



## Bloch Wind Farm

### Technical Appendix 11.1: Assessment of Energy Storage Facility

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## 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.
- 1.1.2 Sound emitted during construction of the energy storage facility, including associated traffic flows, is not predicted to exceed the criteria specified in BS 5228-1:2009<sup>1</sup> such that significant effects would not be anticipated.
- 1.1.3 An acoustic assessment in accordance with BS 4142:2014 + A1:2019<sup>2</sup> has been undertaken to determine the acoustic impact due to the operation of the energy storage facility.
- 1.1.4 The baseline data adopted is that recorded at a wind speed of 1ms<sup>-1</sup> during the background sound measurement surveys made to inform the acoustic assessment of operational noise from the proposed wind farm which correspond to the worst case, or quietest, levels.
- 1.1.5 The main sources of sound within the proposed development are the inverters, transformers and air conditioning for the energy storage systems (ESS). The ESS 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.
- 1.1.6 Acoustic emission data for the proposed equipment is detailed in Table 11.1.1. 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 isn't 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 is used to provide.

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<sup>1</sup> 'Code of Practice for Noise and vibration control on construction and open sites - Part 1: Noise', British Standards Institution, 2009

<sup>2</sup> 'Methods for rating and assessing industrial and commercial sound', British Standards Institution, 2019

**Table 11.1.1: Acoustic Emission Data**

Equipment	Sound Pressure Level at 1m, dB L <sub>Aeq</sub>
PCS unit (inverter & transformer)	79
ESS unit HVAC	78
Auxiliary transformer	69

- 1.1.7 Predicted specific sound levels due to the BESS nearby residential properties, calculated using the ISO 9613-2 propagation model, are detailed in Table 11.1.2. A sound footprint for the energy storage facility is shown in Figure 11.1.1.
- 1.1.8 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.
- 1.1.9 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.
- 1.1.10 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 11.1.2: Predicted Specific Sound Levels**

House ID	Sound Pressure Level, dB L <sub>Aeq</sub>	House ID	Sound Pressure Level, dB L <sub>Aeq</sub>
H1	7	H25	6
H2	11	H26	2
H3	11	H27	6
H4	7	H28	6
H5	11	H29	12
H6	12	H30	-7
H7	9	H31	-7
H8	2	H32	5

House ID	Sound Pressure Level, dB L <sub>Aeq</sub>	House ID	Sound Pressure Level, dB L <sub>Aeq</sub>
H9	10	H33	-7
H10	11	H34	5
H11	11	H35	4
H12	11	H36	8
H13	13	H37	8
H14	14	H38	3
H15	15	H39	6
H16	11	H40	5
H17	14	H41	-1
H18	18	H42	-2
H19	18	H43	4
H20	-3	H44	4
H21	6	H45	-3
H22	8	H46	-2
H23	17	H47	15
H24	6	H48	-6

1.1.11 The sound emitted by the inverter cooling fans and HVAC units can have 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.

## Acoustic Assessment Results

1.1.12 The results of an acoustic assessment at the property where the predicted sound level is largest relative to the background sound level, H23 (Bloch Farm), is shown in Table 11.1.3. This property has financial involvement in the proposed development. These results represent the worst case as the rating sound levels would be smaller relative to the background sound level at all other properties. For example, whilst the predicted specific sound levels at H18 and H19 are 18dB(A), i.e. higher than those at H23, the night-time background sound level is also higher at these locations at 22dB(A) such that the rating level would be 2dB below the background level.

**Table 11.1.3: BS 4142 Assessment Results**

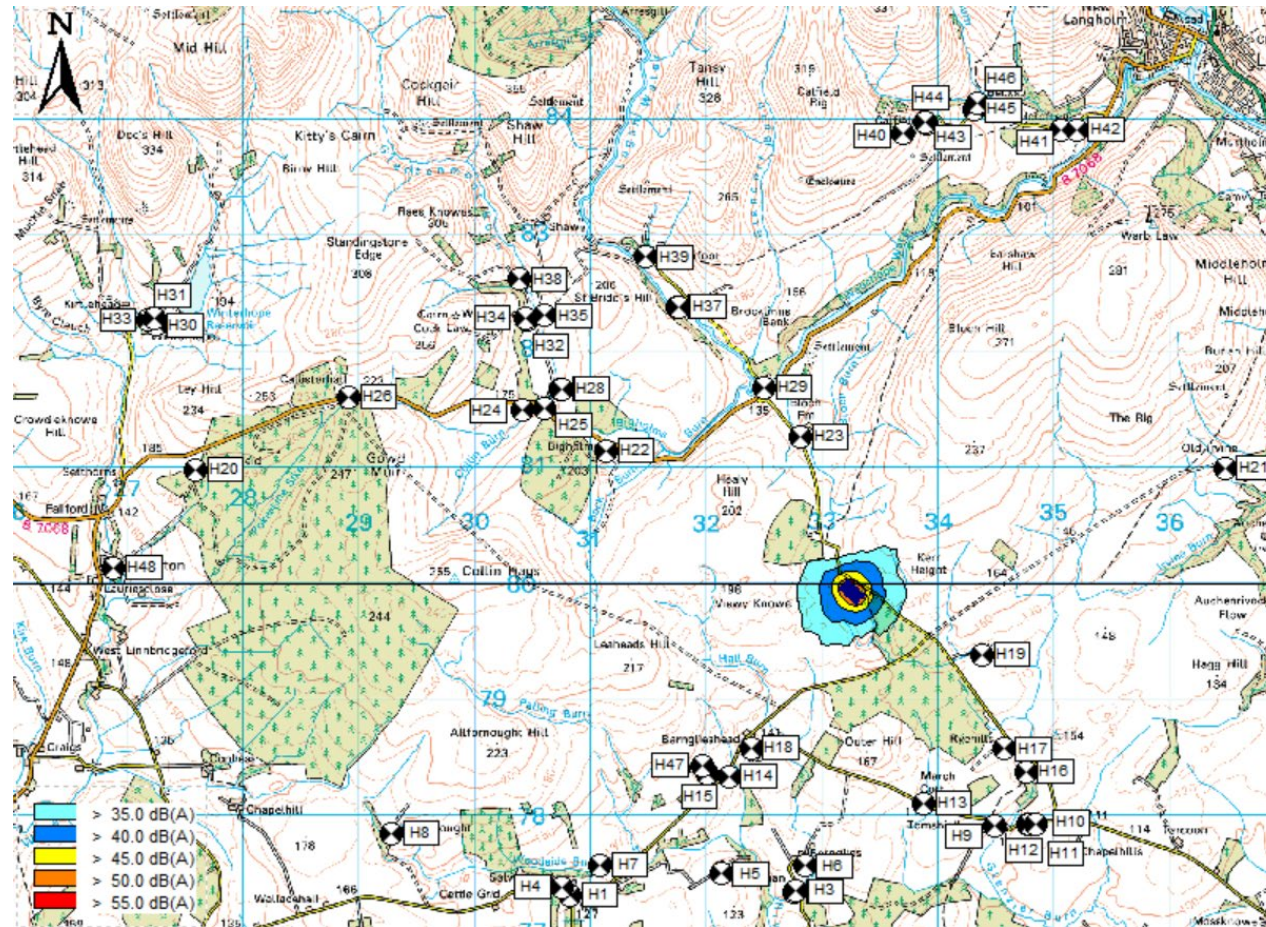
Results	Day	Night
Residual sound level	43dB L <sub>Aeq</sub> , 16 hour	25dB L <sub>Aeq</sub> , 16 hour
Background sound level	29dB L <sub>A90</sub> , 10 min	20dB L <sub>A90</sub> , 10 min
Predicted specific sound level	17dB L <sub>Aeq</sub>	
Acoustic feature correction	2dB	
Rating sound level	19dB L <sub>Aeq</sub>	
Excess of rating level over background	-10dB	-1dB
Predicted ambient sound level	43dB L <sub>Aeq</sub> , 16 hour	26dB L <sub>Aeq</sub> , 16 hour
Conclusion	Low impact	Low impact

- 1.1.13 The BESS is predicted to have a low impact during both day and night-time periods as the rating sound level is at or below the existing background sound level.
- 1.1.14 There is expected to be no change in the ambient sound level during the day and a 1dB increase at night due to the introduction of the BESS, consistent with it having a low impact.
- 1.1.15 The sound levels due to the BESS are predicted to be greater than 10dB below the wind farm sound levels such that they would be deemed insignificant in comparison i.e. there would be no cumulative impact.

## Conclusion

- 1.1.16 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 such that no adverse impacts would be expected. No significant effects are therefore predicted due to the operation of the proposed energy storage facility.

Figure 11.1.1: Predicted BESS Sound Footprint



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