Longcroft Wind Farm

Technical Appendix 12.1

Assessment of Energy Storage Facility

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1 Assessment of Energy Storage Facility

1.1.1 In addition to the wind farm it is also proposed to include a battery energy storage system (BESS) on site. An acoustic assessment in accordance with BS 4142:2014+A1:2019[1] has been undertaken to determine the acoustic impact due to the operation of this part of the proposed development.

1.1.2 The baseline data adopted is that recorded at a wind speed of $1ms^{-1}$ during the background sound surveys made to inform the acoustic assessment of operational noise from the proposed development which correspond to the worst case, or quietest, levels.

1.1.3 The main sources of sound within the proposed development are the inverters, transformers and air conditioning for the BESS. The BESS units are expected to be continuously charging and discharging. If there are any rest periods for the inverters these are likely to be infrequent and the Heating Ventilation and Air Conditioning systems (HVAC) would still be functioning.

1.1.4 Acoustic emission data for the proposed equipment is detailed in **Table 12.1.1**, as well as the number of each units. The data corresponds to the maximum acoustic emission for each device as advised by the manufacturer. Predictions based on this data therefore represent the worst case and the sound levels would be expected to be less when the site is not operating at maximum capacity. The amount of the time that this is the case is unknown at this stage as it depends upon which services the site provides.

Table 12.1.1: Acoustic Emission Data

Equipment	Sound Power Level dB(A)	Number of units
PCS unit (inverter)	93	14
ESS unit HVAC	82	32
MV transformer	69	14

1.1.5 Predicted specific sound levels due to the nearest and worst affected residential properties to BESS, calculated using the ISO 9613-2 propagation

1 "Methods for rating and assessing industrial and commercial sound", The British Standards Institution 2019. BS 4142:2014+A1:2019

model, are detailed in **Table 12.1.2**. A sound footprint for the energy storage facility is shown in **Figure 12.1.1**.

1.1.6 The propagation model takes account of sound attenuation due to geometric spreading and atmospheric absorption. The assumed temperature and relative humidity are 10˚C and 70% respectively.

1.1.7 Ground effects are also taken into account by the propagation model, with a ground factor of 0.5 adopted to reflect a mix of hard and porous ground between the site and the assessment locations. A 4m receiver height has been used. The effect of surface features such as buildings and trees has not been considered. There is a degree of conservatism built into the model as a result of the adoption of these settings.

1.1.8 ISO 9613-2 is a downwind propagation model. Where conditions less favourable to sound propagation occur, such as when the assessment locations are crosswind or upwind of the proposed energy storage facility, the predicted sound levels would be expected to be less and the downwind predictions presented here would be regarded as conservative.

Table 12.1.2: Predicted Specific Sound Levels

House ID	Sound Pressure Level, dB L_{Aeq}
H260	5
H262	5
H265	5
H267	5
H268	5
H303	6
H315	2
H305	8

1.1.9 The sound emitted by the inverter cooling fans and HVAC units may have a distinctive character. A correction of 2dB has been applied in the event that tones are just perceptible at the assessment locations. This is a conservative measure as it may not be the case in practice.

1.1.10 The results of an acoustic assessment at the property where the predicted sound level is highest relative to the background sound level, H305, is shown in **Table 12.1.3**. These results represent the worst case as the

rating sound levels would be lower relative to the background sound level at all other properties.

Table 12.1.3: BS 4142 Assessment Results

Results	Day	Night
Residual sound level	31 dB $L_{Aeq,\ 16\ hour}$	31 dB $L_{Aeq,\ 8\ hour}$
Background sound level	26 dB $L_{A90,\ 10\ min}$	26 dB $L_{A90,\ 10\ min}$
Predicted specific sound level	8 dB L_{Aeq}	
Acoustic feature correction	2 dB	
Rating sound level	10 dB L_{Aeq}	
Excess of rating level over background	-16 dB	-16 dB
Predicted ambient sound level	31 dB $L_{Aeq,\ 16\ hour}$	31 dB $L_{Aeq,\ 8\ hour}$
Conclusion	Low impact	Low impact

1.1.11 The BESS is predicted to have a low impact during both day and night time periods at all properties, as the rating sound level is below the existing background sound level.

1.1.12 There is expected to be no change in the ambient sound level during the day and at night due to the introduction of the BESS, consistent with it having a low impact.

1.1.13 In conclusion, the acoustic assessment shows that the impact due to the operation of the proposed energy storage facility is predicted to be low during both day and night-time periods at all houses. No adverse impacts are expected.

1.1.14 Sound emitted during construction of the energy storage facility, including associated traffic flows, is not expected to exceed the criteria specified in BS 5228-1:2009[2] such that significant effects would not be anticipated.

2 'Code of Practice for Noise and vibration control on construction and open sites - Part 1: Noise', British Standards Institution, BS 5228-1:2009

Figure 12.1.1: Predicted ESS Sound Footprint (Specific Sound Level dB LAeq)