Appendix 12D

NOISE MODELLING CALCULATIONS PARAMETERS

Noise Modelling Calculation Parameters

The ISO propagation model calculates the predicted sound pressure level by taking the source sound power level for each turbine in separate octave bands and subtracting a number of attenuation factors according to the following:

Predicted Octave Band Noise Level = L_{WA} + D - Ageo - Aatm - Agr - Abar - Amisc

The predicted octave band levels from the turbine are summed together to give the overall 'A' weighted predicted sound level.

Directivity Factor

The directivity factor allows for an adjustment to be made where the sound radiated in the direction of interest is higher than that for which the sound power level is specified. Typically, the sound power level is measured in a downwind direction, corresponding to the worst-case propagation conditions considered here.

Ageo – Geometrical Divergence

The geometrical divergence accounts for spherical spreading in the free-field from a point sound source resulting in an attenuation depending on distance according to the following equation:

Ageo = 20 x log(d) + 11

where, d = distance from the turbine

The wind turbine may be considered as a point source beyond distances corresponding to one rotor diameter.

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Aatm - Atmospheric Absorption

The atmospheric absorption accounts for the frequency dependant linear attenuation with distance of sound power over the frequency spectrum according to the following equation:

Aatm = d x α

where,

α = the atmospheric absorption coefficient of the relevant frequency band.

Published values of 'α' from ISO9613 Part 1 have been used, corresponding to a temperature of 10°C and a relative humidity of 70%, the values specified in the IoA GPG, which give relatively low levels of atmospheric attenuation, and subsequently worst-case noise predictions as given in Table 1.

Table 1: Atmospheric Absorption Coefficients.

Octave Band Centre Frequency (Hz)	63	125	250	500	1k	2k	4k	8k
Atmospheric Absorption Coefficient (dB/m)	0.0001	0.0004	0.0010	0.0019	0.0037	0.0097	0.0328	0.1170

Agr – Ground Effect

Ground effect is the interference of sound reflected by the ground interfering with the sound propagating directly from source to receiver. The prediction of ground effects is inherently complex and depend on the source height, receiver height, propagation height between the source and receiver and the ground conditions.

The ground conditions are described according to a variable G which varies between 0 for 'hard' ground (includes paving, water, ice, concrete and any sites with low porosity) and 1 for 'soft' ground (includes ground covered by grass, trees or other vegetation). The IoA GPG states that the use of G = 0.5 and a receptor height of 4m are appropriate assumptions for the determination of noise emission levels at receptor locations downwind of wind turbines provided that an appropriate margin for uncertainty has been included within the source levels for the proposed turbine.

Accordingly, predictions in this report are based on G = 0.5 with a receptor height of 4m.

Amisc – Miscellaneous Other Effects

ISO 9613 includes effects of propagation through foliage, industrial plants and housing as additional attenuation effects. These have not been included here and any such effects are unlikely to significantly reduce noise levels below those predicted

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