Appendix 10.6

Wind Speed Calculations

Coolglass Wind Farm EIAR Volume 3

Coolglass Wind Farm Limited

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APPENDIX 10.6 – WIND SPEED CALCULATIONS

The IOA GPG[1] requires that noise data recorded every 10 minutes are related to standardised ten metre wind speeds experienced at the hub height of the turbines, at a location on the wind farm representative of the wind farm. These wind speeds can be either measured directly at the turbine hub height or derived by calculation from measurements at two heights, with measurements at the upper height not less than 60% of the turbine hub height and measurements at least 15 metres below that. These are referred to as 'Method A' or 'Method B' in the IOA GPG which describes these as the preferred methods to use. IOA GPG Supplementary Guidance Note SGN4 provides additional guidance on these methods.

The site of the proposed development has a temporary LiDAR remote sensing measuring system installed which measured wind conditions at various heights as follows:

- 38m,
- 69m,
- 89m,
- 101m,
- 109m,
- 121m, and
- 164m

The nearest measurement height to the proposed hub heights of 102.5m and 99m is 101m. Data captured at this height was used as representative of hub height wind speeds during each 10 minute period.

Wind speeds are standardised to a height of ten metres assuming a reference ground roughness length of 0.05 metres as described in the IOA GPG SGN4, Equation 1. This approach is of the same form as that given in BS EN 61400 11:2003 for calculating ten metre wind speeds related to hub height wind speeds when providing source noise emission data for wind turbines.

$$v_{10} = v_{hh} \times \left(\frac{\ln\left[\frac{10}{z_0}\right]}{\ln\left[\frac{h_{hub}}{z_0}\right]} \right) \qquad \text{Equation 10.1}$$

By using this method, measured background noise levels were correlated to ten metre wind speeds calculated from wind speeds at hub height. Any likely difference in the shear profile during the 24 hours of the day will be accounted for within the method and be reflected in the resulting standardised ten metre wind speed data. The method used to calculate ten metre wind speeds from those at hub height is the same as that used when deriving noise emission data for the turbines. Because the same method has been used, direct comparison of background noise levels, noise limits and predicted turbine noise immission levels may be undertaken. This method is consistent with guidance published in the IOA GPG.

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[1] A Good Practice Guide to the Application of ETSU R 97 for the Assessment and Rating of Wind Turbine Noise, M. Cand, R. Davis, C. Jordan, M. Hayes, R. Perkins, Institute of Acoustics, May 2013.

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