tnei

A specialist energy consultancy

Environmental Noise Impact Assessment

Swansea Battery Energy Storage System (BESS) Development

Statkraft UK Ltd.

17098-003-R1
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COMMERCIAL IN CONFIDENCE

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1 Introduction

TNEI have been commissioned by Statkraft UK Ltd. (henceforth referred to as 'the client'), to undertake an Environmental Noise Impact Assessment (NIA) to support the planning application for the proposed Swansea Battery Energy Storage System (BESS) development (henceforth referred to as 'the Proposed Development').

The Proposed Development is located at land west of Rhyd-y-pandy Road, Morriston, Swansea, at approximate Ordnance Survey coordinates 265464, 201014. The Proposed Development will have a storage capacity of 100 MW and will connect to the adjacent Swansea North 400 kV Substation. The Proposed Development site is currently undeveloped agricultural/pastural land.

The local area around the site is rural in nature, predominantly consisting of agricultural and pastural land, with a number of residential properties located nearby in all directions.

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 applicable, to provide sufficient levels of protection for all noise sensitive receptors.

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:

- Ewan Watson, AMIOA, BEng (Hons), IOA Postgraduate Diploma in Acoustics and Noise Control: Noise Propagation Modelling and Reporting; and,
- Moise Coulon, AMIOA, BSc Information Technology, 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 adjacent Swansea North 400 kV Substation. The Proposed Development will include primary infrastructure including a single battery compound comprising modular battery storage units and medium-voltage (MV) skids (each skid comprising a MV transformer and Inverter/Power Conversion System (PCS) unit). 3-phase air-core reactors are also included to improve safety and resilience in the unlikely event of an electrical fault in the MV cables, MV skids, PC units and main switch room, housing the switchgear that interconnects and protects the other primary infrastructure. The Proposed Development will also include ancillary infrastructure such as control and storage containers, operations room, welfare office, back-up diesel generator and auxiliary transformers.

Considering the above, the Proposed Development would introduce new sound sources to the local area. Specifically, the dominant sound sources considered within the assessment are:

- Modular Battery Storage Units (286 of);
- MV Transformer/Inverter Skid Units (26 of); and,
- 3-Phase Air-Core Reactor Stacks (3 of).

The layout assessed here is for a BESS with a storage capacity up to 100 MW, as included in Appendix B.

The sound level output of the majority of the ancillary infrastructure listed as part of the Proposed Development description is considered insignificant in comparison to the primary sound sources detailed above. This includes the diesel generator, which is expected to operate in emergencies only, and not as part of typical operations. Accordingly, no other items of plant have been considered within the assessment.

2.1 Study Area

Noise Sensitive Receptors (NSRs) are properties that are potentially sensitive to noise and, therefore, may require protection from proposed 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 are existing residential properties located to the west, northwest, northeast, southeast and south of the Proposed Development. The curtilage of the closest residential receptor is approximately 270 m to the south of the nearest noise emitting plant. Other residences are located approximately between 450 m and 700 m away.

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

Future Wales: The national plan 2040 was published in February 2021, it is the national development framework for Wales and has development plan status. Page 87 states:

'Planning Policy Wales contains the planning policy framework for addressing air quality, soundscape and noise. When proposing new transport infrastructure or new development, average population exposure to air and noise pollution should be reduced and soundscapes improved where it is practical and feasible to do so. At the very least, exposure to pollution should be minimised. This will include taking into account the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment arising as a result of proposals for transport infrastructure or development.'

Planning Policy Wales (PPW) (2024) [(1)] details the land use planning policies of the Welsh Government. The Welsh Government has published a practice guidance to highlight planning implications of a wide variety of renewable energy technologies, and a series of Technical Advice Notes (TANs) also supplement PPW. Chapter 5.9 relates to 'Renewable and Low Carbon Energy', which states:

'Local authorities should facilitate all forms of renewable and low carbon energy development and should seek cross-department co-operation to achieve this. In doing so, planning authorities should seek to ensure their area's full potential for renewable and low carbon energy generation is maximised and renewable energy targets are achieved. Planning authorities should seek to maximise the potential of renewable energy by linking the development plan with other local authority strategies, including Local Well-being plans and Economic/ Regeneration strategies.'

3.1.2 Noise and Soundscape Action Plan 2023–2028

The Welsh Government, in 2023, published the Noise and Soundscape Plan for Wales 2023–2028 (NSAP) [(2)], which outlines the Welsh public sector's strategic policy direction in relation to noise and soundscape management. Other than for onshore wind developments, the NSAP offers no specific guidance with regards to the consideration of noise from industrial scale electrical infrastructure developments such as BESS developments, however, Annex E – '*guidance to support decision making*', references BS 4142:2014+A1:2019 which is the most relevant standard for this noise impact assessment.

3.1.3 Technical Advice Note (TAN) 11: Noise

TAN 11 is currently being revised with a draft submitted in October 2023, and that draft also include reference to the latest version of BS 4142:2014+A1:2019 which is the most relevant standard for this noise impact assessment.

3.2 Assessment Method

A number of standards and guidelines are available for the assessment of environmental noise from proposed new developments or activities. Typically, assessments are based on a comparison of likely noise levels against either 'context' based limits or a set of fixed limits.

Context based limits are set relative to the existing noise environment and may also consider the characteristics of the noise source(s), whilst fixed limits are usually set regardless of the existing noise

environment or type of noise source(s). For this assessment, a noise criteria set in in accordance with BS 4142 is already in place (more details below) therefore a context based criteria was used.

3.2.1 'Context' Based Limits (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, $L_{Aeq(t)}$.
- **Specific Sound Level**: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr. 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 $L_{Ar,Tr}$. 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.'*

3.3 Existing GGP Noise Level Limits and EHO Consultation

It is noted by TNEI that as part of the decision notice issued by Swansea Council (SC) for the Swansea Greener Grid Park (GFP) development (2023/0889/FUL), which is located immediately adjacent to the

Proposed Development, the following BS 4142 related operational noise condition (Condition 17) was included:

"When assessed in accordance with BS 4142:2014+A1:2019, the Rating Level of noise due to the Development when measured in the amenity areas of nearby dwellings, shall not exceed the levels specified in the table below:

Receptor Name	Approximate Grid Reference	BS 4124 Rating Level, dB(A)	
		Daytime (0700-2300)	Night-time (2300-0700)
Abergelli Farm	265112, 201632	40	37
Abergelli (new build)	264949, 201486	42	41
Lletty'r Morfil Farm	264754, 201074	43	38
Maes-eglwys	265455, 200708	40	40

Reason: To protect the residential amenity of the occupiers of nearby properties in the interests of the health and well-being."

TNEI used the conditioned noise level limits above to inform a pre-application feasibility noise study (TNEI document reference 17098-001-R2, included within Appendix C) which was submitted to Swansea Council (SC), demonstrating that both site specific and cumulative BS 4142 Rating Levels from the Proposed Development are likely to meet the already conditioned limits at all identified receptors.

As part of further pre-app consultation, TNEI issued a letter to SC's Environmental Health Department (TNEI document reference 17098-002-R1, also included within Appendix C) in January 2025 to seek an agreement on the use of existing limits to inform TNEI's noise assessment. The letter included two new properties, Rhyd-y-Pandy Road and Cefn Betingau, identified by TNEI which were not listed in the above Condition 17 and which TNEI suggested should be considered for this assessment. In the absence of already assigned limits at these newly identified receptors, TNEI proposed that the adoption of the most stringent existing noise level limits issued as part of the GGP development noise condition (i.e. the lowest levels, which are applicable to Abergelli Farm) would be appropriate.

Table 3-1 shows the full set of limits proposed inclusive of the two new receptors. It should be noted that the coordinates shown within

Table 3-1 are indicative of the property location and not the assessment location. The Noise Assessment Locations (NALs) used within this report, which are generally located within the amenity areas of the identified NSRs closest to the Proposed Development, are shown within Table 4-2 and on Figure 2 within Appendix E.

Table 3-1: Proposed Target BS 4142 Rating Levels

Noise Sensitive Receptor (NSR) Name	Approximate Grid Reference for general identification	BS 4124 Rating Level Limits, dBA	
		Daytime (0700-2300)	Night-time (2300-0700)
Abergelli Farm (from Condition 17)	265112, 201632	40	37
Abergelli (new build) (from Condition 17)	264949, 201486	42	41
Lletty'r Morfil Farm (from Condition 17)	264754, 201074	43	38
Maes-eglwys (from Condition 17)	265455, 200708	40	40
Rhyd-y-Pandy Road (added by TNEI)	265952, 200656	40	37
Cefn Betingau (added by TNEI)	266029, 201493	40	37

At the time of writing this report, TNEI have yet to receive feedback from the SC EHO on the proposed noise level limits, but due to the close proximity of the GGP development to the Proposed Development and the high number of shared receptors, TNEI deem the adoption of the above BS 4142 Rating Level Limits to be appropriate in order to inform the NIA.

The Rating Level Limits set by SC for the GGP development are assumed to have been established with reference to the measured representative background sound level and considering the contextual assessment element of BS 4142 (i.e. they were derived after a full BS 4142 process which considers an initial estimate and context to define potential impact).

3.4 Calculation Method

3.4.1 Noise Propagation Model (ISO 9613)

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 '*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 globally, with specific areas of 0 (hard ground) added to account for the BESS hardstanding area and Swansea North 400 kV Substation; and,

- Receiver heights have been set to 4 m.

3.4.2 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 and simultaneously, at expected operating capacity.

4 Operational Noise Impacts

4.1 Modelling of Individual Sound Sources

The noise model considers all the sound sources detailed within Section 2.

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, with the exception of the reactors stack which have been modelled as vertical line sources. All items of plant have been modelled assuming they are operating continually, at expected operating capacities 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 tendering process. The source noise data used to inform the noise propagation model has been included within Appendix D where possible, but where data cannot be published due to confidentiality reasons, TNEI would be happy to discuss this data in more detail with SC should more information be required.

4.1.1 Modular Battery Storage Units

The client has provided a noise measurement report for the liquid-cooled modular BESS unit, Wartsila Quantum Cube, which details measured Octave Band, A-weighted, Sound Power Level (SWL) for the chiller unit affixed to either side of the cube (two chillers per cube). The datasheet has been included within Appendix D of this report, and the broadband SWL used to model each modular BESS chiller equates to **75 dBA**. Table 4-1 details the Octave-band SWL data used in the model:

Table 4-1: Octave Band SWL, dBA - Battery Cubes

Battery Chiller Unit	Frequency (Hz)								
	31.5	63	125	250	500	1000	2000	4000	8000
Wartsila Quantum Envicool Chiller	40	56	70	70	68	63	60	51	47

4.1.2 MV Transformer/Inverter Skid Units

The noise model considers an SMA SC3950-UP MV Transformer/Inverter unit as a candidate. Again, the client has provided TNEI with a noise measurement report, providing 1/3 Octave Band SWL data for the unit operating at various capacities during both charging and discharging cycles, with and without the fitting of a silencer kit. The noise data has been provided to TNEI from SMA under a Non-Disclosure Agreement and as such the spectral data cannot be provided in this report, however, TNEI can report that a silenced unit has been modelled assuming an **86 dB** broadband SWL considering a 100% apparent power during a charging cycle, as a worst-case (data available shows lower SWL in discharge / grid-feed cycles and also indeed in lower % apparent power scenarios which would be much more frequent than 100%).

4.1.3 3-Phase Air-Core Reactor Stacks

The client has provided information from the candidate reactor supplier with regards to source noise data; each reactor "stack" is to consist of 3 separate air-core reactor units, meaning 9 reactors in total. For each 3-phase stack, the supplier has specified a SWL of **63 dBA**. The supplier has requested that

the total SWL is concentrated in the 100 Hz 1/3 Octave Band only due to the harmonic frequency of the reactor. Each stack has been modelled as a vertical line source, of length 5 m.

4.2 Additional 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.

4.3 Calculated Immission Levels

Noise immission levels have been calculated at six Noise Assessment Locations (NALs), which have been selected to represent the closest NSRs to the development. For this assessment, all identified NSRs detailed in Section 3 have been assessed as NAL and the coordinates have been refined to a precise location to the side of the property facing the development. The NALs are detailed in Table 4-2 and on Figure 2 in Appendix E.

Table 4-2: Noise Assessment Locations

Noise Assessment Location		OS Grid Reference	
NAL ID	**NAL Descriptor**	**Eastings**	**Northings**
NAL01	Abergelli Farm	265151	201609
NAL02	Abergelli (New Build)	264975	201494
NAL03	Lletty'r Morfil Farm	264771	201067
NAL04	Maes-eglwys	265466	200713
NAL05	Rhyd-y-Pandy Road	265929	200708
NAL06	Cefn Betingau	265992	201499

The Specific Sound Levels were calculated assuming all plant is operating continuously and concurrently at anticipated operating capacities. 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 Specific Sound Levels at the NALs for the daytime and night-time periods are detailed in Table 4-3 below and also illustrated as noise contour plots shown in Figure 2 of Appendix E.

Table 4-3: Predicted Specific Sound Levels, dB $L_{Aeq(t)}$

Noise Assessment Location		Specific Sound Level, dB $L_{Aeq(t)}$
NAL ID	**NAL Descriptor**	
NAL01	Abergelli Farm	32
NAL02	Abergelli (New Build)	32
NAL03	Lletty'r Morfil Farm	35

Noise Assessment Location		Specific Sound Level, dB $L_{Aeq(t)}$
NAL ID	NAL Descriptor	
NAL04	Maes-eglwys	39
NAL05	Rhyd-y-Pandy Road	34
NAL06	Cefn Betingau	33

5 Noise Impact Assessment - BS 4142

5.1 Calculating the Rating Level

In order 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.

5.1.1 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."

Whilst some electrical plant, such as power transformers and reactors, can be tonal at source, BS 4142 corrections are only applied if the noise characteristics are present at the receptor location, not at the source location. Consideration of the predicted 1/3 Octave Band levels at the NALs indicates that tonality will not be present at any NAL and as such, no tonal character correction is required.

5.1.2 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 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; once operational, the noise level will be predictable and constant.

5.1.3 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.

5.1.4 Other 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.

5.1.5 BS 4142 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 Level presented in Table 4-3.

5.2 Noise Assessment Results

The predicted Rating Levels have been compared to the Target Rating Levels (from

Table 3-1) and the comparison is detailed in Table 5-1 below:

Table 5-1: Noise Assessment results

Noise Assessment Location		Predicted Rating Level from the Proposed Dev.	Daytime		Night-time	
NAL ID	NAL Descriptor		Target Rating Level, dBA	Margin, dB	Target Rating Level, dBA	Margin, dB
NAL01	Abergelli Farm	32	40	-8	37	-5
NAL02	Abergelli (New Build)	32	42	-10	41	-9
NAL03	Lletty'r Morfil Farm	35	43	-8	38	-3
NAL04	Maes-eglwys	39	40	-1	40	-1
NAL05	Rhyd-y-Pandy Road	34	40	-6	37	-3
NAL06	Cefn Betingau	33	40	-7	37	-4

The predicted Rating Levels from the Proposed Development are below the Target Rating Levels at all receptors during both the daytime and night-time periods.

Accordingly, this BS 4142 assessment concludes that the Proposed Development would meet the Target Rating Level limits at all receptors during both the daytime and night-time periods without any requirement for noise mitigation such as acoustic fences or bunds.

6 Cumulative Impacts

TNEI are aware of a number of operational and consented Solar, Grid Stability and Electrical Infrastructure developments located near to the Proposed Development that require appropriate cumulative consideration in terms of operational noise output. The nearby cumulative developments identified, which were summarised within the EHO consultation letter, are reproduced within Table 6-1 below:

Table 6-1: Summary of Nearby Cumulative Developments

Development Name	SC Planning Reference	Planning Status	NIA Report	Approximate OS Coordinates of Site Centre		Approximate Distance from Swansea BESS Development
				Eastings	Northings	
Swansea Greener Grid Park (GGP)	2023/0889/FUL	Consented	Yes	265340	201117	100 m
Swansea North National Grid 400 kV Substation	2008/1685	Operational	Yes	264973	200946	250 m
Afon Llan Solar Park	2020/0257/FUL	Operational	Yes	266065	201160	500 m
Cefn Betingau Solar Park	2013/0865	Operational	Yes	266063	201499	750 m
Brynwhilach Solar Park	2014/1022	Operational	No	264478	200453	900 m

6.1 Cumulative Assessment

For clarity, TNEI have only considered a development within the cumulative noise assessment if the appropriate operational noise assessment documentation (NIA Report) has been submitted in support of the development and is publicly available to review. In the case of Afon Llan Solar Park and Cefn Betingau Solar Park, although NIA information is provided (within the wider Environmental Statement/Environmental Report document), in both cases operational noise impacts have essentially been scoped out by the consultant, stating the following within the respective noise chapters:

"PV developments are inherently quiet. Noise emissions from PV plant are limited to noise associated with the inverters and transformers. No significant noise impacts are expected due to separation distances of this equipment from the limited number of properties that could be affected and inherent mitigation associated with the equipment and the structures in which they are housed."

As a result, no BS 4142 Rating Levels have been provided for either of the above schemes. For Brynwhilach Solar Park, although an Environmental Statement was submitted, Noise has not been included within the assessment in any form.

As such, only the following schemes have been included within the cumulative assessment:

- Swansea Greener Grid Park (GGP)

- Swansea North 400 kV Substation

With regards to the above, a cumulative assessment was undertaken against the Target Rating Level presented within this NIA (as shown in

Table 3-1) for both the daytime and night-time periods. Tables F-1 and F-2 within Appendix F of this NIA report show the results of the cumulative assessment, in which the respective developments' BS 4142 Rating Levels have been logarithmically added together. Cumulative levels are presented at NALs which are common to all assessments only and in instances where the calculation of Rating Levels varies for different time periods (such as weekends) or assessment heights, the highest level has been used as a worst-case approach.

As can be seen from both Table F-1 and F-2, the maximum cumulative BS 4142 Rating Level remains below the Target Rating Level during the daytime and night-time at all NALs. Accordingly, **the cumulative noise assessment concludes that the Proposed Development would not contribute to a cumulative exceedance of the Target Rating Level at all identified residential receptors during both daytime and night-time periods.**

7 Summary

To assess the impact of operational noise emissions from the Proposed Development, TNEI has produced a noise propagation model to predict the noise immission levels at the nearest identified residential receptors. 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 tendering process. The noise model also 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. No mitigation measures such as acoustic fences were included within the noise propagation model.

An assessment was undertaken in accordance with BS 4142 against a set of Target Rating Levels derived with reference to the already conditioned levels assigned to the consented neighbouring Swansea Greener Grid Park (GGP) development.

Cumulative noise inclusive of the nearby solar, grid stability and electrical infrastructure schemes was considered in the assessment. The predicted cumulative BS 4142 Rating Levels were found to be below the Target Rating Level Limits at all receptors during the daytime and night-time periods respectively. Accordingly, this assessment concludes that the development will not have an adverse operational noise impact on the nearby NSRs due to the ability to meet an appropriate set of target noise level limits.

8 References

1. **Welsh Government.** *Planning Policy Wales.* s.l. : Welsh Government, 2024.

2. —. *Noise and Soundscape Plan for Wales 2023-2028.* 2023.

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. 2024.

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.

7. **Government, Welsh.** Planning Policy Wales - Edition 11. 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).

Isopleth: a line on a map connecting points of equal value, for example air pressure, noise level etc.

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 LAeq, T is the A-weighted equivalent continuous sound level over a given time period (T).

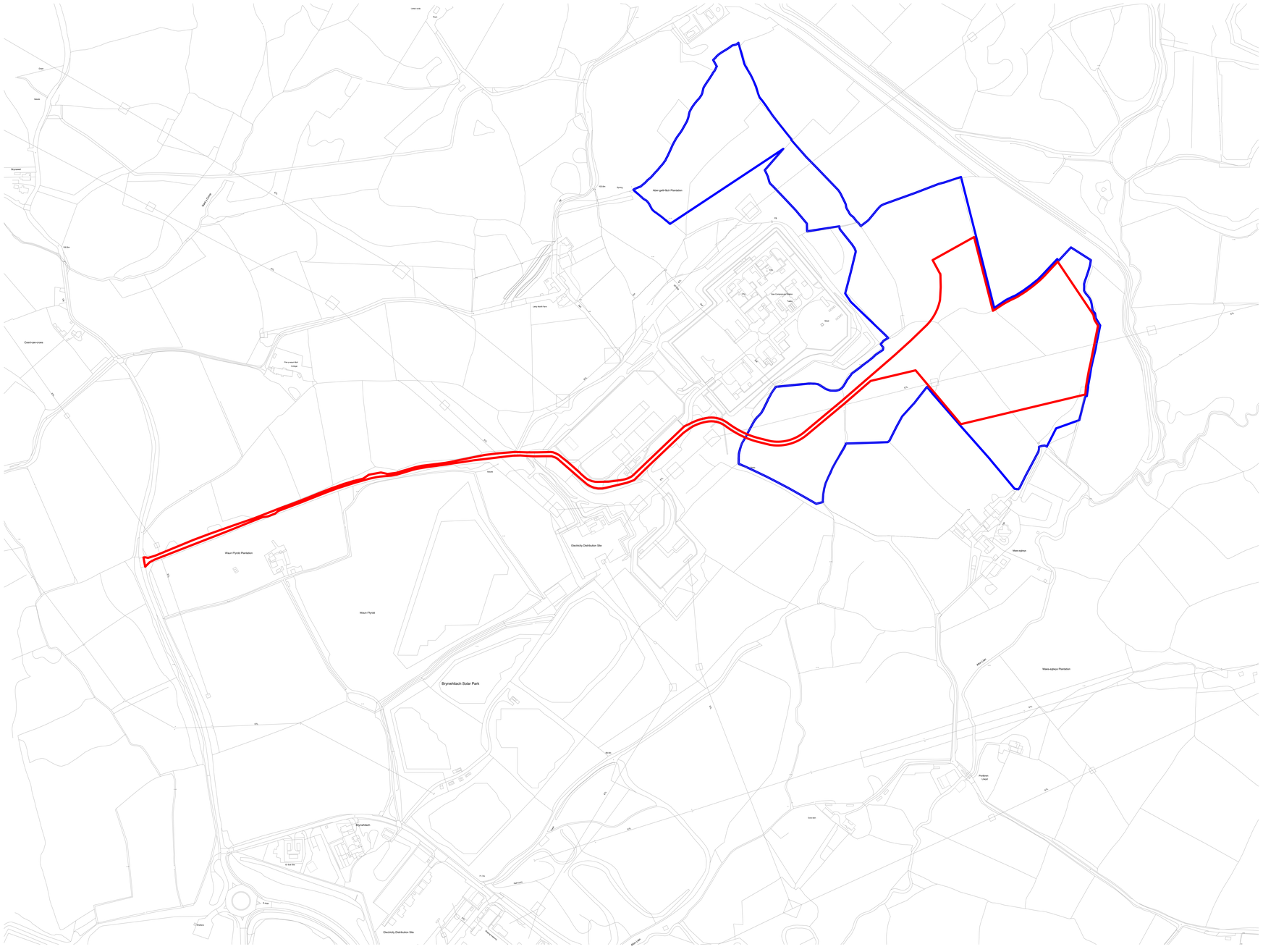
L_{90}: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The LA90,10min is the A-weighted background sound level over a ten-minute measurement 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



Scale; 1: 2,500 Metres 0 50 100 150 200 250 300 350 400 450 500 550 600

Statkraft

LEGEND :

APPLICATION SITE BOUNDARY (6.4 ha)

LAND WITHIN THE CONTROL OF THE APPLICANT

Site Location Plan

Project Name: Swansea BESS

Scale:	Page size:	Revision no.
1:2500	A0	01
Drawn by:	Check by:	Date:
RC	WK, JT	21/01/2025

Scale; 1; 500 Metres 0 10 20 30 40 50 60 70 80 90 100 110 120 130

Statkraft

LEGEND (L x W x H m):

- APPLICATION SITE BOUNDARY (6.4 ha)
- BATTERIES CONTAINERS (29.3 x 2.15 x 2.6)
- INVERTER SKID (8.95 x 2.05 x 3.75)
- CONTROL CONTAINERS (12.20 x 2.5 x 2.6)
- AUXILARY KIT (3.9 x 1.4 x 2.5)
- OPERATIONS ROOM (14.1 x 3.7 x 5.55)
- STORES (6.0 x 2.4 x 2.6)
- WELFARE & OFFICE (9.75 x 3.05 x 2.75)
- AUX TRANSFORMER (3.3 x 2.4 x 2.5)
- DIESEL GENERATOR (6.2 x 3.1 x 3.5)
- ABOVE GROUND WATER TANKS (10.0 X 4 X 3)
- PROPOSED OPERATIONAL ACCESS
- INDICATIVE TREE & WOODLAND MIX (to be provided by TGP)
- INDICATIVE WILDFLOWER MIX (to be provided by TGP)
- AIR-CORED REACTORS (1.5 diameter)
- PERIMETER FENCE (3.4 H)
- SECURITY GATES (6.73 W x 3.4 H)
- PEDESTRIAN ACCESS GATES (3.0 W x 3.4 H)
- SUDs BASIN (to be provided by Motion)
- CABLE ROUTE & 4m BUFFER ZONE EITHER SIDE
- CONSTRUCTION COMPOUND
- LIGHTING COLUMNS (6.0 H)

Proposed Site Layout

Project Name: Swansea BESS

Scale:	Page size:	Revision no.
1:500	A0	06
Drawn by:	Check by:	Date:
RC	MG	29/01/2025

Appendix C – Pre-App Information and EHO Correspondence

Swansea BESS – Pre-Application Noise Assessment Technical Note

To:	Swansea Council Environmental Health/Planning Departments	Client:	Statkraft Ltd.
Address:	Civic Centre, Oystermouth Road, Maritime Quarter, Swansea SA1 3SN	TNEI Reference:	17098-001-R2
Date:	15 January, 2025		

Introduction

Statkraft Ltd. (henceforth referred to as "the applicant") are proposing a 100 MW Battery Energy Storage System (BESS) development (the Proposed Development) on land near to both the existing Swansea North 400 kV Substation and Statkraft's already consented Greener Grid Park (GGP) Development (Swansea Council Planning Reference Number 2023/0889/FUL), which consists of Synchronous Compensator machinery referred to as "Energy Management" equipment. TNEI have been appointed by the applicant to undertake the noise impact assessment work in support of a future planning application for the Proposed Development. The Proposed Development will constitute a separate full planning application to the consented Swansea GGP development.

The purpose of this technical note is to summarise the pre-application noise assessment work already undertaken by TNEI in order to provide Swansea Council (SC) with a sufficient overview of any likely operational noise impacts. The note summarises elements such as the noise study area identified, noise propagation modelling assumptions and operational noise levels predicted at the nearest identified noise sensitive receptors (i.e. residential properties). The note also discusses the assessment methodology that will likely be applied to the full Noise Impact Assessment (NIA) report, specifically regarding appropriate noise assessment criteria.

Project Summary

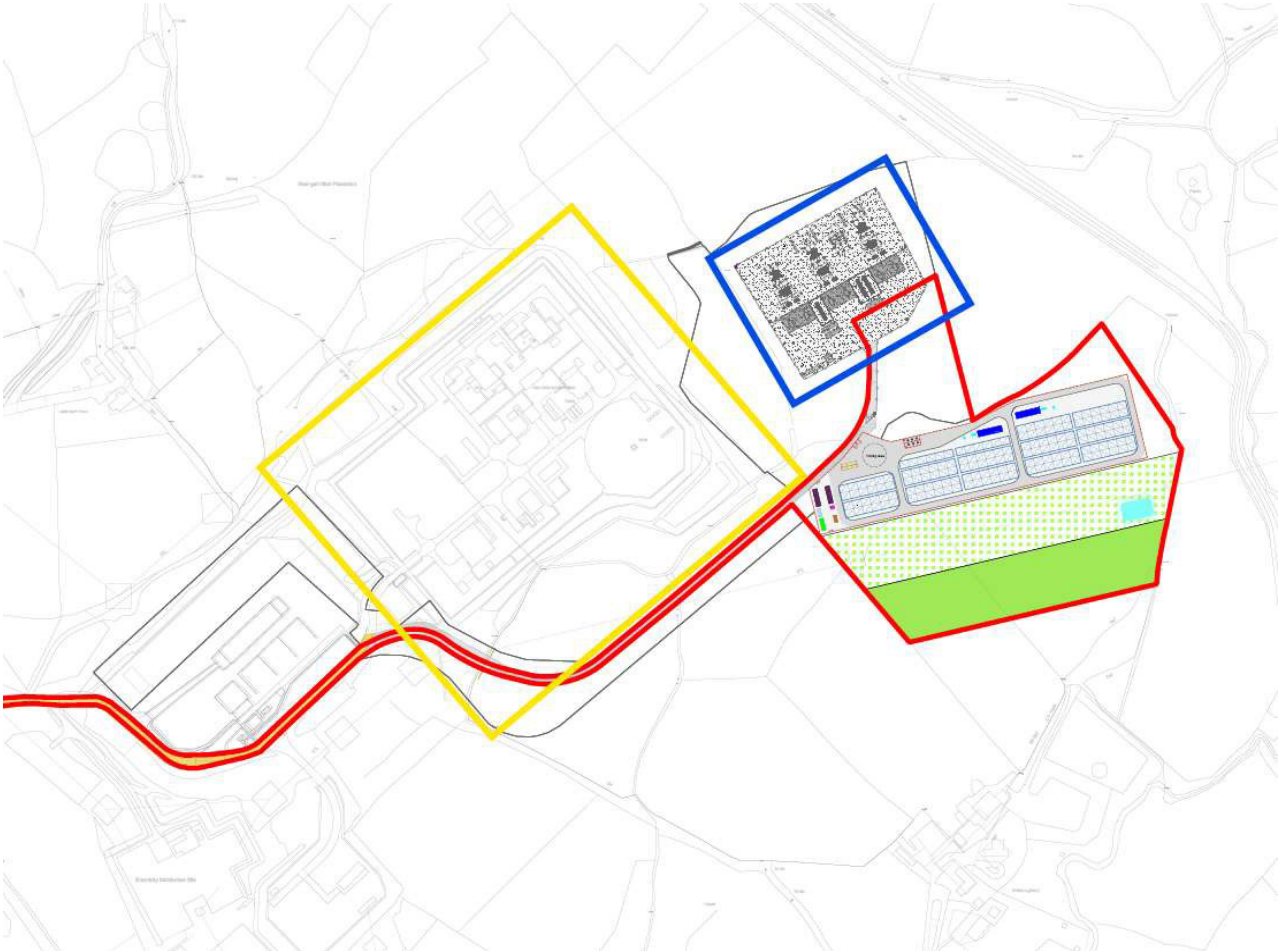
The Proposed Development is to be located approximately 1.5 km to the north of the M4 motorway, north of the City of Swansea, near to both the Swansea North 400 kV Substation and Statkraft's Swansea GGP Development. The area surrounding the Proposed Development is predominantly rural in nature, however

there are a number of residential properties located nearby, the closest of which is approximately 270 m to the south.

Prior to the submission of a full Noise Impact Assessment (NIA) report as part of a future planning application submission, the applicant was keen to understand the viability of the Proposed Development at an early stage and as such commissioned TNEI to undertake a feasibility noise study, primarily consisting of operational noise propagation modelling.

At this early stage, exact details of the Proposed Development are still to be finalised. However, it is expected that the development will have a storage capacity of 100 MW and will include primary noise-emitting infrastructure such as containerised/modular battery storage units and Medium Voltage (MV) transformer/inverter power conversion units (PCU's). Additionally, it is expected that the Proposed Development will include ancillary infrastructure such as control containers, operations room, storage containers, welfare offices and auxiliary transformers. It is expected that the noise output from these ancillary items will be negligible and as such have not been included when undertaking noise predictions. The indicative site boundary and preliminary site layout used to inform the pre-app noise study is included within Appendix A. The latest iteration of the development site layout is shown below on Image 1 (Red), alongside indicative locations of the Swansea GGP development (Blue) and Swansea North 400 kV Substation (Yellow):

Image 1 – Latest Indicative Site Boundary and Site Layout Drawing



Assessment Methodology/Noise Level Limits

Operational noise from developments of this nature is typically assessed in accordance with (the British Standard) BS 4142:2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* (henceforth referred to simply as BS 4142). BS 4142 assesses potential operational noise impacts upon residential receptors, the methodology of which is summarised below:

- Measure existing background sound levels at or close to the nearest Noise Sensitive Receptors (NSRs) for daytime and night-time periods;
- Predict the noise levels likely to be received at the NSRs from the development;
- Add penalties, as required, to account for the characteristics of the sound source to determine the Rating Level;
- Compare the Rating Level with the measured background sound levels to assess the likelihood of adverse impacts; and,
- If required, determine appropriate mitigation measures to reduce the Rating Level to within acceptable levels.

It is noted by TNEI that as part of the decision notice for the adjacent Swansea GGP development (2023/0889/FUL), the following BS 4142 related operational noise condition (Condition 17) was included:

"When assessed in accordance with BS 4142:2014+A1:2019, the Rating Level of noise due to the Development when measured in the amenity areas of nearby dwellings, shall not exceed the levels specified in the table below:

Receptor Name	Approximate Grid Reference	BS 4124 Rating Level, dB(A)	
		Daytime (0700-2300)	Night-time (2300-0700)
Abergelli Farm	265112, 201632	40	37
Abergelli (new build)	264949, 201486	42	41
Lletty'r Morfil Farm	264754, 201074	43	38
Maes-eglwys	265455, 200708	40	40

Reason: To protect the residential amenity of the occupiers of nearby properties in the interests of the health and well-being."

TNEI have assumed the use of the above conditioned noise level limits to inform this initial noise study.

Noise Propagation Modelling

All noise propagation modelling was undertaken in accordance with ISO 9613-2:2024 '*Acoustics – Attenuation of sound during propagation outdoors'* using the propriety noise modelling software, CadnaA. Noise propagation modelling was undertaken using the preliminary site layout plan provided by the applicant, which has since been superseded. The preliminary layout used will differ from the finalised layout that will be submitted as part of the planning application but is considered a good representation of the scale and

specifications of the Proposed Development in terms of numbers of items of noise emitting equipment. All items of plant have been modelled as area sources. **Error! Reference source not found.** below presents the candidate plant data assumed within the noise model:

Table 1 –Summary of Plant Assumptions

Item of Plant	Sound Power Level (dBA)	Number of Items of Plant Modelled
Modular BESS Unit	74	572
MV Transformer/Inverter Skid	86	26

Noise Assessment Locations

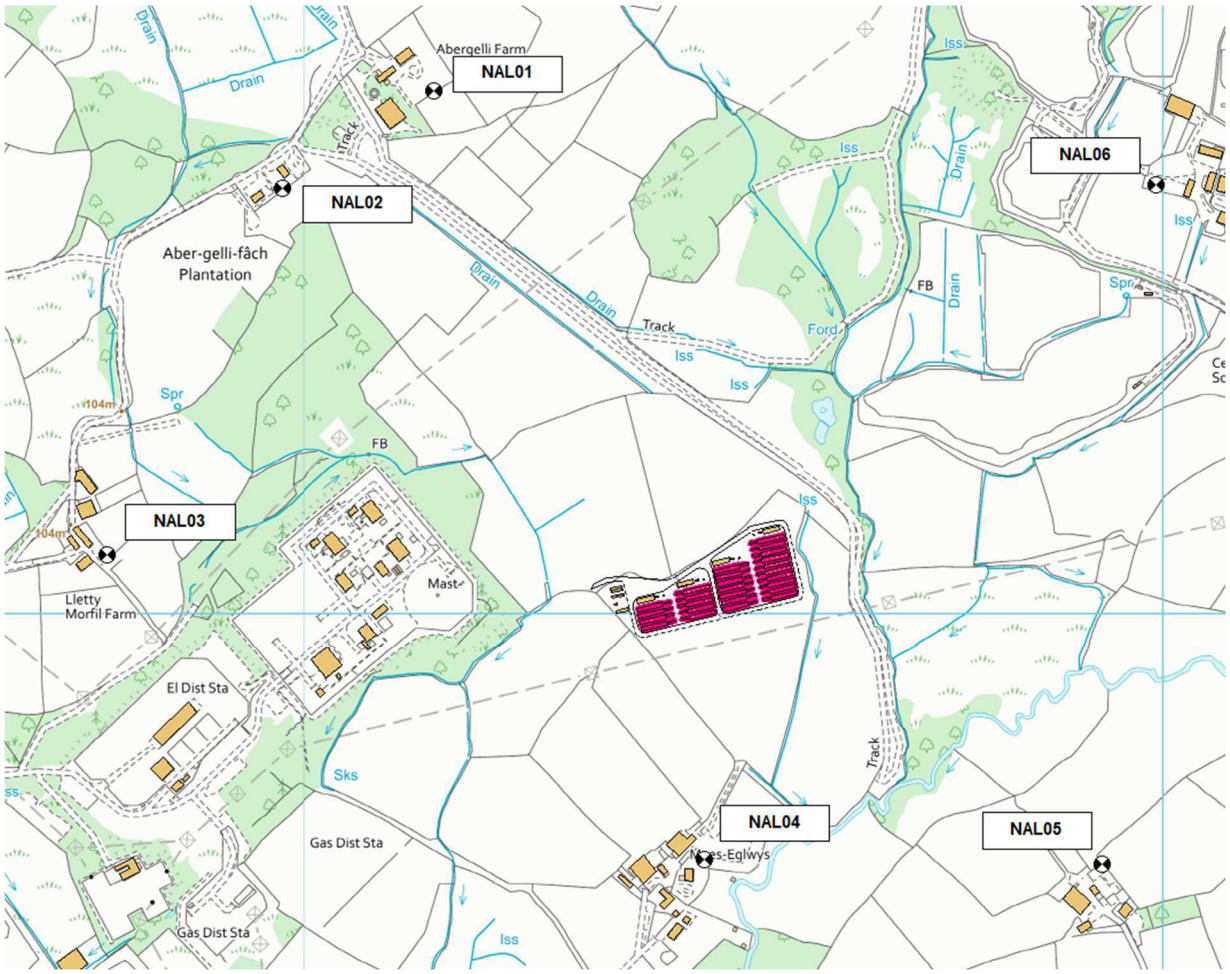
Noise Assessment Locations (NALs) are the exact points where noise predictions have been undertaken. The NALs were selected to represent the nearest Noise Sensitive Receptors (NSRs), i.e. residential properties, in the vicinity of the Proposed Development. For the most part, the NALs below are the same as those presented within the Swansea GGP noise condition, with the addition of NALs 05 and 06, which were identified by TNEI within the study area (further to the west) and have been included for completeness. As a worst-case scenario, the most stringent conditioned noise level limits for the Swansea GPP development (at Abergelli Farm) have been applied to NALs 05 and 06. Details for each NAL are presented in **Error! Reference source not found.** below:

Table 2 - Noise Assessment Locations (NALs)

Noise Assessment Locations (NALs)			
NAL ID	**NAL Descriptor**	**Eastings**	**Northings**
NAL01	Abergelli Farm	265151	201609
NAL02	Abergelli (New Build)	264975	201494
NAL03	Lletty'r Morfil Farm	264771	201067
NAL04	Maes-eglwys	265466	200713
NAL05	Rhyd-y-Pandy Road	265929	200708
NAL06	Cefn Betingau	265992	201499

The locations of the respective NALs in relation to the Proposed Development location are shown in Image 2 below (where the pink-coloured area represents the noise emitting elements of the Proposed Development and the black and white circles represent the exact assessment points):

Image 2 – Noise Assessment Locations (NALs)



Noise Modelling/Assessment Results

The predicted levels are presented below and were calculated assuming all plant is operating continuously and concurrently with no operational differences between the daytime and night-time periods. For avoidance of doubt, the values presented below in **Error! Reference source not found.** are BS 4142 Rating Levels, not just the predicted Specific Noise Levels. This is an important distinction as the BS 4142 assessment process requires the consideration of the character of the sound, with any corrections (essentially penalties) being applied to the predicted noise levels to obtain a rating level. For the purposes of this assessment and using TNEI's extensive experience of BS 4142 assessments for BESS developments, + 0 dB BS 4142 character correction is judged as applicable.

BS 4142 character corrections are often influenced by the plant specifications (i.e. noise source data), and as such the application of these corrections will be revised as part of the full noise impact assessment submitted to support the Proposed Development's planning application when the design has been finalised. However, at the pre-app stage, no correction has been applied and as such the noise predicted levels equate to the BS 4142 Rating Levels.

For completeness, the BS 4142 Rating Levels presented within the Swansea GGP NIA Report[1] were logarithmically added to the Proposed Development's Rating levels in order to obtain a Cumulative Rating

[1] *Authored by Wardell Armstrong, entitled "Statkraft, Swansea Greener Grid Park, Noise Assessment Report, April 2023", Job number – ST19905, Report number – 001.*

level. The Cumulative Rating Levels have been compared to the GGP noise level limits during the daytime and night-time periods. Rating Levels for the GGP were not presented within the GGP NIA report at three of the NALs included within TNEI's assessment and as such, it is assumed that the GGP Rating Level at these locations is negligible (indicated with a dash below). Assessment results are provided below in **Error! Reference source not found.** and **Error! Reference source not found.** on this basis:

Table 3 – Assessment Results (Daytime)

NAL ID	Proposed Development Rating Level, dBA	Swansea GGP Rating Level, dBA	Cumulative Rating Level	Daytime Noise Level Limit, dBA	Margin, dB
NAL01	30	-	30	40	-10
NAL02	31	32	35	42	-7
NAL03	34	32	36	43	-7
NAL04	38	32	39	40	-1
NAL05	33	-	33	40	-7
NAL06	32	-	32	40	-8

Table 4 – Assessment Results (Night-time)

NAL ID	Proposed Development Rating Level, dBA	Swansea GGP Rating Level, dBA	Cumulative Rating Level	Night-time Noise Level Limit, dBA	Margin, dB
NAL01	30	-	30	37	-7
NAL02	31	32	35	41	-6
NAL03	34	32	36	38	-2
NAL04	38	32	39	40	-1
NAL05	33	-	33	37	-4
NAL06	32	-	32	37	-5

Considering the results presented above, at all NALs during both the daytime and night-time periods, the cumulative BS 4142 Rating Levels were found to be below the conditioned noise level limits assigned to the adjacent Swansea GGP development.

Further Cumulative Considerations

The applicant acknowledges the presence of additional BESS schemes located in the surrounding area that may need to be considered as part of a cumulative noise assessment. However, given their premature status and that no formal planning applications have yet to be submitted to the LPA for these schemes, it is difficult to robustly assess for cumulative impacts. Within TNEI's formal consultation letter that will be issued to Swansea Council prior to submission of the NIA report, we will highlight these schemes and propose which

of the schemes can realistically be included within the full Noise Impact Assessment in support of the proposed development.

Summary and Recommendations

The purpose of this technical note was to summarise the pre-application noise assessment work undertaken to appraise potential operational noise impacts from a new proposed BESS development in Swansea. A noise propagation model was built to predicted operational noise levels at the nearest residential receptors using typical candidate data for a development of this nature. Incorporating the results of the nearby Swansea GGP development's noise impact assessment, the Cumulative BS 4142 Rating Levels have been assessed against the conditioned noise level limits already assigned to the GGP development. It was found that the Cumulative BS 4142 Rating Levels would be below these noise level limits at all nearby noise sensitive receptors during both the daytime and night-time periods. As such, it is anticipated that operational noise attributable to the Proposed Development is unlikely to result in an adverse impact when assessed against the existing noise level limits.

TNEI will be in touch in due course with the Swansea Council's Environmental Health and/or Planning departments to provide more detail regarding the proposed assessment methodology for the full Noise Impact Assessment that will be issued in support of the Proposed Development's planning application, including discussion regarding the application of the extant noise level limits and appropriate consideration of the wider cumulative noise situation.

For the time being, we hope the above provides you with a clear summary of the noise assessment work TNEI have undertaken so far to highlight potential noise impacts in view of a future planning application. If there is any aspect of the above that you would like to discuss in more detail in the meantime, please do not hesitate to get in touch.

Yours sincerely,

Ewan Watson
BEng (Hons), IOA Dip, MIOA

Principal Consultant
ewan.watson@tneigroup.com
Tel: 0141 428 3182

Reviewed and approved by:

Moise Coulon
BSc, MIOA

Principal Consultant
moise.coulon@tneigroup.com
Tel: 0191 211 1408

Document Control

Revision	Status	Prepared by	Checked by	Approved by	Date
R0	FIRST ISSUE	EW	MC	MC	10/01/2025
R1	CLIENT COMMENTS	EW	MC	MC	14/01/2025
R2	CLIENT COMMENTS	EW	MC	MC	15/01/2025

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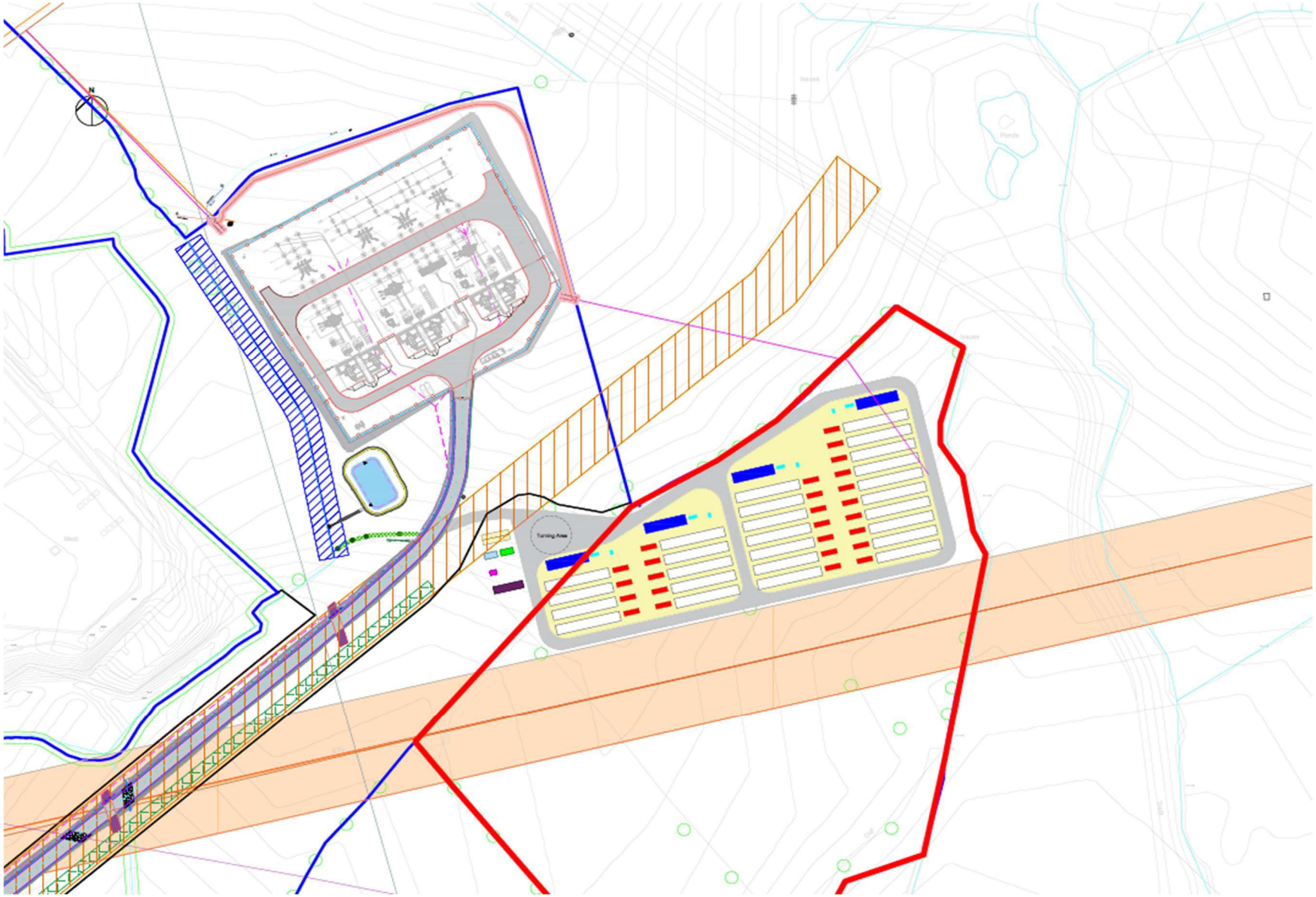
Appendix A – Preliminary Site Layout Used to Inform Pre-App Noise Modelling



A specialist energy consultancy

Swansea Battery Energy Storage System (BESS) Development: Noise Impact Assessment Methodology – EHO Consultation

To:	Swansea Council Environmental Health Department	Client:	Statkraft Ltd.
Address:	Civic Centre, Oystermouth Road, Maritime Quarter, Swansea SA1 3SN	TNEI Reference:	17098-002-R1
Date:	23 January, 2025		

Introduction

Dear Sir/Madam,

TNEI Services Ltd (TNEI) have been commissioned by Statkraft Ltd. (the applicant) to carry out a Noise Impact Assessment (NIA) to support the planning application for the proposed Swansea Battery Energy Storage System (BESS) development (the Proposed Development). The Proposed Development is to be located adjacent to the Swansea North 400 kV Substation and Statkraft's already consented Greener Grid Park (GGP) Development (Swansea Council Planning Reference Number 2023/0889/FUL).

As part of the pre-application documentation submitted to Swansea Council (SC) by the applicant's planning consultant, DWD, TNEI provided a technical note (document reference 17098-001-R0, dated 15th of January 2025), which summarised the feasibility noise assessment work undertaken by TNEI, investigating the viability of the scheme in terms of likely noise impacts on surrounding receptors. Within the note, TNEI present the results of early-stage noise propagation modelling assessed against the extant conditioned noise level limits applicable to the neighbouring GGP development (Condition 17 of 2023/0889/FUL Decision Notice). The early-stage noise modelling exercise showed that noise levels (both from the Proposed Development alone, and cumulatively when including the GGP's operational noise output) were below the extant GGP noise level limits.

The purpose of this letter is to seek to agree upon the use of the extant noise level limits to inform the full Noise Impact Assessment (NIA) report that will be submitted in support of the Proposed Development's planning application, as well as to discuss potential further cumulative considerations that may be required.

BS 4142 and Extant Swansea GGP Noise Level Limits

Operational noise from developments of this nature is typically assessed in accordance with (the British Standard) BS 4142:2014 *'Methods for Rating and Assessing Industrial and Commercial Sound'* (henceforth referred to simply as BS 4142). BS 4142 assesses potential operational noise impacts upon residential receptors, the general methodology of which is summarised below:

- Measure existing background sound levels at or close to the nearest Noise Sensitive Receptors (NSRs) for daytime and night-time periods;
- Predict the noise levels likely to be received at the NSRs from the development;
- Add penalties, as required, to account for the characteristics of the sound source to determine the Rating Level;
- Compare the Rating Level with the measured background sound levels to assess the likelihood of adverse impacts; and,
- If required, determine appropriate mitigation measures to reduce the Rating Level to within acceptable levels.

It is noted by TNEI that as part of the decision notice for the adjacent Swansea GGP development (2023/0889/FUL), the following BS 4142 related operational noise condition (Condition 17) was included:

"When assessed in accordance with BS 4142:2014+A1:2019, the Rating Level of noise due to the Development when measured in the amenity areas of nearby dwellings, shall not exceed the levels specified in the table below:

Receptor Name	Approximate Grid Reference	BS 4124 Rating Level, dB(A)	
		Daytime (0700-2300)	Night-time (2300-0700)
Abergelli Farm	265112, 201632	40	37
Abergelli (new build)	264949, 201486	42	41
Lletty'r Morfil Farm	264754, 201074	43	38
Maes-eglwys	265455, 200708	40	40

Reason: To protect the residential amenity of the occupiers of nearby properties in the interests of the health and well-being."

As mentioned above, TNEI have used the conditioned noise level limits to inform the initial noise study and have demonstrated that both site specific and cumulative BS 4142 Rating Levels are likely to meet the conditioned limits at all identified receptors. This assessment outcome will be subject to change when accounting for the finalised planning layout in the planning application NIA but is a good indication of the scheme's operational noise impact, nonetheless.

As part of TNEI's pre-application study, we have identified two further noise sensitive receptors (NSRs) within the relevant study area that are not included within the above noise condition but will need to be included as part of TNEI's NIA report. They are shown as NSRs 05 and 06 in the Table 1 and Figure 1 below:

Table 1: Nearest Noise Sensitive Receptors (NSRs) Identified by TNEI

Noise Sensitive Receptor (NSR) Name	Approximate Grid Reference
NSR01 - Abergelli Farm	265112, 201632
NSR02 - Abergelli (new build)	264949, 201486
NSR03 - Lletty'r Morfil Farm	264754, 201074
NSR04 - Maes-eglwys	265455, 200708
NSR05 - Rhyd-y-Pandy Road	**265952, 200656**
NSR06 - Cefn Betingau	**266029, 201493**

Figure 1 – Nearest Noise Sensitive Receptors (NSRs) and Indicative Site Location

In the absence of already assigned limits at these newly identified receptors, TNEI propose that the adoption of the most stringent noise level limits issued as part of the GGP development noise condition (i.e. the lowest levels, applicable to Abergelli Farm) would offer appropriate protection from potential noise impacts.

With consideration of the above, TNEI propose that BS 4142 Rating Levels contained within Table 2 should be adopted as the target noise assessment criteria to inform the Proposed Development's NIA report:

Table 2: Proposed Target BS 4142 Rating Levels to Inform Swansea BESS NIA

Receptor Name	Approximate Grid Reference	BS 4124 Rating Level, dB(A)	
		Daytime (0700-2300)	Night-time (2300-0700)
Abergelli Farm	265112, 201632	40	37
Abergelli (new build)	264949, 201486	42	41
Lletty'r Morfil Farm	264754, 201074	43	38
Maes-eglwys	265455, 200708	40	40
NSR05 - Rhyd-y-Pandy Road	265952, 200656	40	37
NSR06 - Cefn Betingau	266029, 201493	40	37

Cumulative Considerations and Assessment Approach

The applicant has informed TNEI that in addition to the already considered Swansea GGP development, there are a number of operational or proposed renewable energy/electrical infrastructure schemes within the area surrounding the Proposed Development that may require cumulative consideration within our assessment. Table 3 summarises the developments that we intend to include within our assessment that have been identified near to the Proposed Development.

Table 3: Neighbouring Schemes to the Proposed Development

Neighbouring Scheme	Swansea Council Planning Reference Number	Planning Status
Swansea Greener Grid Park (GGP)	2023/0889/FUL	Consented
Swansea North 400 kV Substation	2008/1685	Operational
Afon Llan Solar Park	2020/0257/FUL	Operational
Cefn Betingau Solar Park	2013/0865	Operational
Brynwhilach Solar Park	2014/1022	Operational

Our cumulative assessment will consider the likely cumulative noise levels from the operation of all of the above developments, **but only in instances where the requisite noise assessment**

report/information is publicly available to allow us to do so[1]. Where developments have either no associated noise impact assessment (or are not publicly available) or are at such an early stage that this has not yet been considered, we cannot reasonably include this within the assessment and will therefore be scoped out.

For the cumulative schemes that can be included within the assessment, TNEI will seek to demonstrate that the cumulative noise level from all schemes will either not exceed the target noise levels proposed at each NSR, or in instances where cumulative schemes are already exceeding the target noise levels (if applicable), demonstrate that the site-specific noise levels from the Proposed Development will be at least 10 dB below the cumulative noise level of the neighbouring developments therefore contributing a negligible amount to the cumulative level. For clarity, whilst we do agree that the investigation of likely cumulative noise effects is an important consideration, **TNEI do not believe that a cumulative noise condition is appropriate** and would expect that any noise limits that are imposed upon the Proposed Development should it be granted consent would be site specific only.

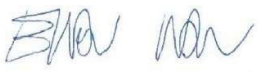
Summary

We hope the above provides you with requisite information to allow us to agree upon an appropriate noise impact assessment methodology and progress with the assessment in due course. Specifically, we would request feedback on the following:

- Do you agree with the use and application of BS 4142?
- Do you agree with the target BS 4142 Rating Levels set out in Table 2?
- Can you confirm that you are happy with the list of identified cumulative schemes and provide details of any other schemes that you want to be considered?

We would welcome any additional feedback you may have on the above, particularly with regards to the adoption of the extant noise level limits and proposed cumulative approach. If you feel that a call would be beneficial to discuss matters further, please do not hesitate to get in touch and we can look to arrange this.

Yours sincerely,



Ewan Watson

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Principal Consultant

TNEI Services Ltd

[1] This builds on the assumption that if a noise assessment was not submitted with the planning application, then SC were satisfied that noise emissions were negligible and therefore did not require an assessment.

Document Control

Revision	Status	Prepared by	Checked by	Approved by	Date
R0	FINAL ISSUE	EW	JM	JM	17/01/2025
R1	CLIENT COMMENTS	EW	JM	JM	23/01/2025

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Appendix D – Noise Modelling Data

Doc. Name	Noise Data Sheet		
Doc. ID		**Revision**	g
Doc. Type	Data Sheet	**Pages**	1 (1)
Author	Agbenyoh, Godwin - Wärtsilä Energy Business	**Status**	Approved
Reviewed by **Approved by**			

Noise Data Sheet Gridsolv Quantum

1. Envicool Chiller (2 units per Gridsolv Quantum)

Model number : EMW75HDNC1A

A-weighted sound power level of the chiller, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
A-weighted sound power level $L_{w,A}$ [dB]	40	56	70	70	68	63	60	51	47	**74**

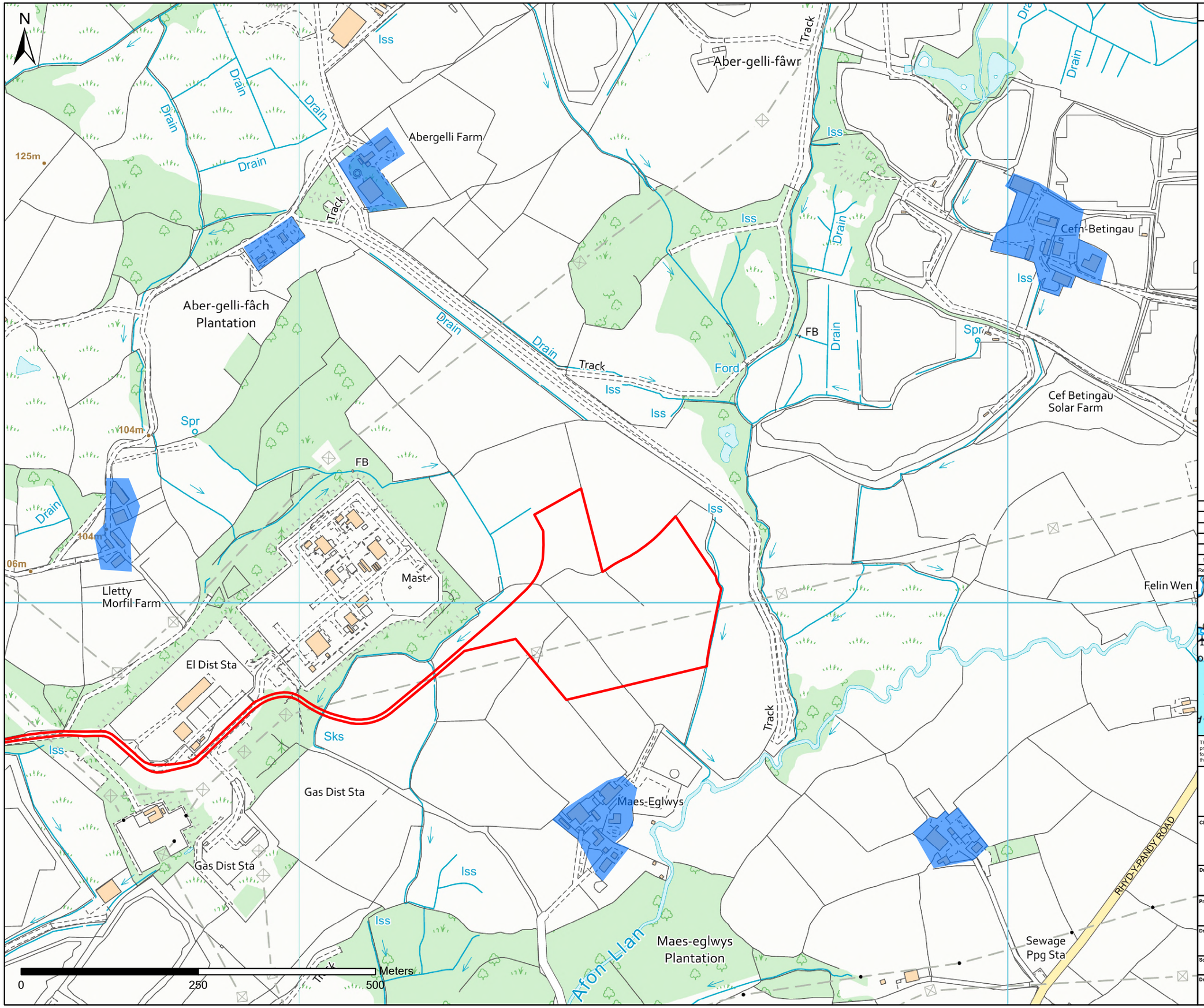
Sound power level is based on measurement made according to standard ISO 3744:2010 Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane.

Each Gridsolv Quantum has two Envicool chiller units on either side. The noise data is given for the single Envicool chiller unit.

Figure 1 Gridsolv quantum

Figure 2 Single Envicool chiller unit

Appendix E – Figures



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LEGEND

- Red Line Boundary
- Nearest Noise Sensitive Receptors (NSRs)

Rev.	Date	Amendment Details	Drawn	Approved
1	10/02/2025	FOR PLANNING	KB	EW

tnei

Client: Statkraft

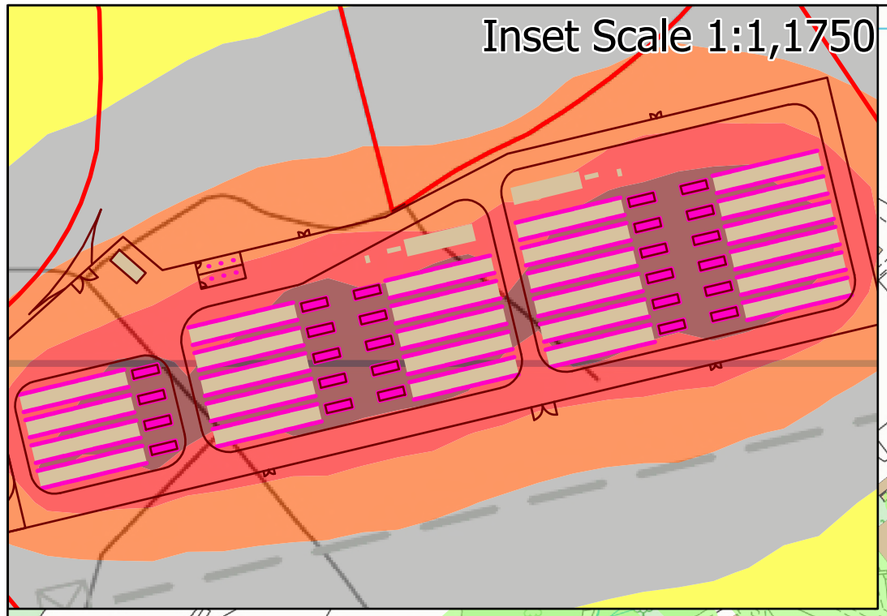
Drawing Status: FOR PLANNING

Project Title: SWANSEA BESS

Drawing Title: FIGURE 01 - NOISE STUDY AREA

Scale:	Original Size:	Spatial Reference:
1:5,000	A3	British National Grid

Drawing Number: 17098-004



NAL01
NAL02
NAL03
NAL04
NAL05
NAL06
Abergelli Farm
Aber-gelli-fâwr
Aber-gelli-fâch Plantation
Lletty Morfil Farm
El Dist Sta
Gas Dist Sta
Mast
Track
Drain
Iss
Spr
FB
Ford
35
40
45
50
104m
106m
108m
0
250
500
Meters

LEGEND

- Red Line Boundary
- Site Layout
- Noise Assessment Locations (NALs)
- Modelled Noise Sources
- Modelled Buildings

Predicted Noise Levels (dBA)

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

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 assumed to be operating concurrently.

All levels shown as dB LAeq(t).

Rev.	Date	Amendment Details	Drawn	Approved
2	10/02/2025	FOR PLANNING	KB	EW

tnei

Client: Statkraft

Drawing Status: FOR PLANNING

Project Title: SWANSEA BESS

Drawing Title: FIGURE 02 - NOISE CONTOUR PLOT

Scale:	Original Size:	Spatial Reference:
1:5,000	A3	British National Grid

Drawing Number: 17098-005

Appendix F – Cumulative Assessment Tables

Table F-1: Daytime Cumulative BS 4142 Assessment

Noise Assessment Location (NAL)			A)Proposed Development Rating Level, dBA (by TNEI)	B)-Swansea Greener Grid Park (GGP)Rating Level, dBA	C) Swansea North 400 kV Substation Rating Level, dBA	A+B+C) Predicted Cumulative Rating Level, dBA (by TNEI)	Target Rating Level Limit, dBA	Margin between Predicted Cumulative and Target Rating Level, dB
Swansea BESS	Equivalent Swansea Greener Grid Park (GGP)	Equivalent Swansea North 400 kV Substation						
NAL01 - Abergelli Farm	*N/A	*N/A	32	*N/A	*N/A	32	40	-8
NAL02 - Abergelli (New Build)	ESR1 - Abergelli New Build	*N/A	32	32	*N/A	35	42	-7
NAL03 - Lletty'r Morfil Farm	ESR3 - Lletty'r Morfil Farm	Lletty'r Morfil	35	32	24	37	43	-6
NAL04 - Maes-eglwys	ESR2 - Maes-eglwys	Maes-eglwys	39	32	30	40	40	0
NAL05 - Rhyd-y-Pandy Road	*N/A	*N/A	34	*N/A	*N/A	34	40	-6
NAL06 - Cefn Betingau	*N/A	*N/A	33	*N/A	*N/A	33	40	-7

*Noise Rating Levels were not predicted (or presented) at these locations within equivalent NIAs.

Table F-2: Night-time Cumulative BS 4142 Assessment

Noise Assessment Location (NAL)			A)Proposed Development Rating Level, dBA (by TNEI)	B)-Swansea Greener Grid Park (GGP)Rating Level, dBA	C) Swansea North 400 kV Substation Rating Level, dBA	A+B+C) Predicted Cumulative Rating Level, dBA (by TNEI)	Target Rating Level Limit, dBA	Margin between Predicted Cumulative and Target Rating Level, dB
Swansea BESS	Equivalent Swansea Greener Grid Park (GGP)	Equivalent Swansea North 400 kV Substation						
NAL01 - Abergelli Farm	*N/A	*N/A	32	*N/A	*N/A	32	37	-5
NAL02 - Abergelli (New Build)	ESR1 - Abergelli New Build	*N/A	32	32	*N/A	35	41	-6
NAL03 - Lletty'r Morfil Farm	ESR3 - Lletty'r Morfil Farm	Lletty'r Morfil	35	32	24	37	38	-1
NAL04 - Maes-eglwys	ESR2 - Maes-eglwys	Maes-eglwys	39	32	30	40	40	0
NAL05 - Rhyd-y-Pandy Road	*N/A	*N/A	34	*N/A	*N/A	34	37	-3
NAL06 - Cefn Betingau	*N/A	*N/A	33	*N/A	*N/A	33	37	-4
*Noise Rating Levels were not predicted (or presented) at these locations within equivalent NIAs.								