



**ACCON**<sub>UK</sub>  
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**Accounting for Uncertainties in  
the Assessment of Noise from  
Proposed Windfarms/Wind  
Turbines**  
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# Accounting for Uncertainties in the Assessment of Noise from Proposed Windfarms

This presentation will focus on some of the following points:

- Recent Planning Inspector decisions in respect of wind turbines
- Judicial Review
- ETSU-R-97
- The IOA Position Paper
- How are noise predictions made and what are the assumptions
- Background noise monitoring
- Where do the uncertainties occur?
- Appropriate noise conditions

# Recent Planning Decisions

- Appeal reference APP/A3010/A/06/2017850 Grove, East of Retford
  - Proposal for ten turbines:
    - Considerable agreement between main parties noise experts
    - Statement of common ground
    - Wind farm could be operated so as to comply with ETSU-R-97
    - Daytime limit of 37.5  $L_{A90, 10 \text{ min}}$  chosen

## Recent Planning Decisions

- **It is unusual for appeals to be determined on the noise case alone!**
- **Appeal reference APP/F2605/A/08/2089810 Wood Farm, Shipdham**
  - **Proposal for two turbines:**
    - **Noise measurements considered to be unrepresentative**
    - **Anomalies causes doubt as to the accuracy of the results**
    - **Detailed data provided for windshear**
    - **Detailed data showed that non-neutral or stable conditions prevailed for 82% of the time; as opposed to the neutral conditions that ETSU assumes**
    - **Inspector decision - Proposed noise conditions could not control noise effectively: Fail the Circular 11/95 tests of precisional enforceability and are too cumbersome for frequent use.**

## **Judicial Review/Legal Challenge**

- **Increasing lack of acceptance of Appeal Decisions**
- **Challenge from both applicants and objectors**
- **e.g. the Podington Decision**
- **Denbrook –request for detailed wind data**



## Podington –The Inspector’s DL

However, the approach used by the appellant does not represent Government policy and stipulated practice, and it does not appear to be supported by further research. Furthermore, the later assessment is based on information obtained from a meteorological mast that was away from the appeal site and used in connection with an earlier proposal for a larger wind farm. I also share the Council’s concern that background noise level measurements were limited only to the closest properties to the site. Moreover, I consider that the period during which the later assessment was carried out was too brief. Altogether I find the overall lack of compliance with the stated Government policy approach creates such a degree of uncertainty over the assessment that I cannot rely on its findings. I have considered whether or not conditions could be imposed on any approval detailing noise levels not to be exceeded at specific points. However, I find that I have insufficient evidence before me to be satisfied that such conditions would be enough to mitigate any noise impacts.

# Podington –The Appellants Response

- The Inspector failed to revisit in the light of his continuing duty under EIA Reg 19(1), his earlier consideration of the adequacy of the ES
- The Inspector had a duty to notify the Appellants of his opinion and require the provision of additional information
- In Nov 2009 DECC published the Draft National Policy Statement for Renewable Energy Infrastructure, this reiterated at EN-3 para 2.6.4, : ETSU-R-97 as being the guidance to use but added that this should **‘be in accordance with latest industry practice which should reflect any updated guidance issued in relation to ETSU and accepted by Government ‘**
- Nuon has reserved its right to challenge the Inspector’s findings on noise outside of the Section 288 (1)(b) application under the Town & Country Planning Act 1990.

# Wind Farm Noise Complaints

- Hamsterley & Upper Gauntless Action Group
- Recent research on 217 operational windfarms
- 20% incidence of complaints
- **Does this mean that we are correctly assessing the noise impact of wind turbines?**

# The fundamentals of wind turbine noise assessment

- **Measure background noise levels**
- **Determine noise limits as per ETSU-R-97**
- **Predict turbine noise levels at different speeds**

# How are Turbine Noise Levels Rated?

- Sound Power Levels – IEC 61400-11
- IEC 61400-11 is a standard for turbine noise measurement techniques.
  - Widely accepted
  - Reproducible results
  - Used for certification
  - Used for warranties
  - Note that the ES will only identify candidate turbines
  - Therefore uncertainty as to ultimate headroom between predicted noise levels and the derived noise limit!

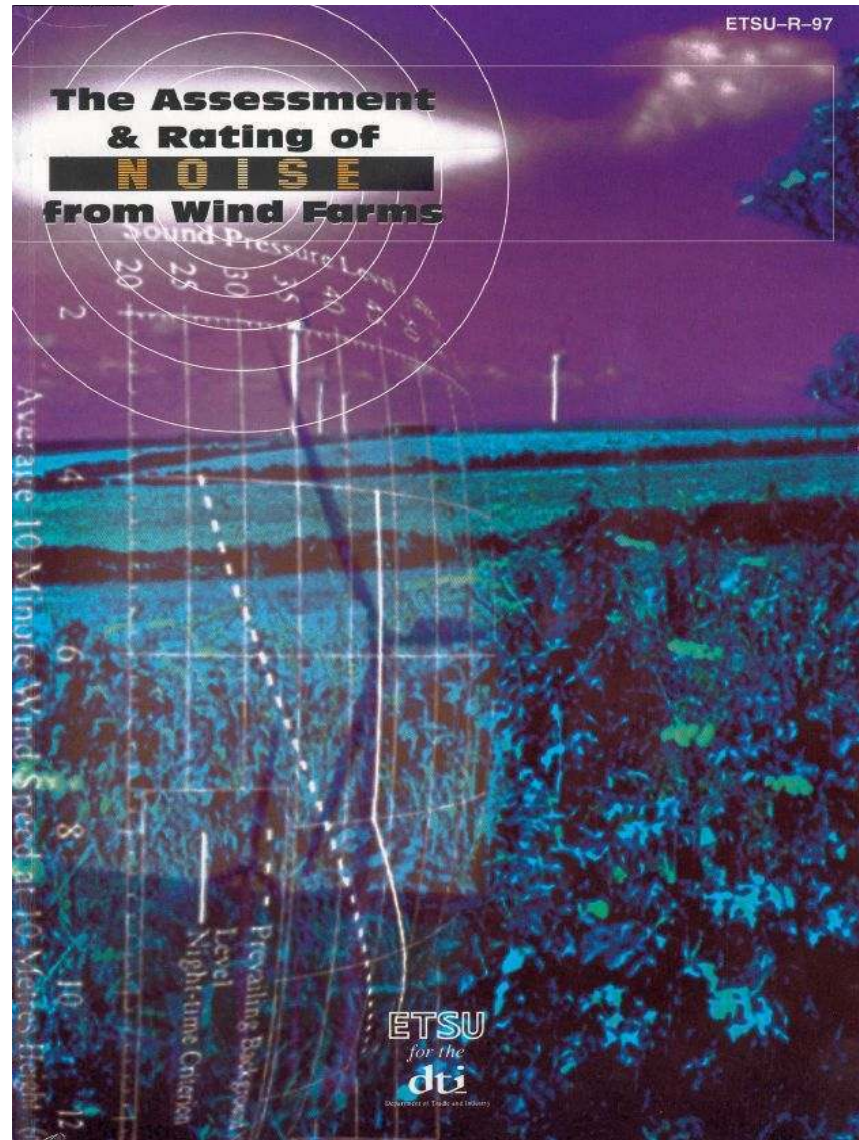
# How is it Assessed?

## Planning Policy Statement 22: Renewable Energy.

### At Paragraph 22 it states:

*“Renewable technologies may generate small increases in noise levels (whether from machinery such as aerodynamic noise from wind turbines, or from associated sources – for example traffic). Local planning authorities should ensure that renewable energy developments have been located and designed in such a way to minimise increases in ambient noise levels. Plans may include criteria that set out the minimum separation distances between different types of renewable energy projects and existing developments. The 1997 report by ETSU for the Department of Trade and Industry should be used to assess and rate noise from wind energy development.”*

# Wind Farm Noise – Setting Acceptable Limits

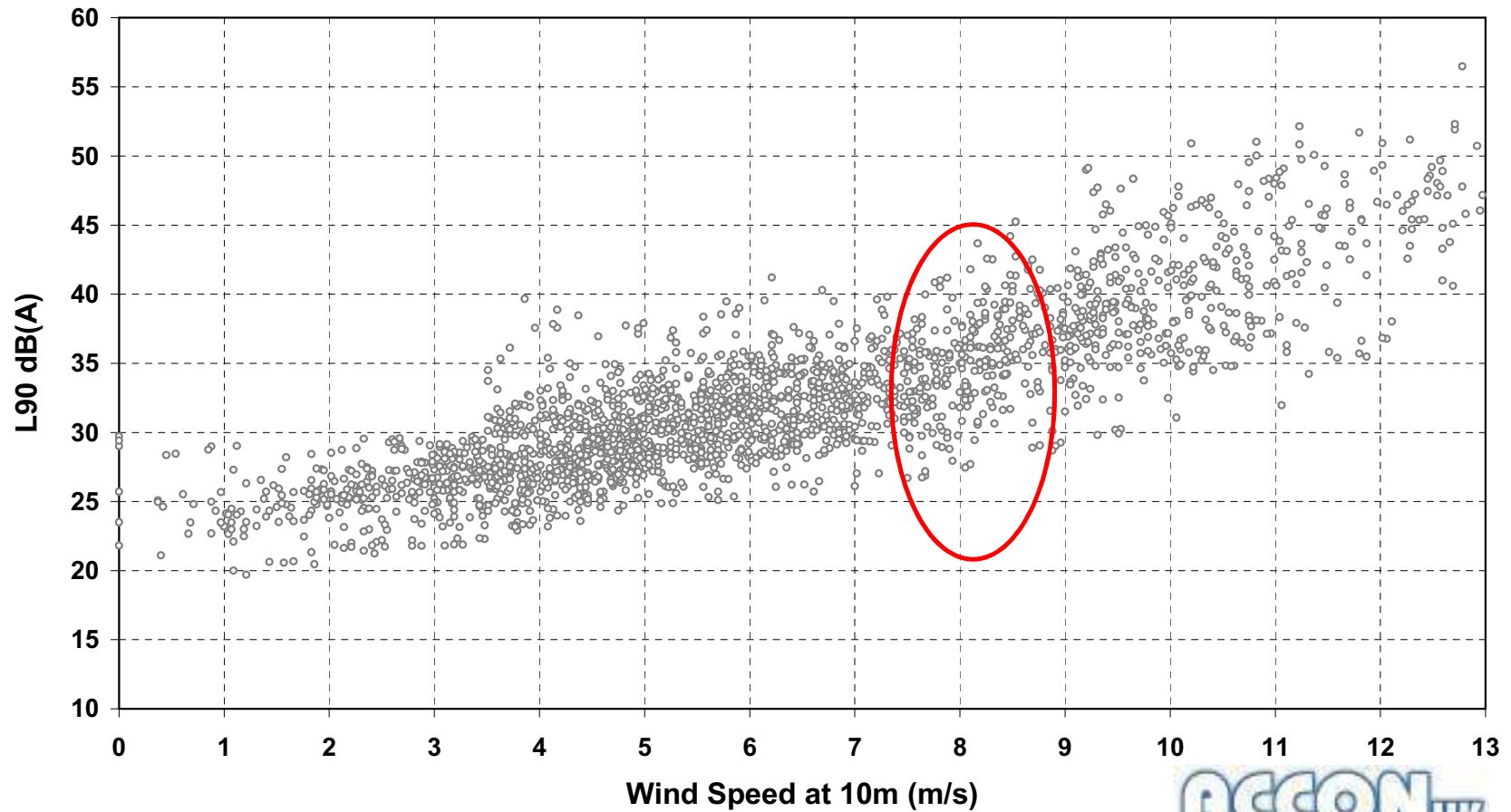


# The Important Aspects of ETSU-R-97 and its Background

- The NWG recommend that noise limits should be set relative to the background noise level ( $L_{A90}$ )
- Separate limits should apply to daytime and nighttime
  - During the nighttime external amenity is less important and therefore the emphasis should be on preventing sleep

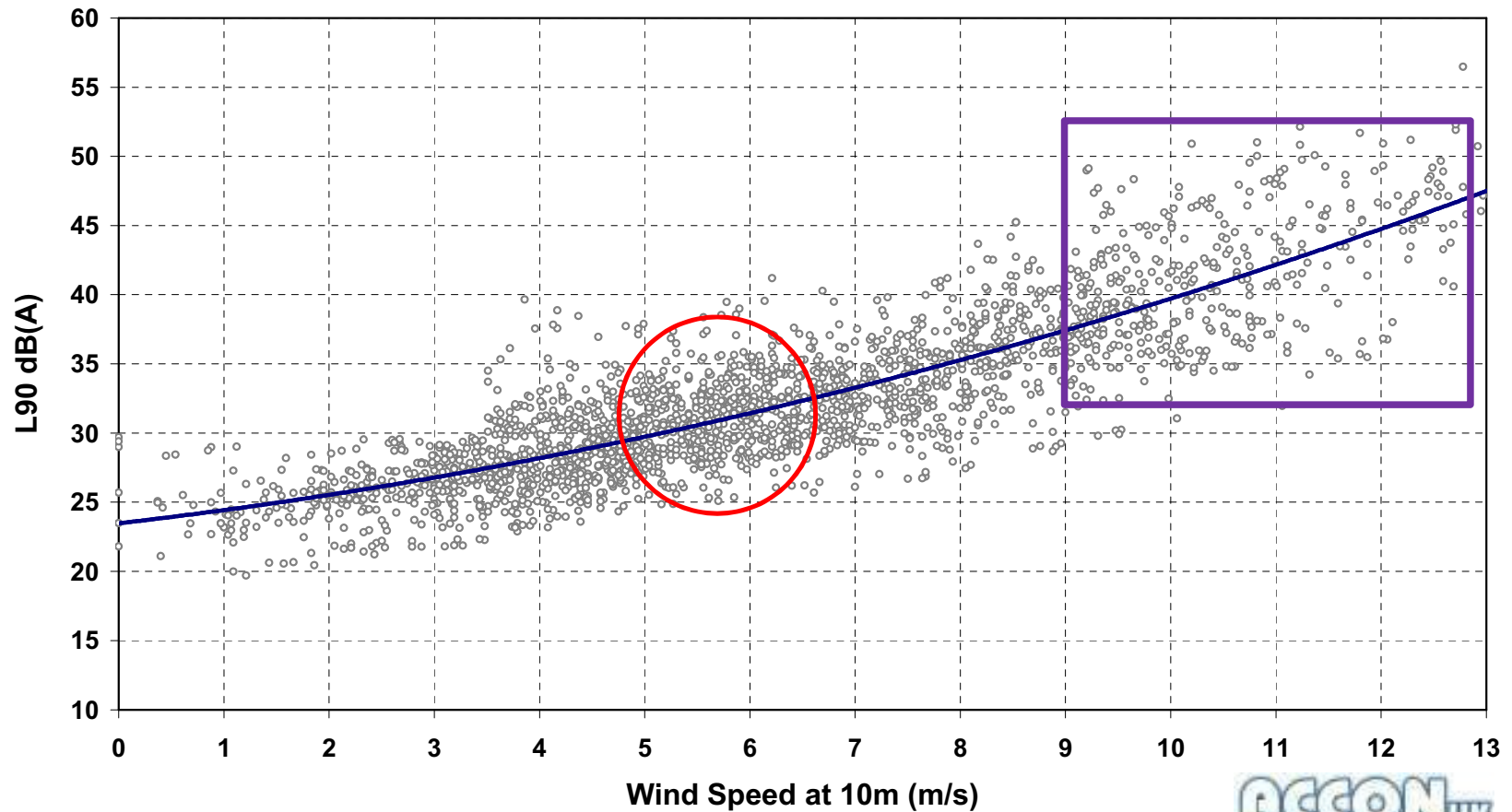
# Measure the Existing Background Noise

Assessment Property - Quiet Day-time Periods

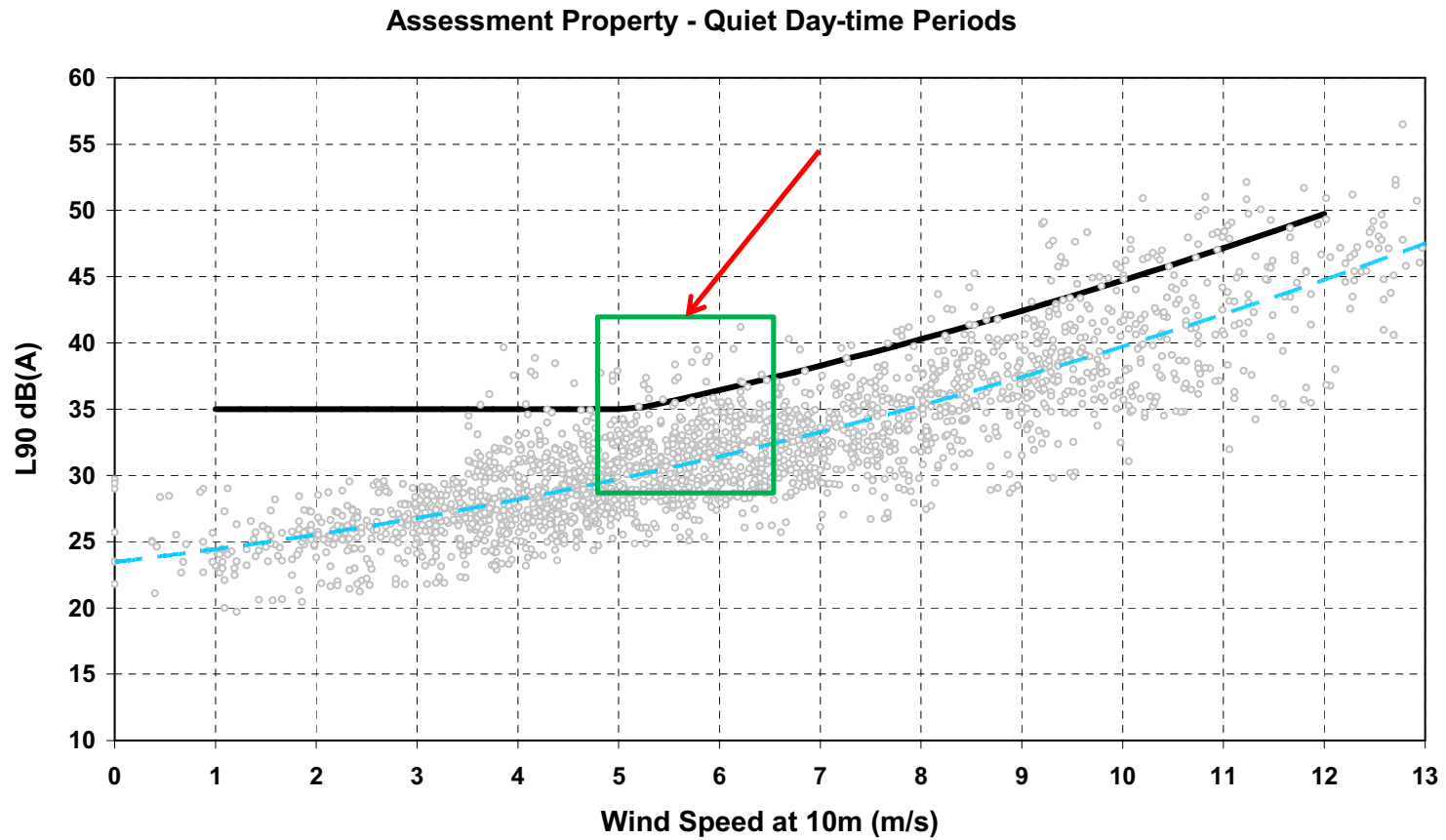


# Calculate the 'Average' Background Level – the Regression Analysis

Assessment Property - Quiet Day-time Periods



# Set Noise Limit Relative to Background



## Why is the headroom important?

- The so called 'Headroom' is important because it provides confidence that the noise assessment methodology will protect occupiers of property from unwanted noise disturbance
- The greater the Headroom the less likely that complaints will occur!

# Important Aspects of ETSU-R-97

- For daytime, the recommended limits are 35-40 dB(A) or 5 dB(A) above background whichever is the greater
- For night-time, the recommended limit is 43 dB(A) or 5 dB(A) above background whichever is the greater
- All limits are set as  $L_{A90, 10 \text{ min}}$
- Predicted noise levels are  $L_{Aeq}$  adjusted to  $L_{A90}$  by subtracting between **1.5-2.5 dB(A)**.

# The IOA Position Paper - Prediction and Assessment of Wind Turbine Noise (March 2009)

Following issues are addressed:

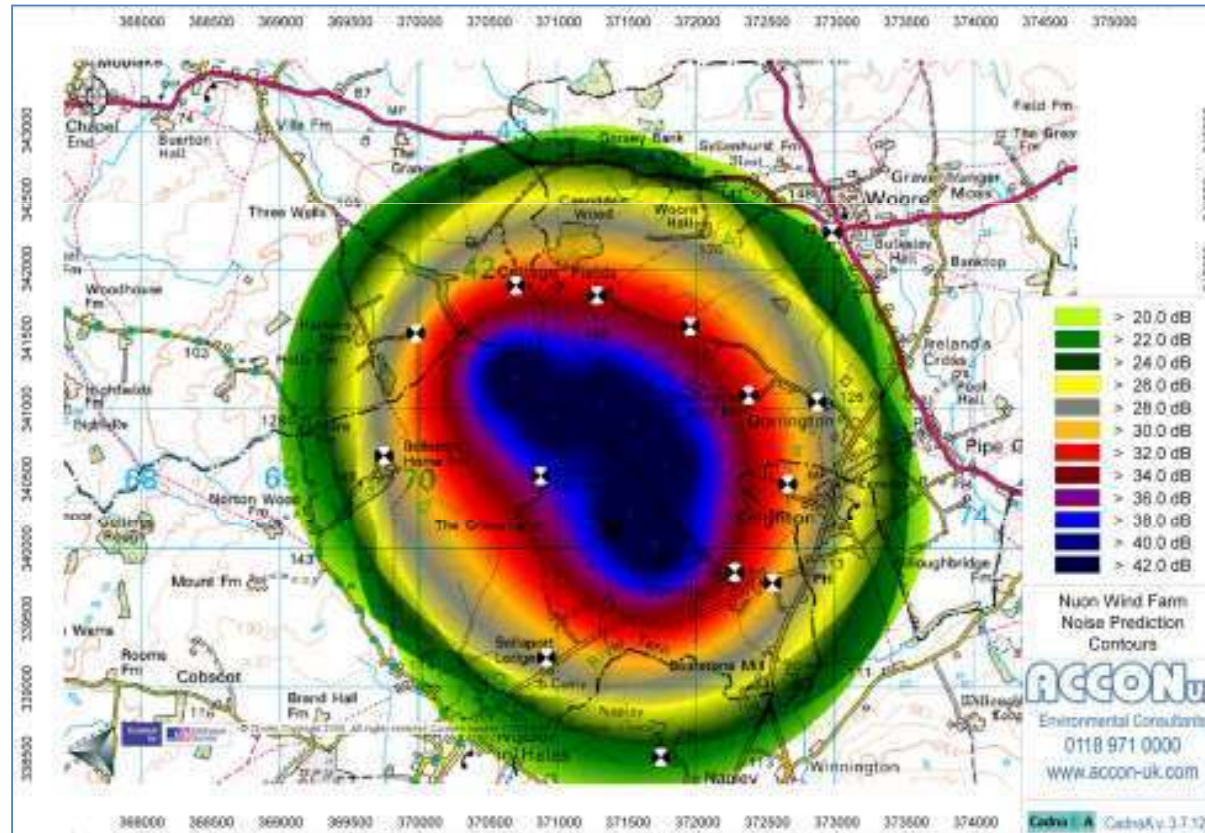
- The acquisition of baseline data at receptor locations and the analysis of this data, to take account of site specific wind shear
- The prediction of wind turbine noise at receptor locations
- The significance of low frequency noise, infrasound and ground-borne vibration

# Acquisition and Analysis of Background Noise Data

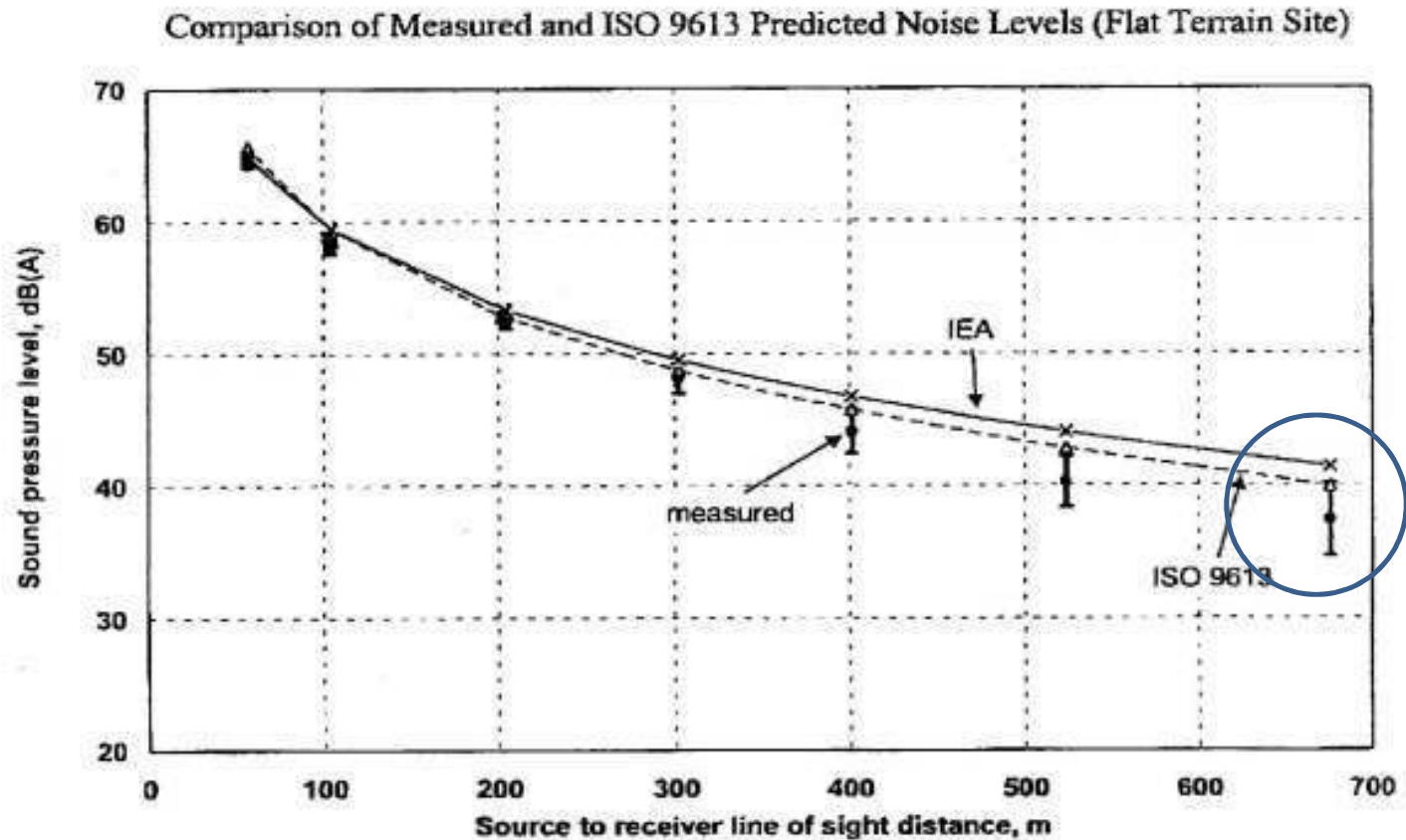
- The procedures set out in ETSU-R-97 are universally adopted
- Data set of LA90.10min is acquired at each survey location, correlated with simultaneous measurements of the 10m height wind speeds.
- Potential mismatch between speeds used for baseline noise measurements and those used for turbine source levels.
- **Overcome this problem by correlating background noise levels with derived (not measured) 10 metres height wind speeds.**

# How Are Noise Predictions Made & What Are The Assumptions?

- Noise predictions use advanced noise modelling software
- All noise modelling software can implement ISO 9613

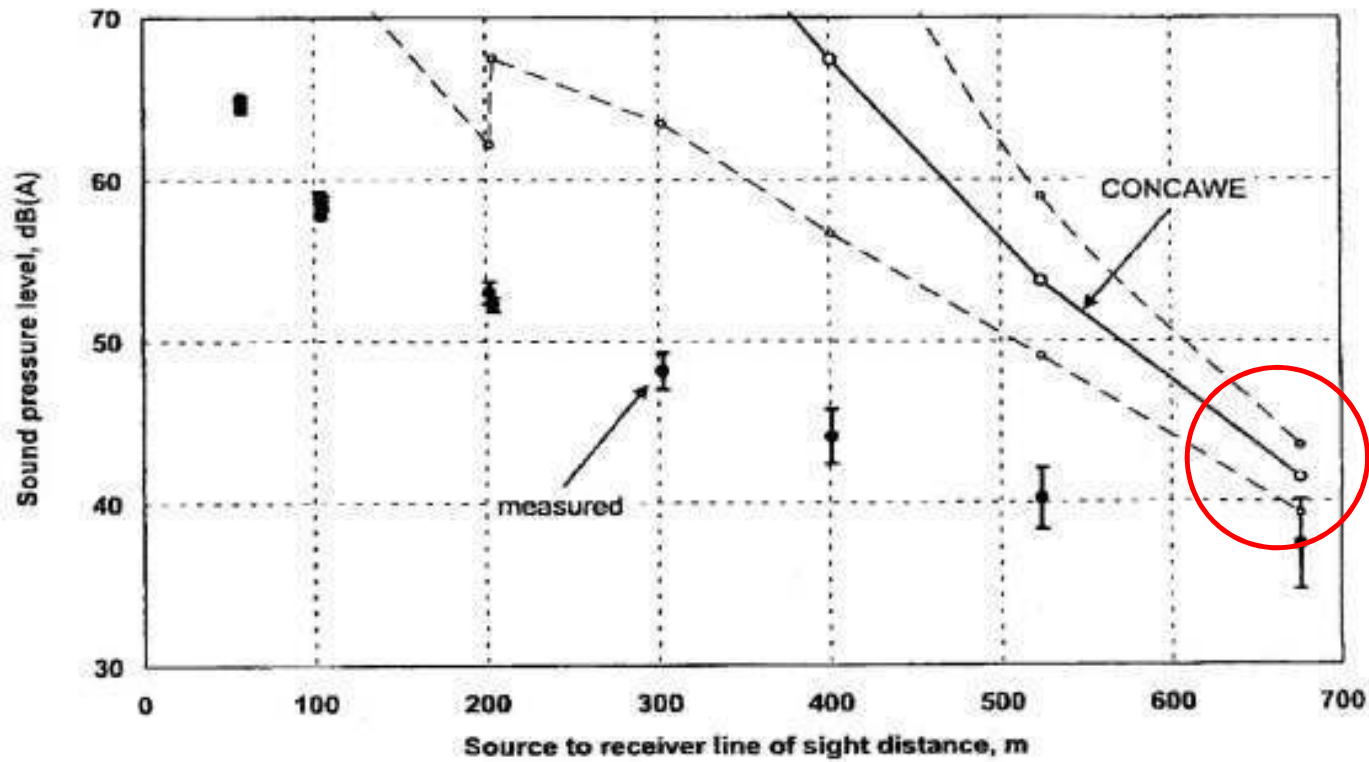


# Errors in noise prediction



# Errors in noise prediction

Comparison of Measured and CONCAWE Predicted Noise Levels (Flat Terrain Site)

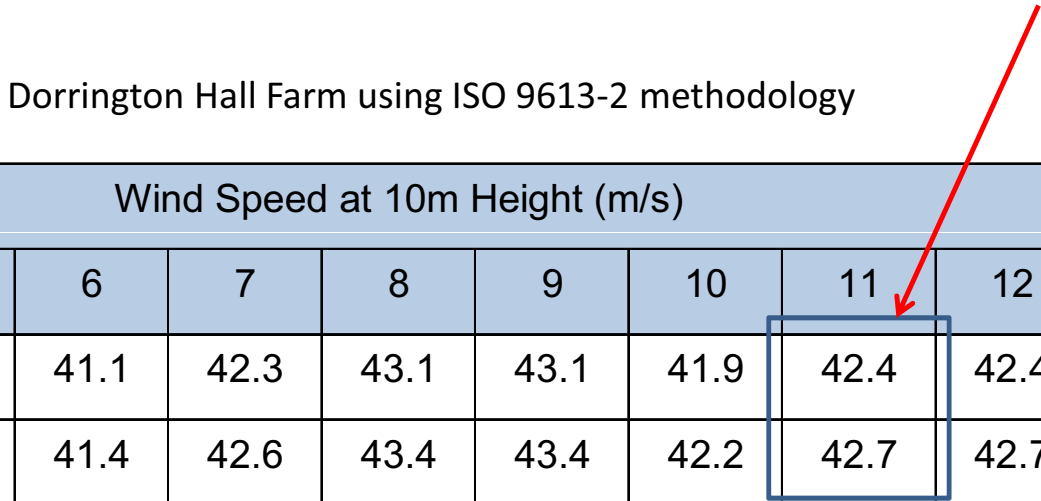


# How Are Noise Predictions Made & What Are The Assumptions?

**Predictions of noise from specific windfarms should achieve the same noise levels at specific receptor locations !!!!!!!**

Predicted noise levels (dBA) at Dorrington Hall Farm using ISO 9613-2 methodology

	Wind Speed at 10m Height (m/s)								
	4	5	6	7	8	9	10	11	12
Entec	32.3	37.6	41.1	42.3	43.1	43.1	41.9	42.4	42.4
ACCON	32.6	37.9	41.4	42.6	43.4	43.4	42.2	42.7	42.7



# How Are Noise Predictions Made & What Are The Assumptions?

What if a different noise prediction methodology is used?

Margins below noise limits at College Fields East using appellant background noise levels

	Wind Speed at 10m Height (m/s)								
	4	5	6	7	8	9	10	11	12
Quiet Daytime (ISO 9613-2)	-3.8	-1.2	-0.9	-3.2	-6.3	-10.6	-16.5	-16	-16
Quiet Daytime (CONCAWE)	-0.9	1.7	2	-0.3	-3.4	-7.7	-13.6	-13.1	-13.1
Night-time (ISO 9613-2)	-9.9	-4.6	-1.1	-2.3	-5.4	-9.6	-15.3	-19.5	-24.6
Night-time (CONCAWE)	-7	-1.7	1.8	0.6	-2.5	-6.7	-12.4	-16.6	-21.7

# Good Practice in Background Noise Monitoring

- Determine representative receptor locations
- Liaise with LA to agree noise monitoring locations
- Site equipment appropriately
  - Away from facade
  - Not unduly influenced by noise from trees or vegetation
  - At the correct height
  - Uncertainties can occur if the measurement locations are not chosen carefully and if they are not sufficiently representative of other potentially affected locations

## Where do Uncertainties Occur?

- **Variability in background noise levels - therefore different noise limits e.g. time of year, period of assessment, anomalous conditions, wind direction etc.**
- **Windshear – what data is used and how the derived background noise levels / windspeed analysis is calculated .**
- **Guaranteed or warranted noise levels.**
- **Predictions of noise.**

# Appropriate Noise Conditions – Do They Meet the Tests of 11/95?

Can they meet the tests?

- Necessary
- Relevant to planning
- Relevant to the development to be permitted
- Enforceable
- Precise, and
- Reasonable in all other respects

# On-going Research into Wind Turbine Noise?

- DEFRA funded research into a windfarm noise complaint methodology
- DECC Funded research into 'Analysis of How Noise Impacts are Considered in the Determination of Wind Farm Planning Applications'
- Manufacturers continue to research ways in reducing noise levels
- Windfarm syndrome
  - Nina Pierpont
  - Deeping St Nicholas
- Is ETSU-R-97 a robust assessment framework?
  - Yes
  - and **No**

**THE END**

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