Appendix 11.2: Methodology for calculating wind shear from different height Met Mast wind speed.

Supplementary Guidance Note 4: Wind Shear Equations

a) **Standardising from hub height (hh) to 10m**

$v_{10} = v_{hh} * (LN(10/0.05)/LN(hh/0.05))$ [EQUATION 1]

v_{10} = Standardised 10m wind speed

v_{hh} = Hub height wind speed   Hub heights (hh) = 102.5m and 110.5m

0.05 = Standard ground roughness length which remains constant (fixed)

b) Calculating from different heights

$v_1 = v_2*(h1/h_2)^m$ [EQUATION 2]

v_1 = wind speed at h_1

v_2 = Wind speed at h_2

h_2 = 10m

m = Wind shear

c) Equation **b** can be re-arranged to determine wind shear exponent 'm' based on known data at two different Met mast heights (80m and 50m). With wind shear calculated this can be applied to the wind speed at higher (differing) height of 80m to determine hub height wind speed (hub heights being 110.5m and 102.5m).

$m = LN(v_2/v_1) / LN(h_2/h_1)$ [EQUATION 3]

NB: There is no change in sound power levels from 105m to 102.5m hub height over range of wind speeds