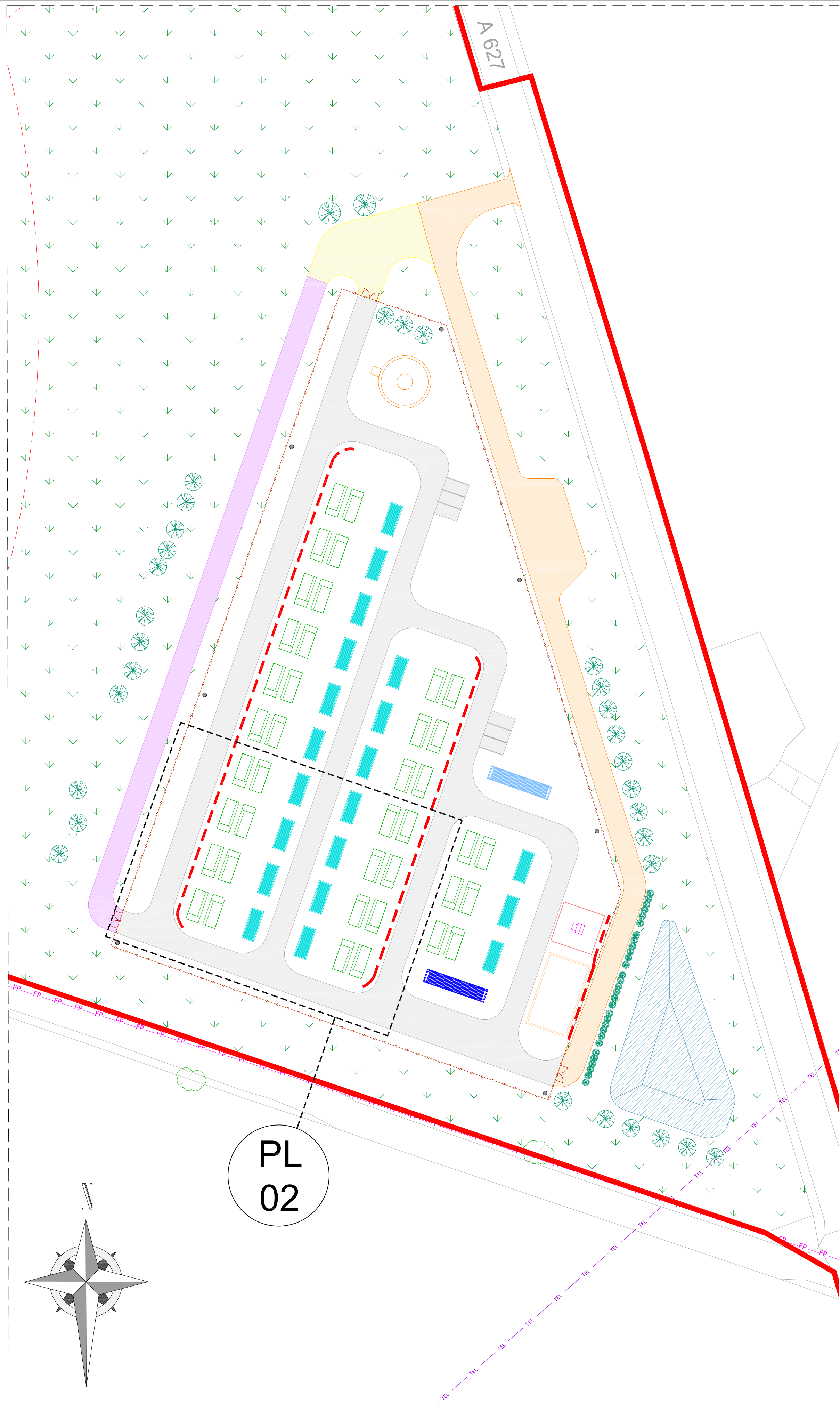
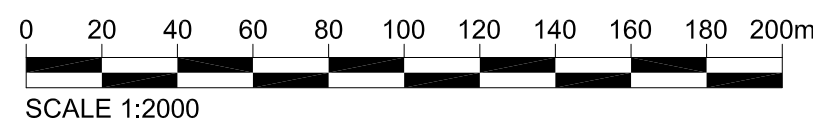
Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of ≤ 20 Hz). This noise is subjectively more annoying than broadband noise.

Appendix B – Development Information



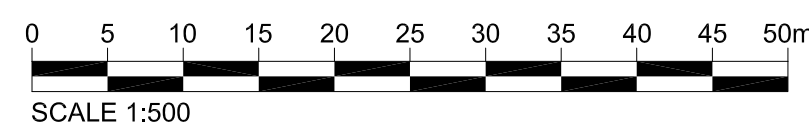
PROPOSED SITE LAYOUT PLAN (OVERALL)

Scale: 1:2000@A1



PROPOSED SITE LAYOUT PLAN (BESS)

Scale: 1:500@A1



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Revisions:

Revision	Date	Revision Notes	Drawn	Inspected
01	13.12.24	First Issue	OM	PR
02	18.12.24	BNG Area Added, RLB Amended	OB	PR
03	27.02.25	Technology Changed	RR	PR
04	16.03.25	Layout, Legend & Titles Updated	RL	PR

LEGEND:

WATER COURSE	BOUNDARY
DNO ACCESS ROUTE	SITE ACCESS
INTERNAL ACCESS	EMERGENCY ACCESS
2.4m HIGH WIRE MESH PERIMETER FENCELINE	200M RESIDENTIAL BUFFER
EXISTING PROW	EXISTING TELECOMS
RETAINING WALL	

SITE INFRASTRUCTURE:

SECURITY GATE	240,000L WATER TANK
33kV SUBSTATION	WATER HYDRANT
BATTERY UNIT	CCTV CAMERA
TRANSFORMER	AUX TRANSFORMER
CUSTOMER SWITCHGEAR	ATTENUATION POND
SPARE PARTS CONTAINER	POC

VEGETATION:

EXISTING VEGETATION	BNG AREA	PROPOSED VEGETATION
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Status:

PLANNING

Project:

Rossendale BESS
Rochdale Road, Turn Village

Client:

Cubico
SUSTAINABLE INVESTMENTS

Cubico Sustainable Investments
Tel: 020 3805 3800
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Drawn by:

CADmando
2D, 3D CAD & BIM SERVICES

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Mob: +44 (0) 7914439910

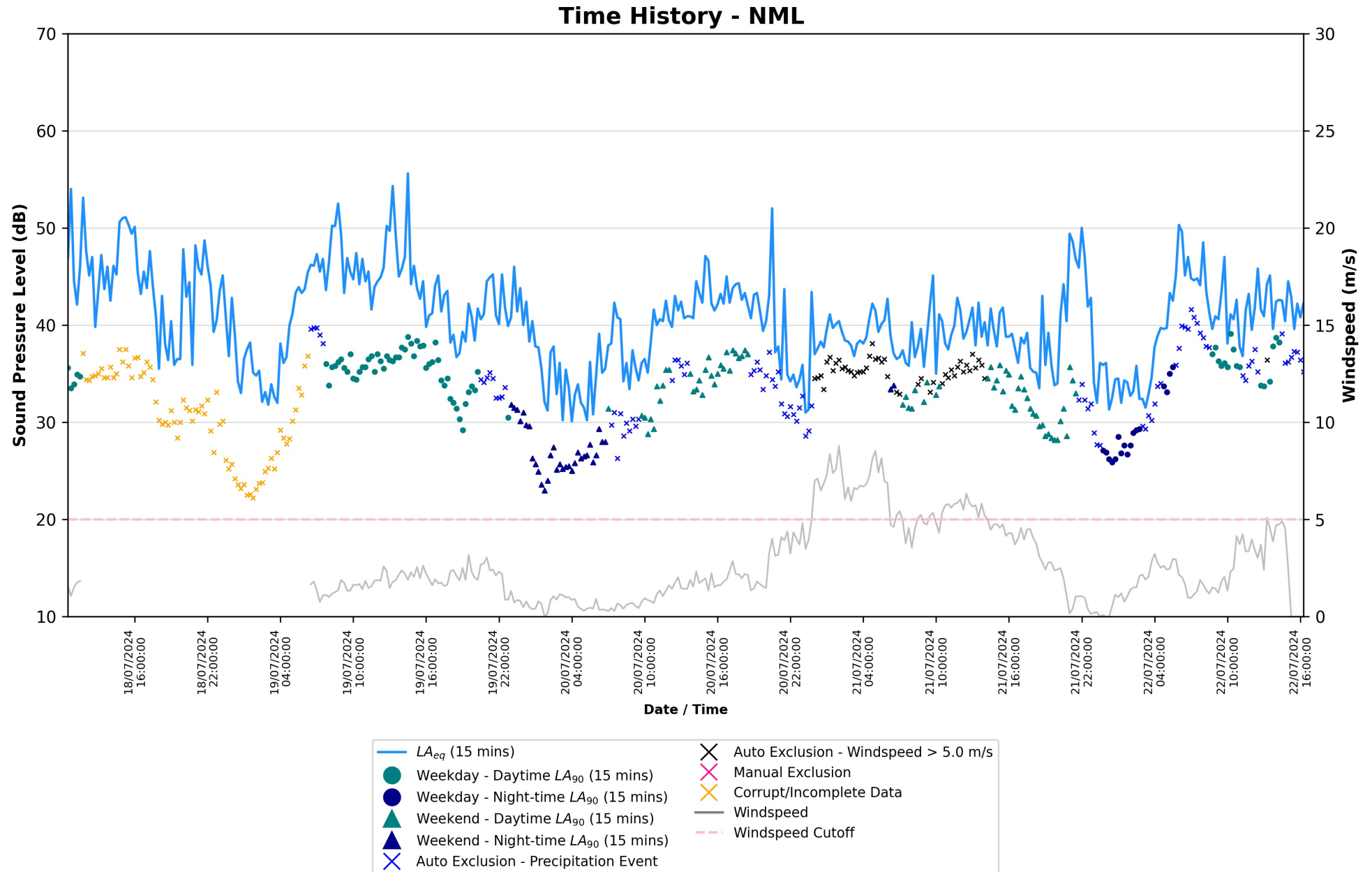
Drawing Title:

**Rossendale BESS -
Proposed (Illustrative) Site Layout Plan**

Drawn: OM	Checked: PR	First Issued: 13.12.2024
Project Code: CUB001-	Drawing Number: PL-03	
Sheet Size: A1	Scale: A.N	Revision: 04

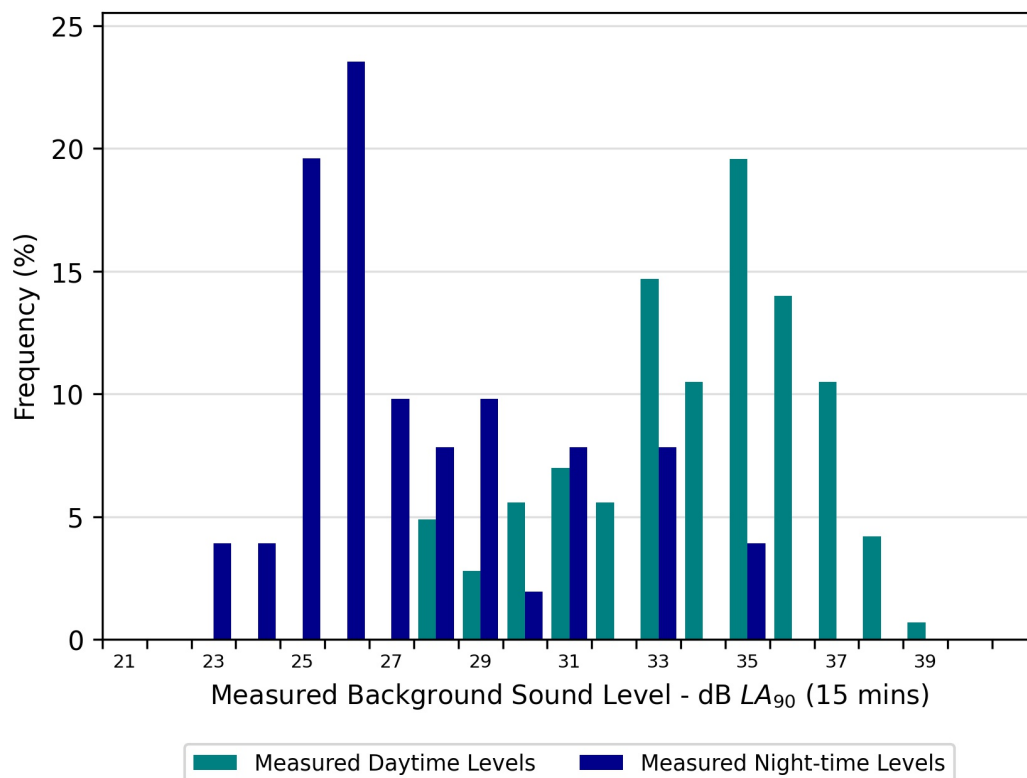
Appendix C – Baseline Survey Data

17176 - Rossendale BESS - Measured Sound Levels:

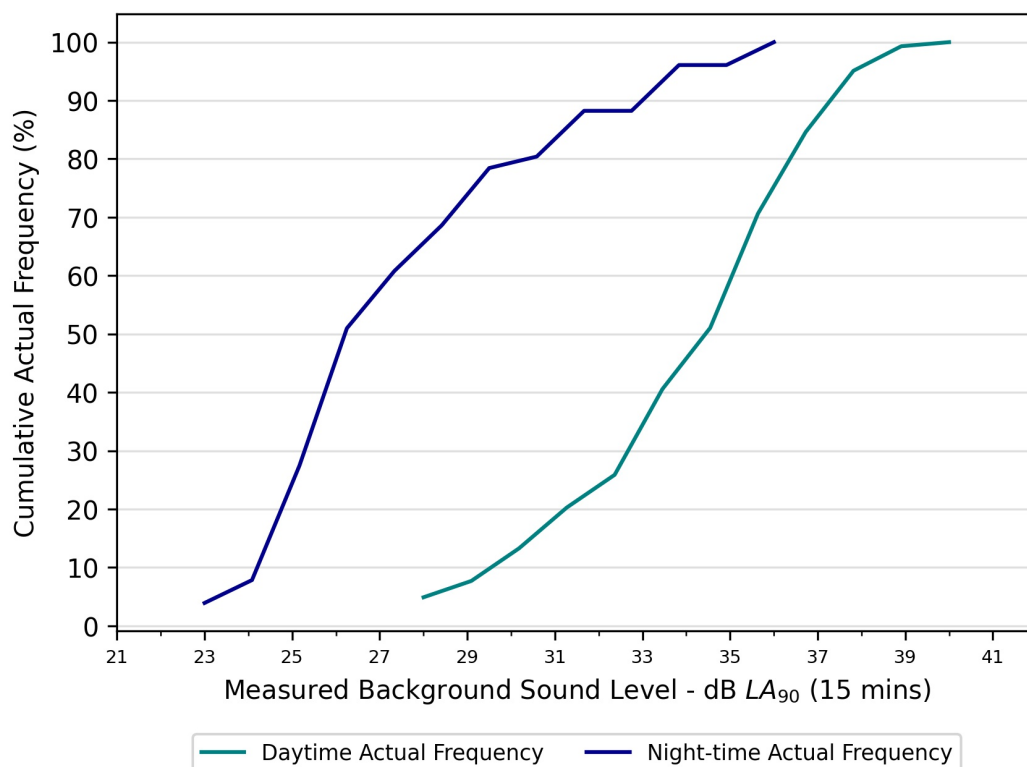


17176 - Rossendale BESS - Measured Sound Levels:

Statistical Analysis - NML



Statistical Analysis - NML





17176 - Rossendale BESS - Measured Sound Levels:

Relevant Statistics

NML

		COUNT	MEAN	MEDIAN	RANGE
DAYTIME	LA90 (15 MINS)	143	34	35	28 - 39
	LAEQ (15 MINS)	143	42	42	34 - 56
NIGHT-TIME	LA90 (15 MINS)	51	28	27	23 - 36
	LAEQ (15 MINS)	51	36	36	30 - 46

Appendix D – Noise Modelling Data



TEST REPORT

Sound Level

Serial No. : 1ZPL001134582

Combination of sound level measurements

Rated voltage	Applied voltage	Rated current	Applied current	Tap position	Fans in operation	Pumps in operation
[%]	[kV]	[%]	[A]			
100	33	100	262.43		8	

Rated voltage	Applied voltage	Rated current	Applied current	Tap position	Fans in operation	Pumps in operation
[%]	[kV]	[%]	[A]			

Frequency	Measurement 1 Sound Power Level	Measurement 4 Sound Power Level	Combined Sound Power Level
[Hz]	[dB(A)]	[dB(A)]	[dB(A)]

Frequency			Combined Sound Power Level
[Hz]			[dB(A)]

Total Sound Level		76.9	87.8		88.2
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Total Sound Level					
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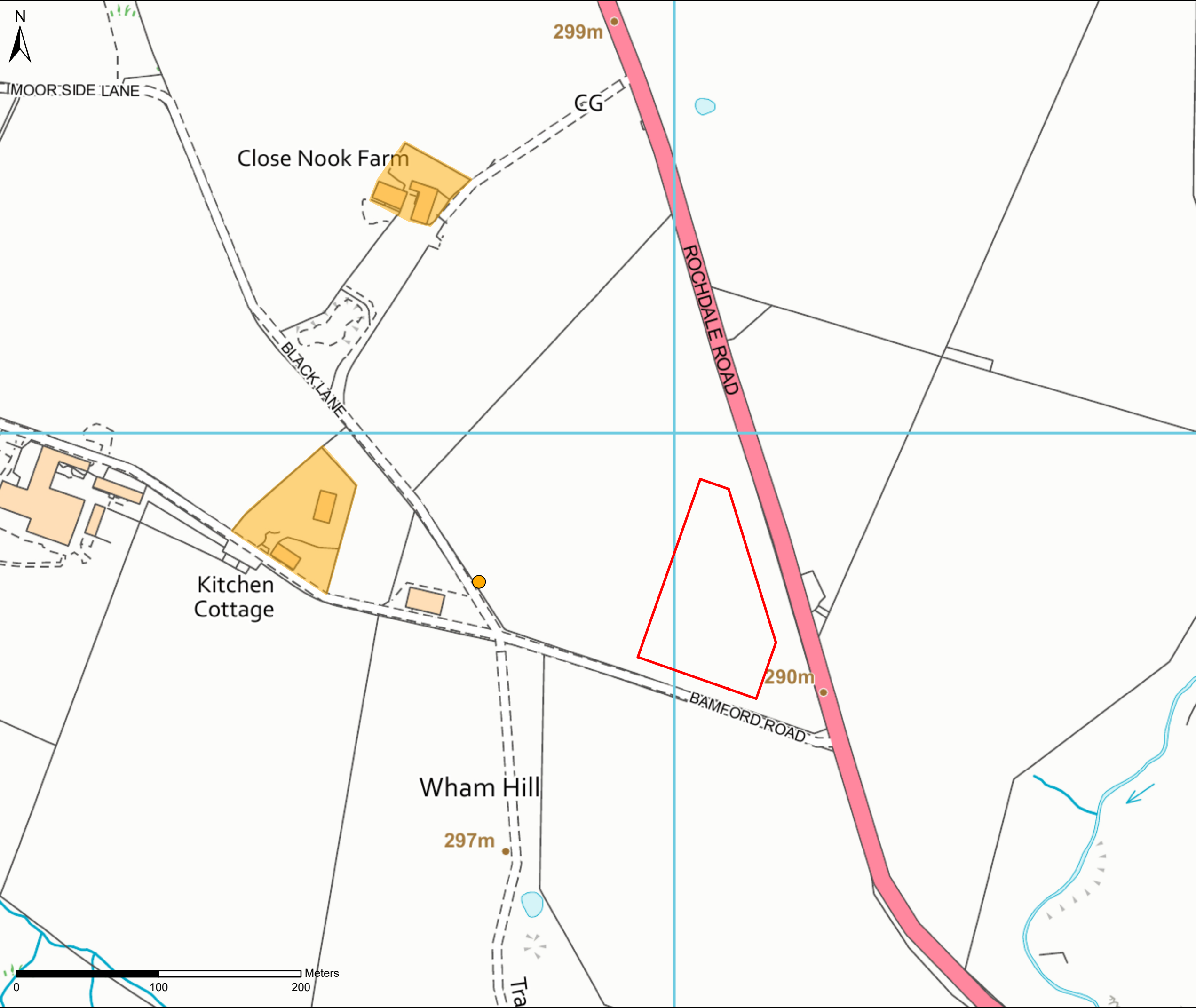
Octave Band	63	39.6	64.4		64.4
	125	59.5	79.6		79.6
	250	76.1	81.2		82.3
	500	67.3	82.6		82.7
	1000	56.3	81.7		81.7
	2000	51.6	75.4		75.4
	4000	54.1	71.3		71.4
	8000	57.4	64.2		65.0

Octave Band	63				
	125				
	250				
	500				
	1000				
	2000				
	4000				
	8000				

1/3 Octave Band	50	36.1	63.8		63.8
	63	37.0	47.4		47.8
	80	0.0	55.1		55.1
	100	58.4	71.9		72.1
	125	47.5	68.5		68.6
	160	51.3	78.4		78.4
	200	63.1	73.7		74.1
	250	60.9	76.4		76.5
	315	75.8	78.0		80.1
	400	61.2	77.0		77.1
	500	63.7	76.9		77.1
	630	62.5	79.2		79.3
	800	53.7	78.6		78.6
	1000	51.4	76.7		76.7
	1250	47.1	74.5		74.5
	1600	47.0	72.4		72.4
	2000	46.7	70.2		70.2
	2500	46.9	68.5		68.5
	3150	48.4	67.5		67.6
	4000	49.6	66.9		67.0
	5000	49.9	64.8		64.9
	6300	51.2	61.5		61.9
	8000	52.9	58.8		59.8
	10000	53.6	56.4		58.2

1/3 Octave Band	50				
	63				
	80				
	100				
	125				
	160				
	200				
	250				
	315				
	400				
	500				
	630				
	800				
	1000				
	1250				
	1600				
	2000				
	2500				
	3150				
	4000				
	5000				
	6300				
	8000				
	10000				

Appendix E – Figures



LEGEND

- Proposed Site Location
- Noise Monitoring Location 01 (NML01)
- Areas of Noise Sensitive Receptors (NSRs) Represented by NML

0	06/03/2025	FIRST ISSUE	TS	EW
Rev.	Date	Amendment Details	Drawn	Approved

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Project Title:

ROSSENDALE BESS

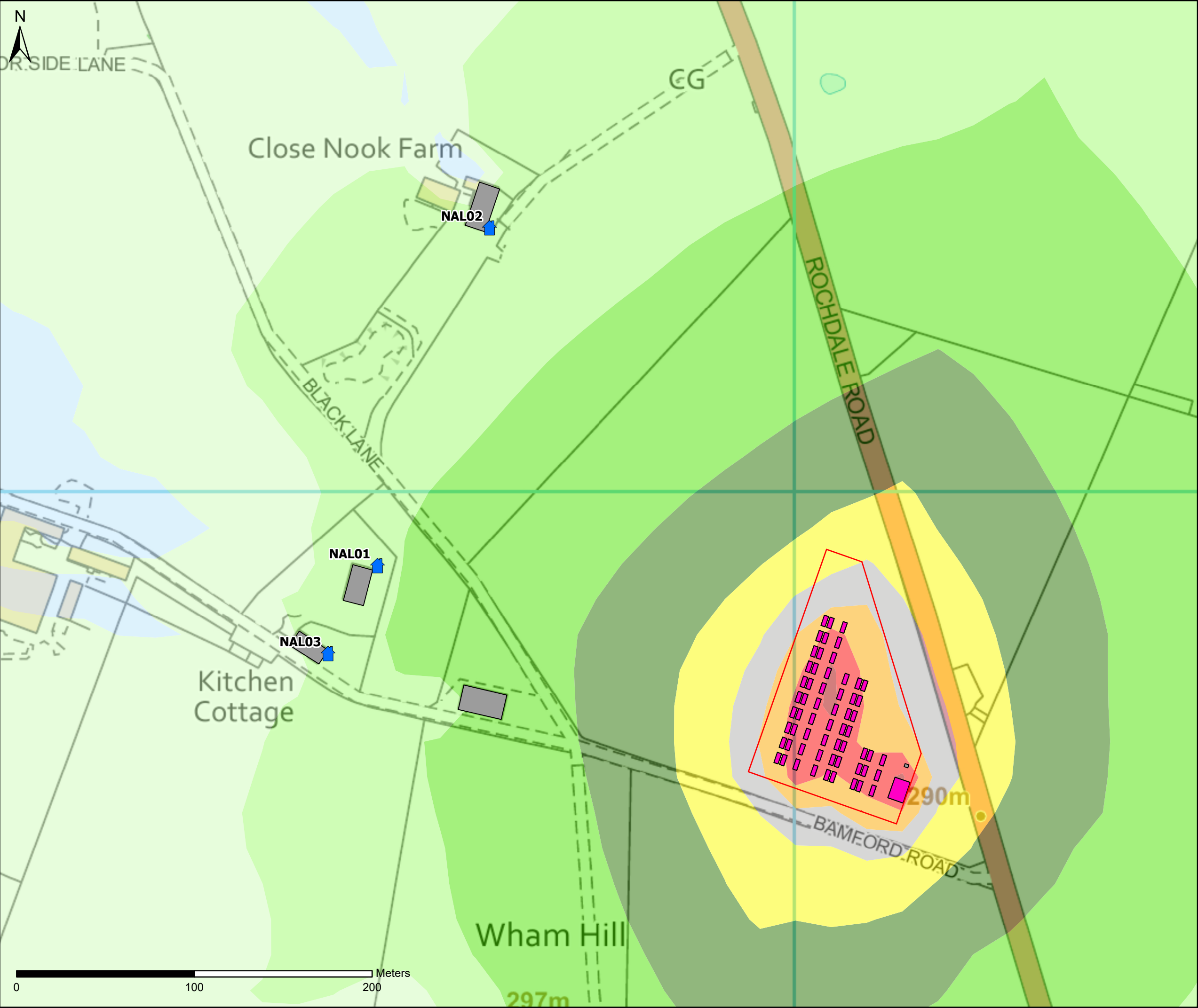
Drawing Title:

FIGURE 1: STUDY AREA

Scale:	1:2,500	Original Size:	A3	Spatial Reference:	British National Grid
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Drawing Number:

17176-002



LEGEND

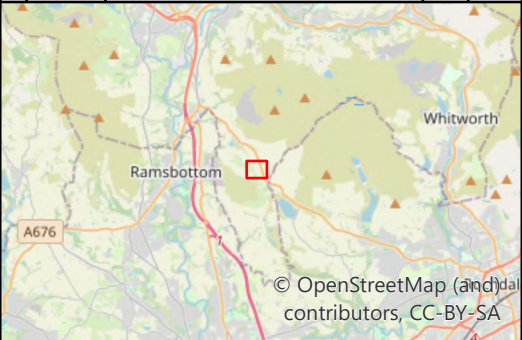
- Proposed Site Location
- Noise Assessment Locations (NALs)
- Modelled Noise Sources
- Modelled Buildings

Predicted Noise Levels (dBA)

- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70

Noise contours modelled in accordance with ISO 9613 Part 2: 2024 and displayed on a 20 m by 20 m grid.
All noise sources are operating concurrently.
All levels shown as dB LAeq(t).

0	06/03/2025	FIRST ISSUE		TS	EW
Rev.	Date	Amendment Details		Drawn	Approved



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Drawing Status:

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Project Title:

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Drawing Title:

FIGURE 2: NOISE CONTOUR PLOT

Scale:

1:2,000

Original Size:

A3

Spatial Reference:

British National Grid

Drawing Number:

17176-003

Appendix F – One-Third Octave Band Predicted Levels (dBZ)

Noise Assessment Location (NAL)	External Predicted Noise Levels, dB(Z)																											
	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	
NAL01 - Higher Moss	40	40	49	41	35	34	29	26	28	24	26	23	19	17	15	15	16	10	7	4	1	-	-	-	-	-	-	
NAL02 - Close Nook Farm	40	39	48	40	35	35	30	27	30	27	29	27	26	24	24	24	27	21	18	15	12	8	2	-	-	-	-	
NAL03 - Kitchen Cottage / Roseylyn	40	40	48	41	35	35	31	28	30	27	29	26	24	22	22	21	24	18	15	11	8	3	-	-	-	-	-	
Where a dash (-) is presented, predicted values were negligibly low (0 dB or below), and as such were not included within the table.																												