Field

BEAULY BESS 100 MW

Noise Impact Assessment Report

DECEMBER 2024

PUBLIC

Field

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Noise Impact Assessment Report

ACOUSTIC REPORT (FIRST ISSUE) PUBLIC

PROJECT NO. 70124421

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APPENDICES

1 INTRODUCTION

1.1 OVERVIEW

WSP has been appointed by Field Beauly Ltd to undertake a noise assessment to support the planning application for a new 100 MW battery energy storage system (BESS) with associated infrastructure, access and ancillary works (including landscaping and biodiversity enhancement) at Dunballoch Farm, Beauly, IV4 7AY.

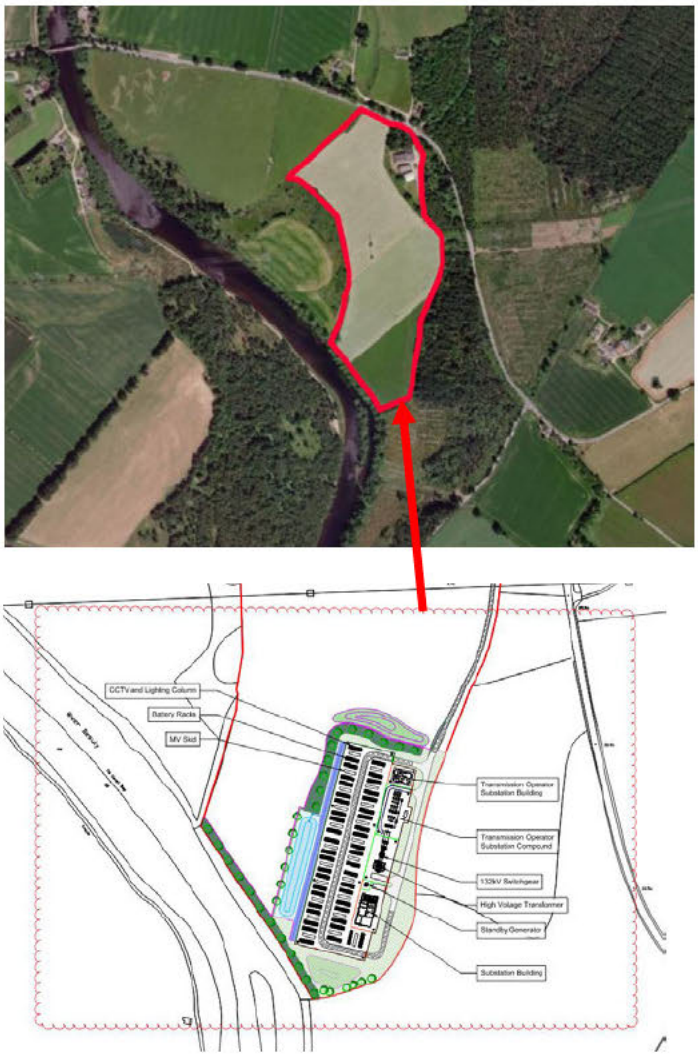
A summary of technical terminology used in this report can be found in Appendix A. The limitations of the report can be found in Appendix D.

1.2 SITE LOCATION

The site is located within the administrative boundary of The Highland Council (THC), between the river Beauly and roads A862 and A833. The surrounding area generally comprises fields, forest, residential properties, and farms. The proposed site currently comprises grazing farmland.

The location of the site and the currently proposed site layout are shown in Figure 1.

Figure 1 - The proposed site and surroundings



There are a number of buildings near to the site, some being residential properties. The nearest noise sensitive properties to the site are indicated in Figure 2 and identified in Table 1.

They include a residential property on the west side of the River Beauly, a holiday park to the north-west, and detached residential properties to the south-east and north. A holiday home development has received consent on the land to the immediate south-east.

Table 1 – Noise sensitive receptors

Receptors	Coordinates (British National Grid)	
	X (Easting)	Y (Northing)
Dunballoch	252310	844883
Dunballoch cottages	252476	844906
Elmdubh	252514	844759

Phoineas View	252919	844186
Ballindoun Lodge	252793	843940
Holiday Park (consented, not built)	252437	843906
The Willows	251659	844601
Beauly Holiday Park	251751	845157
Fishing Lodge	252252	843979

Figure 2 – Locations of noise sensitive receptors

2 GUIDANCE AND CRITERIA

2.1 LOCAL AUTHORITY REQUIREMENTS

WSP has consulted with THC and they have stated the proposed site should demonstrate it will meet the following criteria:

- *"The noise when measured and/or calculated as an $L_{Zeq,5min}$ in the 100 Hz one third octave frequency band must not exceed 30 dB, at the curtilage of any noise sensitive premises; and*
- *The Rating Level must not exceed the current background noise levels at the curtilage of noise sensitive premises. The Rating Level should be calculated in accordance with BS 4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound."*

They have also stated that:

"*NR20 might be used as a design standard where there is no garden or other external amenity at the noise sensitive receptor, or where background levels are very high (> 40 dB). However, I understand that the existing background sound level in the vicinity of the site is relatively low.*

I would advise that there would not be any relaxation of the above noise standards for any properties with a financial involvement with the development.

Finally, the expectation is that the noise assessments are based on 100% operational capacity unless there is something from the manufacturer which demonstrates that a lower capacity and lower sound power level would be appropriate. Ideally, it would be useful if the units can be physically restricted to whatever lower capacity is adopted."

WSP has suggested to THC to update the limit of 30 dB $L_{Zeq,5min}$ in the 100 Hz one third octave band frequency to read:

"The L_{Zeq} 100 Hz must not exceed a level of 5 dB below the measured $L_{Zeq,5min}$ 100 Hz as it would still provide assurance to local authority that the resulting noise levels would not be tonal and there would be no significant change in the prevailing conditions for the 100 Hz band."

WSP has also consulted whether the proposed broadband limit of a rating level not greater than the background noise level can be updated such that it also accounts for context as required by BS 4142 as follows:

"The absolute noise levels will be taken into account as a contextual consideration in accordance with BS 4142."

THC's response stated:

"In respect to the limit of 30dB L_{Zeq} 100Hz, provided that it can be demonstrate the BESS does not have any significant tonal element at 100Hz, our Service would accept with your suggested criteria of "The L_{Zeq} 100Hz must not exceed a level of 5dB below the measured $L_{Zeq,5mins}$ 100Hz"

In respect to the broadband criteria, I appreciate that this is quite an onerous standard, but it is the criteria our Service applies to all BESS. Whilst BS4142 does allow for context to be considered and for the consideration of a fixed limit for areas of very low background, it does not state how initial estimate of impact should be adjusted when background and rating levels are low. Our Service would not agree to the suggested criteria of "Rating Level must not exceed the current background noise levels or must be less than 35dB $L_{Ar,Tr}$"

However, as the BS 4142 assessment will consider contextual matters, our Service will take this into consideration and may agree noise level above background noise level, if it is considered appropriate in the circumstances."

2.2 BRITISH STANDARD 4142:2014+A1:2019 'METHOD FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND' (BS 4142)

BS 4142:2014+A1:2019[1] provides methods for rating and assessing sound arising from commercial sources, including external plant and on-site vehicle movements, and unloading, at residential receptors. It uses a relative assessment approach whereby the predicted commercial sound level (suitably penalised for annoyance character if appropriate) is compared with the prevailing background sound level. A summary of the BS 4142 approach is set out as follows:

- Establish the specific sound level of the source(s).
- Measure the representative background sound level.
- Correct the specific sound level for on-time and interferences if necessary.
- Rate the specific sound level to account for distinguishing characteristics.
- Estimate the impact by subtracting the background sound level from the rating level.
- Consider the initial impact estimate in the context of the sound and its environs.

The representative background sound level should be established from data measured at the receptor locations.

The specific sound level is rated using the following penalties:

- Tonality up to 6 dB
- Impulsivity up to 9 dB
- Other sound characteristics up to 3 dB
- Intermittency 3 dB

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level as described in section 11 of BS 4142. The results of this comparison are assessed based on the following:

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 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.

[1] BS 4142:2014 +A1:2019 *Methods for rating and assessing industrial and commercial sound*, British Standards Institute

All pertinent contextual factors should then be considered, and these include:

- The absolute level of the sound.
- The character and level of the residual sound compared to the character and level of the specific sound.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

3 SOUND LEVEL SURVEY

3.1 METHODOLOGY

To determine the existing environmental sound levels at the site, a baseline survey was undertaken between approximately 17:00 Tuesday 7th and 10:00 Wednesday 15th May 2024.

During the survey, consecutive 1-second measurements were sampled and recorded, to allow post-processing of L_{Aeq}, $L_{Amax,Fast}$ and L_{A90} parameters for any required period.

3.2 WEATHER

At the time of installation, there was no rain, cloud cover was 30%, the temperature was 14°C and wind speed was between 0 and 2.7 m/s. At collection, conditions were dry, cloud cover was 10%, temperature was 20°C, and the wind was still.

3.3 MEASUREMENT POSITIONS

A sound level meter was installed at measurement position 1 (MP1), just beyond the north site boundary, on the north side of the A862. This position was selected to be representative of the sound levels occurring at the three houses identified to the immediate north of the site. The microphone was installed on a tripod at a height of 1.6 m, in free-field conditions.

A second sound level meter was installed at MP2, in the south part of the site. This location was selected to be representative of the background sound levels experienced at existing receptors at the east, the consented holiday park to the south and the fishing lodge to the south-west. The sound level meter was installed at a height approx. 2.5 m so that the microphone was above an existing wall, in free-field conditions.

A third sound level meter was installed at MP3. This position was selected to be representative of the background levels experienced by existing residential properties to the west and north of the site. The microphone was installed on a tripod at a height of 1.6 m, in free-field conditions. Figure 3 shows the locations of the monitoring positions.

Figure 3 – Locations of the monitoring positions

3.4 EXISTING SOUND ENVIRONMENT

Road traffic noise from the A862 was noted to be the dominant source at MP1, in addition to noise from sheep, lambs, birds and rustling of foliage.

Construction site noise was noted from the property near to MP1, and audible noise was noted during the on-site attendance. A small stream next to the meter was not noted to be audible, due to a very low flow.

Sound at MP2 was dominated by road traffic noise from A862. Birdsong and rustling of foliage were also audible throughout the attendance.

Sound at MP3 was dominated by road traffic noise from A862. Running water from the river Beauly was audible, probably dominating the night-time noise level. During collection of the monitoring equipment, sound was noted from ducks on a nearby pond, occasionally flapping their wings and splashing slightly.

3.5 EQUIPMENT

The monitoring was completed using the type 1 specification sound level monitoring equipment detailed in Table 2.

Table 2 – Sound level monitoring equipment

Location	Equipment	Make and Model	Serial Number	Calibration Due Date
MP1	Sound level meter	Rion NL52	00242744	07 September 2024
	Pre-amplifier	H25	32772	
	Microphone	Condenser	06229	
	Calibrator	Rion NC-74	34246512	16 August 2024
MP2	Sound level meter	Rion NL52	00510145	09 October 2025
	Pre-amplifier	H25	10138	
	Microphone	Condenser	02850	
	Calibrator	Rion NC-74	34615220	16 August 2024
MP3	Sound level meter	01dB-METRAVIB Black Solo	65806	22 September 2024
	Pre-amplifier	01dB-Metravib PRE 21 S	16461	
	Microphone	01dB Metravib MCE 212	166412	
	Calibrator	01dB-Stell Cal 21	34323904	28 September 2024

3.6 MEASUREMENT RESULTS

Table below summarises the sound level measurement results from the survey that are relevant to the noise impact assessment. The full survey results are presented in Appendix B. The background $L_{A90,T}$ sound levels presented in Table 3 below have been determined using a range of statistical methods comprising three averages and interpretation of the distribution of values presented in the histograms in Appendix B.

Table 3 – Summary of survey results

Method	MP1		MP2		MP3	
	Day	Night	Day	Night	Day	Night
Mean	37	27	37	33	37	34
Mode	38	20	37	29	37	32
Median	38	27	37	32	37	34
From histogram	38	N/A*	36	N/A*	37	32
Selected typical value	**38**	**27**	**37**	**32**	**37**	**32**

*Histogram shape is inconclusive

3.7 NOISE LIMITS

The noise limits at the receptors identified are proposed below based on the results from the nearest sound level measurement position.

Table 4 – Plant noise limits

Receptor	Representative measurement position	Daytime criterion, dB $L_{Ar,1hr}$	Night-time criterion, dB $L_{Ar,15min}$
Dunballoch	MP1	38	27
Dunballoch cottages	MP1	38	27
Elmdubh	MP1	38	27
Phoineas View	MP2	37	32
Ballindoun Lodge	MP1[1]	38	27
Holiday park (consented, not built)	MP2	37	32
The Willows	MP3	37	32
Fishing Lodge	MP2	37	32

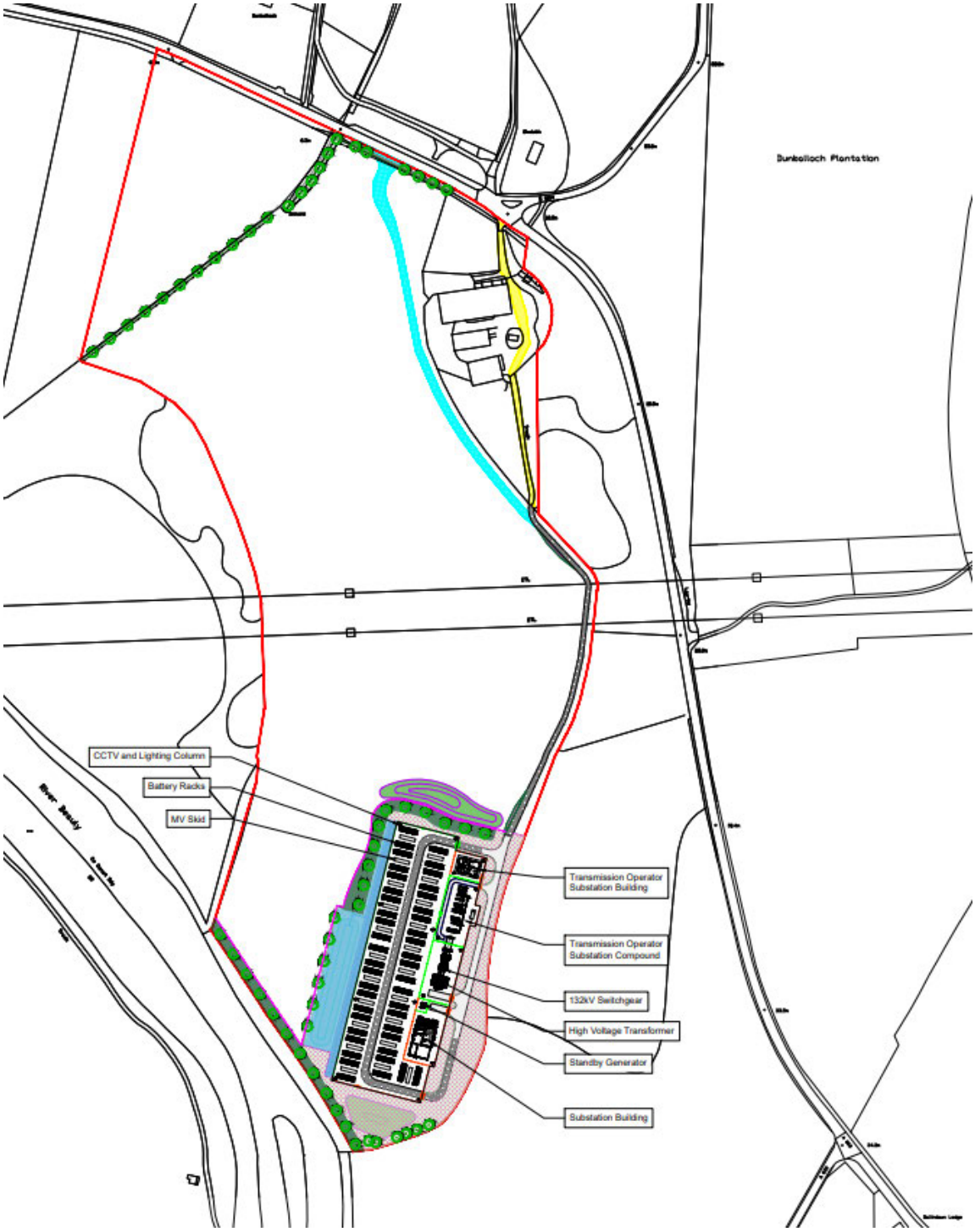
[1] Although MP2 is geographically closer to the receptor, MP1 is considered to be more representative due to being a similar distance from the A862.

4 NOISE IMPACT ASSESSMENT

4.1 SITE LAYOUT

The site layout is shown in Figure 4 on the latest site plan drawing with reference BTGBBEA02 - 001.1 - Indicative Site Layout Plan dated 201124.

Figure 4 – Beauly site layout



4.2 NOISE SOURCES

Details of the site and equipment have been provided by Field. The development plan includes the following noise sources:

- 44 DC skids
- 22 AC skid twin inverter (PCS) and transformer units
- 1 HV grid transformer

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. Where possible, noise modelling data is shown within Appendix E, however, where data cannot be published due to confidentiality reasons, Field would be happy to discuss this data in more detail with THC, if required.

The third-octave band sound power levels of these sources have been provided by the manufacturer, and are presented in Table 5. In addition to the source noise data supplied, which has been measured in a controlled test environment, a modelling recommendation document has been provided by the Supplier (as included within Appendix E) that states the recommended operational parameters for use within the noise propagation model. These recommendations are based upon operational data obtained from a 2-hour battery scheme located within the UK.

Table 5 – Sound power levels for proposed plant

Frequency (Hz)	Sound Power Level, dB L_{wA}		
	DC skid BESS container	AC skid twin inverter and transformer (PCS)	HV Grid Transformer
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

4.3 NOISE MODEL

A 3D noise model of the Beauly site and the surrounding area has been produced using the CadnaA noise prediction software (Version 2024 MR1 (build: 205.5427), which implements the ISO 9613-2:2024 calculation methodology to predict the effects on noise propagation of geometric spreading, topography, screening, meteorological conditions, and information provided regarding the sources of noise.

A 4 m high noise barrier is included in the model around the southern and eastern boundary of the proposed site.

Details of the settings used in the model are summarised as follows:

- Default ground absorption: G = 0.8 (acoustically absorbent)
- Three orders of reflection (buildings are reflective)
- ISO 9613 (2024) propagation model
- Topography data was included in the model
- Offsite receptor locations derived from satellite imagery
- Receptors have a height of 4.0 m
- Predicted levels are free-field
- Heights of buildings are assumed to be 6.0 m
- Sound power level data are based on information received by Field, as summarised above.

A screenshot of the model is shown in Figure 5 for reference. Noise plots are presented in Appendix C.

Figure 5 – Screenshot of noise model

4.4 RESULTS

Specific sound levels from the BESS have been calculated at the nearest noise sensitive receptors shown in Table 1 using the noise model. The results presented in Table 6 below are compared against the background noise levels, representing an initial estimate of the impact in accordance with BS 4142 Clause 11. Noise prediction results are presented with and without the noise barrier on the southern and eastern boundaries of the site.

Table 6 – Noise model results

Receptor	Description	Predicted sound level, dB $L_{Aeq,T}$	
		Without noise barrier	With 4 m noise barrier
Dunballoch	Predicted dB(A)	24	24
	dB above night L_{A90}	-4	-4
Dunballoch Cottages	Predicted dB(A)	23	23
	dB above night L_{A90}	-5	-5
Elmdubh	Predicted dB(A)	25	25
	dB above night L_{A90}	-3	-3
Phoineas View	Predicted dB(A)	27	27
	dB above night L_{A90}	-5	-5
Ballindoun Lodge	Predicted dB(A)	27	27
	dB above night L_{A90}	0	0
Holiday Park	Predicted dB(A)	35	32
	dB above night L_{A90}	+3	0
The Willows	Predicted dB(A)	21	21
	dB above night L_{A90}	-11	-11
Fishing Lodge	Predicted dB(A)	32	32
	dB above night L_{A90}	0	0

4.5 ASSESSMENT

4.5.1 BS 4142 RATING CORRECTIONS

From the currently available third-octave data for the proposed plant, it is unlikely that there are any tonal characteristics. Based on experience, it is likely that any tonality would be related to the fan speed. Not all fans will operate at the same speed at the same time, so different fan speeds will therefore blur any tonality, and make it less perceptible.

BESS equipment is very unlikely to have any impulsive characteristics, as all moving parts are related to airflow and are therefore rotational.

The nature of modern plant inherently leads to varying or intermittent operation in order that the plant can respond to changes in temperature efficiently. However, these changes are usually small variations as opposed to dramatic changes from 'fully off' to 'full load' and are therefore unlikely to draw attention. Furthermore, any rating correction applied for intermittent or varying operation is normally offset by the changes to the plant's on-time. As such, it is not considered appropriate to apply any correction for intermittent operation.

On this basis, no rating corrections have been applied and the rating sound levels are considered to be the equal to the specific levels.

4.5.2 BS 4142 INITIAL ASSESSMENT RESULTS

The results of the initial estimate presented in Table 6 demonstrate that the rating levels do not exceed the background sound level when the inverters run at 30% speed and a 4 metre high acoustic barrier is included along the southern and eastern boundary of the proposed site.

The initial estimate of the BS 4142 assessment presented above has confirmed that the proposed BESS equipment in Table 5 is likely to meet the aspirations indicated by THC of rating level not exceeding background sound levels.

4.5.3 BS 4142 CONTEXTUAL CONSIDERATIONS

It is understood that THC would seek to place a noise condition that would require the $L_{Zeq,5min}$ in the 100 Hz third-octave band frequency to not exceed 30 dB at the curtilage of any noise sensitive premises.

Field has also recently discussed with THC regarding another of their BESS developments just outside of Inverness (Knocknagael) and have a previously agreed position that an alternate approach is acceptable to demonstrate no tonal characteristics were expected.

According to Annex C of BS 4142 *'Objective method for assessing the audibility of tones in sound: One-third octave method',* the level difference to identify a tone in the low-frequency one-third octave bands (25 Hz to 125 Hz) is 15 dB. Sound power levels for the proposed equipment shown in Table 5 demonstrate that there are no tonal features, as defined in Annex C of BS 4142.

However, the predicted levels at the receptors, in accordance with the sound levels at source in Table 5, demonstrate that the proposed development does not expect to produce tonal characteristics at 100 Hz in accordance with Annex C of BS 4142.

WSP understands that a similar noise limit has been set in the past by THC due to concerns regarding tonality in the 100 Hz band for electrical plant, most specifically for transformers from substations. However, in this context, where there are no tonal features at the source, this could be unduly restrictive and not appropriate for a BESS development. On the basis that the sources are not expected to be tonal, this is considered to support a finding of a low impact and therefore should provide adequate protection to residents.

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

4.5.4 CUMULATIVE EFFECTS

The pre-application advice received from THC on 08 October 2024 states that any cumulative effects from nearby developments in the planning or development stage should be taken into consideration. The following nearby existing and proposed electrical infrastructure sites have been identified from the planning portal:

- Beauly substation, approximately 1.5 km north-west of the Field site
- Fanellan substation, approximately 4 km south-west of the Field site
- Kilmorack substation, approximately 4 km west of the Field site
- Aigas substation, approximately 4.5 km, west of the Field site

The closest proposed site is Beauly BESS, located approx. 340 m south-west of Balblair Substation (reference: 24/01548/FUL) and 1.2 km west of the BESS assessed herein. The noise impact assessment submitted with the application predicts sound levels that are significantly lower than 25 dB $L_{Aeq,T}$ at the nearest noise sensitive receptor (The Willows) which is shared between both BESSes. Therefore, it is unlikely that there will be any cumulative effects from the proposed development. Additionally, both BESSes assume operating at their design maximum, which is a worst-case scenario that is unlikely to happen in practice, therefore the effects are likely to be insignificant.

The other sites identified are significantly further from the Field Beauly BESS site, and would therefore be expected to have an even lower cumulative effect.

5 CONCLUSION

WSP have been appointed by Field Beauly Ltd to undertake a noise assessment to support the planning application for a 100 MW BESS at Beauly (Land at Dunballoch Farm, Beauly, IV4 7AY).

A sound level survey has been carried out to determine the existing ambient and background sound levels at locations that are representative of the nearest noise sensitive receptors. The survey took place between Tuesday 7th and Wednesday 15th May 2024.

The results of the sound level survey and the requirements of The Highland Council have been used to determine appropriate plant noise level limits for the proposed 100 MW BESS.

Noise levels from the proposed development have been calculated at the nearest noise-sensitive receptors using a 3D noise model. A noise assessment has been undertaken in accordance with BS 4142, having an initial estimate and placing this into context.

The noise levels predicted at the nearest noise-sensitive receptor demonstrate that the criterion set out by THC can be achieved with a 4 m high acoustic barrier along the south and east site boundaries.

A second criterion proposed by THC relates to the sound level in the 100 Hz one-third octave band. However, it has been shown that this is not necessary for this development as the proposed plant does not exhibit tonal sound characteristics.

Based on the sound level predicted and the context in which the sound would occur, this assessment demonstrates that noise from the proposed BESS will have low impacts at receptors.

It is therefore concluded that there are no noise considerations which could preclude against determination in favour of the application. However, it is anticipated that pre-development conditions would be agreed in relation to operational noise.

Appendix A

ACOUSTIC TERMINOLOGY

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table:

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory

Acoustic Terminology	
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Background Sound	A sound field that represents a typical ambient sound level in a given location, free from any unusual sonic events, measured as an L_{90}. Background sound is usually the sound level against which the severity of the impact relating an intrusive noise is measured.

Appendix B

SURVEY RESULTS

TIME HISTORY

MP1 day results

Date	L_{Aeq}	L_{A90}
7/5/2024	55	34
8/5/2024	56	41
9/5/2024	55	37
10/5/2024	55	39
11/5/2024	54	36
12/5/2024	54	36
13/5/2024	54	37
14/5/2024	55	37
15/5/2024	54	38
Average	55	37
Range	42 – 64	18 – 48

MP1 night results

Date	L_{Aeq}	L_{A90}
7/5/2024	47	25
8/5/2024	47	33
9/5/2024	51	25
10/5/2024	46	27
11/5/2024	48	27
12/5/2024	50	30
13/5/2024	50	27
14/5/2024	51	26
Average	49	27
Range	19 – 64	17 – 45

MP2 day results

Date	L_{Aeq}	L_{A90}
7/5/2024	49	35
8/5/2024	47	40
9/5/2024	45	37
10/5/2024	46	37
11/5/2024	46	37
12/5/2024	47	35
13/5/2024	45	36
14/5/2024	47	37
15/5/2024	48	38
Average	47	37
Range	29 – 66	26 – 47

MP2 night results

Date	L_{Aeq}	L_{A90}
7/5/2024	46	33
8/5/2024	48	35
9/5/2024	42	32
10/5/2024	48	33
11/5/2024	44	33
12/5/2024	43	34
13/5/2024	49	33
Average	46	33
Range	27 – 64	26 – 52

MP3 day results

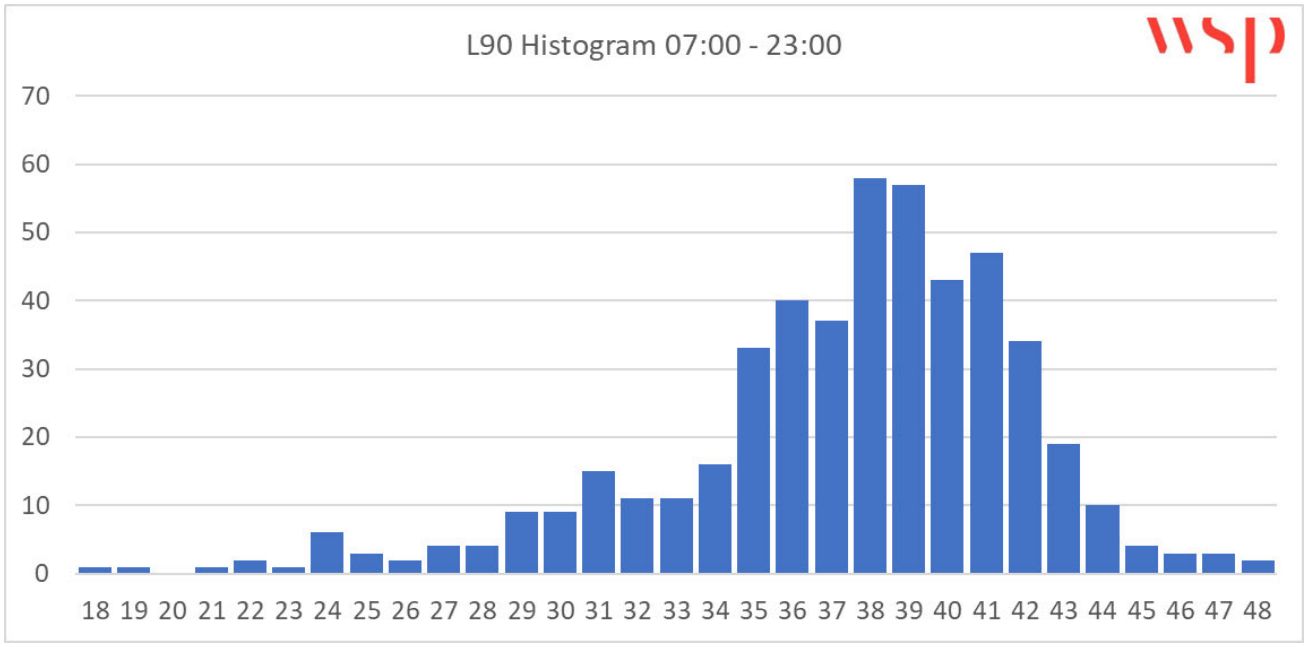
Date	L_{Aeq}	L_{A90}
7/5/2024	47	36
8/5/2024	47	40
9/5/2024	44	37
10/5/2024	47	37
11/5/2024	45	35
12/5/2024	43	35
13/5/2024	43	37
14/5/2024	45	37
15/5/2024	45	37
Average	45	37
Range	35 – 63	32 – 47

MP3 night results

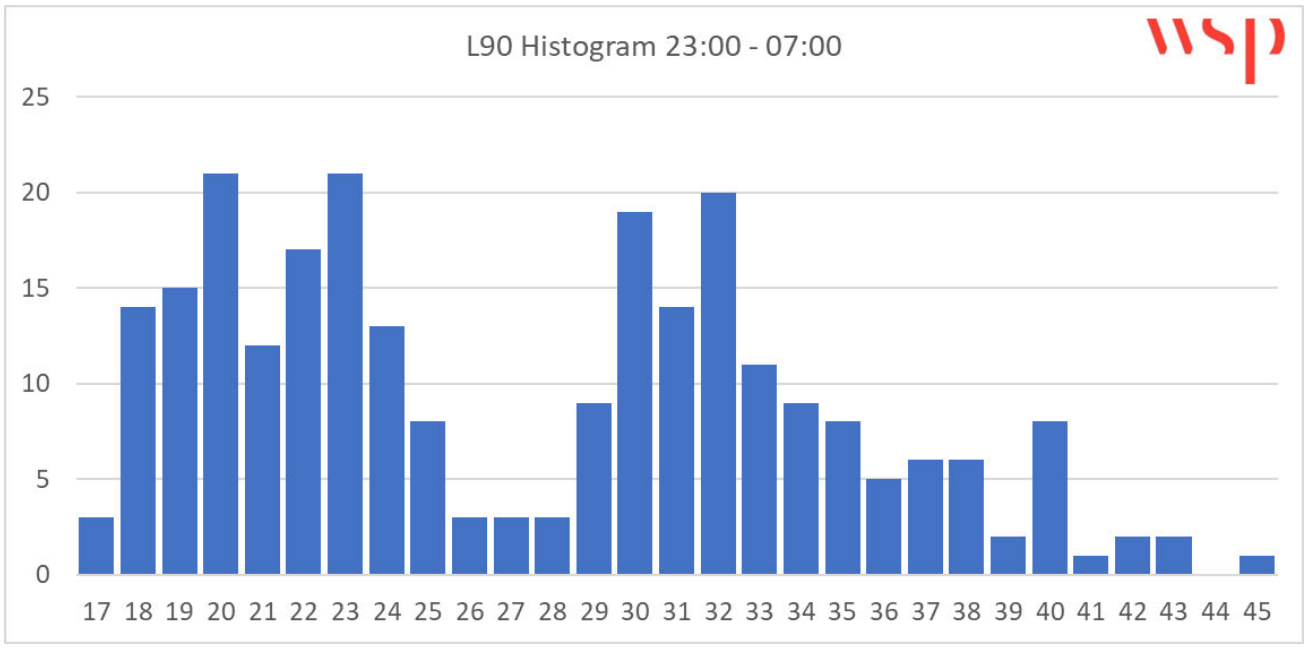
Date	L_{Aeq}	L_{A90}
7/5/2024	46	34
8/5/2024	44	37
9/5/2024	43	33
10/5/2024	43	34
11/5/2024	43	33
12/5/2024	43	35
13/5/2024	42	34
14/5/2024	43	33
Average	44	34
Range	32 – 56	31 – 44

HISTOGRAMS

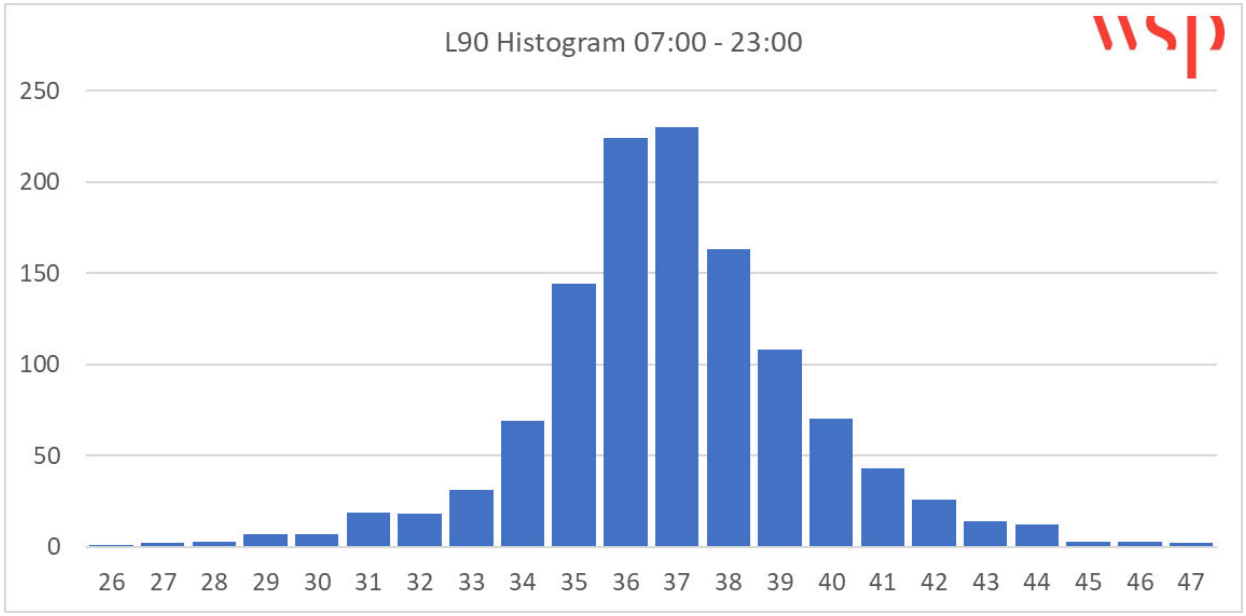
MP1 – L_{A90} Day Values



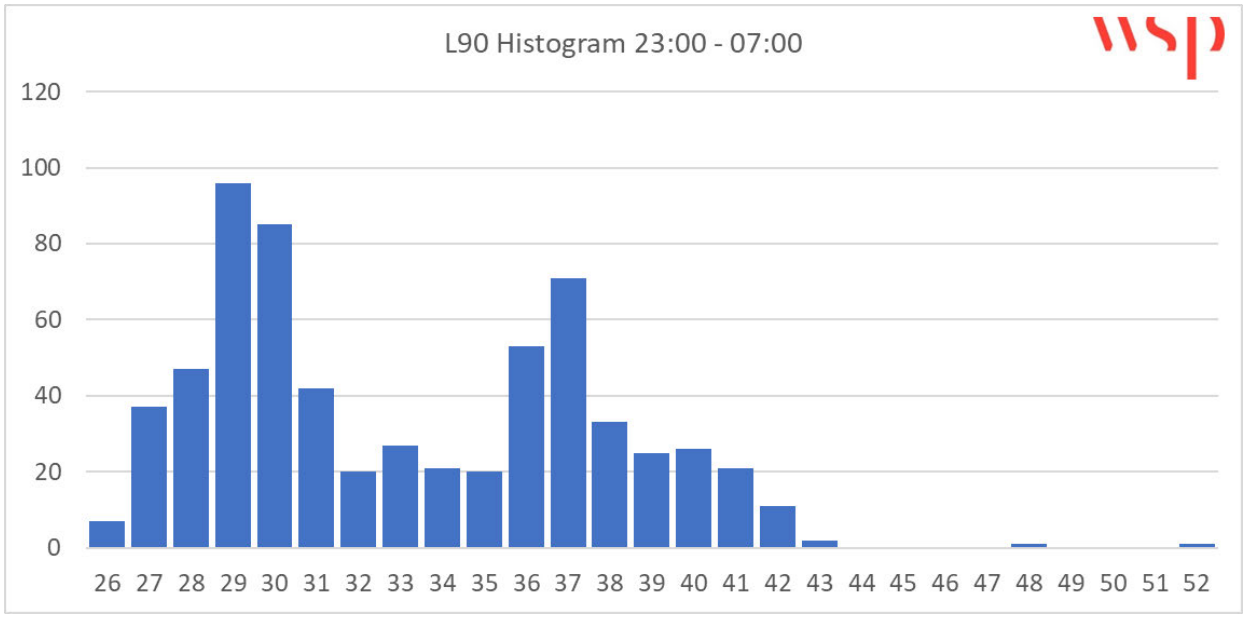
MP1 – L_{A90} Night Values



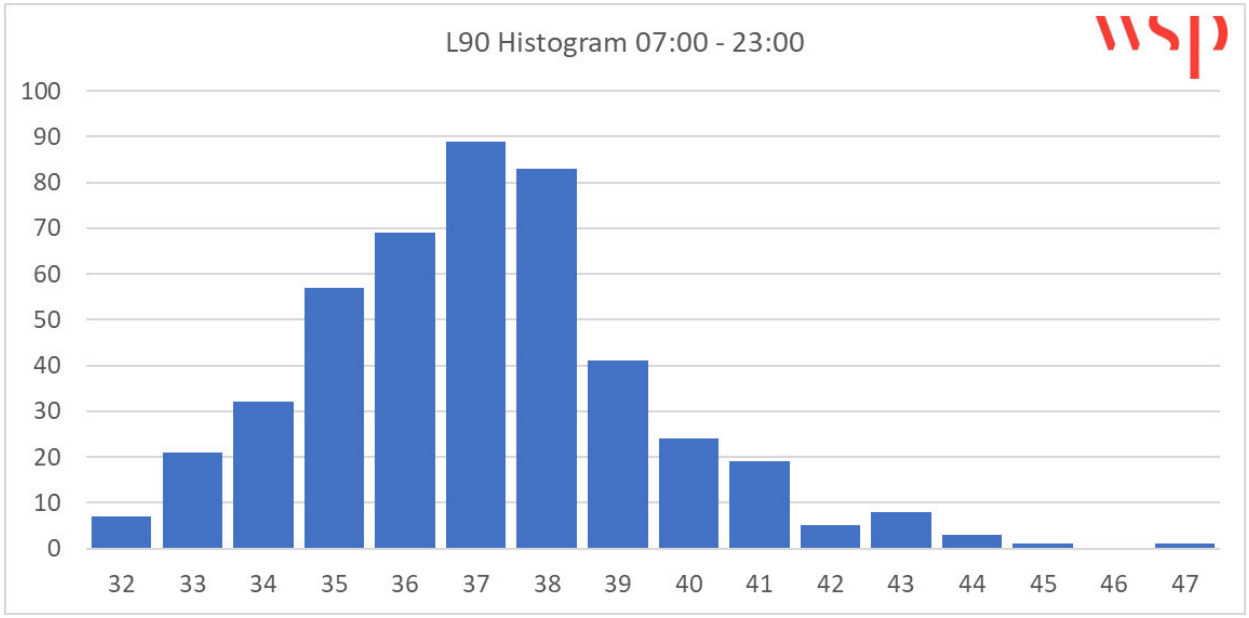
MP2 – L_{A90} Day Values



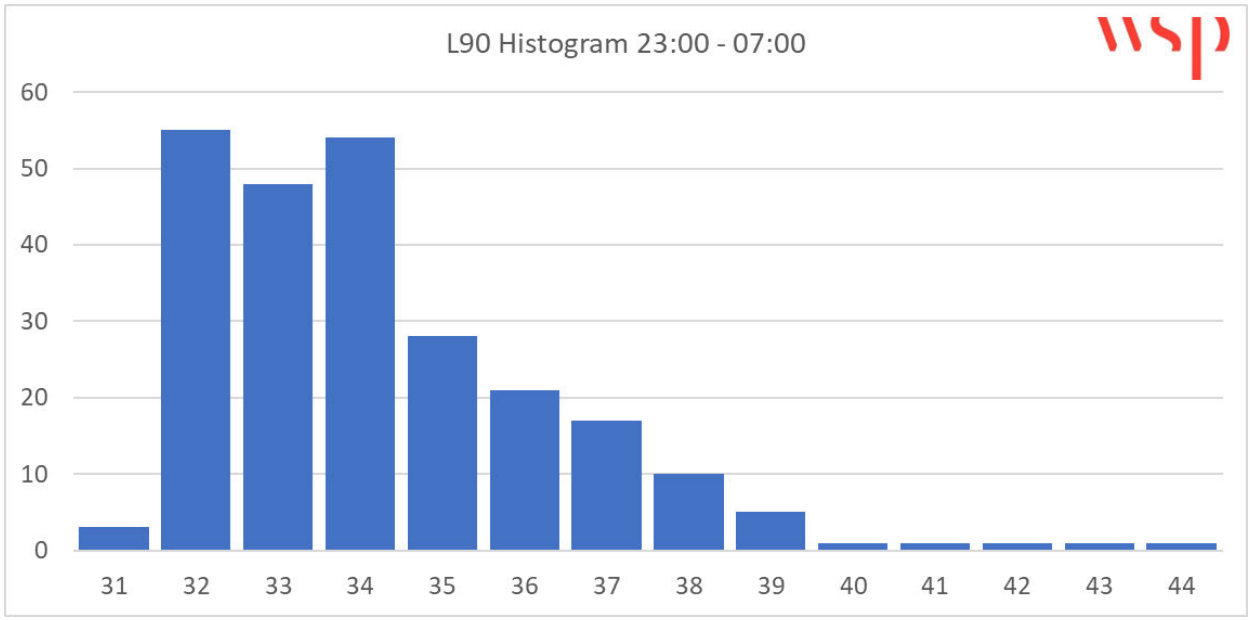
MP2 – L_{A90} Night Values



MP3 – L_{A90} Day Values



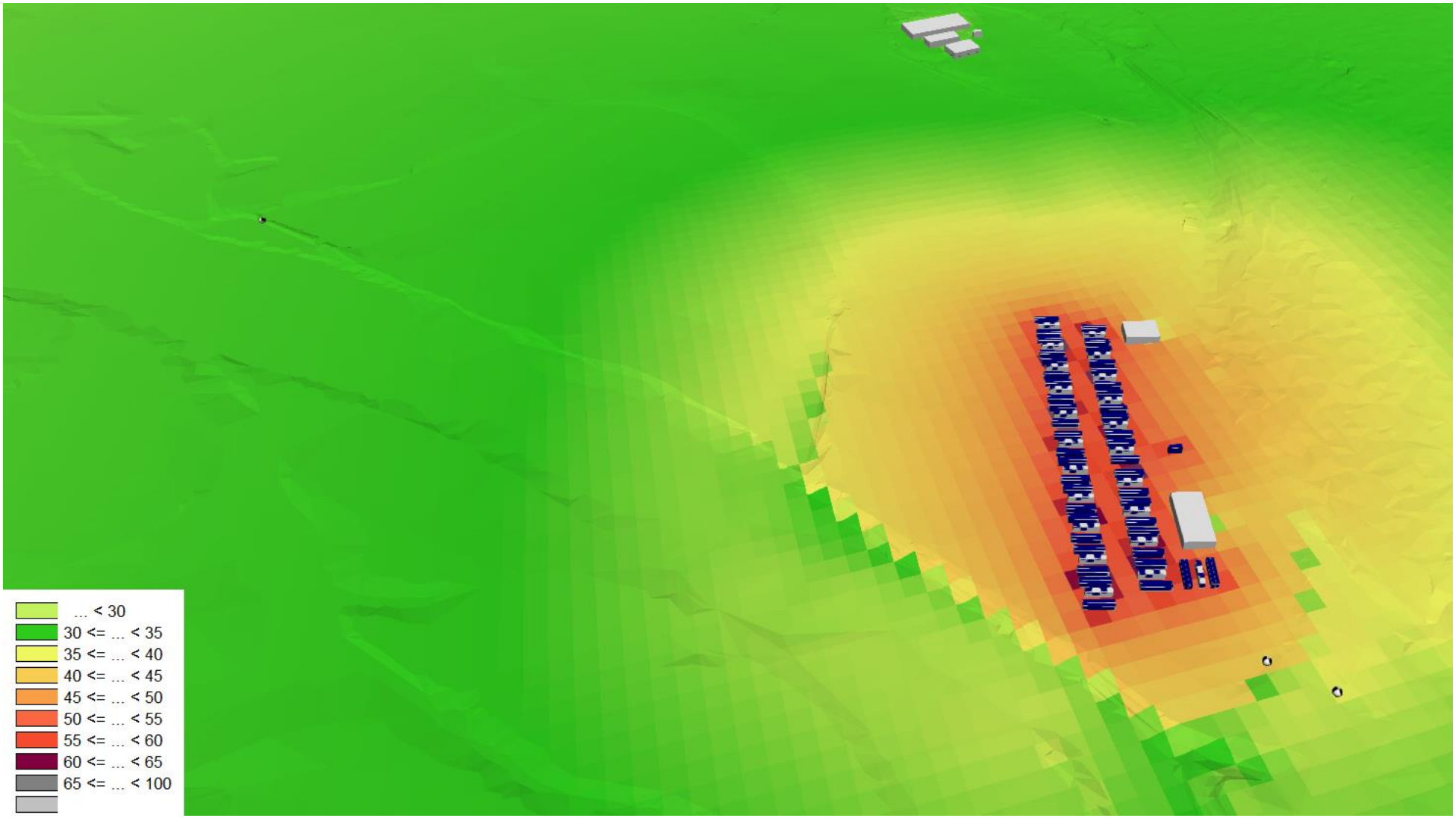
MP3 – L_{A90} Night Values



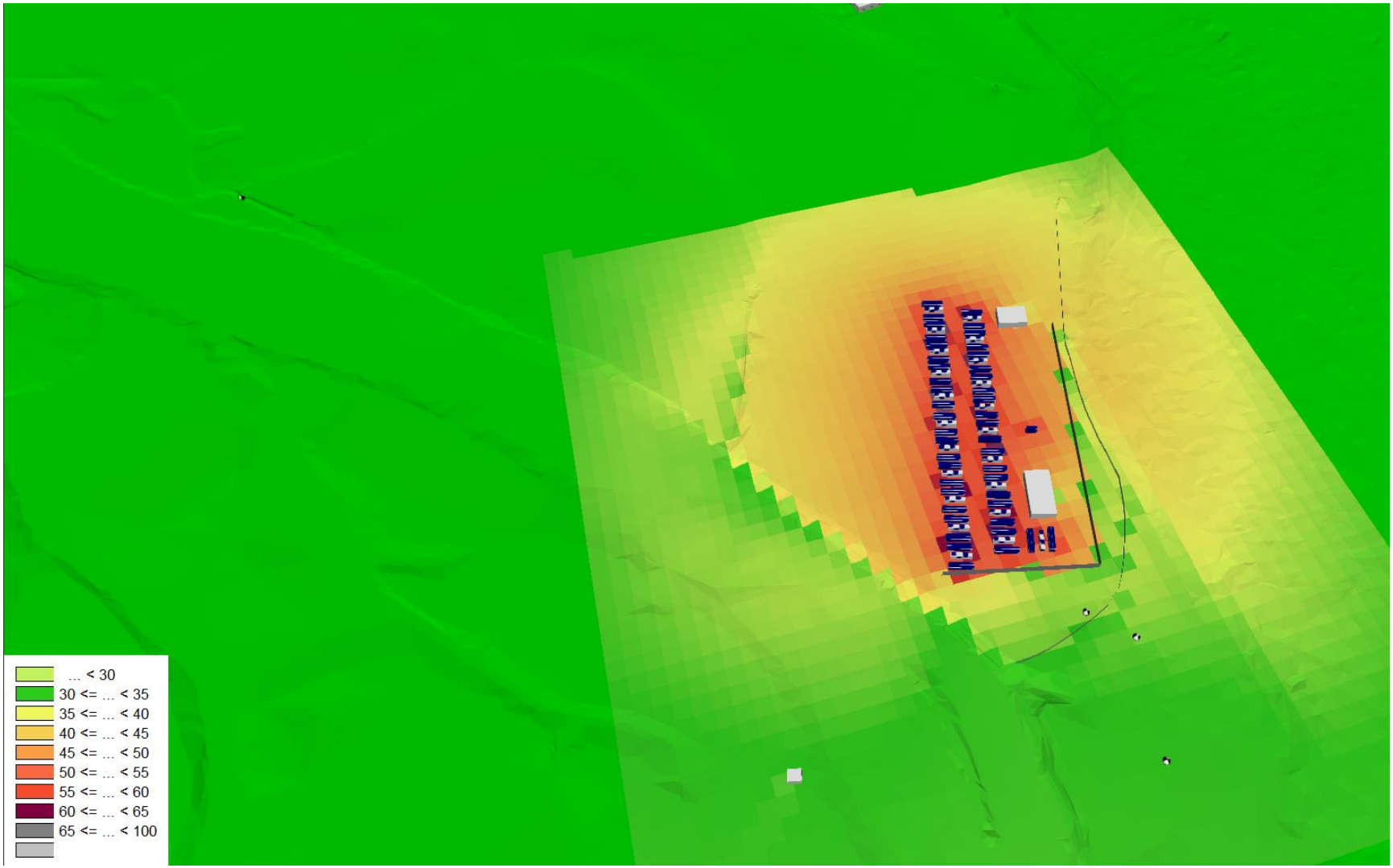
Appendix C

NOISE PLOTS

Noise predictions at 30% inverter speeds without acoustic barrier



Noise predictions at 30% inverter speeds with 4 m high acoustic barrier



Appendix D

LIMITATIONS

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of WSP UK Limited. WSP UK Limited accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/or WSP UK Limited and agree to indemnify WSP UK Limited for any and all loss or damage resulting therefrom. WSP UK Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP UK Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

Appendix E

SUPPLIER MODELLING RECOMMENDATIONS

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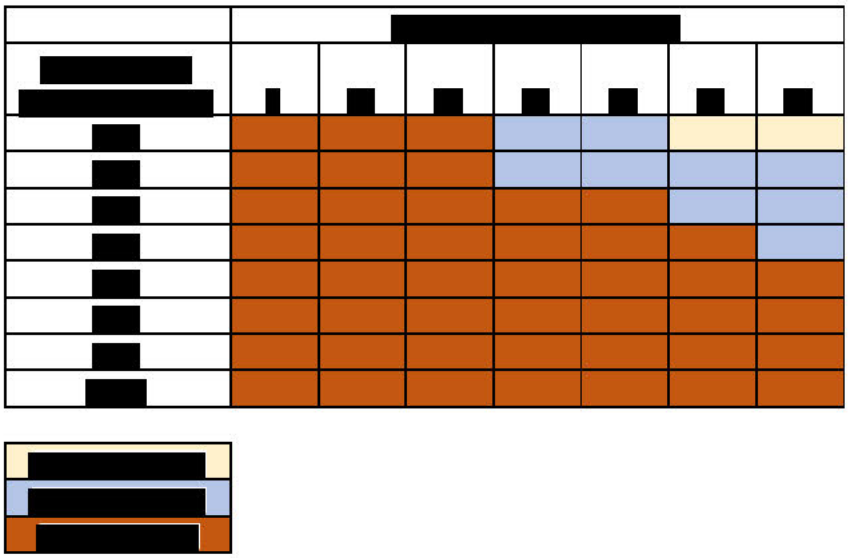

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