'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		Background, dB L_{A90} (15 mins)	Margin, dB	Background, dB L_{A90} (15 mins)	Margin, dB
NAL01	Culcraggie Lodge	33	36	-3	27	6
NAL02	Clashnabuiac	31	36	-5	27	4
NAL03	Deer Park Cottages	25	36	-11	27	-2
NAL04	Dairy Bungalow	27	36	-9	27	0
NAL05	Fyrish House	25	32	-7	25	0

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 below the representative background sound levels at NAL03, NAL04 and NAL05, which *"…is an indication of the specific sound source having a low impact, depending on the context."*
- At NAL01 during the night-time, the Rating Level is 4 dB above the representative background sound level which is just below the level that is *"likely to be an indication of adverse impact, depending on the context".*
- At NAL02 during the night-time, the Rating Level is 6 dB above the representative background sound level which is just above 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 state:

"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 BS4142 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 $L_{Ar,Tr}$".

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 *"low"* during the daytime at some NALs and *"very low"* during the night-time at all NALs. 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 01 and 02, where relatively low Rating Levels of 33 dB and 31 dB exceeds the very low background sound level of 27 dBA by 6 dB and 4 dB respectively. As such, at night-time the absolute sound levels

are considered more relevant than the initial estimate findings which only compares the Rating Level with the representative background sound level.

Precedent has been set for the consideration of absolute sound levels by THC in the past for BESS developments in instances where background sound levels are deemed to be very low. In 2024, TNEI undertook a NIA [1] in support of the planning application for the proposed Knocknagael BESS development near Inverness (THC planning reference 24/05097/S36). As part of the assessment, the baseline sound level survey resulted in a very low night-time background sound level value of 23 dBA. THC agreed that an assessment of the margin against background was not wholly appropriate and ultimately considered the absolute value of the Rating Levels, which were up to 7 dB above background during the night-time, to be acceptable.

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

The character of the residual sound is fairly consistent at all NMLs, and sound levels are influenced mostly by wind induced noise with small contribution from intermittent sound sources such as passing road traffic, industrial/farming activity and birdsong. The Proposed Development is not anticipated to have distinguishing character features and is considered 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 all NMLs, ranging from 24 – 60 dB $L_{Aeq\ (15\ mins)}$. At NMLs 03 and 04 (which represent NALs 02 and 01), the mean residual sound level values during the night-time are around 33dB to 34 dB therefore at the same levels as the Specific Levels which do not exceed 33dB. When adding the specific sound levels to the median ambient levels at NAL01 (where predictions are the highest), this would give an ambient sound level of 36. 5 dB(A) (33 dB + 34 dB), an increase in overall sound level of 2.5 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 described as just or barely 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 Rated 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.

[1] TNEI Document reference 16292-005-R1, dated 27th June 2024

6.4 BS 4142 Assessment Conclusion

The Stage 1- Initial estimate predicted that depending on the context there could be a low impact at most receptors in both daytime in night-time and that there could be an adverse impact at night at NAL1 and NAL2. 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.**

6.5 Consideration of Noise Levels at 100 Hz

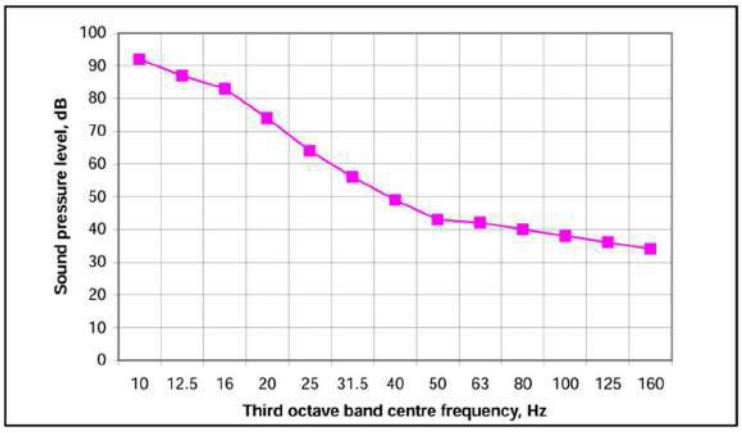
With due regard to the EHO concern regarding the operational noise level specifically within the 100 Hz frequency band, in addition to the consideration of tonality in accordance with BS 4142 (as above), it is helpful to look at the absolute level of the noise predicted within this frequency band, and the DEFRA approved study by Salford University; *'NAN-R-45 Procedure for the assessment of low frequency noise complaints'* [8] is helpful in this regard.

NAN-R-45 presents guidance with the aim of developing a method for the assessment of low frequency noise for use by Environmental Health practitioners in the UK. It provides a criterion curve to aid such an assessment, suggesting that if any particular frequency exceeds the curve this may indicate a source of low frequency noise that could cause disturbance.

The dB levels that define the curve are for noise levels measured inside a dwelling. This is reproduced as Figure 6-1 below.

Figure 6-1: NAN-R-45 Assessment Criterion Curve

Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB, Leq	92	87	83	74	64	56	49	43	42	40	38	36	34



At 100 Hz, the internal NAN-R-45 criterion curve level is 38 dBZ. Appendix G presents the external calculated one third octave band noise levels at the NALs to provide an indicative comparison. The maximum external predicted noise level attributable to the Proposed Development within the 100 Hz band has been calculated as 27 dBZ (at NAL02, as shown in Appendix G) which is below the internal NAN-R-45 criteria of 38 dBZ. As such, the internal level will be considerably below the 100 Hz NAN-R-45 criteria and as such it is considered highly unlikely that noise levels from the Proposed Development within the 100 Hz frequency band will cause any disturbance to residents.

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. The noise model includes mitigation measures in the form of acoustic fencing and landscaping bunds.

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 most receptors in both daytime in night-time and that there could be an adverse impact at night at two receptors (NAL1 and NAL2). 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.

Additionally, operational noise from the Proposed Development is also not expected to have any tonal characteristics present in any frequency band when incident at the receptors and the absolute level of sound predicted within the 100 Hz frequency band is considerably below the NAN-R-45 internal criteria curve at 100 Hz.

As such, the Proposed Development is expected to have a low noise impact at all nearby receptors, with appropriate mitigation in place.

Should the Scottish Ministers decide to grant consent to the Proposed Development, TNEI would welcome continued consultation with both THC and the Energy Consents Unit to help draft an appropriate set of planning conditions relating to operational noise, prior to a decision notice being issued. Based upon the details presented within this NIA report, we would likely propose the adoption of limits which fully consider the context as requested by BS 4142.

8 References

1. **The Scottish Government.** *PAN 1/2011 Planning and Noise.* Scotland : The Crown, 2011.

2. —. *Technical Advice Note (TAN) 'Assessment of Noise'.* Scotland : The Crown, 2011.

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.

7. **Commission Electrotechnique Internationale (IEC).** *Electroacoustics - Sound level meters - Part 1: Specifications.* Geneva : IEC, 2013. IEC 61672-1:2013.

8. **University of Salford, Manchester.** *Procedure for the assessment of low frequency noise disturbance.* s.l. : DEFRA, 2011.

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

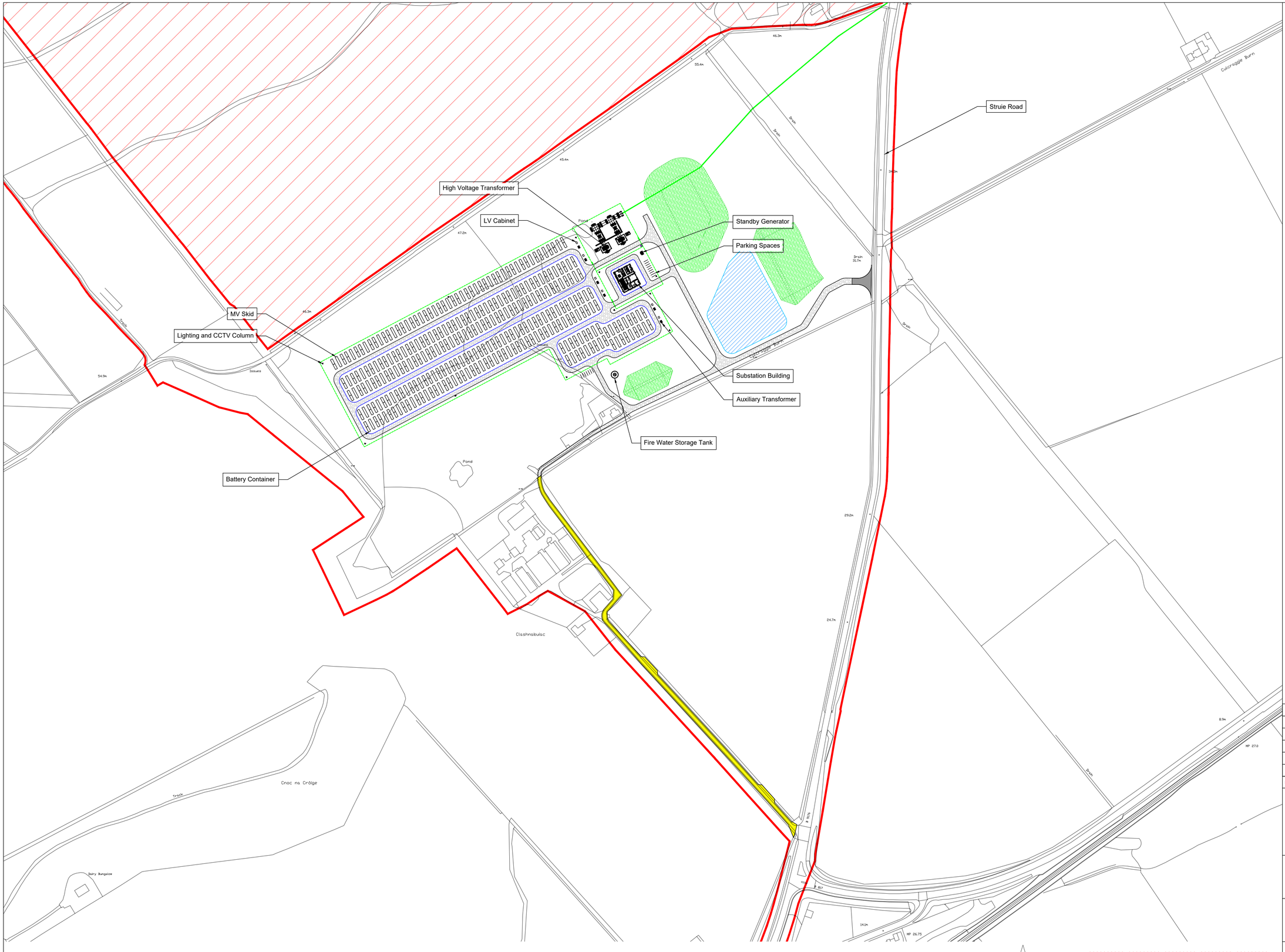
L_{90}: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The LA90,10min is the A-weighted background sound level over a ten-minute measurement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



1 Site Layout Plan
Scale 1:2000 @ A1

Drawing Notes:

1. All dimensions are shown in metres unless noted otherwise.
2. Do not scale from this drawing.

Legend:

- Planning Boundary
- Not In Application Boundary
- Indicative Cable Route
- Fencing
- Access Route - Existing
- Site Access Road - Unbound Finish
- Site Access Road - Asphalt Finish
- Indicative 4m Bund
- Attenuation Area

REV	DATE	DESCRIPTION	BY	CHK'D
4	09/01/2025	LAYOUT, ATTENUATION AREA AND BUNDING AMENDED, FIRE WATER STORAGE TANK ADDED	WL	JH
3	17/09/2024	BESS EQUIPMENT AMENDED, LAYOUT ADJUSTED TO SUIT	WL	JH
2	19/12/2023	OPTION AREA AMENDED AND TEMPORARY CONSTRUCTION COMPOUND ADDED	WL	JB
1	11/10/2023	POSITION OF SITE AMENDED	WL	JB
0	30/08/2023	SITE LAYOUT PLAN - CONCEPT - ORIGINAL	WL	JB

1:100	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m
1:200			5m		10m		15m			20m
1:250		5m		10m		15m		20m		25m
1:500		10m		20m		30m		40m		50m
1:1000	10m	20m	30m	40m	50m	60m	70m	80m	90m	100m
1:2000		50m		100m		150m		200m		
1:2500		50m		100m		150m		200m		250m
1:5000		100m		200m		300m		400m		500m

Field
Fora - Montacute Yards
186 Shoreditch High Street
London
E1 6HU

PROJECT: FYRISH

TITLE: SITE LAYOUT PLAN

DISCIPLINE: PLANNING

DRAWING STATUS: FOR PLANNING

SCALE	DATE	DRAWN BY	CHECKED BY	APPROVED BY
1:2000 @A1	30/08/2023	WL	JH	JB

PROJECT NO.	DRAWING NO.	REV.
BTGBFYR01	001.1	4

Appendix C – EHO Consultation Data

Fyrish Battery Energy Storage System (BESS): Noise Impact Assessment

To:	[redacted]	Planning Authority:	The Highland Council
Address:	By Email	TNEI Ref.:	16819-001-R0
Date:	25 July, 2024		

Dear [redacted]

TNEI Services Ltd (TNEI) have been commissioned by Field Energy to undertake a Noise Impact Assessment to support the planning application for a Battery Energy Storage System (BESS) development located in near to Alness in the Scottish Highlands, at approximate OS coordinates, 262846, 869443. The Proposed Development will introduce new sound sources into the area in the form of externally located battery banks, inverters and transformers.

Figure 1 (appended) details an indicative red line boundary and the nearest identified Noise Sensitive Receptors (NSRs), which are residential properties located to the northeast, southeast and southwest of the Proposed Development.

Proposed Assessment Method

TNEI propose to undertake an assessment in line with BS 4142:2014+A1-2019 Methods for Rating and Assessing Industrial and Commercial Sound (BS 4142), however, we recognise there are a number of alternative methods of assessment available, such as the use of fixed guideline levels e.g. BS 8233:2014 or Noise Rating (NR) curves. Accordingly, if you would like us to consider any alternative approaches, then please advise and we would be happy to incorporate this into our assessment.

Proposed Baseline Survey

To inform the BS 4142 assessment, TNEI will be undertaking a baseline sound level survey, which we anticipate will be commencing in early August 2024. If you would like to comment on the survey requirements, then it would be much appreciated if you could come back to us as soon as possible.

It is anticipated that the survey will be undertaken at three locations, shown on the appended Figure 1. The NML's have been coloured to match the NSR's that they will represent e.g. the data measured at within the yellow NML boundary will be representative of all NSR's marked yellow. The assessment will consider the closest NSRs only, on the assumption that if noise is within acceptable levels at these locations, it will also be acceptable at more distant receptors. We have marked areas, rather than points, which represent the

approximate area that the Sound Level Meter (SLM) will be installed in. Exact monitoring locations will be determined during the site visit.

Continuous unattended monitoring will be undertaken for a period of at least 7 days and the noise levels will be logged in 15-minute intervals. We will install a rain gauge and a small wind speed monitor at one of the NMLs and all data measured during periods of precipitation and high wind speeds will be removed from the dataset.

A representative background sound level will be determined for each NML following the guidance presented in both BS 4142 and the Association of Noise Consultants' (ANC) BS 4142 Technical Note. Where background sound levels are determined to be very low i.e. below 30 dB $L_{A90(t)}$, and predicted Rating levels are also likely to be low (less than 35 dB $L_{Aeq(t)}$) then we may propose to undertake the assessment against an absolute limit, as opposed to against the background sound level, as detailed within the ANC document. Should this be the case, we will write to you beforehand to discuss these details further.

Summary

We hope the above provides you with a clear explanation as to the approach that we intend to adopt for this assessment. We would be very grateful if you could confirm your acceptance of this approach, or otherwise. If there is any aspect of the proposed survey or assessment method you would like to discuss in more detail, or if you would like further information with regards to the nature of the development, then please do not hesitate to get in touch.

Yours sincerely,

[redacted]

Principal Consultant

TNEI Services Ltd

[redacted]

Document Control

Revision	Status	Prepared by	Checked by	Approved by	Date
R0	FIRST ISSUE	EH	EW	EW	25/07/2024

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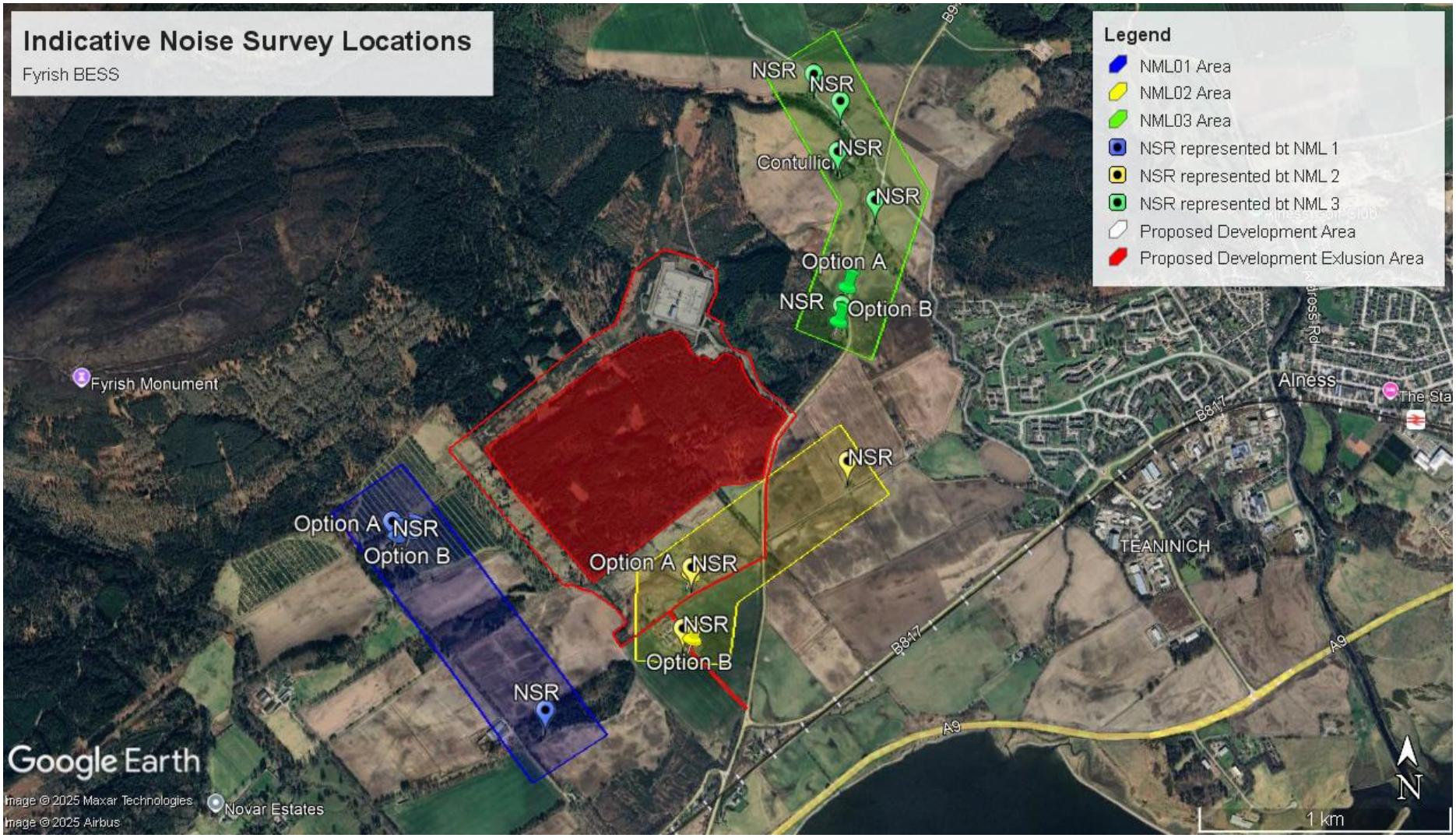
Cape Town7530
South Africa,
Tel: +27 (0)72 855 6999

Appended: Figure 1 - NIA Study Area



Reproduced under Google Earth Pro License 2024

[redacted]

From: [redacted]
Sent: 05 August 2024 16:18
To: [redacted]
Cc: [redacted]

Subject: RE: Fyrish BESS Development - Noise Impact Assessment Methodology

Hi [redacted]

Thank you for your feedback, and noted regarding each assessment being considered on its own merit – we will likely revisit this once the baseline survey has been undertaken.

In the meantime, please let me know if either yourself or your colleagues [redacted] have any immediate feedback with regards to our suggested monitoring locations for the survey. Otherwise, we will be looking to attend site asap.

Kind regards,

[redacted]

tnei

[redacted]

From: [redacted]
Sent: Monday, August 5, 2024 3:34 PM
To: [redacted]
Subject: RE: Fyrish BESS Development - Noise Impact Assessment Methodology

Hi [redacted] apologies for the delay in getting back to you. From our previous discussions I think you will have a good idea of our preferred methodology and criteria. I understand the arguments for set levels, where both background and specific noise levels are deemed to be low but where feasible we will try to stick to a policy of not exceeding existing background levels. In Highlands, a background below 30dB would not be considered as very low, in rural areas that's pretty much average. Saying that, each case has to be looked at on its own merits in determining context.

It's not my area so I'm not sure if I'll be dealing with the application but happy to discuss anything in the meantime.

[redacted]

From: [redacted]
Sent: Monday, July 29, 2024 12:31 PM
[redacted]
Subject: Fyrish BESS Development - Noise Impact Assessment Methodology

Good Afternoon [redacted]

Hope you are well.

TNEI have been commissioned to undertake a Noise Impact Assessment in support of the proposed Fyrish Battery Energy Storage System (BESS) development, near to Alness, Highlands.

Please find attached a letter delineating our proposed NIA methodology and proposed baseline noise survey locations. Although exact dates are yet to be finalised, we are planning to visit site to install the noise monitoring equipment some time in August, so we would invite your feedback regarding the attached as soon as possible.

I suspect that we may be in a similar situation with regards to low background sound levels (as we were at Knocknagael) so there may be some crossover in terms of a similar approach to this site's assessment, but we can address that in more detail when required. In the meantime, if there are any other site-specific assessment criteria that may apply particularly to this site, please let us know. If you have any queries on the attached, I am happy to try and address them.

Kind regards,

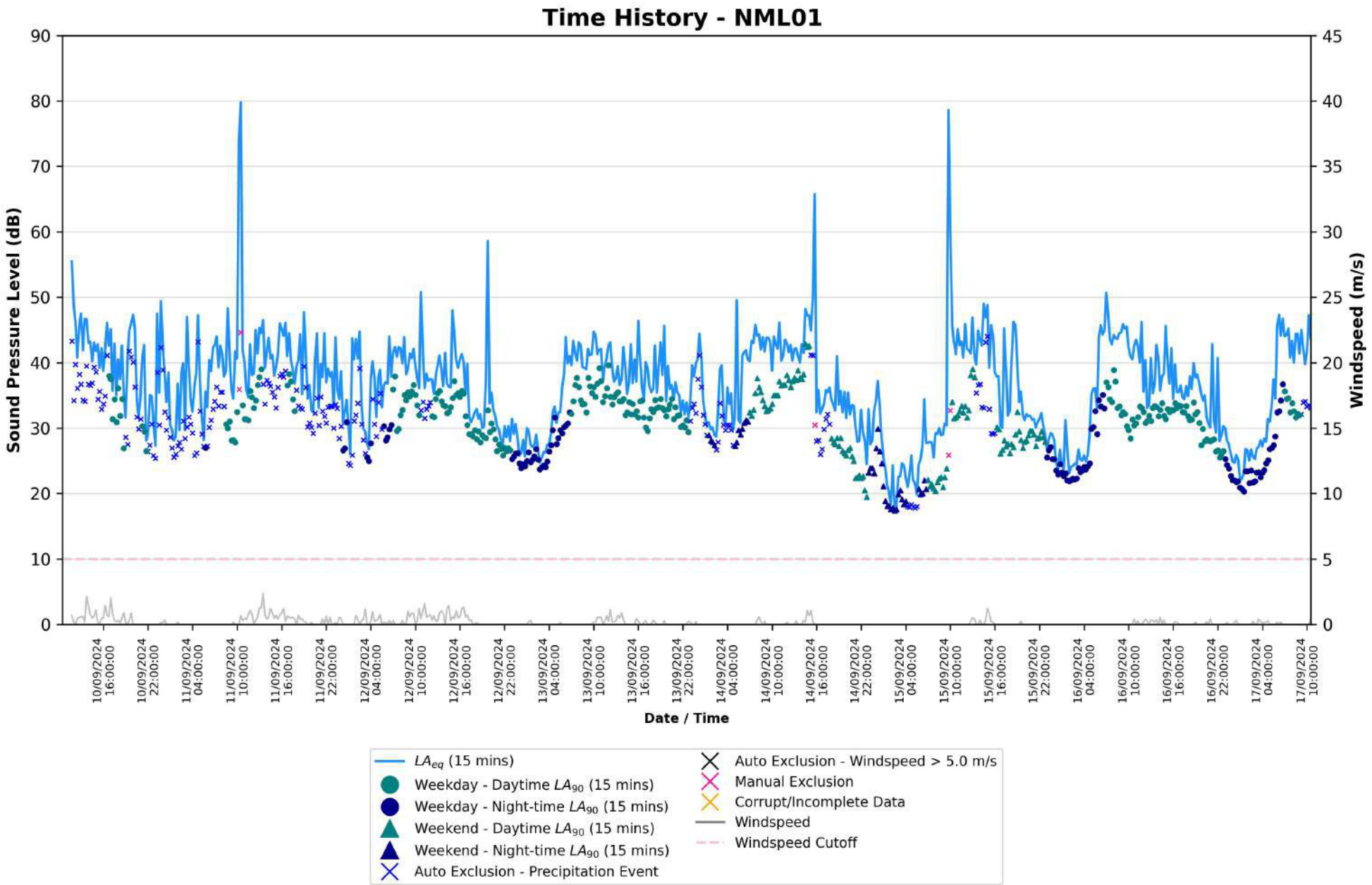
[redacted]

tnei [redacted]

7th Floor, 80 St Vincent Street, Glasgow, G2 5UB, United Kingdom

Appendix D – Baseline Survey Data

16819 - Fyrish BESS - Measured Sound Levels:



16819 - Fyrish BESS - Measured Sound Levels: