Technical Appendix 10.1: Assessment of Energy Storage Facility

10.1.1 In addition to the wind farm it is also proposed to include energy storage on site. An acoustic assessment in accordance with BS 4142: 2014[1] has been undertaken in order to determine the acoustic impact due to the operation of this part of the Proposed Development.

10.1.2 The baseline data adopted is the worst case of that recorded during the background sound measurement surveys which inform the acoustic assessment of operational noise from the proposed wind farm.

10.1.3 The main sources of sound within the Proposed Development are the sixteen inverters, eight transformers and air conditioning for the Energy Storage Systems (ESS). The eight 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.

10.1.4 Acoustic emission data for the proposed equipment is detailed in Table 10.1.1. 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.

Table 10.1.1 - Acoustic Emission Data

Equipment	Sound Pressure Level at 1m, dB L_{Aeq}
Inverter	77
ESS unit	78
Transformer	65

10.1.5 Predicted specific sound levels due to the proposed energy storage facility at nearby residential properties, calculated using the ISO 9613-2 propagation model, are detailed in Table 10.1.2. A sound footprint for the energy storage facility is shown in Figure 10.1.1.

10.1.6 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.

10.1.7 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 4 m receiver height has been used. Terrain and the effect of surface features such as buildings and trees have not been considered. There is a degree of conservatism built into the model as a result of the adoption of these settings.

10.1.8 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.

[1] "Methods for rating and assessing industrial and commercial sound", The British Standards Institution 2014

Table 10.1.2 - Predicted Specific Sound Levels

House Name	House ID	Sound Pressure Level, dB L_{Aeq}
Brynbedw House	H1	17
1 Greenfield Terrace	H2	16
Nantymoel Farm	H3	18
Bryn Eglur	H4	15
60 Vale View Terrace	H5	17
13 Scotch Street	H6	14
14 Pwllgarn Terrace	H7	17
Residential Caravan	H8	18
Abergwynfi	H9	14
Blaen Cwmdu Farm	H10	6
Blaengarw	H11	16
Bryn Coed	H12	9
40 High Street	H13	14
30 Queen Street	H14	17
Ty-Talgarth	H15	15

10.1.9 The sound emitted by the inverter cooling fans and HVAC units can have distinctive character. A correction of 4 dB has been applied in the event that tones are clearly perceptible at the assessment locations. This is a conservative measure as it may not be the case in practice.

10.1.10 The results of an acoustic assessment at the property where the predicted sound level is largest relative to the background sound level, H13 (40 High Street), are shown in Table 10.1.3.

Table 10.1.3 - BS4142: 2014 Assessment Results

Results	Day	Night
Background sound level	23 dB $L_{A90,\ 10\ min}$	21 dB $L_{A90,\ 10\ min}$
Predicted specific sound level	14 dB L_{Aeq}	
Acoustic feature correction	4 dB	
Rating sound level	18 dB L_{Aeq}	
Excess of rating level over background	-5 dB	-3 dB
Conclusion	Low impact	Low impact

10.1.11 The proposed energy storage facility is predicted to have a low impact during both day and night time periods as the rating sound level is below the existing background sound level.

10.1.12 There is expected to be no change in the ambient sound level due to the introduction of the energy storage facility, consistent with it having a low impact.

10.1.13 The sound levels due to the proposed energy storage facility are predicted to be greater than or equal to 10 dB below the cumulative predicted wind farm sound levels such that they would be deemed insignificant in comparison.

10.1.14 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.

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

Figure 10.1.1 – Predicted Energy Storage Sound Footprint