Field

SPITTAL BESS 300MW

Noise Impact Assessment

DECEMBER 2024

PUBLIC

Field

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Noise Impact Assessment

NOISE REPORT (FOR ISSUE) PUBLIC

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APPENDICES

1 INTRODUCTION

1.1 OVERVIEW

1.1.1. WSP has been appointed by Field Spittal Ltd to undertake a noise assessment to support the planning application for a new battery energy storage system (BESS) with a capacity of up to 300 megawatts (MW) at Spittal, Wick, KW1 5XR (the Proposed Development).

1.1.2. A summary of technical terminology used in this report can be found in Appendix A.

1.2 SITE LOCATION

1.2.1. The site is located within the administrative boundary of The Highland Council (THC), and is situated 500 m to the West from the A9 road. The surrounding area generally comprises fields, forest, residential properties, and farms.

1.2.2. The proposed site currently comprises grazing farmland. There are also a number of other existing buildings near the site, some being residential properties. The nearest noise sensitive properties to the site are indicated with green dots in Figure 1-1, and include a residential property on the west side of the site layout, and detached residential properties to the south-east and north.

Figure 1-1 – Site plan showing nearest receptors in the surrounding area of the proposed development

1.2.3. The nearest noise sensitive properties to the site are indicated in Figure 1-1 and identified in Table 1. They include residential properties to the north, south and west, all west of the A9.

Table 1 – Noise sensitive receptors and monitoring locations

Receptors	Coordinates (British National Grid)	
	X (Easting)	Y (Easting)
NSR1 (Achanarras)	315140	955114
NSR2 (Spittal Mains)	316087	954650
NSR3 (St Magna's Cottage)	316076	954507
NSR4 (Achalone Farmhouse)	315623	956152
NSR5 (House west of A9)	315670	956179
MP1	315426	955036
MP2	315845	954982

2 GUIDANCE AND CRITERIA

2.1 LOCAL AUTHORITY REQUIREMENTS

2.1.1. WSP has consulted with THC for this site who provided the following likely planning conditions:

Table 1 – Indicative THC planning conditions relating to noise

THC indicative planning condition	WSP comments
1. Noise arising from the development, when measured and/or calculated as an LZeq, 5min, in the 100Hz one third octave frequency band must not exceed 30 dB, at the curtilage of any noise sensitive premises.	BESS noise is characterised as being broadband in nature, and does not usually contain strong low frequency energy in the way that a transformer typically would.
2. The Rating Level of noise arising from this development as determined in accordance with BS4142 Methods for Rating and Assessing Industrial and Commercial Sound shall not exceed XXdB(A) at the curtilage of any noise sensitive receptor.* **The sound level to be applied will depend on the measured background level and the predicted sound level at the nearest noise sensitive property. Maybe open to negotiation and agreement.*	The rating level stipulated in the condition would be based on the background sound levels measured in the survey. Elsewhere in the THC response, it is stated that the rating level from the BESS should not exceed the background sound level at the receptors. The response also states the following in relation to locations with very low background sound levels: *"BS4142 does allow for noise to be considered in context and that could include consideration of an absolute limit in areas with very low background levels. However, while not tonal in nature, noise from battery sites is likely to be different to natural noises found in rural locations so this too should be given consideration"*
3. NR20 as a design standard might be used where there is no garden or other external amenity at the noise sensitive receptor, or where background levels are very high (>40dB). *All plant, machinery and equipment associated with the development shall be so installed, maintained and operated such that any associated operating noise does not exceed NR20 when measured or calculated within any*	Background sound levels of 40 dBA are usually considered to be low in the context of environmental sound levels generally. However, it is acknowledged that this comment is made in the context of THC's administrative area, which is predominantly rural.

noise-sensitive property with windows open for ventilation purposes.	
4. The development shall proceed in accordance with the approved Noise Impact Assessment. Mitigation measures identified in the assessment shall be in place prior to the commencement of operation and thereafter maintained in perpetuity.	BESS equipment is an emerging technology and is generally becoming quieter and more efficient with each generation. Therefore, it is recommended that the focus of any planning conditions should be on the noise levels produced by the equipment most likely to be installed, rather than the mitigation recommended for an older generation of technology.
5. Prior to the development becoming operational, if there are any changes to the proposed equipment or mitigation measures which could result in an increased noise level, a revised noise impact assessment shall be submitted to and approved in writing by the Planning Authority. Thereafter the development shall proceed in accordance with the revised assessment.	This is standard practice for all forms of noise assessment where there is a potential impact, and also potential for the sound sources themselves to be reselected.

2.1.2. The THC responses stated that '*In many cases, a new battery development may be sited beside an existing substation. In such cases, a cumulative noise assessment should be submitted and any noise limits, would apply to the cumulative noise level*.' There is an existing SSE substation to the north of the Proposed Development. As noted in Section 3.4, the existing substation was not audible at noise survey locations or at noise-sensitive receptors. As a result, a cumulative noise assessment is not required.

2.1.3. The THC response also indicated that there may be a requirement to carry out a survey of noise from the BESS site once it is operational and submit the results to THC to demonstrate compliance. It is stated that a survey duration of 1 week is normally required. However, the noise environment was so steady that the noise data measured over four days was considered representative of the receptors.

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

2.2.1. The assessment procedure contained within BS 4142 is initially to determine the "rating level" ($L_{Ar,Tr}$) that is (or would be) generated by the source under assessment, externally, at the assessment location. Where this source does not include any acoustic features, such as tonality, impulsivity or intermittency etc., then the rating level ($L_{Ar,Tr}$) equals the specific sound level (LS), which is the sound pressure level produced by the source using the $L_{Aeq,T}$ noise index. Where the source under assessment does include acoustic characteristics, then a series of corrections are added to the specific sound level in the determination of the rating level. The degree of correction applied in the determination of the rating level depends upon the results of either subjective or objective appraisals.

2.2.2. The background sound level at the assessment location, measured using the $L_{A90,T}$ noise index, is then subtracted from the rating level. The result provides an indication of the magnitude of impact, where the greater the difference, the greater the magnitude of impact.

2.2.3. The following scale is presented:

- 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.

2.2.4. It can be seen from the above that the magnitude of impact is also dependent upon the context in which the sound arises. Factors that are considered with respect to context include: the absolute level of sound, and the character and level of the residual sound (the in absence of the source under assessment) compared to the character and level of the specific sound.

2.2.5. With regards to absolute level, amongst other points, it is stated that "*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*".

2.2.6. In order to control potential future noise impacts on existing receptors as a result of the proposed scheme it is appropriate to determine the existing background noise environment in the absence of the proposed noise source. Appropriate noise limits have been established at sensitive receivers for proposed new noise sources by measuring the background noise level at the receiver with the absence of the proposed source. Any proposed plant or other noise source associated with the operational phase of the development should be designed in such a manner that these noise limits are not exceeded at the identified sensitive receiver(s) including any applicable acoustic penalties as appropriate for the source(s).

2.2.7. When assessing a proposed system against the determined noise limits the guidance contained within BS 4142 and summarised above should be followed.

3 SOUND LEVEL SURVEY

3.1 METHODOLOGY

3.1.1. To determine the existing environmental sound levels at the site, a baseline survey was undertaken between 19th and 22nd February 2024.

3.1.2. 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

3.2.1. At the time of installation, there was no rain, and wind speed throughout the survey was below 5 m/s.

3.3 MEASUREMENT POSITIONS

3.3.1. A sound level meter was installed at measurement position 1 (MP1), at the red line boundary along the west of the Proposed Development. This position was selected to be representative of the sound levels occurring at the closest property to the west of site. The microphone was installed on a tripod at a height of 1.6 m, in free-field conditions.

3.3.2. A second sound level meter was installed at MP2, to the south of the Proposed Development alongside the access road to the north of Spittal Mains (residential receptor). This location was selected to be representative of the background sound levels experienced at existing receptors to the south and north (which are both a similar distance from the A9 as MP2). The sound level meter was installed at a height of approx. 1.6 m so that the microphone was above an existing fence, in free-field conditions.

3.3.3. Figure 1-1 shows the monitoring position and the locations of the nearest noise sensitive receptors.

3.4 EXISTING SOUND ENVIRONMENT

3.4.1. Subjective observation during the survey periods noted the following:

- Agricultural machinery was in operation for some periods of the afternoon and evening upon setup but their influence was not discernible in the data.
- Sounds that were audible at both NMLs were predominantly road traffic noise from A9 and birdsongs.
- Observed sounds that were unique to NML01 included noise from geese and a tractor. The existing substation was not audible at the measurement location.
- Observed sounds that were unique to NML02 included foliage in the wind and noise from cows. The existing substation was not audible at the measurement location.

3.5 EQUIPMENT

3.5.1. The noise monitoring equipment consisted of two Rion NL52 SLMs fitted with appropriate wind shields. All noise monitoring equipment (calibrator, SLM and microphones) used for the study are categorized as Class 1, as specified in IEC 616762-1 *'Electroacoustics, Sound level meters. Specifications'* (6). The equipment was calibrated onsite at the beginning and end of each measurement period with no significant deviation noted. Table 2 contains the equipment and laboratory calibration details for the SLMs and microphones.

Table 2 – Sound level monitoring equipment

Location	Equipment	Make and Model	Serial Number	Calibration Due Date
MP1	Sound Level Meter	Rion NL52	01021288	23 August 2025
	Pre-amplifier	NH25	21330	
	Microphone	UC59	08198	
	Calibrator	Rion NC-74	35173440	13 August 2025
MP2	Sound Level Meter	Rion NL52	01021292	27 September 2025
	Pre-amplifier	NH25	21334	
	Microphone	UC59	19829	
	Calibrator	Rion NC-74	35125825	4 October 2025

3.6 MEASUREMENT RESULTS

3.6.1. Table 3 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 C. The background $L_{A90,T}$ sound levels presented in Table 3 below have been determined from the most commonly occurring background sound levels measured in the applicable period.

Table 3 – Summary of survey results

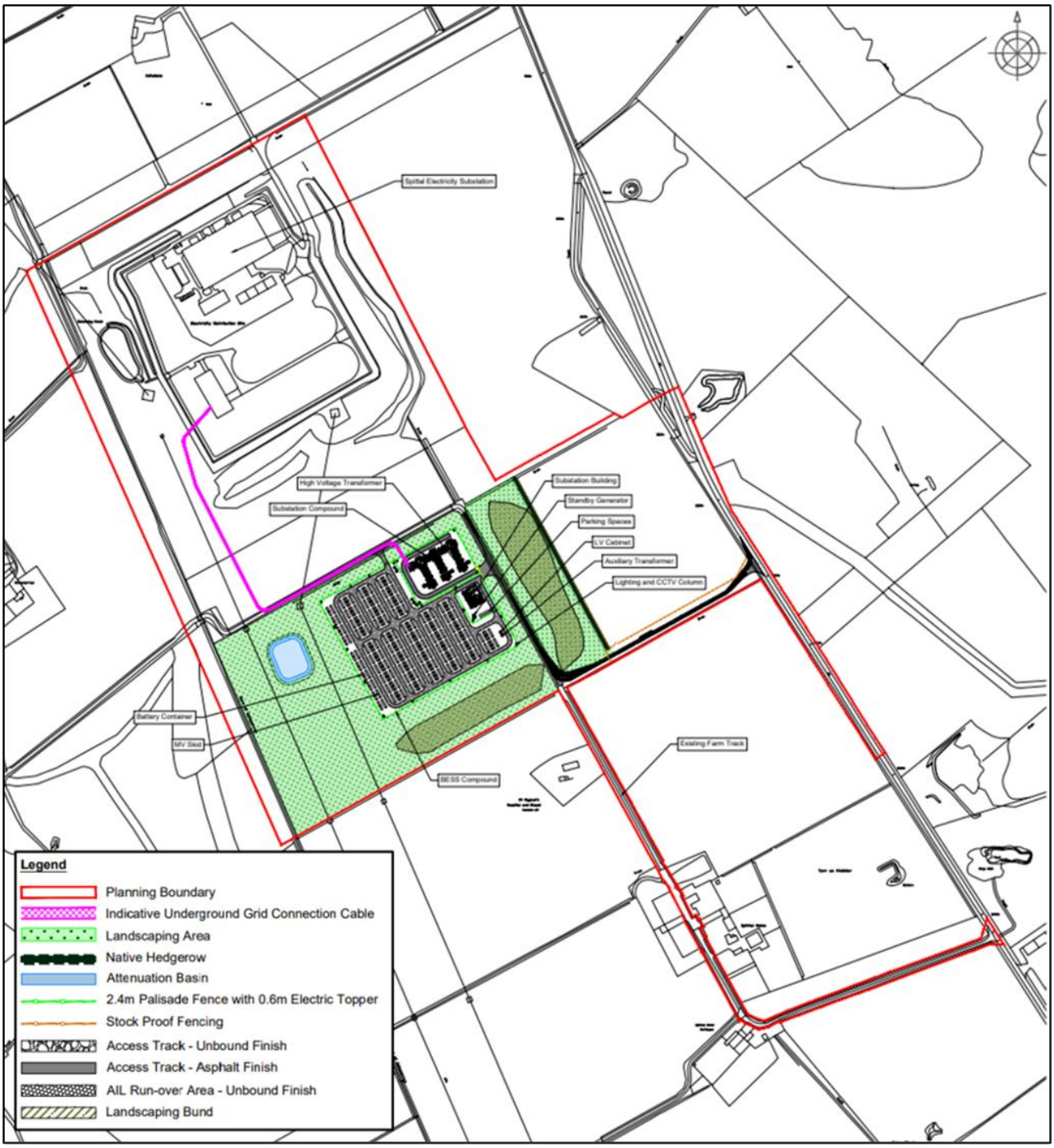
Location	Ambient, daytime	Ambient, night-time	Background, daytime	Background, night-time
MP1	46 dB $L_{Aeq,16hr}$	39 dB $L_{Aeq,8hr}$	34 dB $L_{A90,1hr}$	32 dB $L_{A90,15min}$
MP2	49 dB $L_{Aeq,16hr}$	41 dB $L_{Aeq,8hr}$	36 dB $L_{A90,1hr}$	33 dB $L_{A90,15min}$

4 NOISE IMPACT ASSESSMENT

4.1 SITE LAYOUT

4.1.1. The site layout is shown in Figure 3-2 based on drawing BTGBSPI01 – Spittal Indicative Site Layout Plan dated 31.08.2023.

Figure 3-2 – Spittal proposed site layout



4.2 NOISE SOURCES

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

- 196 DC skid BESS containers
- 98 AC twin skid inverters and transformer units (PCS)
- 3 HV 275 kV grid transformers

4.2.2. 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.

4.2.3. The third-octave band sound power levels of these sources have been provided by the manufacturer and are presented in Figure 4-3 and Figure 4-4. 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.

4.2.4. Field has designed the site to be 'oversized' in order to be capable of delivering a short-term inertial response service to the grid, thus requiring the Proposed Development to have more PCS units than would normally be required to deliver the maximum power permitted by its grid connection.

4.2.5. Typically, the supplier recommends the use of 40% or 50% rated power data to model the PCS, as these output powers were found to keep the C rates below 0.25C around 95% of the time during the daytime and about 96.5% of the time during night-time. However, this data is prescribed for situations where the PCS units are expected to operate as they would for a typical, non-oversized site. In the case of this site, because it is oversized, the PCS units of each skid will be operating at a reduced rating. However, the noise model assumes 80% rated power data for the PCS, which is considered to be a conservative assumption.

4.2.6. BESS equipment is designed to operate in a very wide range of global locations with different ambient air temperatures, from Nordic climates to the Middle East. As such, the cooling system (which produces the majority of the system noise) would only need to operate at low to medium duties in temperate climates such as at the Spittal site. The manufacturer has advised that the maximum cooling duties required for this site would be 30 % for the DC-skids and 30 % for the AC-skids. These values are consistent with those quoted on other BESS sites. These cooling duties are sufficient for the BESS to operate at 100 % of its designed storage and charge/discharge capacity.

4.2.7. Data from the manufacturer states that '*The fan speed of the AC Twinskid system automatically adjusts based on ambient temperature to ensure optimal performance and noise management. The fan operates at a reduced speed of 32% when the ambient temperature is below 30°C*.' From historical meteorological data, it is known that the ambient temperature in this location does not normally exceed 30°C, and therefore, a fan speed of 30% is considered appropriate. The manufacturer's information is included in Appendix E.

4.2.8. Noise from the BESS equipment has been modelled using the following data provided by the manufacturer for their 'gen 7' system:

- DC skids – [redacted]
- AC skids – [redacted]

4.2.9. The sound power levels supplied by the manufacturer are presented in Figure 4-3 and Figure 4-4 below.

Figure 4-3 – Manufacturer's sound power level data for DC skid (30 % fan speed), dB A-weighted

Freq (Hz)	Sound Pressure Level dB(A)	Sound Power Level						Background dB(A)
		Front dB(A)	Back dB(A)	Left dB(A)	Right dB(A)	Roof dB(A)	Total dB(A)	
[redacted]								

Figure 4-4 – Manufacturer's sound power level data for DC skid (30 % fan speed), dB A-weighted

Freq (Hz)	Sound Pressure Level dB(A)	Sound Power Level						Background dB(A)
		Front dB(A)	Back dB(A)	Left dB(A)	Right dB(A)	Roof dB(A)	Total dB(A)	
[redacted]								

4.3 NOISE MODEL

4.3.1. A 3D noise model of the Spittal 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,

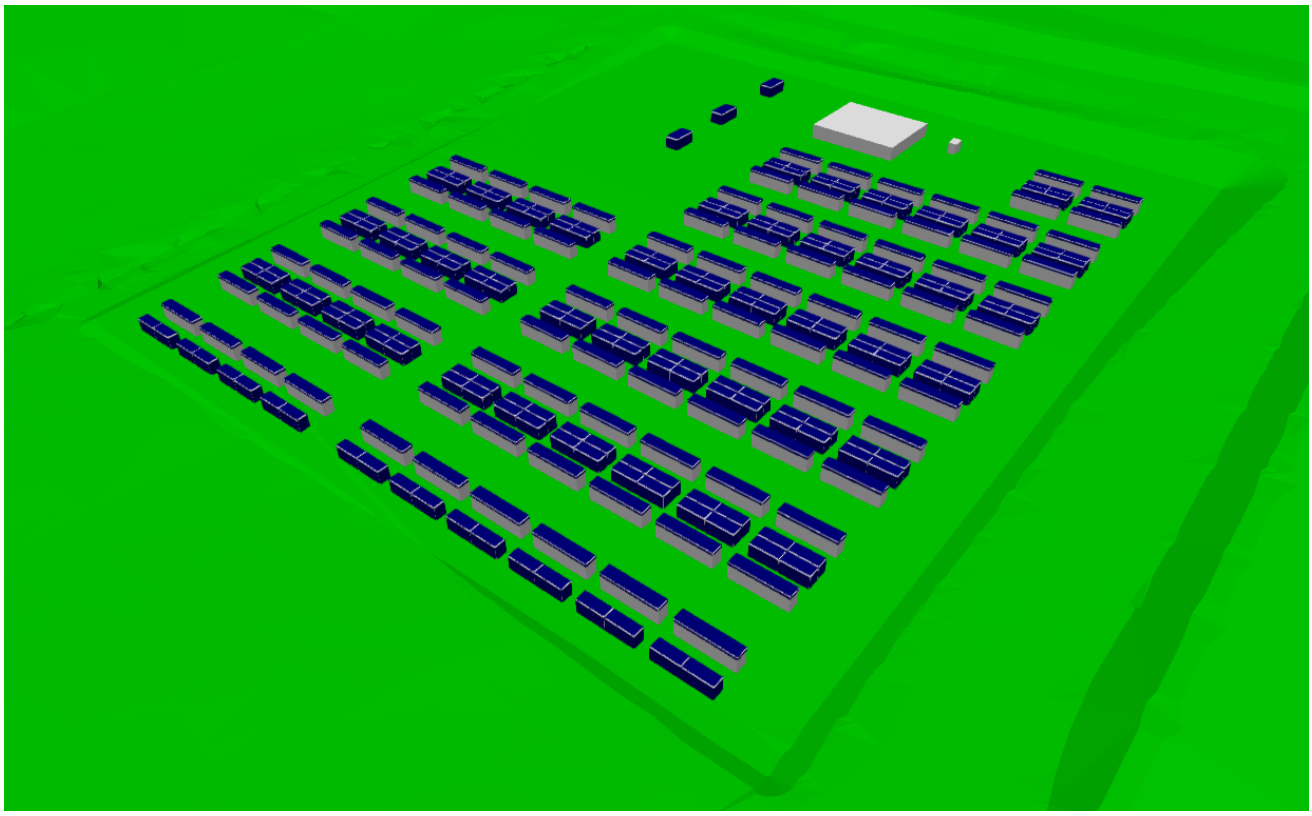
topography, screening, meteorological conditions, and information provided regarding the sources of noise.

4.3.2. 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 heights of 4.0 m.
- Predicted levels are free field.
- Heights of buildings are assumed to be 6 meters.
- Sound power level data are based on information received by Field, as summarised above.

4.3.3. A screenshot of the model is shown in Figure 4-5 for reference. Noise plots are presented in Appendix D.

Figure 4-5 – Screenshot of noise model



4.4 RESULTS

4.4.1. Specific sound levels from the Proposed Development have been calculated at the nearest noise sensitive receptors shown in Table 2 using the noise model. The results presented in Table 6 below are compared against the background sound levels to provide an initial estimate of the impact in accordance with BS4142 Clause 11. Noise prediction results are presented with and without a noise barrier on the southern and south-eastern boundaries of the site. The highest noise levels are predicted at NSR1 and NSR2. Therefore, these are the only receptors presented for assessment.

Table 6 – Noise Model results

Receptor	Description	Predicted sound level, dB $L_{Aeq,T}$
NSR 1	Predicted dB(A)	32
	Background, night-time (L_{A90})	32 (MP1)
	Comparison to night L_{A90}	0
NSR 2	Predicted dB(A)	28
	Background, night-time (L_{A90})	34 (MP2)
	Comparison to night L_{A90}	-6

4.5 DISCUSSION

BS 4142 RATING CORRECTIONS

4.5.1. 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 blur any tonality, and make it less perceptible.

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

4.5.3. 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 plants’ on-time. As such, it is not considered appropriate to apply any correction for intermittent operation.

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

BS 4142 INITIAL ASSESSMENT RESULTS

4.5.5. The results of the initial estimate presented in Table 6 demonstrates that the predicted rating levels will not exceed the background sound level.

4.5.6. The initial estimate of the BS 4142 assessment presented above has confirmed that the proposed BESS equipment in Figure 4-3 and Figure 4-4 is likely to meet the aspirations indicated by THC of the rating level not exceeding the background sound levels.

BS 4142 CONTEXTUAL CONSIDERATIONS

4.5.7. 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. However, it is understood that from scoping opinions provided for other sites that this requirement can be waived if it can be demonstrated that the noise has no tonal element.

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

4.5.9. According to Annex C of BS 4142 *'Objective method for assessing the audibility of tones in sound: One-third octave method',* For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level ($L_{Zeq,T}$) in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference. The level difference to identify a tone in the low-frequency one-third octave bands (25 Hz to 125 Hz) is 15 dB. In the 100 Hz third-octave band, a 15 dB difference from both adjacent third-octave bands.

4.5.10. Sound power levels for the proposed equipment shown in Figure 4-3 and Figure 4-4 demonstrate that there are no tonal features, as defined in Annex C of BS 4142.

4.5.11. 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, any tonal noise from the transformers would be much lower than the sound produced by the BESS equipment, and will therefore be substantially masked. Therefore, requiring assessment against this third-octave band limit could be unduly restrictive and is not considered appropriate for a BESS development. On the basis that the vast majority of 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.

5 CONCLUSION

5.1.1. WSP has been appointed by Field to undertake a noise impact assessment to support the planning application for a 300 MW BESS at Spittal Mains, Wick.

5.1.2. 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 19th and 22nd February 2024.

5.1.3. 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 300 MW BESS.

5.1.4. 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 4142:2014+A1:2019.

5.1.5. The noise levels predicted at the nearest noise sensitive receptors demonstrate that the criteria set out by THC can be achieved at all identified noise-sensitive receptors.

5.1.6. 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.

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

5.1.8. It is, therefore, concluded that there are no noise considerations which would 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.
R_w	The level of sound insulation provided by a partition can be defined using a single figure sound reduction index, R_w. From the R_w, it is possible to determine how a particular wall, window, floor or other partition will perform given a known sound level incident upon it.

Appendix B

LIMITATIONS

LIMITATIONS TO THIS REPORT

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 C

SURVEY RESULTS

TIME HISTORY

Location MP1

Day results (07:00 – 23:00)

Date	Ambient, dB $L_{Aeq,T}$	Maximum, dB L_{AFmax}	Background, dB $L_{A90,T}$
19/2/2024	41	72	31
20/2/2024	46	78	33
21/2/2024	49	84	38
22/2/2024	42	73	33
22/2/2024	42	73	33
Average	46	-	34
Range	41 – 49	72 – 84	31 – 38

Night Values – 23:00-07:00

Date	Ambient, dB $L_{Aeq,T}$	Maximum, dB L_{AFmax}	Background, dB $L_{A90,T}$
19/2/2024	29	42	27
20/2/2024	42	64	32
21/2/2024	34	55	29
22/2/2024	37	58	33
Average	39	-	31
Range	29 – 42	42 – 64	27 – 33

Location 2 – MP2

Day Values – 07:00-23:00

Date	Ambient, dB $L_{Aeq,T}$	Maximum, dB L_{AFmax}	Background, dB $L_{A90,T}$
19/2/2024	46	83	34
20/2/2024	49	82	34
21/2/2024	49	84	40
22/2/2024	53	80	36
Average	49	-	36
Range	46 – 53	80 – 84	34 – 40

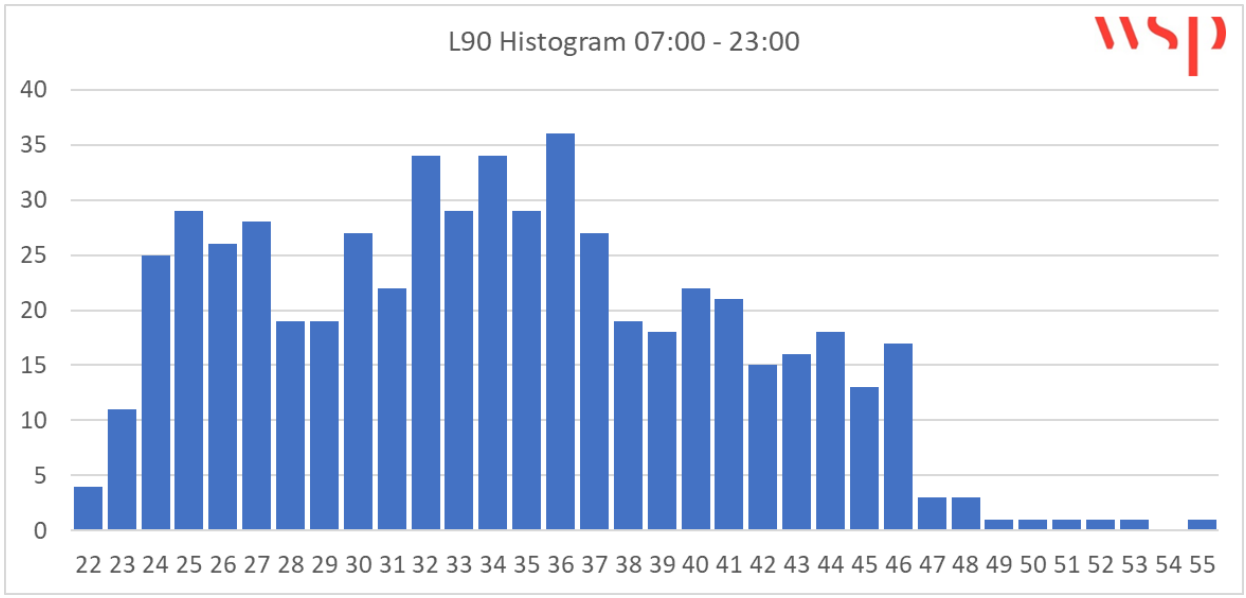
Night Values – 23:00-07:00

Date	Ambient, dB $L_{Aeq,T}$	Maximum, dB L_{AFmax}	Background, dB $L_{A90,T}$
19/2/2024	41	54	29
20/2/2024	44	57	34
21/2/2024	37	51	31
22/2/2024	40	53	36
Average	41	-	33
Range	41 – 44	51 – 57	29 – 36

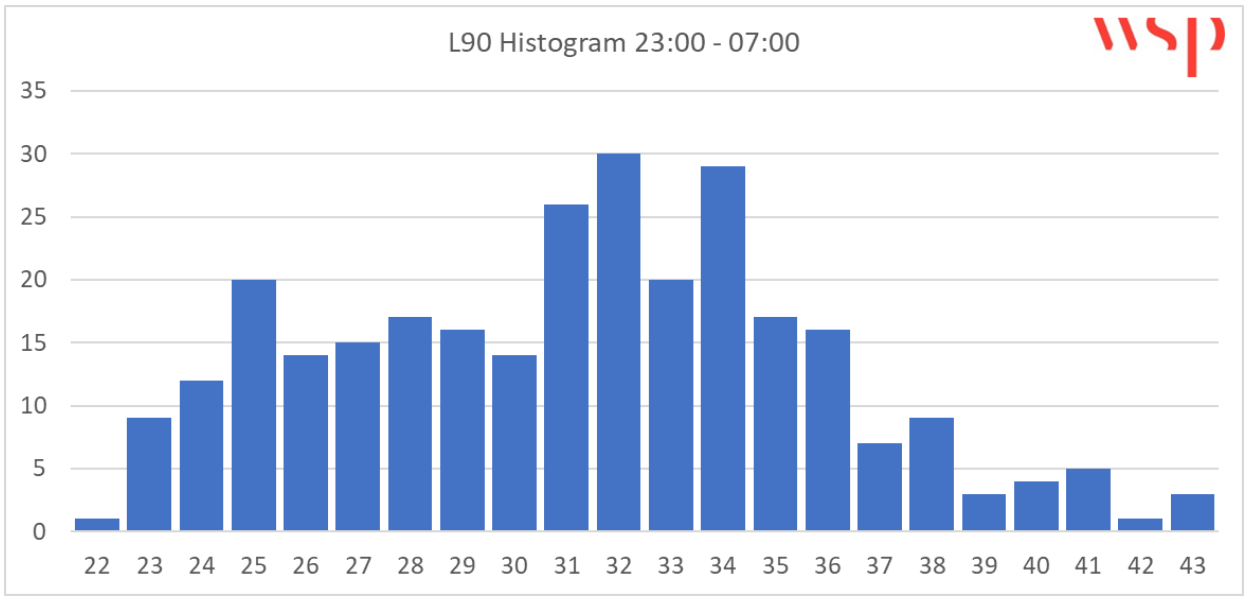
HISTOGRAMS

Location 1 – MP1

MP1 – L_{A90} Day Values

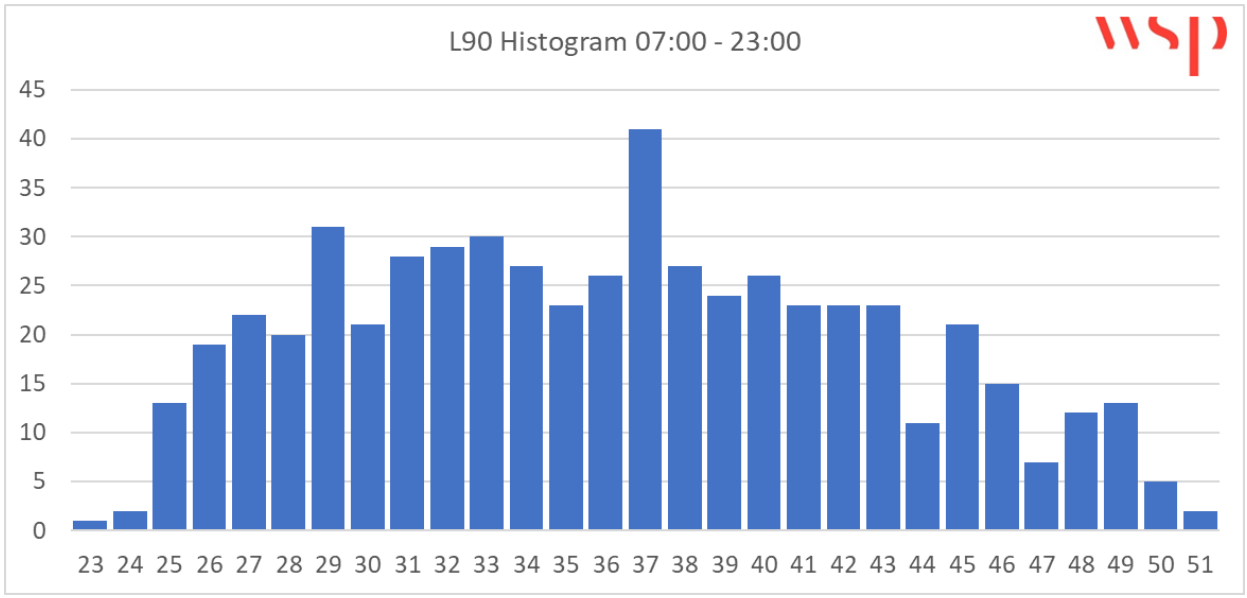


MP1 – L_{A90} Night Values

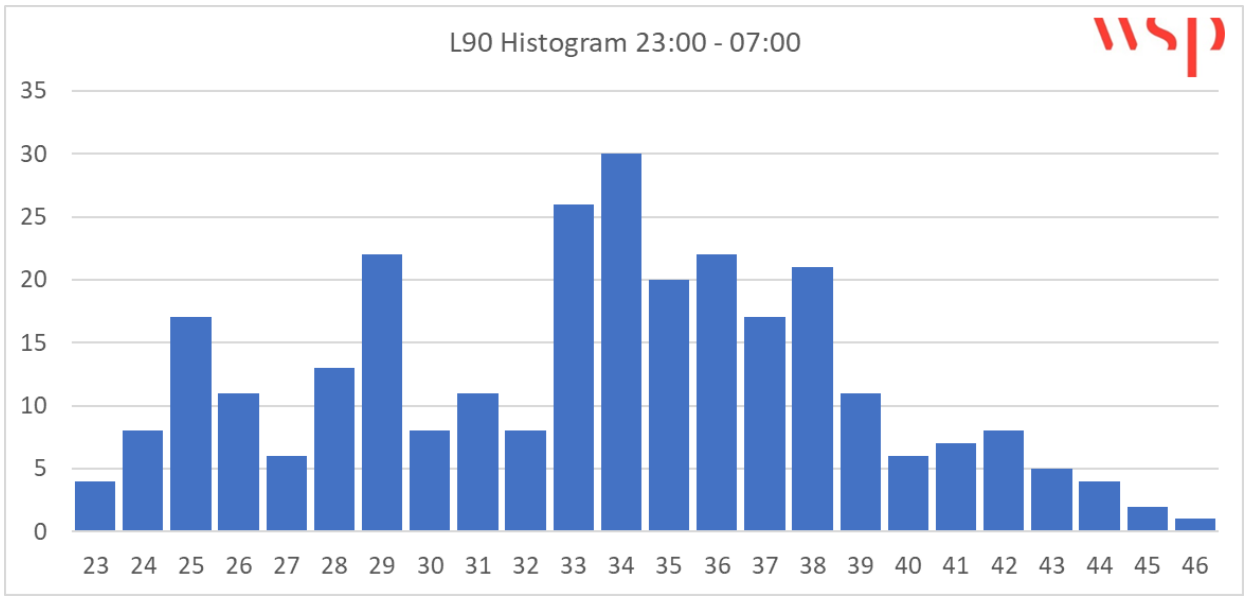


Location 2 – MP2

MP2 – L_{A90} Day Values



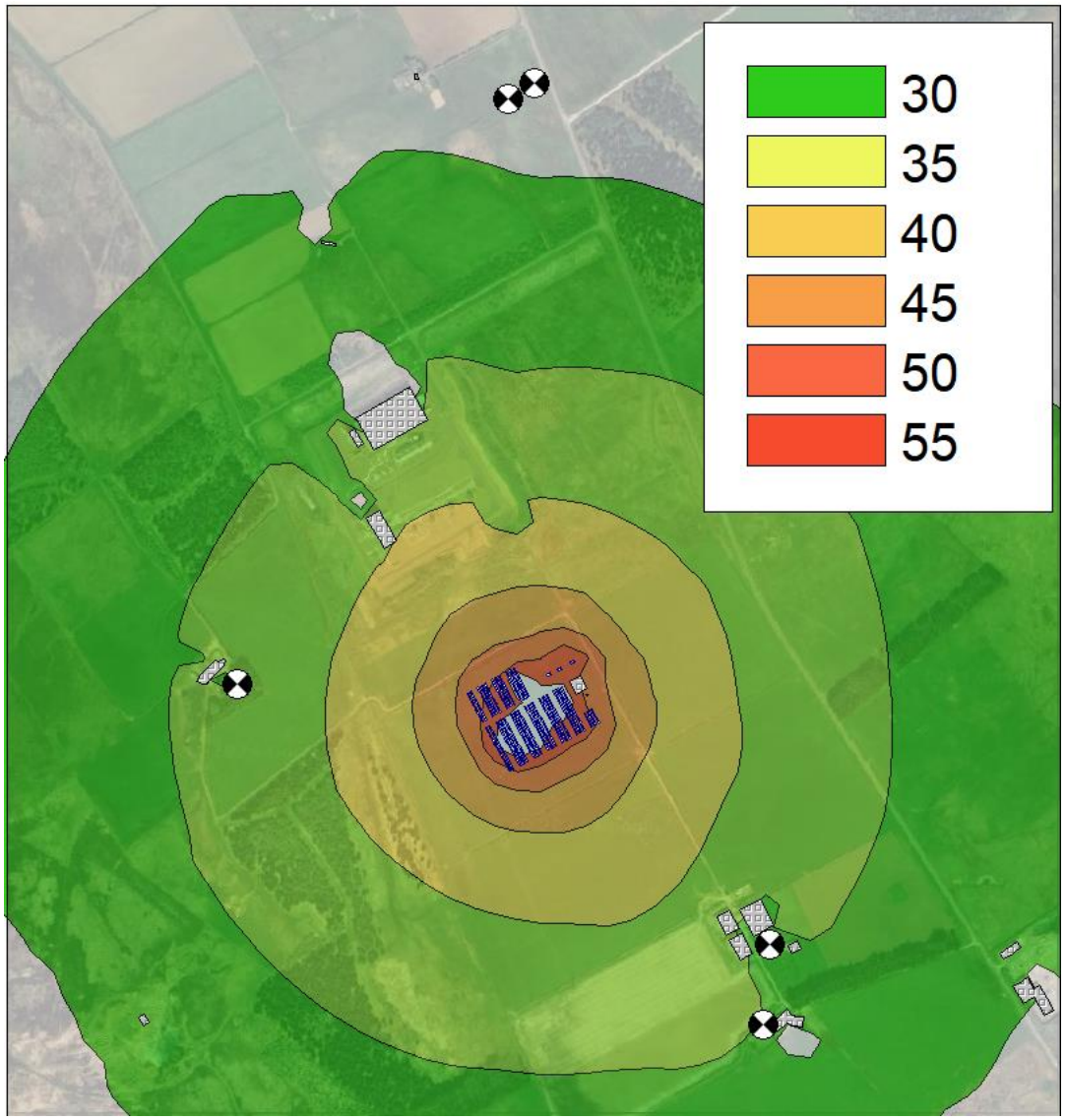
MP2 – L_{A90} Night Values



Appendix D

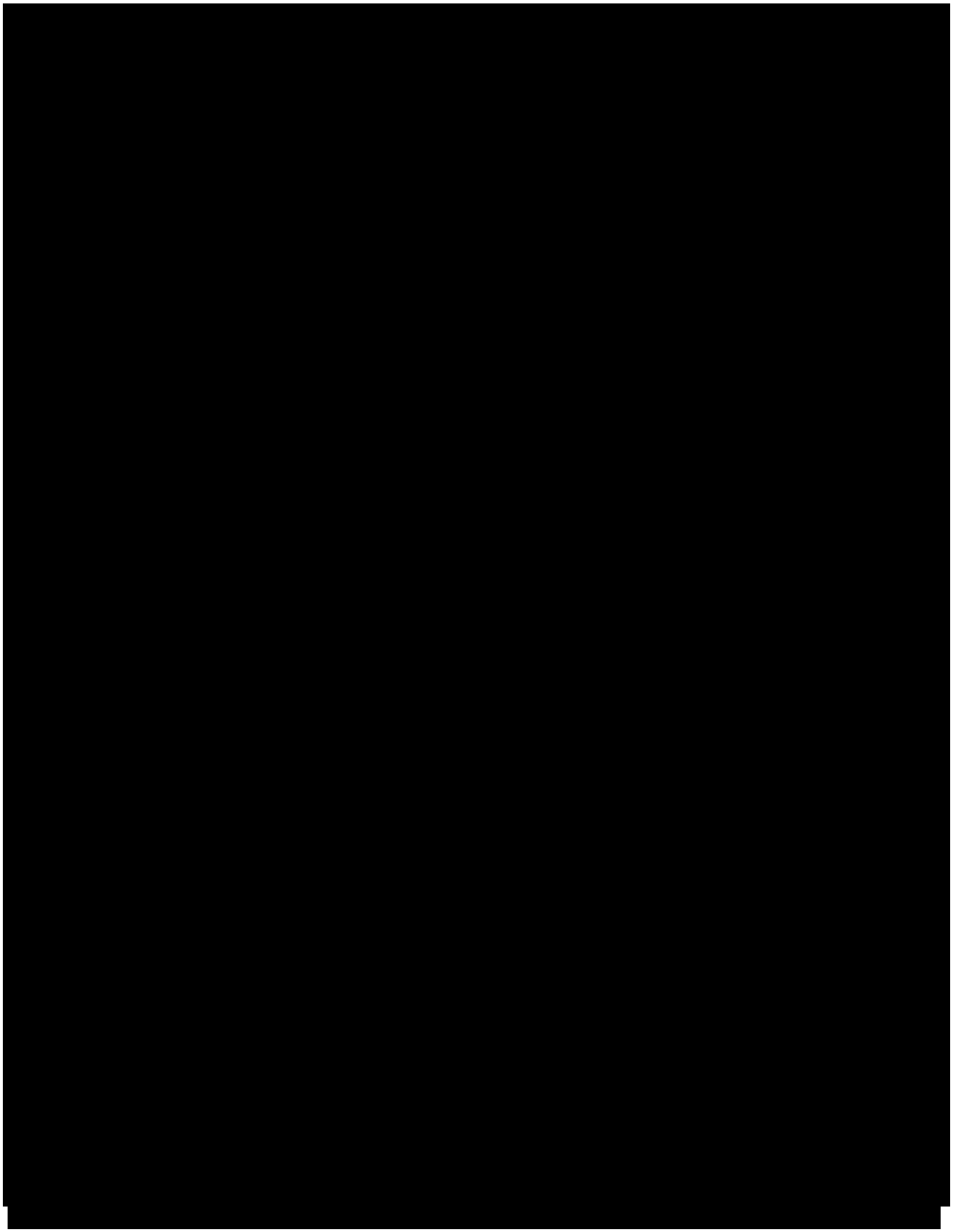
NOISE PLOT

Predicted specific sound levels, dB $L_{Aeq,T}$



Appendix E

SUPPLIER MODELLING RECOMMENDATIONS



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