

Background Noise Measurements for Wind Farm Noise Assessment

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Assessment Methodology

- PAN45 → ETSU-R-97
- PPS22 → ETSU-R-97
- PPS22 Companion Guide → ETSU-R-97

ETSU-R-97 provides *‘indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development...’*



ETSU-R-97 Noise Limits

- X dB L_{A90} or 5 dB above 'prevailing' background, whichever is the greater.
 - X varies with time of day and other factors
 - Day-time: $X=35-40$
 - Night-time: $X=43$
 - Financially Involved: $X=45$
 - B/G quantified as a function of wind speed
 - B/G averaged over relevant period
 - night 2300-0700
 - 'sensitive' day-time hours (1800-2300, Sat pm and all day Sun)

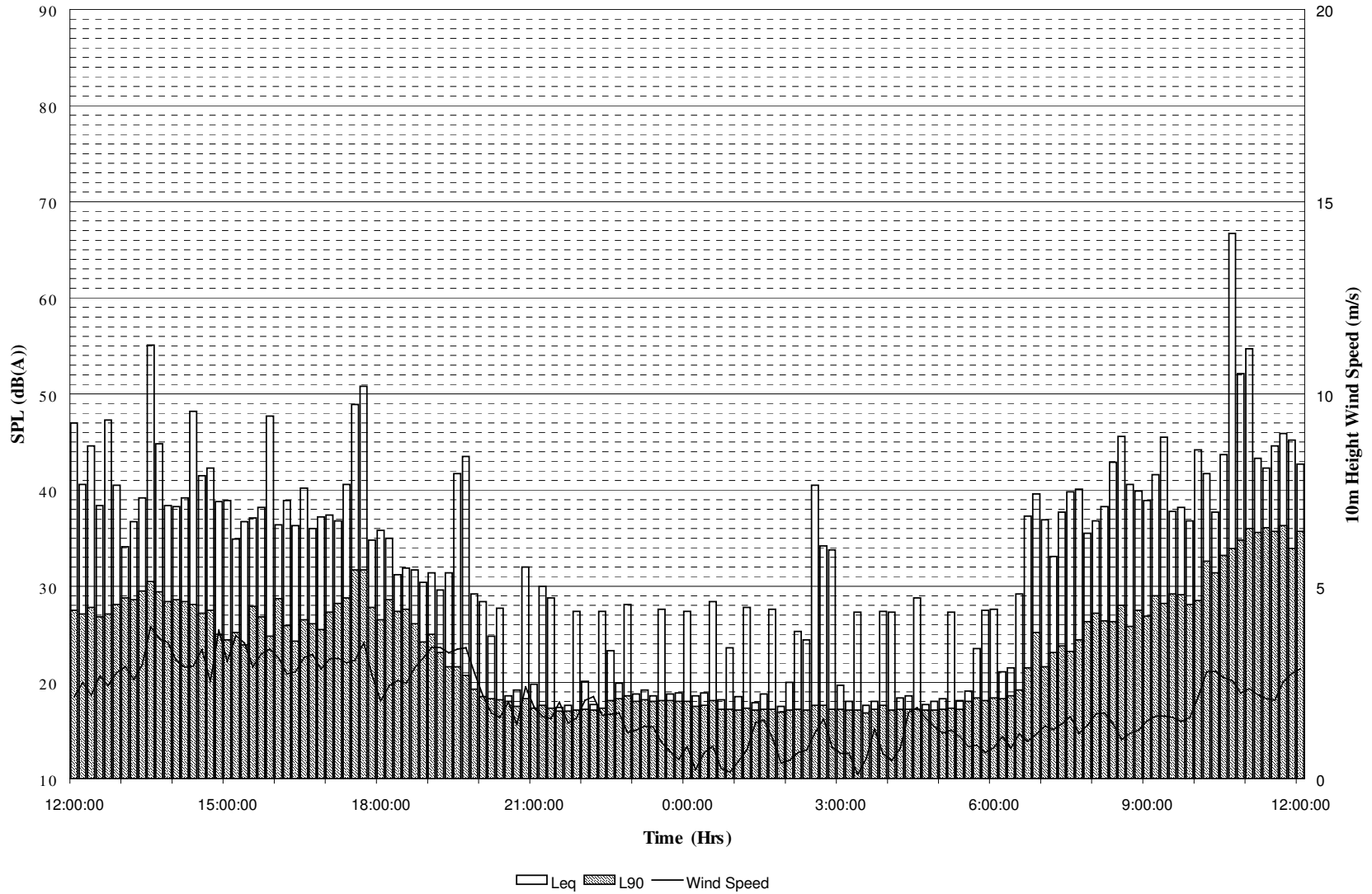


ETSU-R-97 Prevailing Background Technicalities

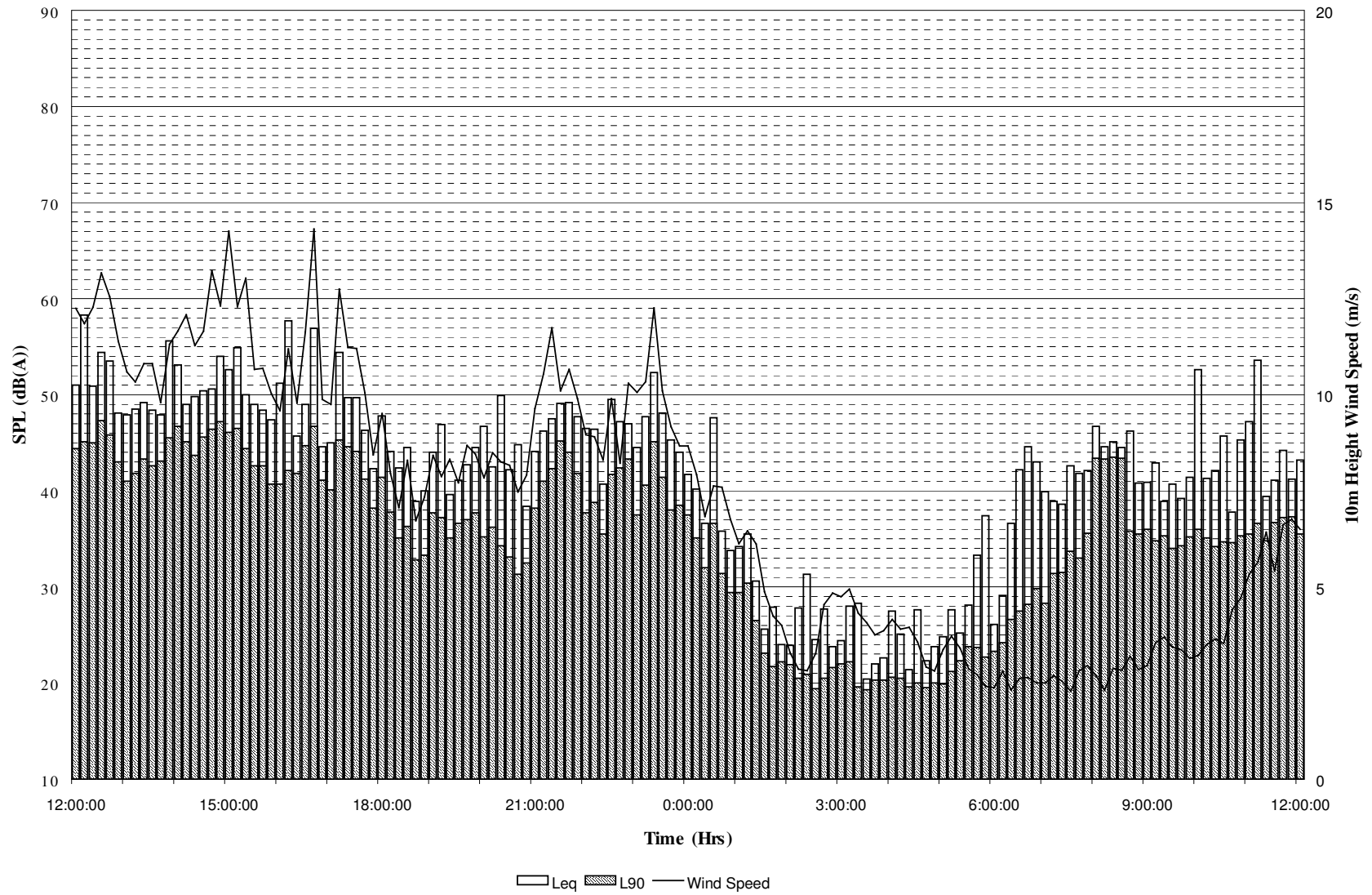
- Successive 10 min. L_{A90} noise levels
- Successive 10 min. synchronised w/s & w/dir
- Leave for two weeks
- Plot variation of noise & wind with time



Wind Farm - Baseline Noise Data
16th/17th February 2002



Wind Farm - Baseline Noise Data
20th/21st February 2022

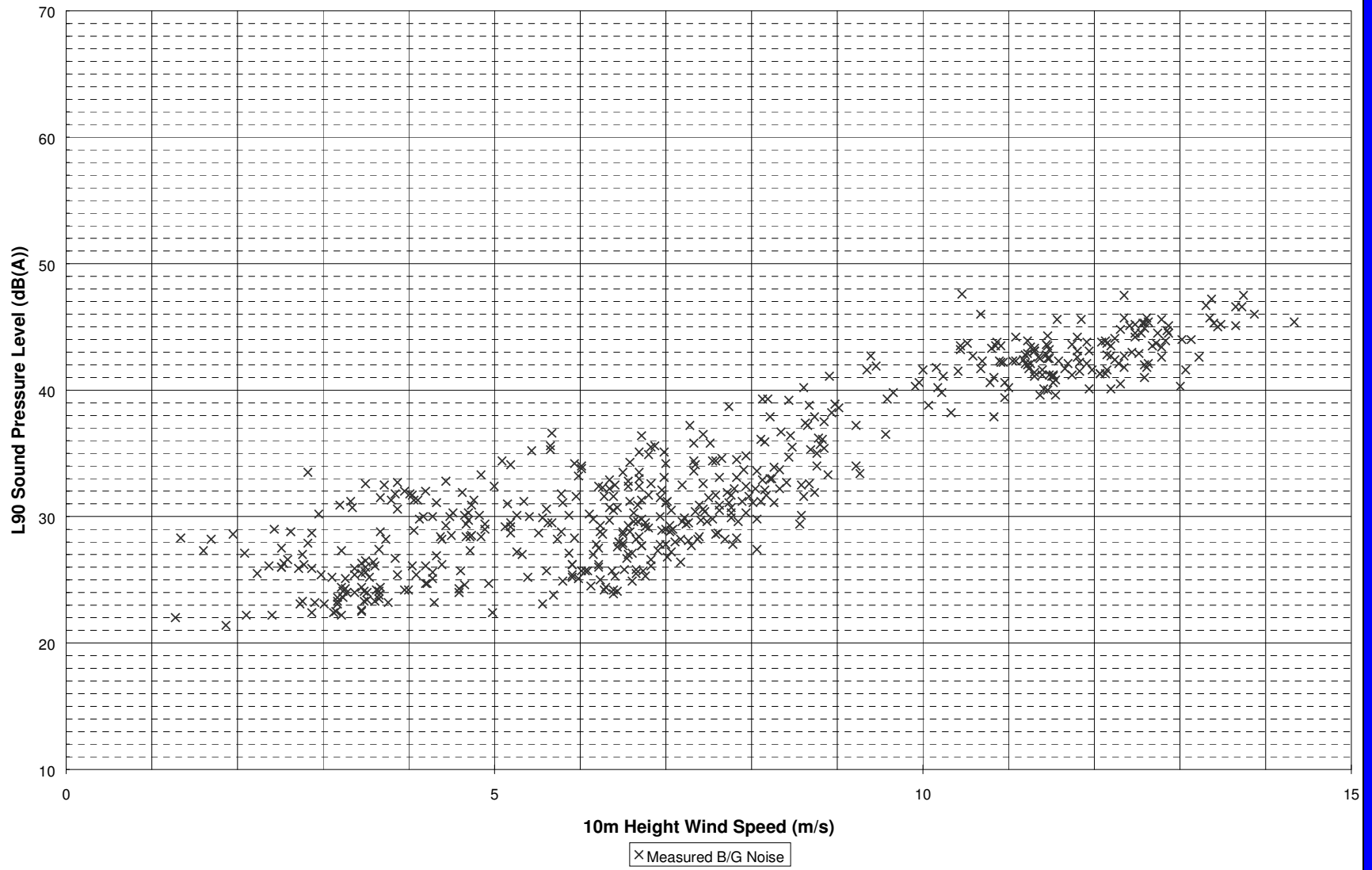


Derivation of Noise Limits

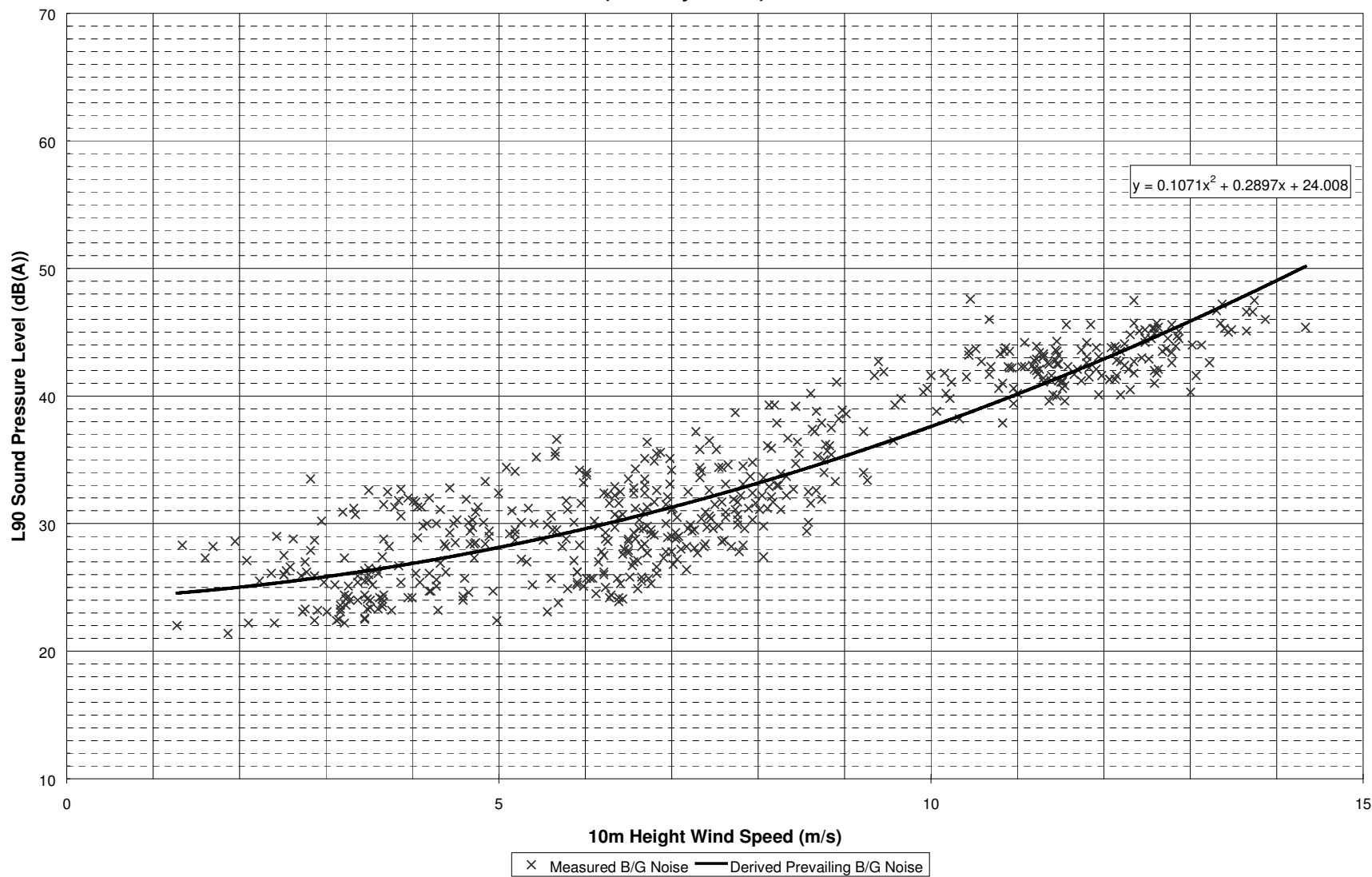
- For ‘sensitive’ day-time and night time:
- For each measurement location:
 - Plot noise against wind speed
 - Derive ‘prevailing’ b/g
 - Derive noise limits



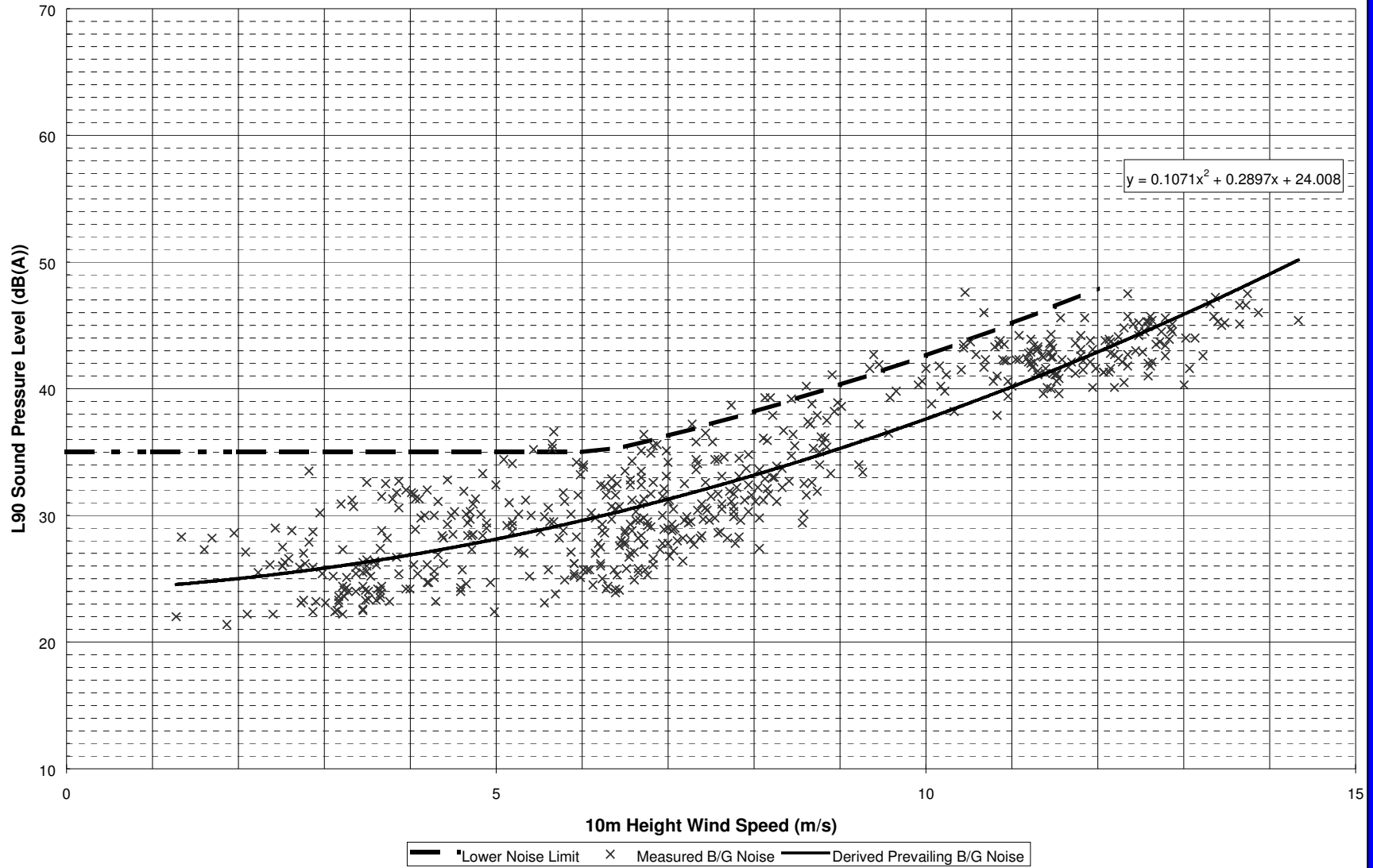
Wind Farm Noise Assessment Background Noise vs Wind Speed



Wind Farm Noise Assessment Background Noise vs Wind Speed (Amenity Hours)



Wind Farm Noise Assessment Noise Limits and Background Noise vs Wind Speed (Amenity Hours)



Why?

- WGNWT concluded that *'limits set relative to the background noise* are more appropriate [than fixed limits] in the majority of cases'*.
- This reflected the view that BS4142 represented an almost universal approach to noise assessment where no alternative was specified.

* Subject to the relevant fixed lower limit.



What is Background Noise ?

- Mixed Residential and Industrial Areas
 - as per BS4142
 - people living near existing industrial premises
 - noise from industrial premises and distant traffic noise (fairly consistent)
- Rural Areas
 - birds, animals, streams, distant traffic (may be highly variable)
 - wind generated noise (depends on wind speed)





How Relevant is BS4142 to Assessment of Noise from Wind Farms ?

BS4142:

- Fails to address the issue of variability in background noise level.
- Fails to address the issue of low background noise levels likely to occur in rural areas.



How Does ETSU-R-97 Improve on BS4142 for Assessment of Noise from Wind Farms ?

ETSU-R-97:

- acknowledges the basic BS4142 methodology of comparison with baseline.
- goes further than BS4142 in defining the precise methodology by which such comparisons should be carried out.
- defines various fixed limits to be used when background noise is low.



Moving Forward from ETSU-R-97

- WGNWT suggested a review to be carried out 2 years after publication. This has not occurred to date.
- Any review should consider the role of actual background noise measurements around proposed wind farm sites in rural locations.

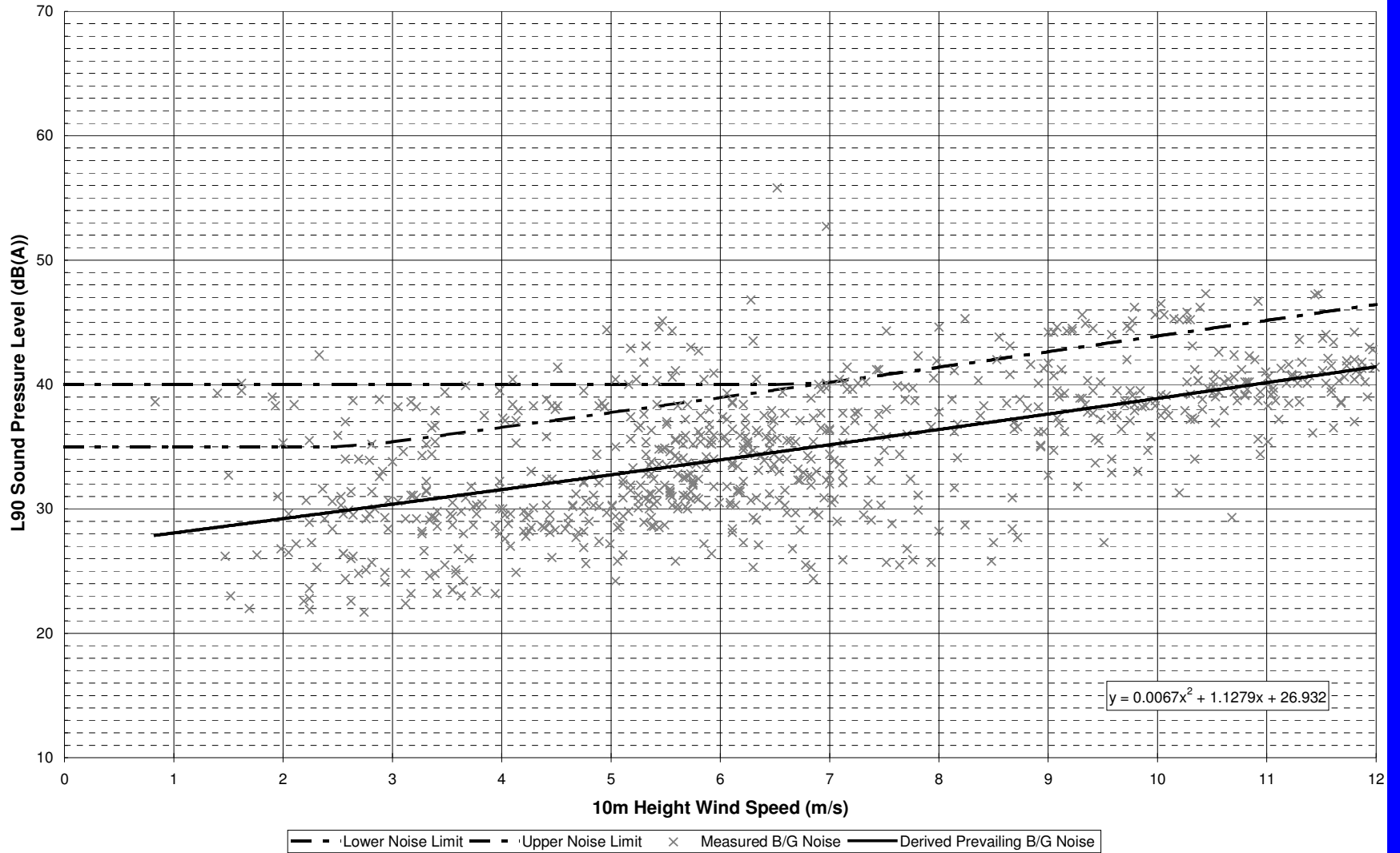


What is the problem with 'actual' background noise measurements?

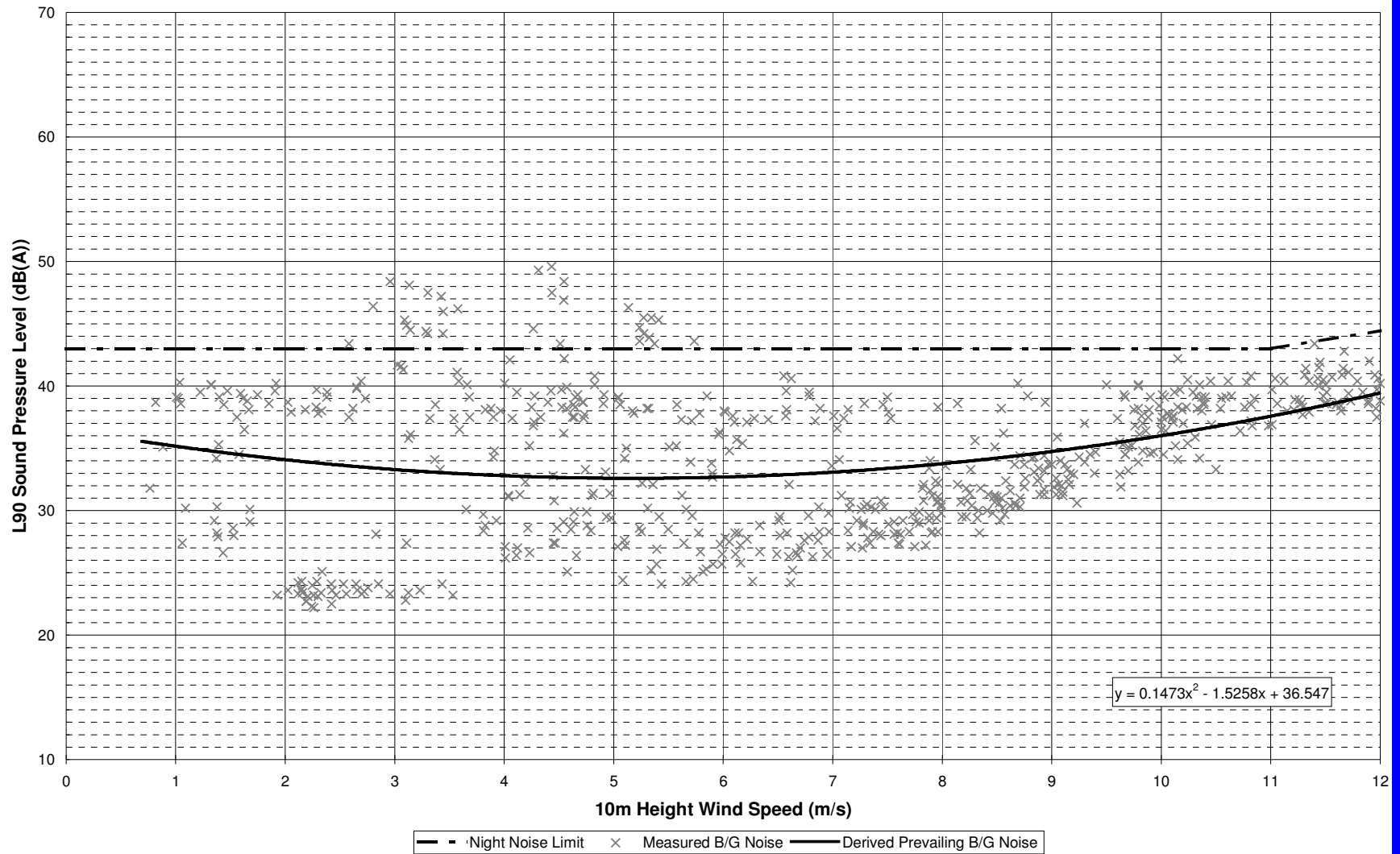
- Uncertain?
- Variable?
- Representative?
- Typical?
- Relevant?
- Requirement for shut-downs of other sites?



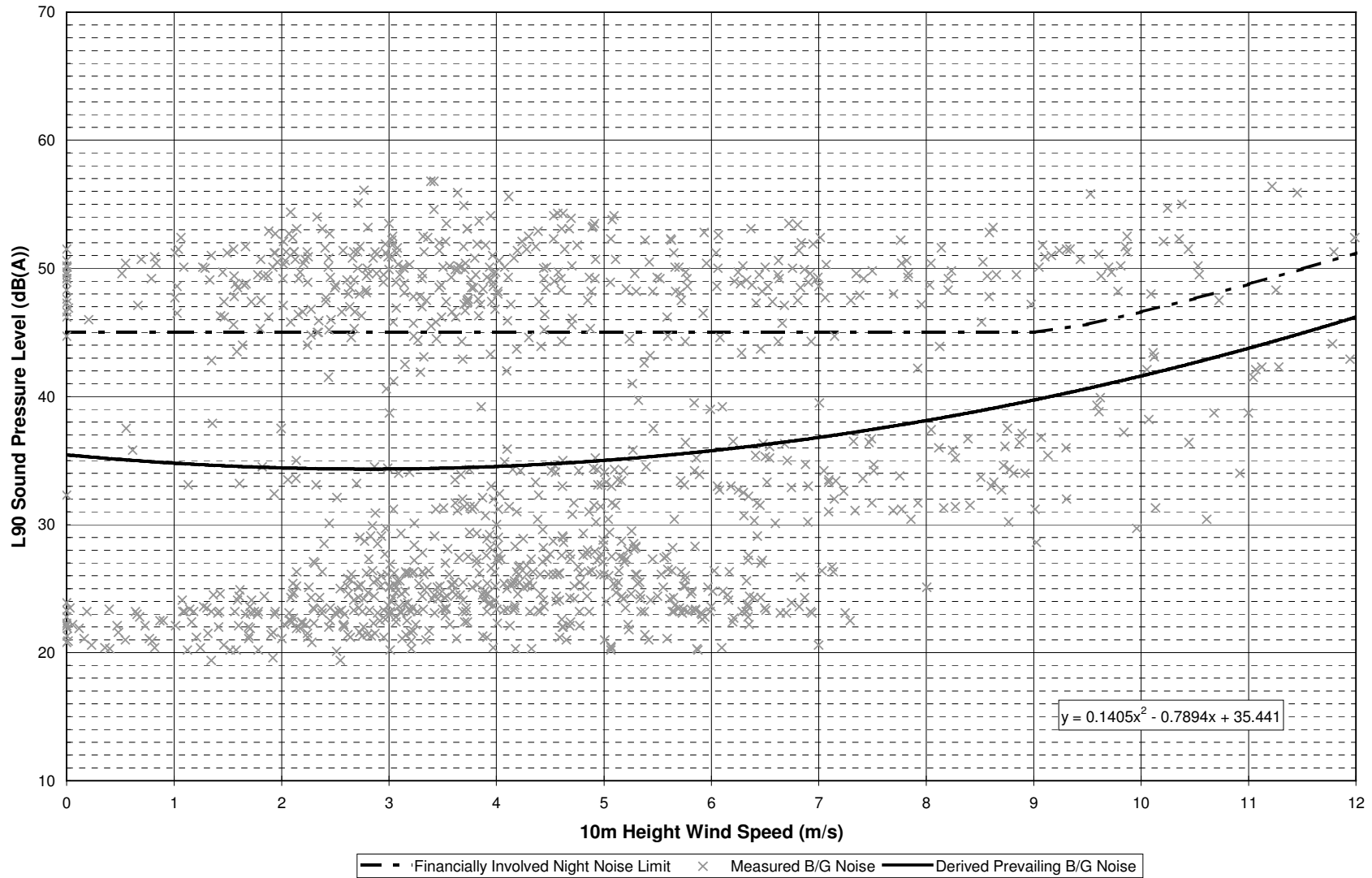
W/F Noise Assessment
Background Noise & Derived Noise Limit vs Wind Speed
(Amenity Hours)



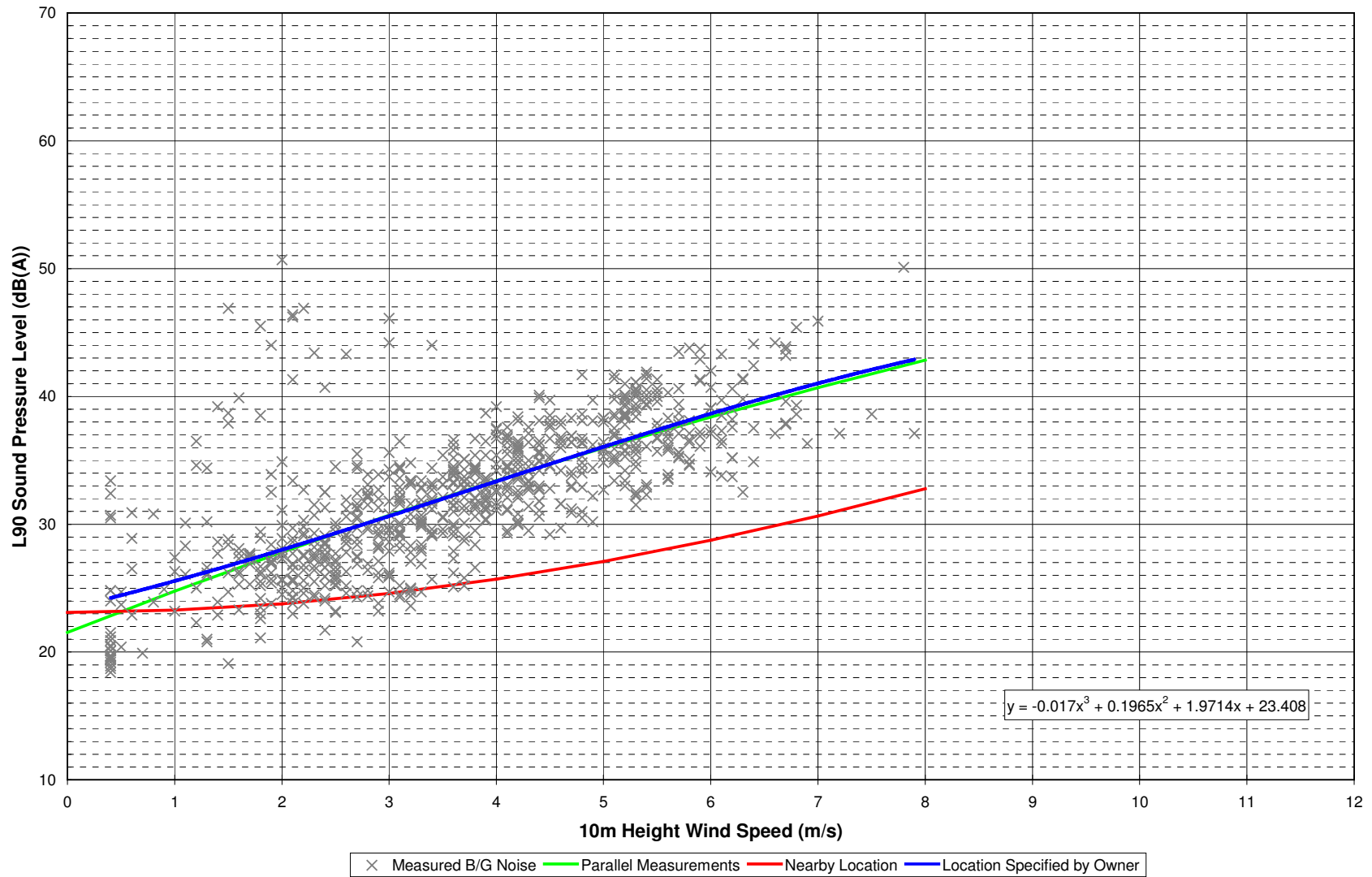
W/F Noise Assessment
Background Noise and Derived Limits vs Wind Speed
(Night Hours 2300-0700)



W/F Noise Assessment
Background Noise and Derived Noise Limits vs Wind Speed
(Night Hours 2300-0700)



W/F Noise Assessment
Background Noise vs Wind Speed
(Amenity Hours)



Not Backwards

- Criticisms of ETSU-R-97 have focussed particularly on the 'fixed lower limits' and hence the lack of comparison with measured background data at low wind speed.
- More detailed analysis of background data, longer measurement periods, equipment with reduced noise floor, spectral measurements etc. will not necessarily make for more robust assessments and improve impact assessment.



But Forwards

The aim of ETSU-R-97 could be achieved without reference to background data by acknowledging that:

- Background noise levels are usually very low in rural areas at low wind speeds but it is acceptable to introduce a noise source with a level around 35-40 dB L_{A90} (as per existing).
- As wind speed increases the noise limit can be allowed to increase (as per ETSU-R-97)
- The increase in noise limit should depend on site specific factors such as height differential, foliage, sheltering.



Outcome

- Resources not tied up with extensive background measurements, especially where shut-down of existing sites required.
- Removal of risk to equipment security (and personnel!)
- Developers not at mercy of possible uncertainties in outcome.
- Straightforward noise conditions can be applied which are understandable to developers, decision makers and public.
- More straight forward assessment of cumulative impact.



Overview

- The current ETSU-R-97 assessment methodology incorporates a robust refinement of the BS4142 appropriate to wind farm noise assessment.
- This could be improved by acknowledging the uncertainties inherent in the determination of an appropriate ‘prevailing’ background noise level in rural areas and specifying noise limits for different wind speeds appropriate for a given site which reflect the stated aims of ETSU-R-97.

