Noise
&
Wind Turbines

andrewbullmore@acoustics.hoarelea.com

HOARE LEA ACOUSTICS

Planning & Noise – Planning Policy Guidance Note 24

HOARE LEA ACOUSTICS

PPG 24

‘The aim of this guidance is to provide advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development ….’

Renewable Energy – Planning Policy Guidance Note 22

PPG 22

- insufficient information available at time of writing (1993) for quantitative guidance on noise limits
- presents a general discussion on the ‘bland’ qualities of wind turbine noise and the beneficial masking effects of natural wind noise
- suggests 350m to 400m separation distance should offer adequate protection

HOARE LEA ACOUSTICS

Planning Policy Guidance Note 22

PPG 22

- ‘Sites proposed for the development of renewable energy sources will often be in rural areas or on the coast ...
- Such development will almost always have some local environmental effects …
- Government’s policies for developing renewable energy sources must be weighed carefully with its continuing commitment to policies for protecting the environment …
- Authorities will need to consider both the immediate impact of renewable energy projects on the local environment and their wider contribution to reducing emissions of greenhouse gases …’

HOARE LEA ACOUSTICS

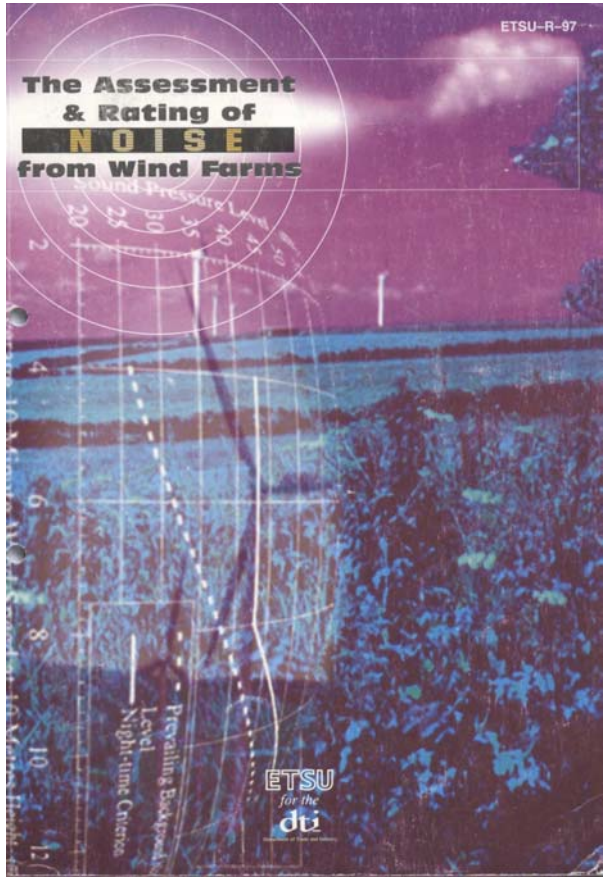
Windfarm Noise – Updated Guidance

Draft PPS22

- 'Renewable technologies may generate small increases in noise levels *(during both construction and operation)* ….
- Local planning authorities should ensure that renewable energy developments have been located and designated is such a way as to minimise increases in ambient noise levels….
- The 1996 report by ETSU for the Department of Trade and Industry should be used to assess and rate noise from wind energy development.'

HOARE LEA ACOUSTICS

ETSU-R-97

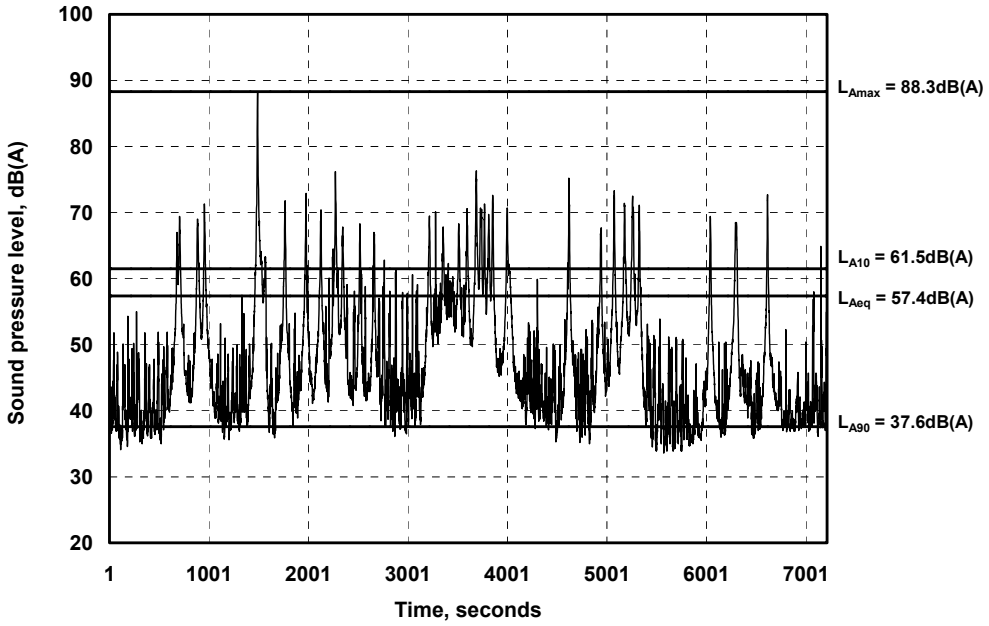


- working group comprised wind farm developers, environmental health officers and independent acoustic consultants
- convened primarily to address shortcomings of BS4142 when applied to wind farm noise
- also to collate experience to date with UK wind farms compared with experience in other countries

HOARE LEA ACOUSTICS

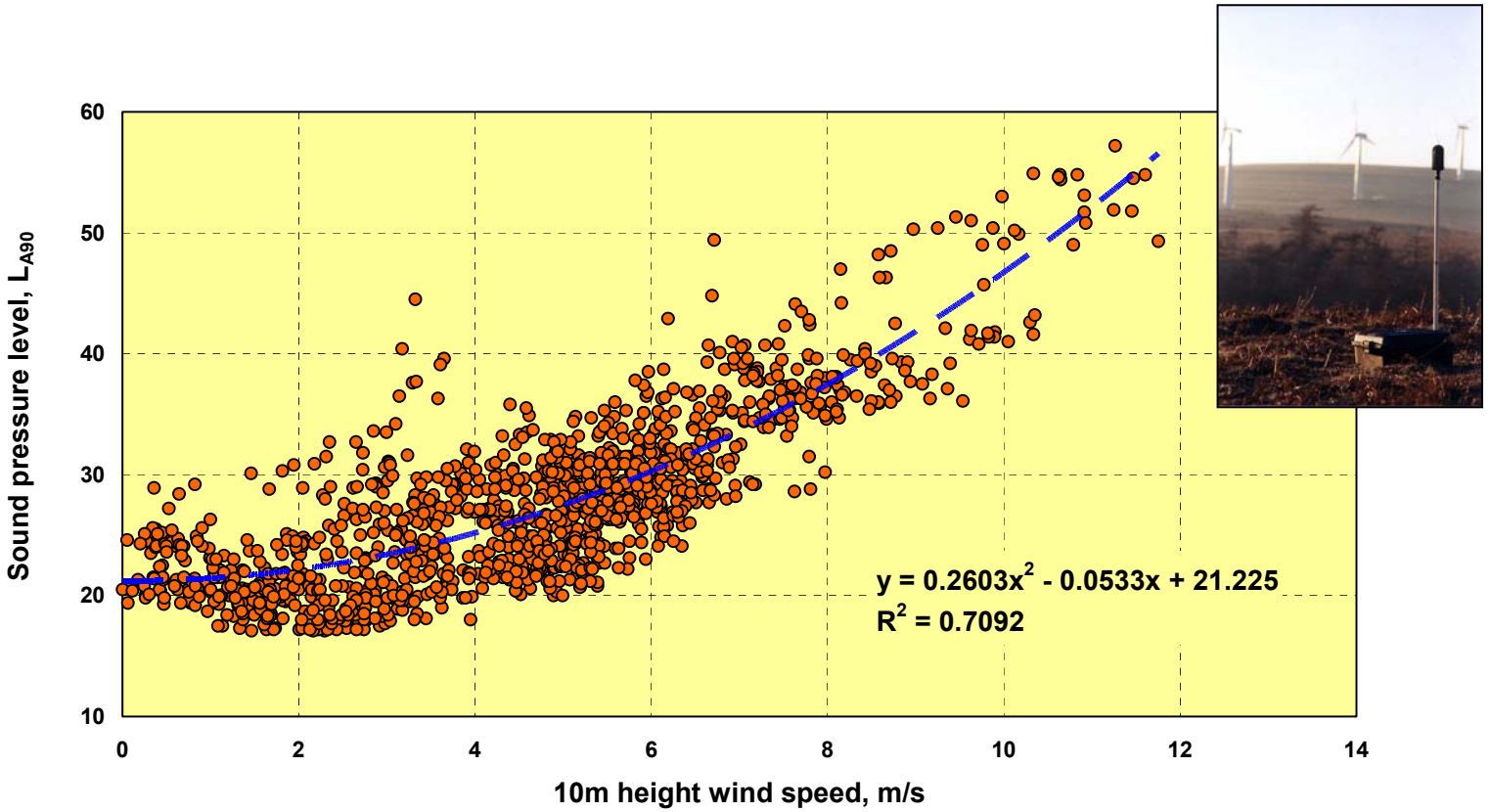
The Starting Point – BS4142

- assess impact by comparing the noise level at nearby residences due to the source under investigation against the background noise at those residences
- establish existing background noise through measurement
- assess potential impact separately for daytime and night-time periods
- undertake all assessments in conditions of low wind speed
- do not apply if background level <30dB(A)



HOARE LEA ACOUSTICS

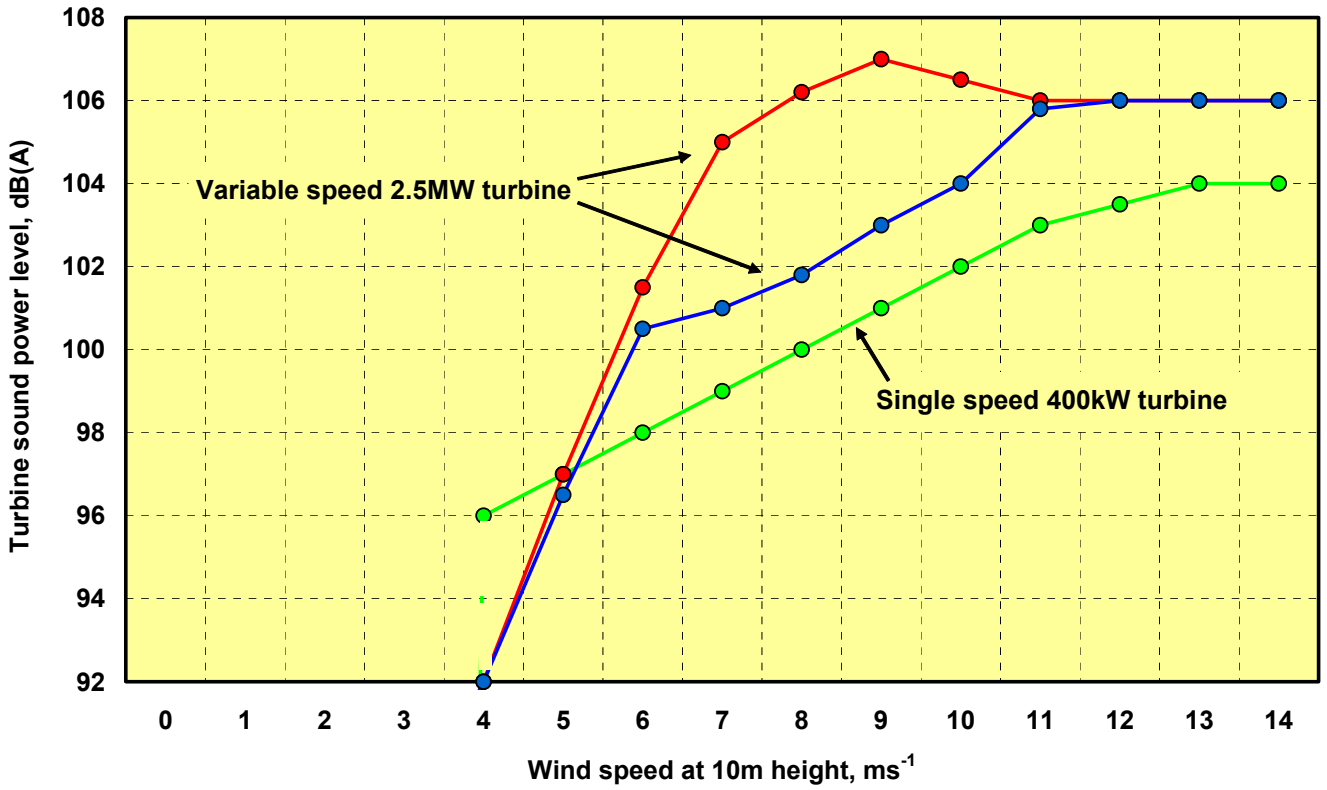
Background noise and wind farms



- background noise levels often fall below 30dB(A)
- noise levels also vary with wind speed

HOARE LEA ACOUSTICS

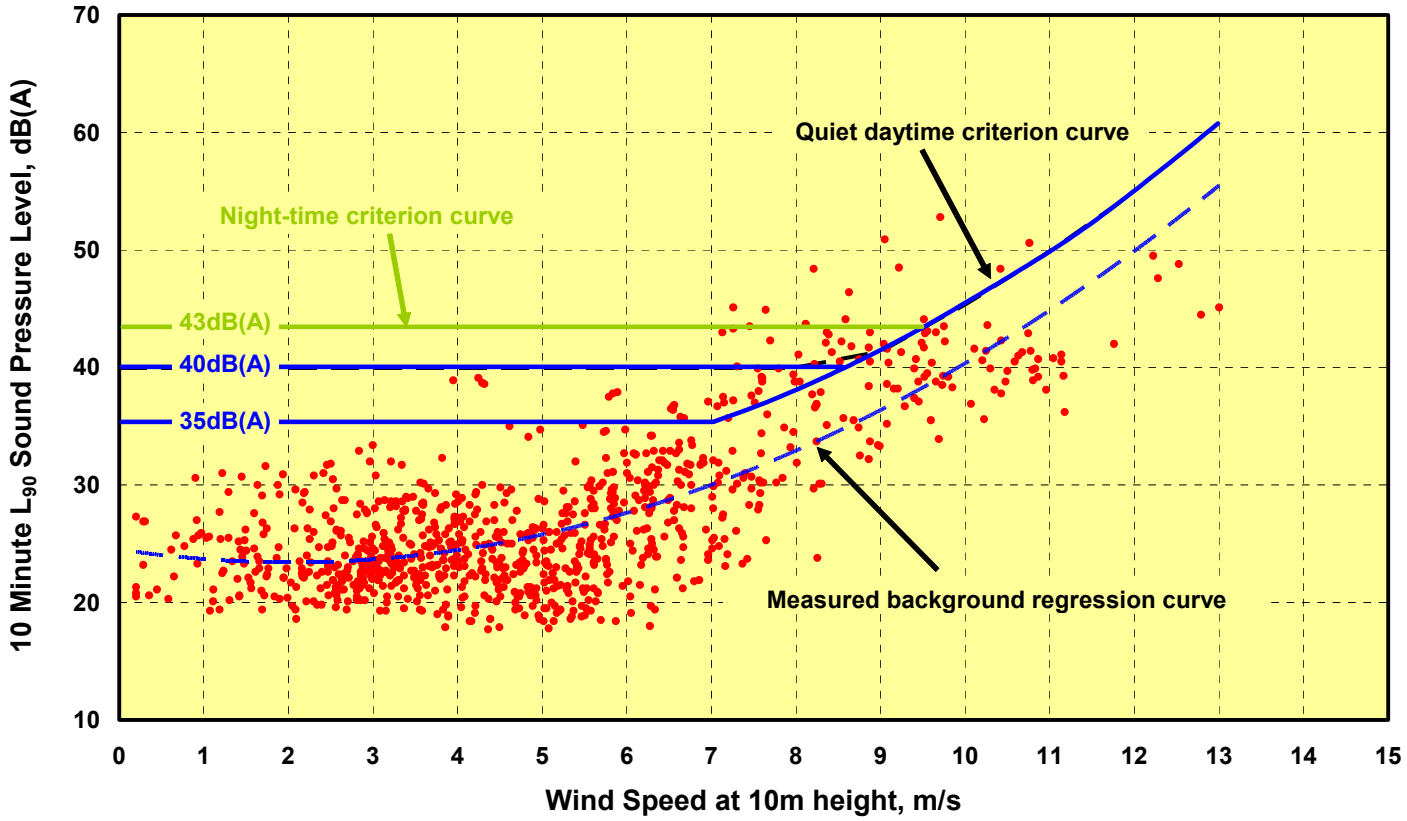
Source noise and wind farms



- turbine sound output levels are wind speed dependent
- actual variation with wind speed is turbine specific

HOARE LEA ACOUSTICS

Derivation of criterion curves



- allow 5dB(A) increase above background (minus tonal penalty)
- where background is low, apply fixed lower limit

HOARE LEA ACOUSTICS

Choice of lower noise limits

- use of 5dB(A) increase above background limits in very quiet areas is not necessary to offer a reasonable degree of protection to wind farm neighbours

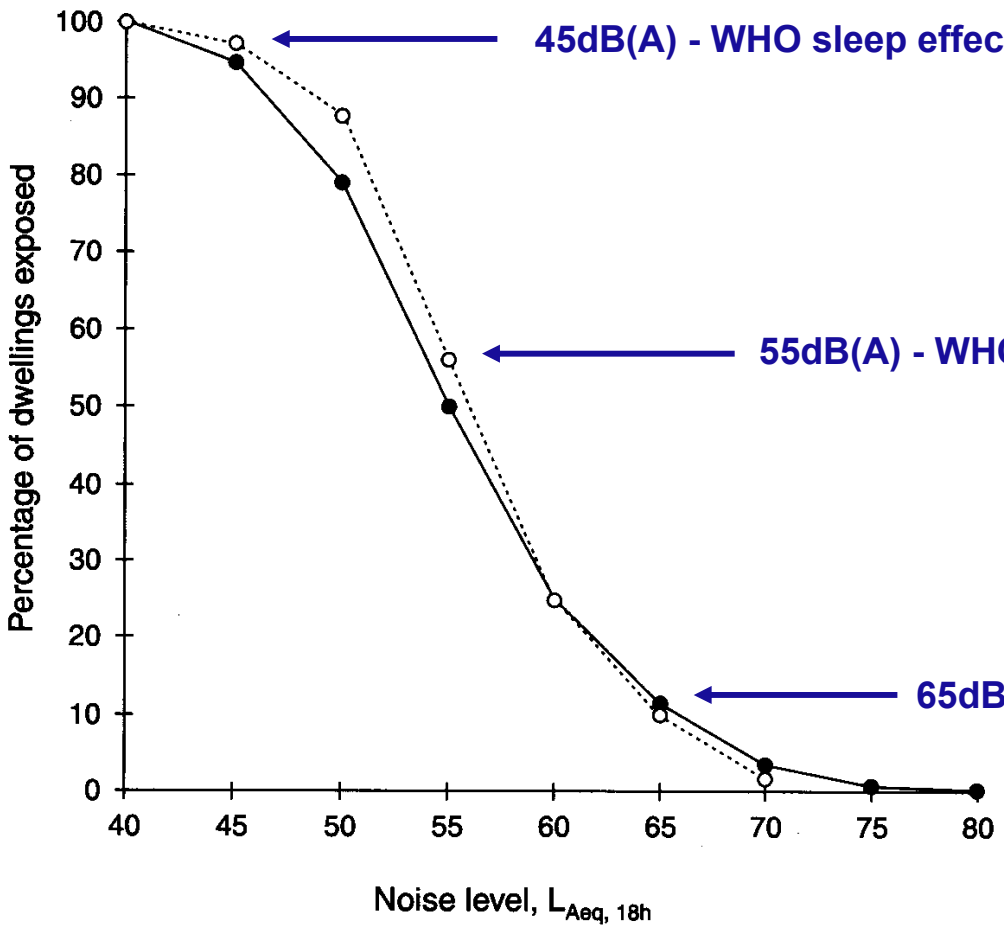
- use of such limits would also unduly restrict developments recognised as having wider national and global benefits

- limits have been set as free field external levels in accord with World Health Organisation Guidelines to:
  - protect external amenity during the day [35 to 40dB(A)]
  - protect sleep inside properties during the night [43dB(A)]

- actual lower limit of between 35dB(A) and 40dB(A) should reflect
  - number of dwellings affected
  - the effect of noise limits on kWh generated
  - the duration of the level of exposure

HOARE LEA ACOUSTICS

World Health Organisation Guidelines



45dB(A) - WHO sleep effects night-time

55dB(A) - WHO 'desirable' daytime

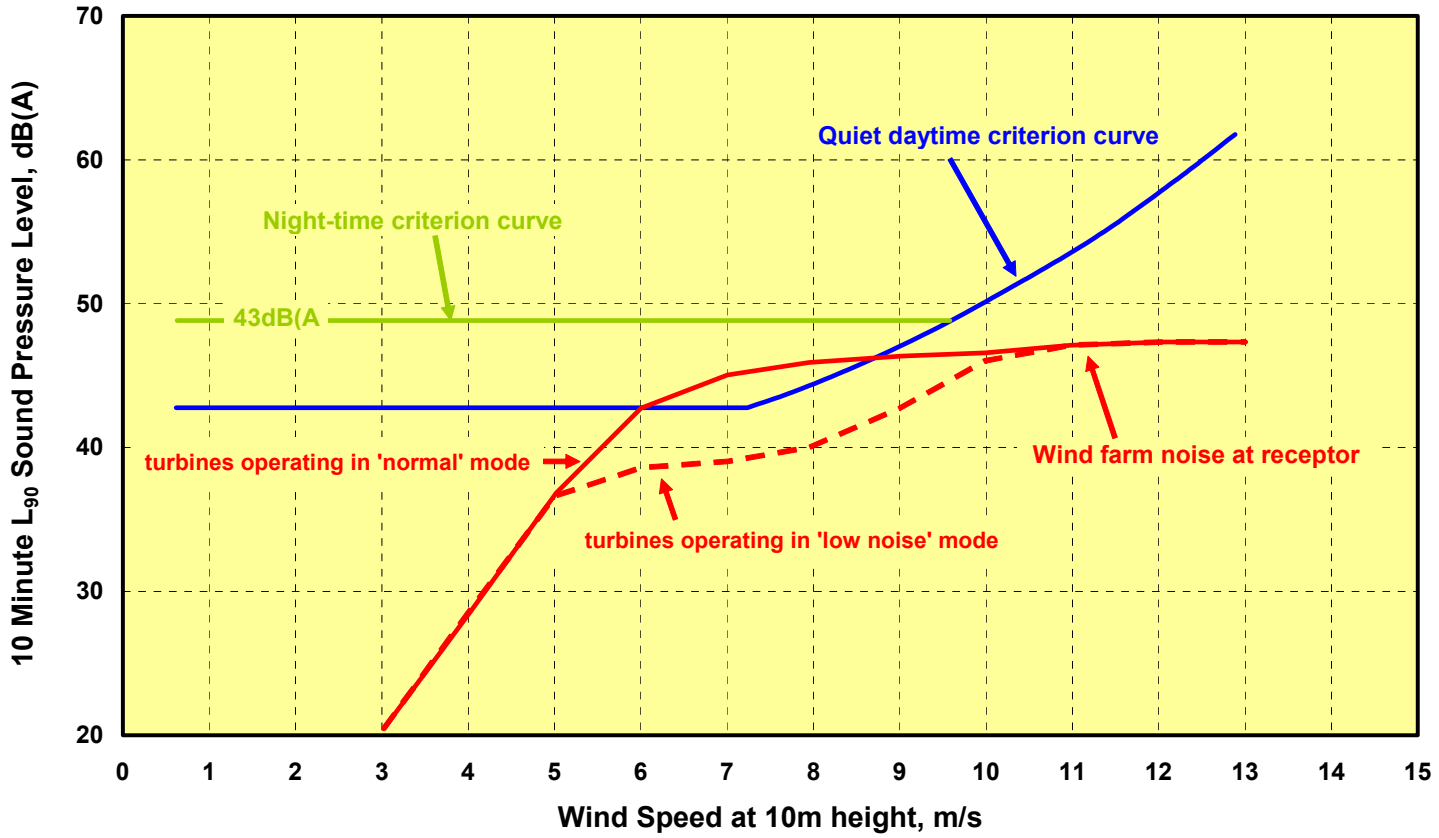
65dB(A) - WHO 'tolerable' daytime

Plot shows results of UK National Noise Incidence Surveys [BRE]

solid line = 1972, dashed line = 1990

HOARE LEA ACOUSTICS

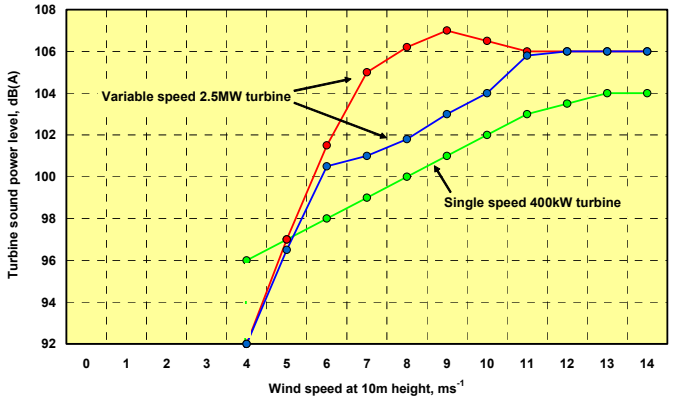
Assessment of Noise Impact

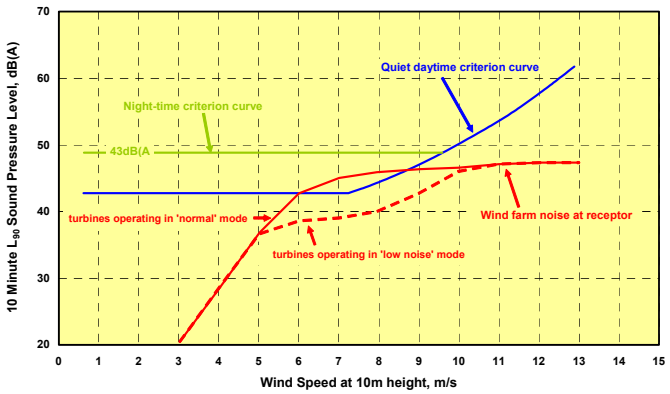


HOARE LEA ACOUSTICS

Current trends & summary

- turbines increasing in size to >2.0 MW
- typical increase in noise ~6dB(A), although noise levels of new larger turbines often lower at cut-in due to variable speed rotors
- all other things being equal, original >350m recommended separation distance on grounds of noise should now be >700m
- but … sound output of modern turbines can be regulated, albeit with some loss of power
- Target should be an appropriate balance between power generation, noise impact and other environmental impacts





HOARE LEA ACOUSTICS