Regional Wind Planning Seminar

Environmental Considerations in Wind Farm Development

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Topics

- *Noise*
- *Visual Impact (ZTV)*
- *Shadow Flicker*
- *Meteorological Masts*
- *Geotechnical (Peat Stability Assessment)*
- *Hydrology*

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Noise

- *Advances in turbine technology have resulted in reduced aerodynamic and mechanical noise*
- *Potential turbine noise disturbance typically between wind speeds of 4 and 10 m/s*
- *Noise sensitive locations (receptors)*
- *DoEHLG Wind Farm Planing Guidelines*
  - *In general, a lower fixed limit of 45 dB(A)$_{10}$ or a maximum increase of 5dB(A) above background noise at nearby noise sensitive locations is considered appropriate to provide protection to wind energy development neighbours. However, in very quiet areas, the use of a margin of 5dB(A) above background noise at nearby noise sensitive properties is not necessary to offer a reasonable degree of protection and may unduly restrict wind energy developments which should be recognised as having wider national and global benefits. Instead, in low noise environments where background noise is less than 30 dB(A), it is recommended that the daytime level of the LA90, 10min of the wind energy development noise be limited to an absolute level within the range of 35-40 dB(A).*
  - *A fixed limit of 43dB(A) will protect sleep inside properties during the night*

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Noise

Day time noise limit

- *45 dB(A) or 5 dB(A) above background*

If background < 30 dB(A) then

- *35 to 40 dB(A)*

Night time noise limit

- *43 dB(A) or 5 dB(A) above background*

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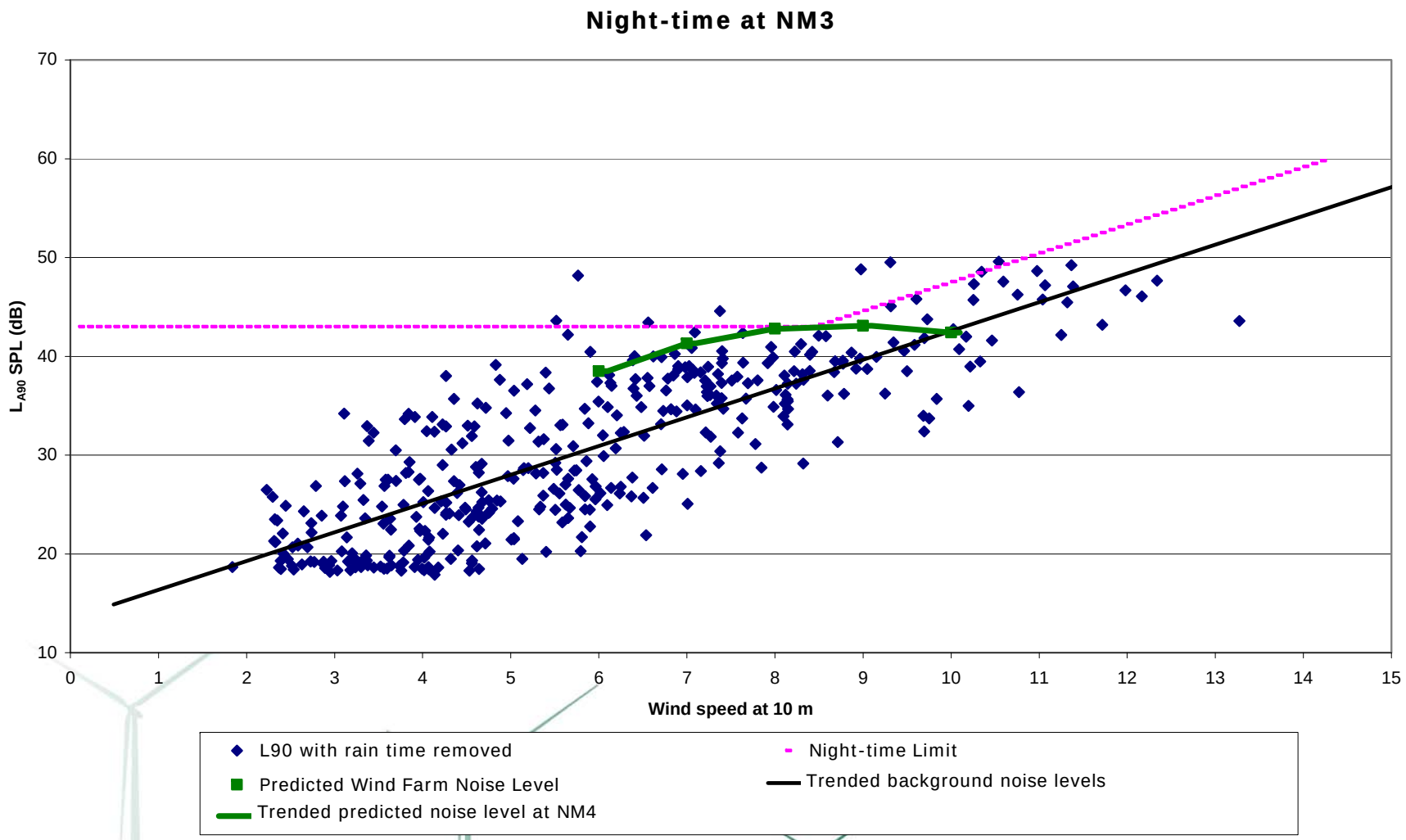

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Noise

Noise models are usually conservative – typical noise prediction model assumptions:

- *omni-directional wind*
- *hard ground*
- *no barriers*
- *turbines with loudest noise characteristics used*

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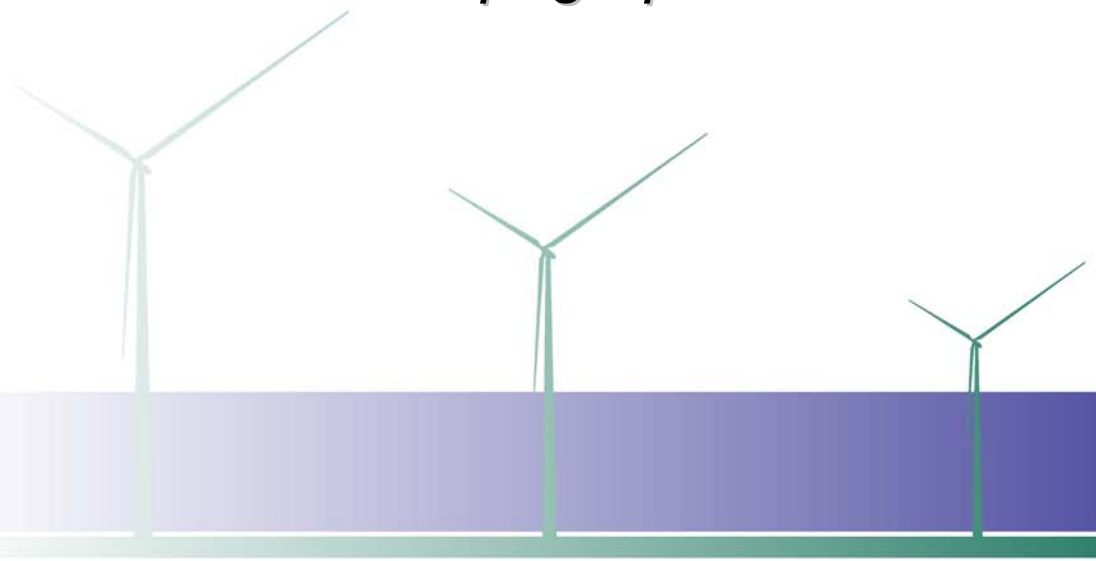
Visual (ZTV)

- *Representative*
- *Very conservative*
- *Does not take into account local screening*
- *Usually based on 10 m contours and does not take into account local topographical features*



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Shadow Flicker

- *Overview*
  - *Description*
  - *Variables (windows, distance, wind direction, turbine dimensions, time, weather)*
- *Model*
  - *Geometric model (path of sun, turbine dimensions, topography and receptor locations)*
  - *Simplifications (clear skies, turbines rotating, blades perpendicular, sun represented as point)*
- *Shadow flicker has no effect at distances > 10 rotor diameters or 1000 m*

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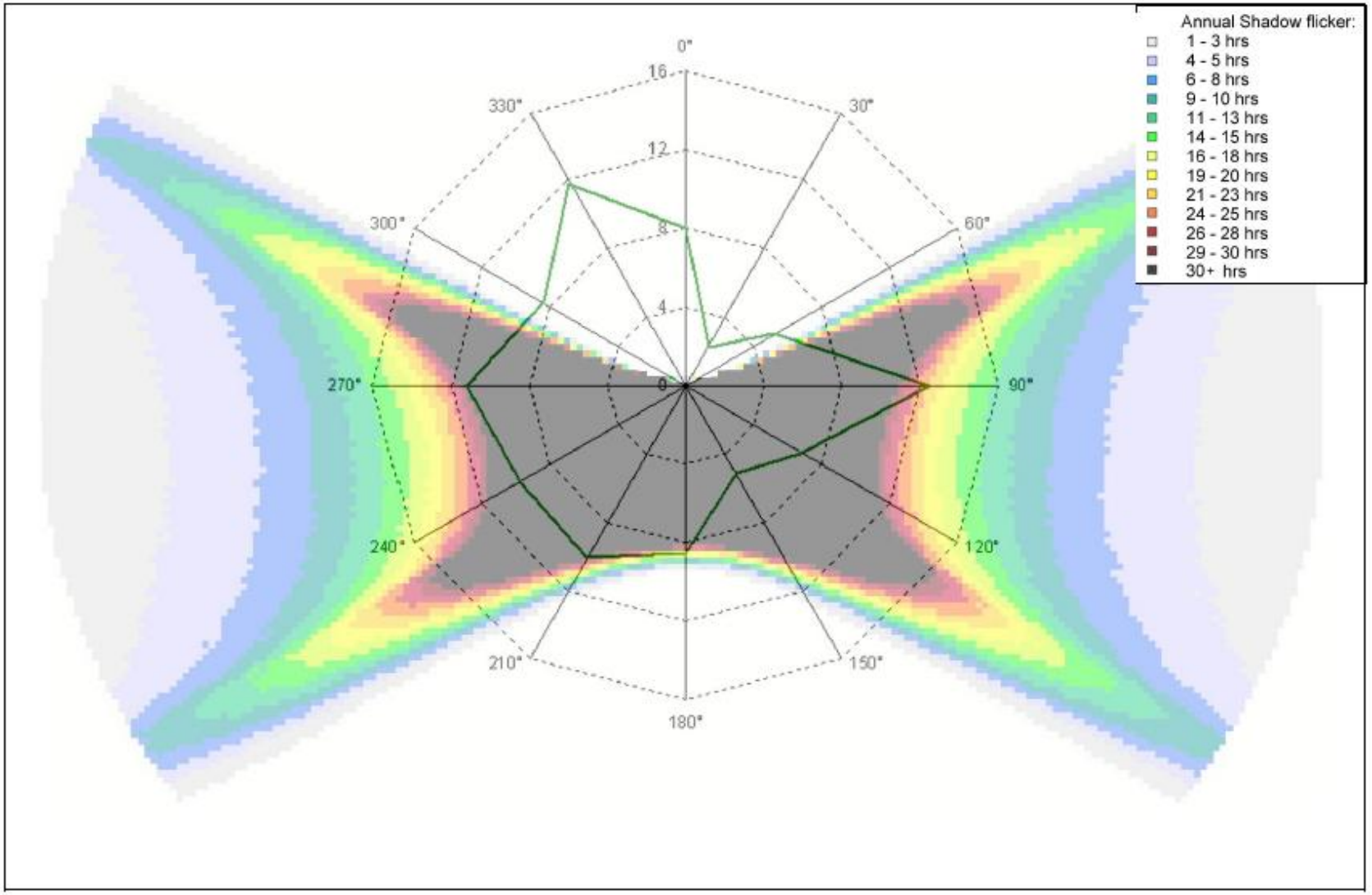

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Shadow Flicker

- *Conservative Assumptions:*
  - *Wind direction (can be adjusted by assessment of wind rose)*
  - *Cloud cover (can be adjusted by reference to cloud data)*
  - *Screening*
  - *Turbine in constant operation*
  - *Sun modelled as point source, blades modelled as disks, hub doesn't block out sun, aerosol effect*

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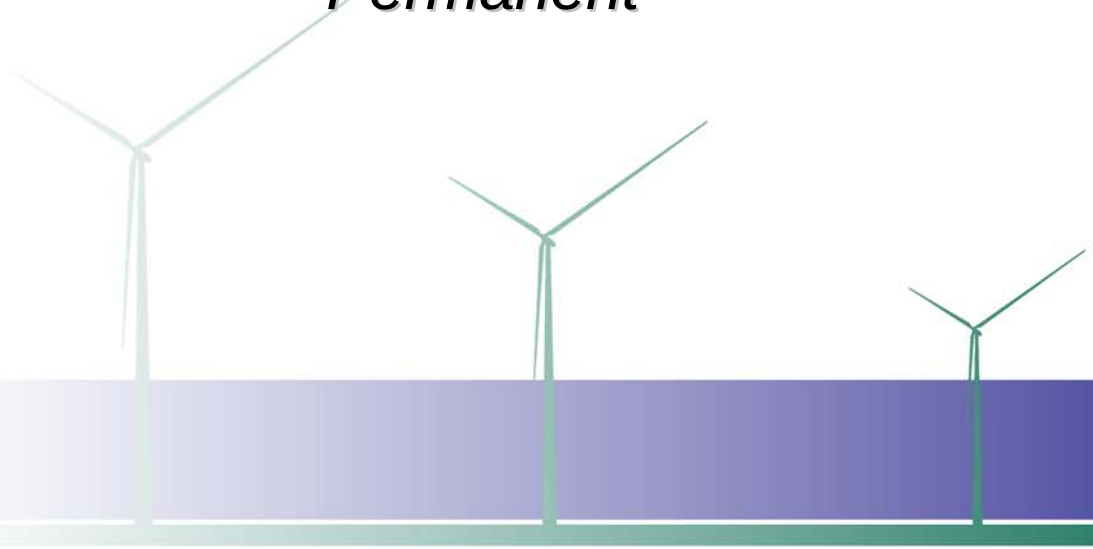
Meteorological Masts

- *Poles*
- *Lattice masts*
- *Free standing*
- *With stays*
- *Temporary*
- *Permanent*



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Geotechnical

- *Fieldwork (geomorphological mapping, probes, shear vane tests, experience)*
- *Peat Stability Assessment*
- *Landslide Susceptibility Mapping*
- *Factors include:*
  - *Peat depth, slope, aspect, altitude, curvature, vegetation*
- *Slope Stability Analysis*
- *Possible Landslide Routes*
- *Landslide Hazard Zone Plan*

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Hydrology

- *Maintain existing overland flow*
- *Regular outlets from new runoff*
- *Silt traps, fences, curtains*
- *Sedimentation ponds*
- *Attenuation*
- *Water quality*

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