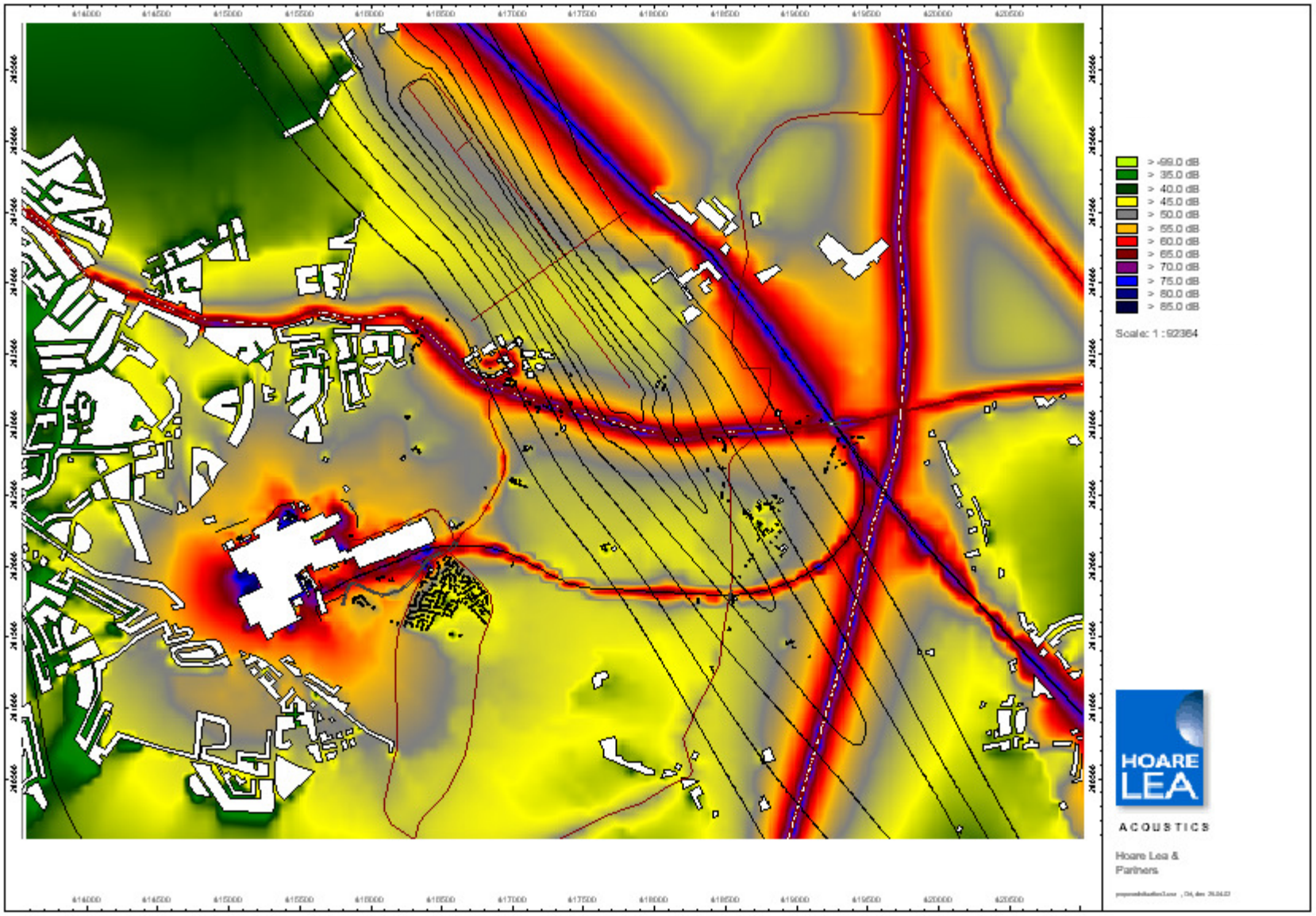
Effects of Wind on Background and Ambient Noise

Dr A R McKenzie — Hayes McKenzie Partnership

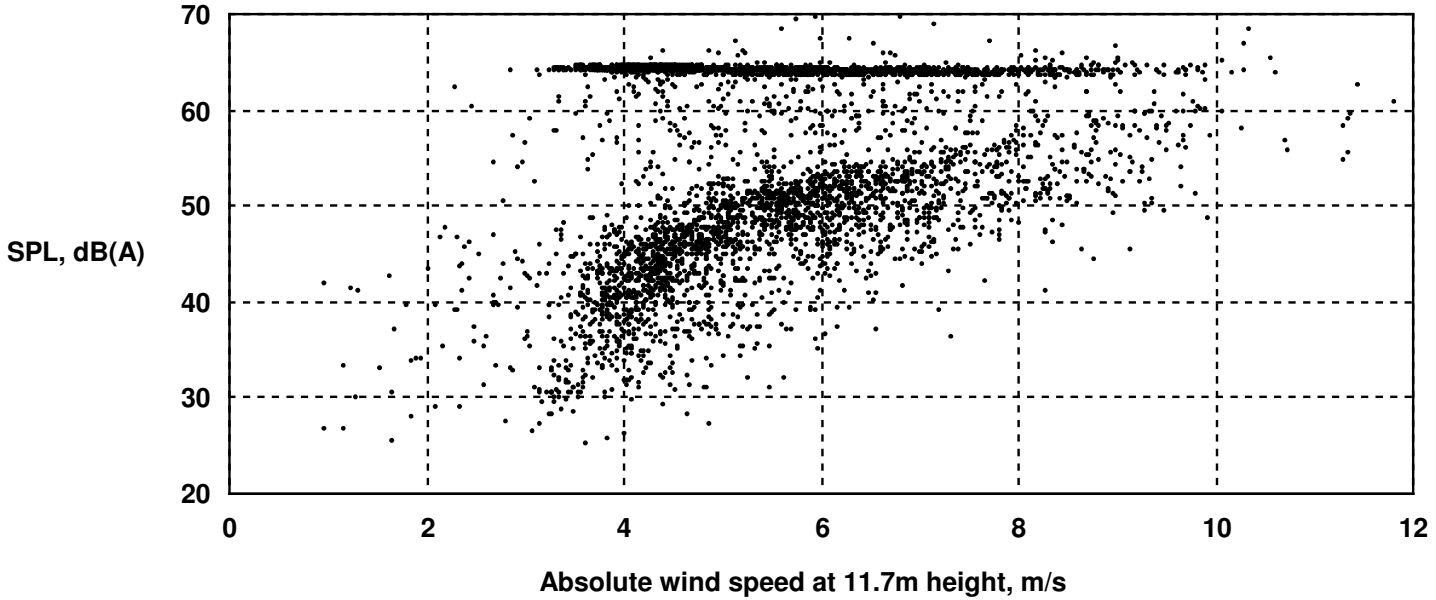
Dr A J Bullmore — Hoare Lea Acoustics

Dr I H Flindell — Flindell Associates

Predictions usually result in a single level



Potential Wind Effects



- Increased wind induced noise (trees, buildings etc) local to the monitoring location

- Modification of noise propagation between source(s) and the monitoring location

Methodology

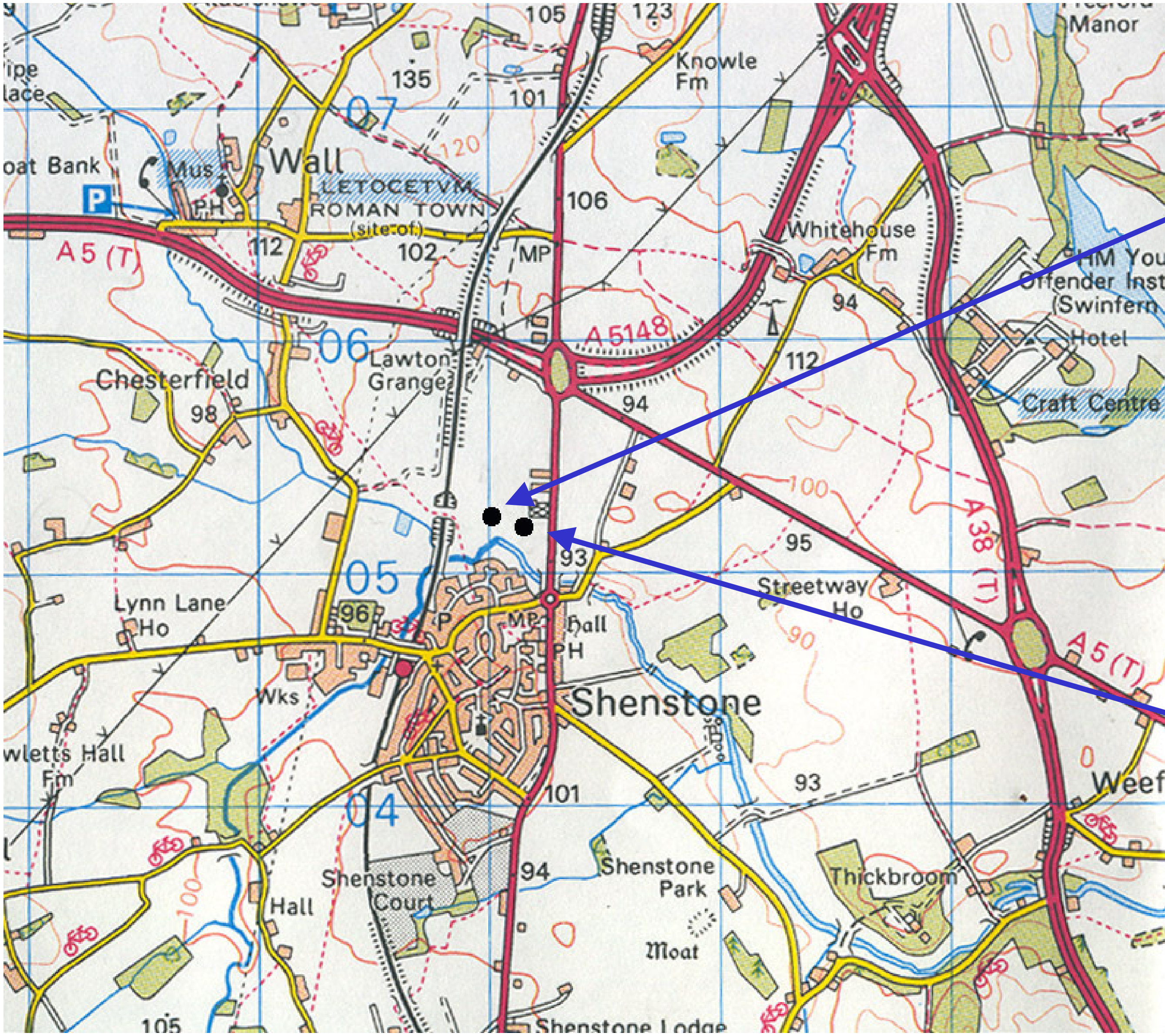
- undertake long term, synchronysed noise and meteorological measurements

- analyse data from 2 different sites

  site 1 - near Heathrow Airport

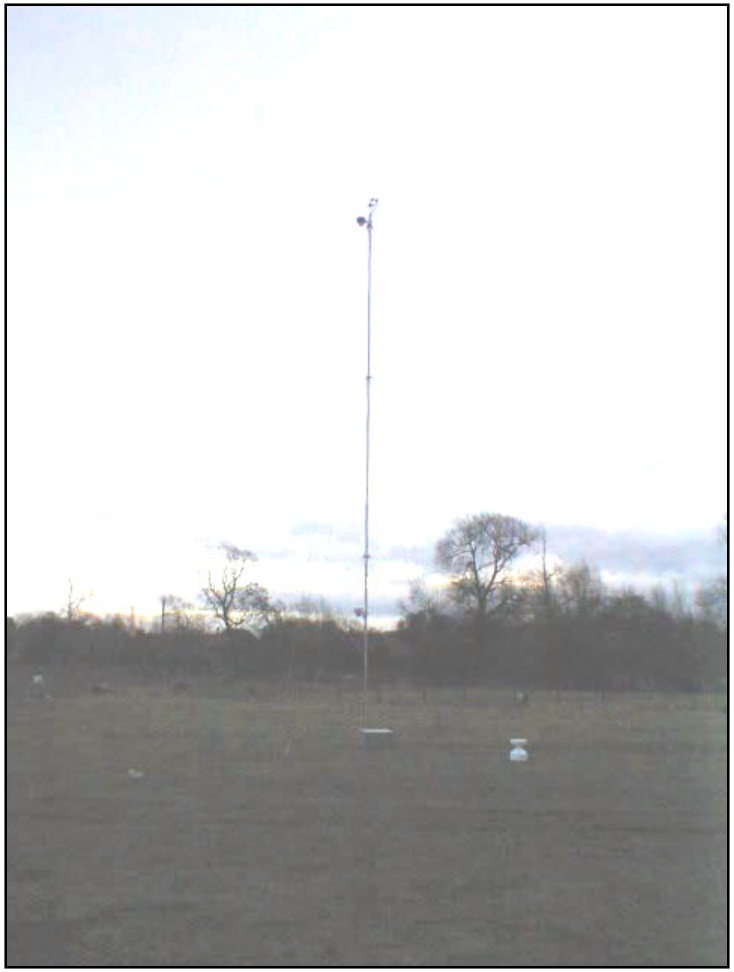
  site 2 – north of Birmingham

Birmingham



Noise logger

Met mast



Met mast

Noise logger

Noise sources

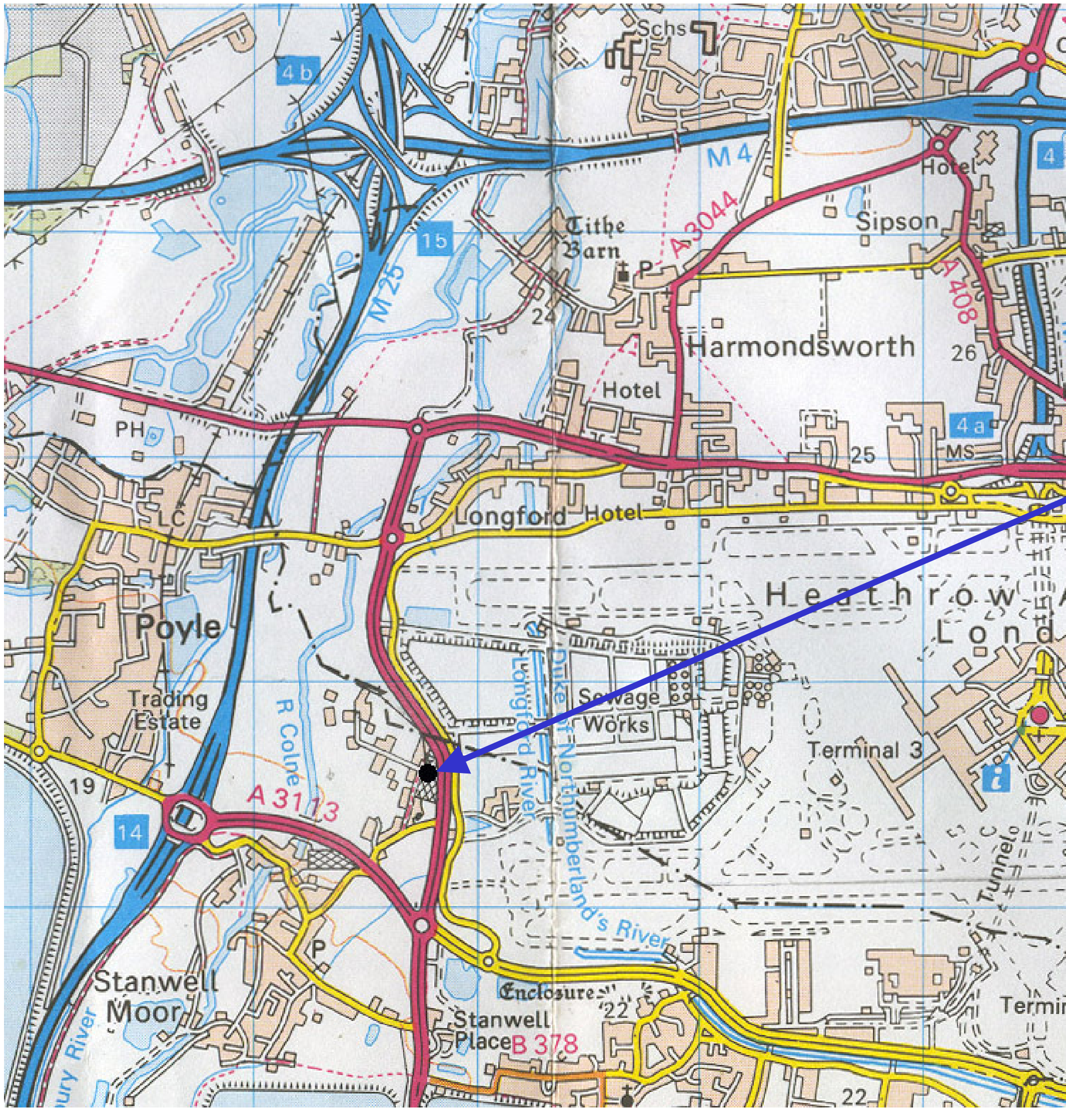
Railway

A5 trunk

A5127

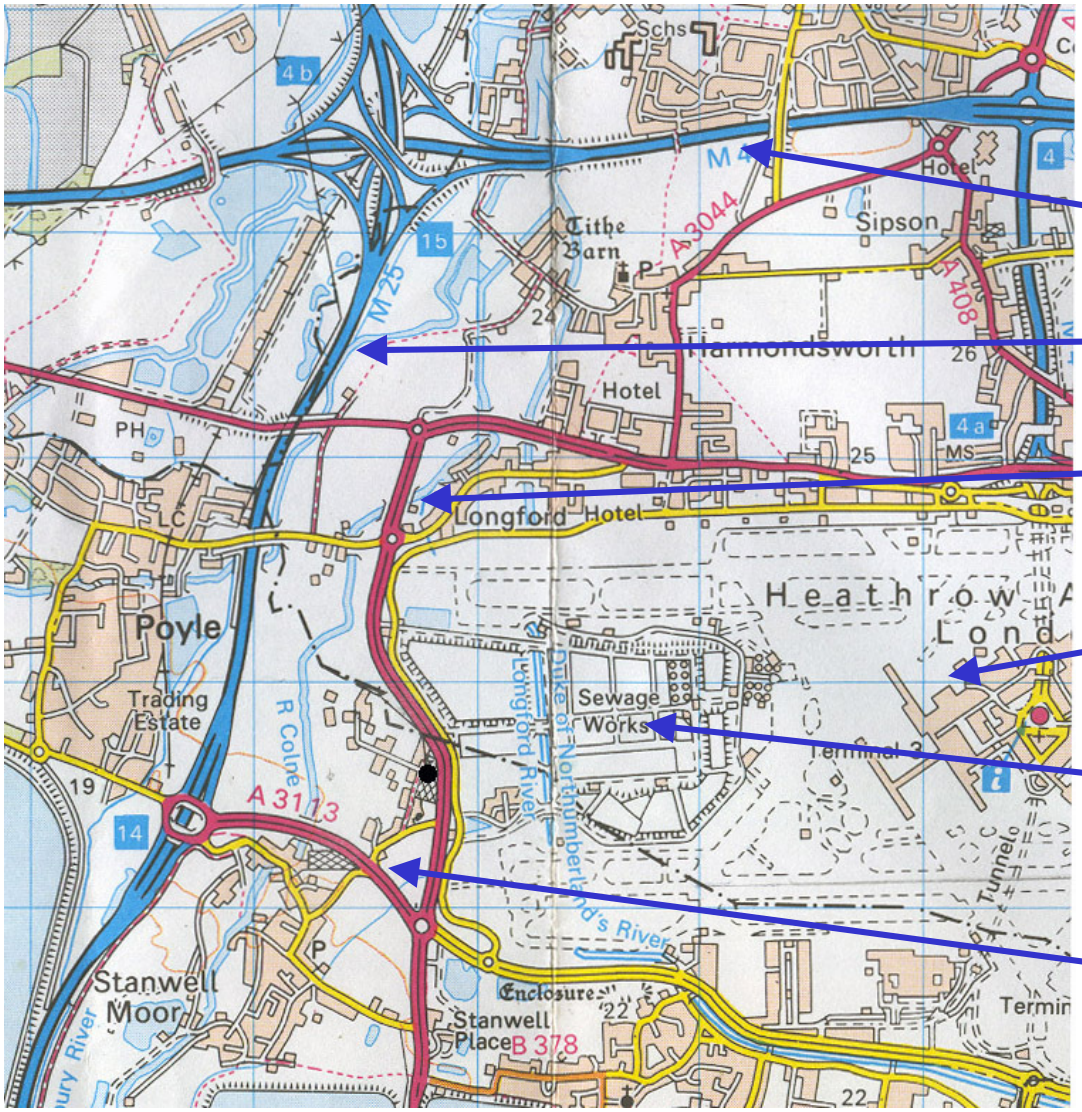
Trees

Heathrow



Noise logger & Met mast

Noise sources



M4

M25

A3044

Heathrow

Industry

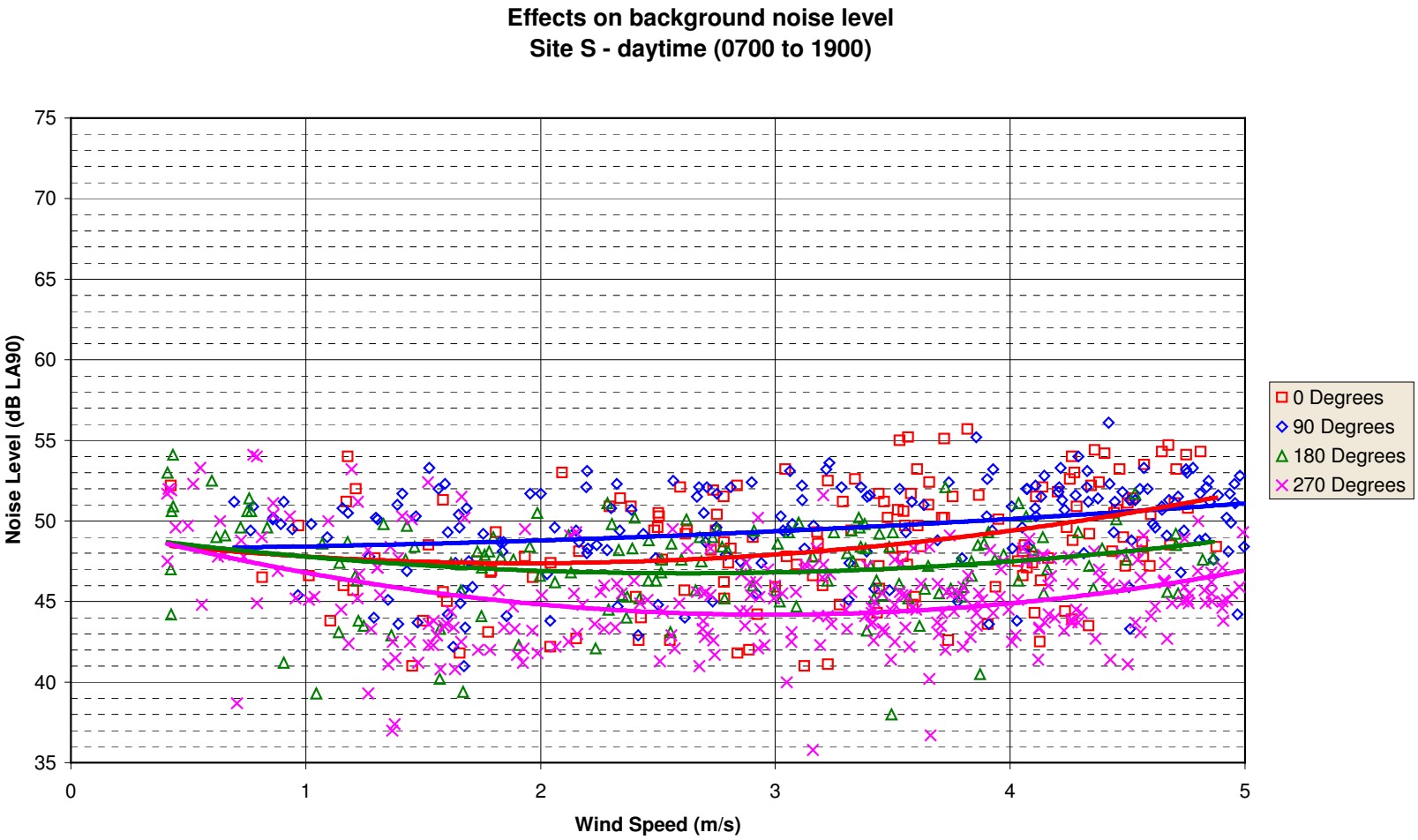
A3113

Noise logging

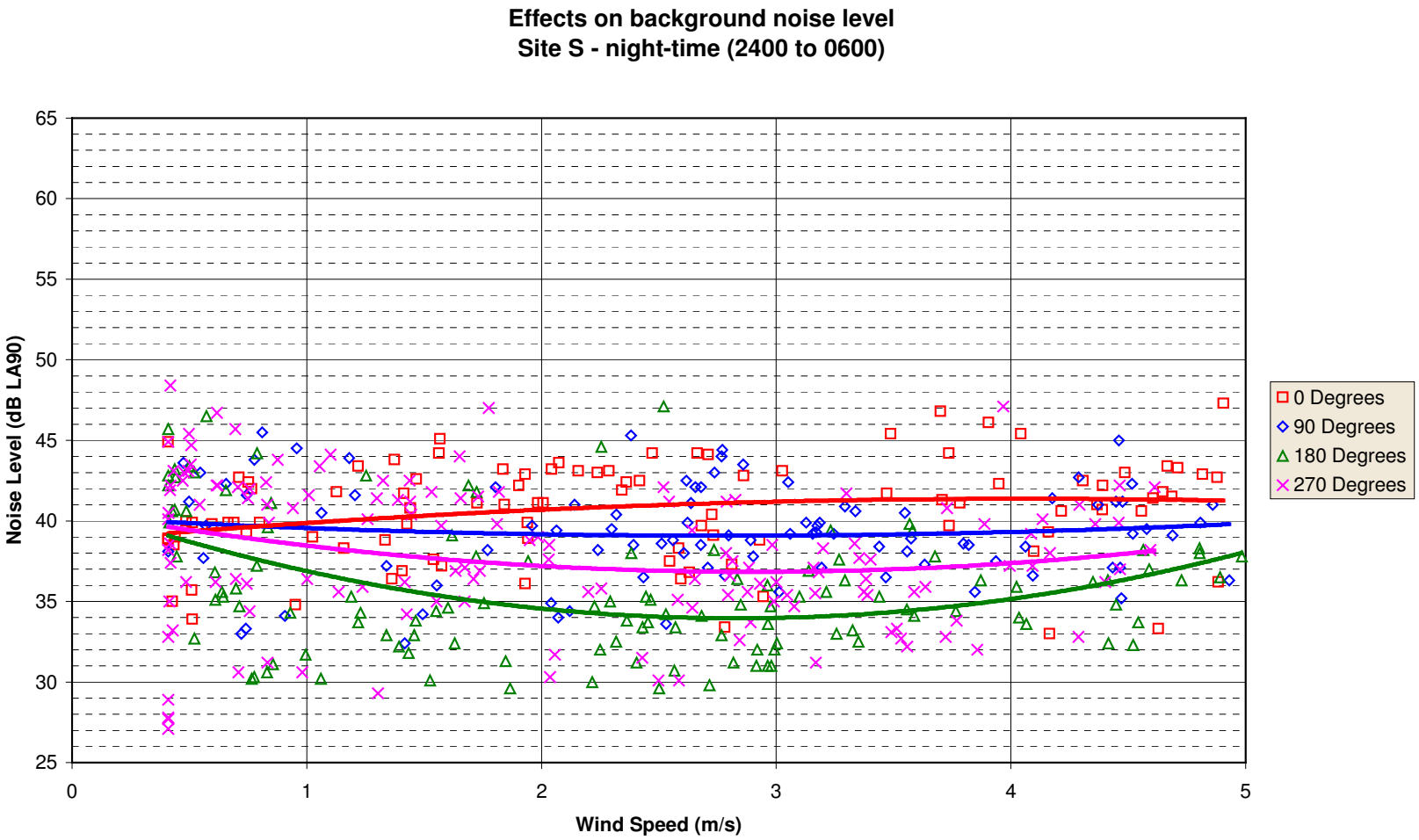
- 4m mast Birmingham, 1.2m mast Heathrow
- $L_{Aeq,t}$ and $L_{A90,t}$ noise levels
- 1 hour time periods
- total 2 months data analysed
- data separated into daytime and night-time
- 06:00 to 07:00 and 19:00 to 24:00 avoided

Wind logging

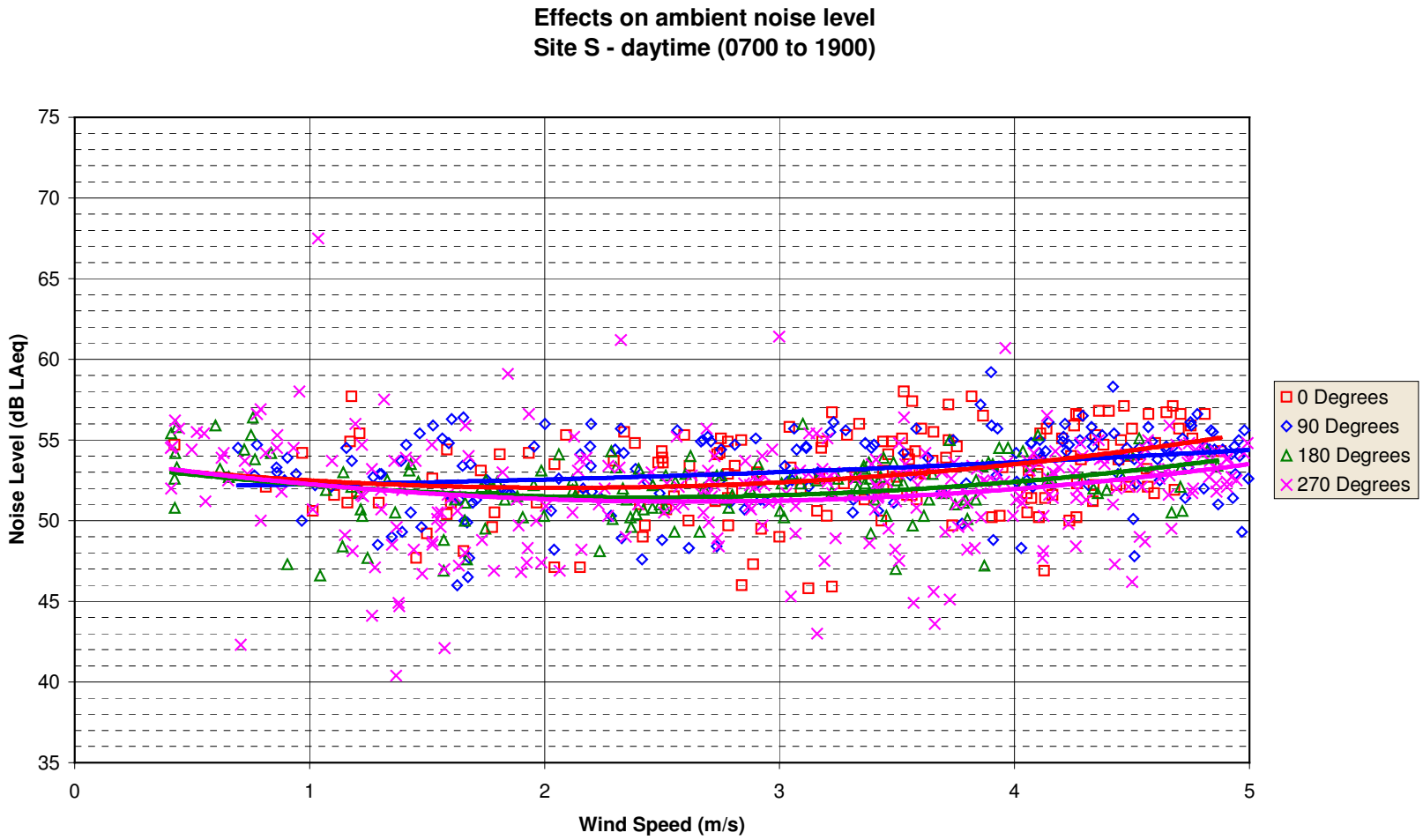
- 7m high mast
- wind speed and direction
- 1 hour time periods
- total 3 months data analysed
- data separated into quadrants



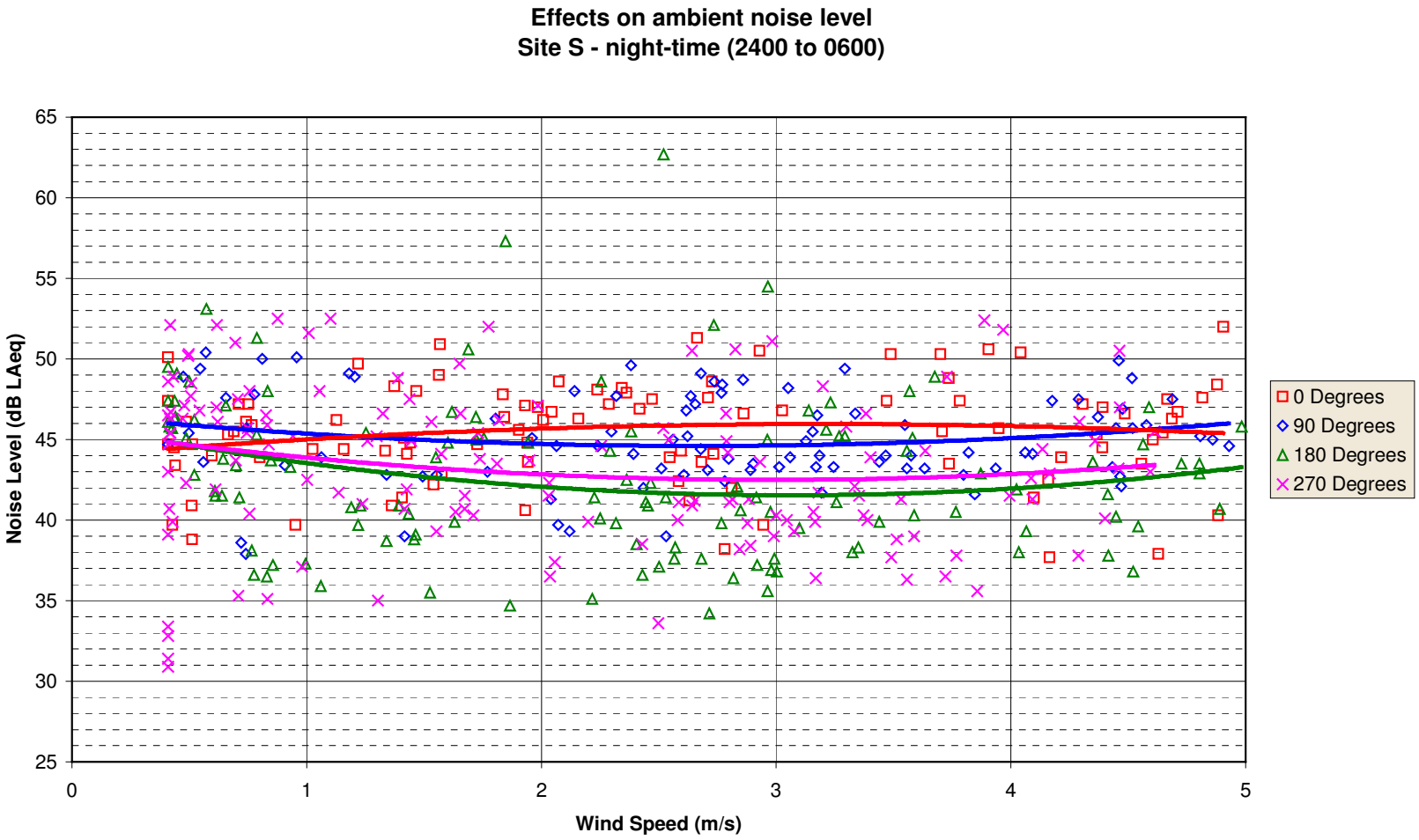
Birmingham L_{A90}: daytime



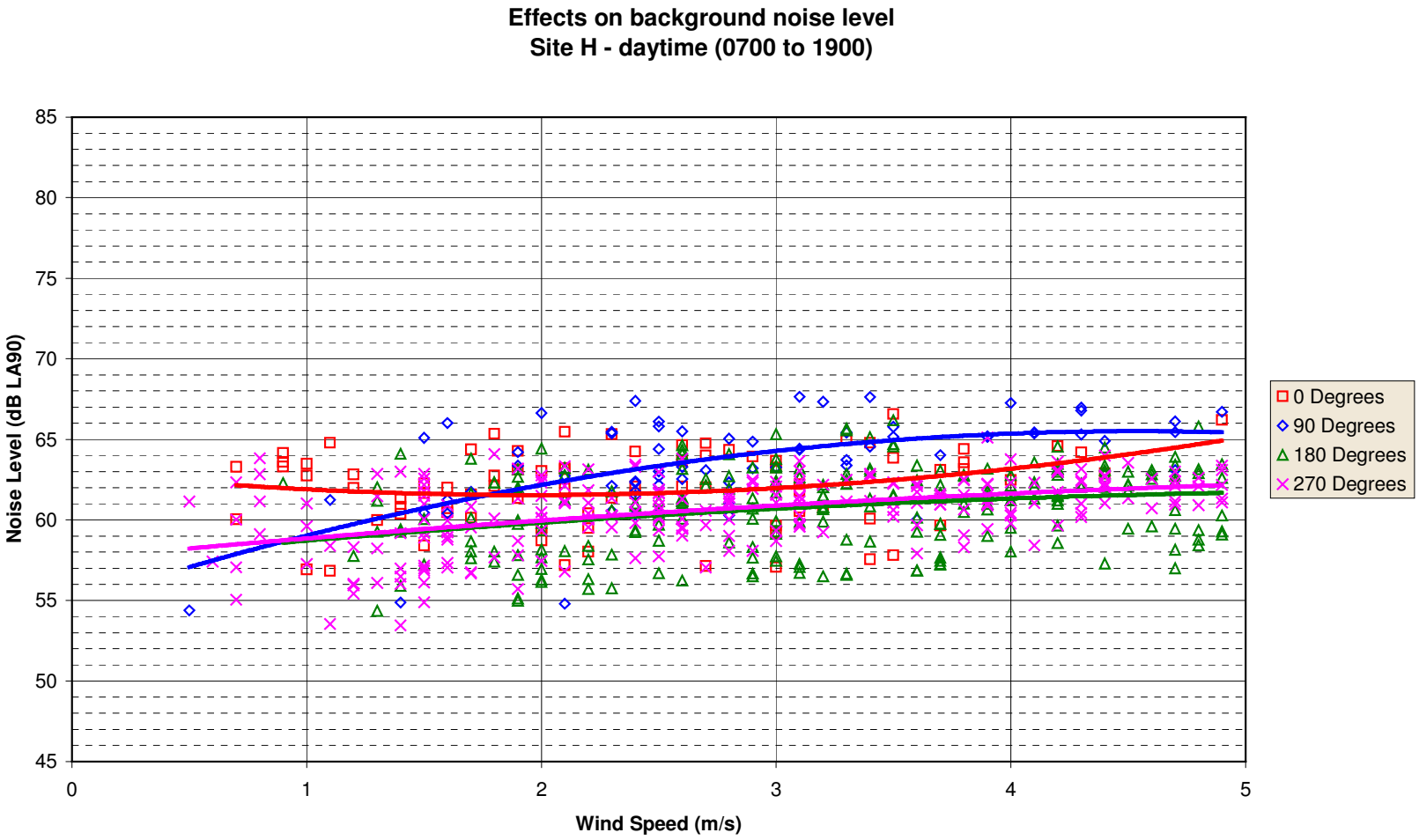
Birmingham L_{A90}: night-time



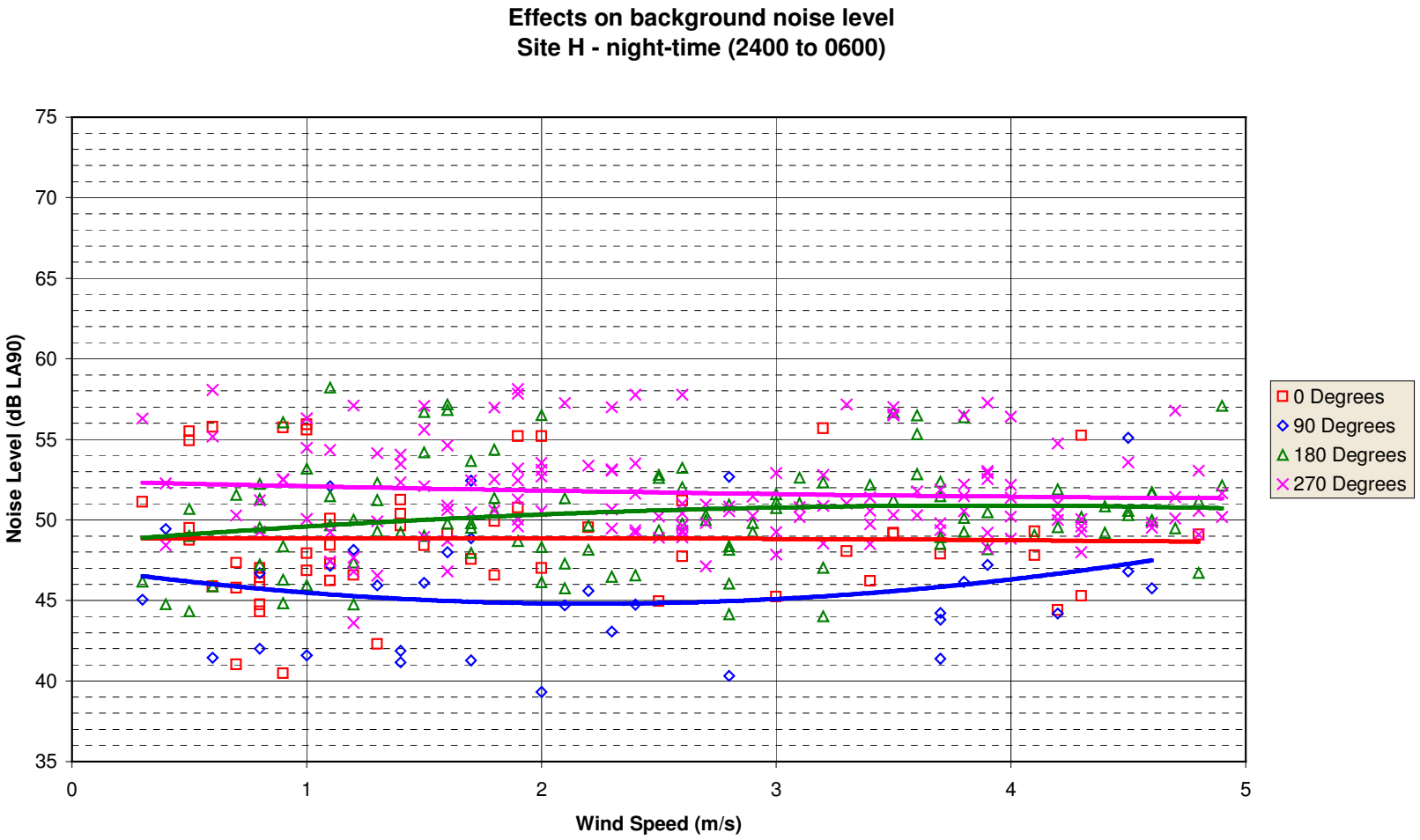
Birmingham L_{Aeq}: daytime



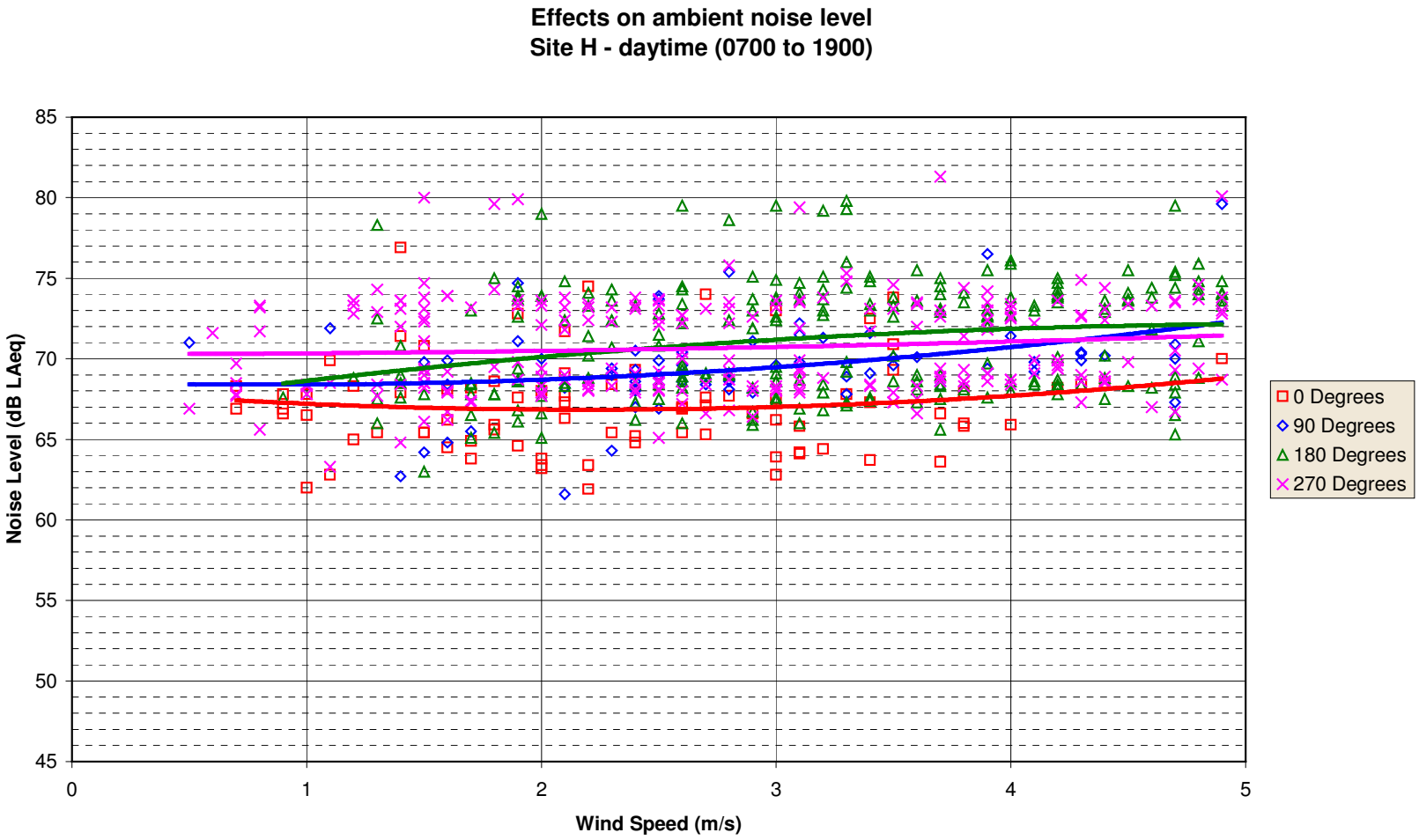
Birmingham L_{Aeq}: night-time



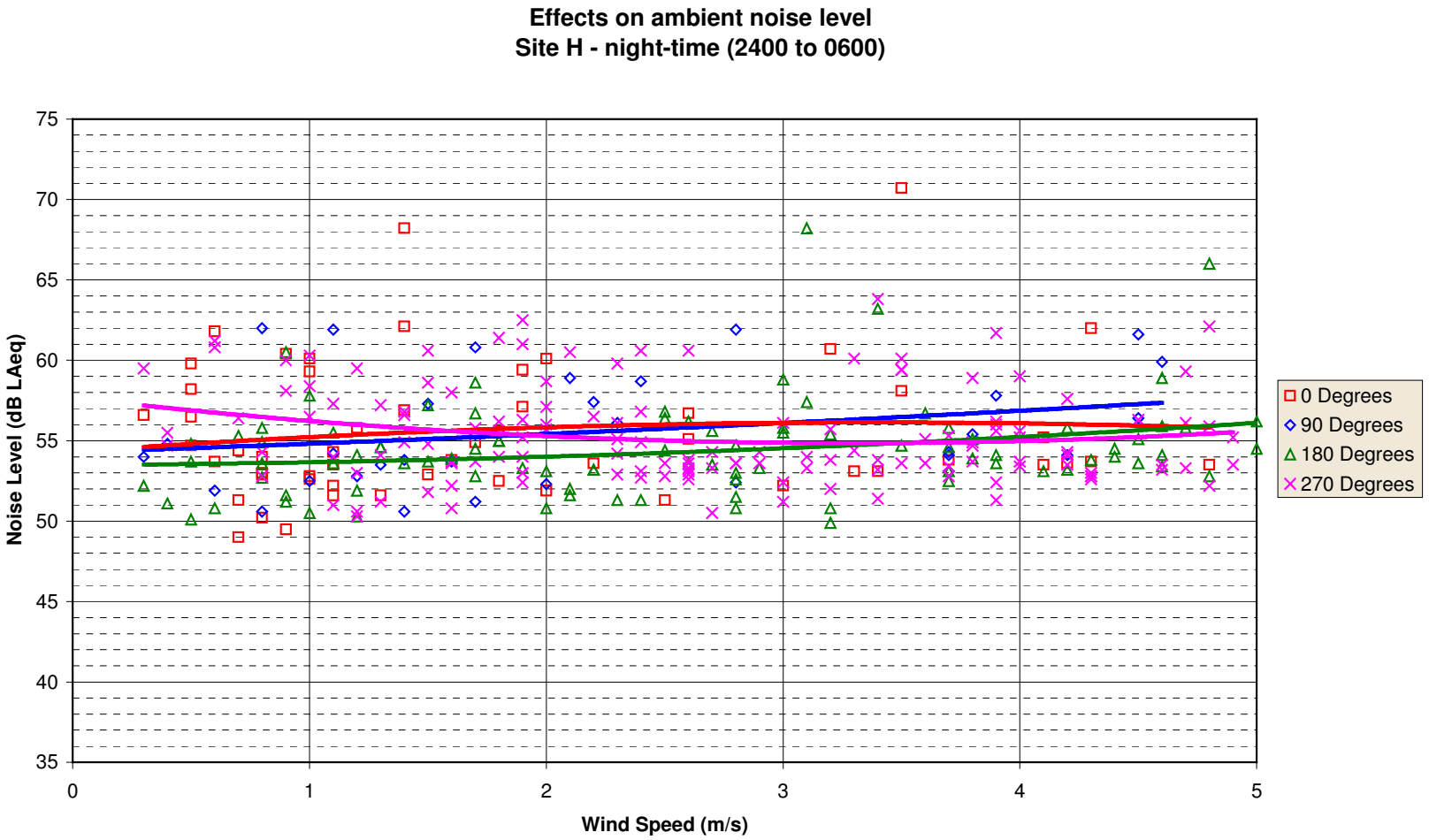
Heathrow L_{A90}: daytime



Heathrow L_{A90}: night-time



Heathrow L_{Aeq}: daytime



Heathrow L_{Aeq}: night-time

Conclusions - general

- 3 months data in urban areas analysed
- high degree of scatter in noise levels
- conclusions based on means
- complex relationships between noise and wind
- relationships are situation dependent

Conclusions - Birmingham

- mainly affected by road noise from the north
- L_{A90} levels affected more than L_{Aeq} levels
- upwind conditions resulted in greatest change (reduction) in L_{A90} levels from 'neutral'
- scatter in excess of 15dB(A)
- differences in <u>mean</u> levels of up to 7dB(A)

Conclusions - Heathrow

- more complex than Birmingham site
- affected by road noise to west and airport noise to east
- L_{A90} levels affected more than L_{Aeq} levels during night-time (as per Birmingham)
- L_{A90} and L_{Aeq} levels affected roughly equally during the daytime (unlike Birmingham)
- reason due to dominance of road noise only to west during the night-time (airport ground noise reduces at night)