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***Issues in air and noise
pollution - lessons from
Heathrow runway 3***

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Background

ATWP says:

“The further development of Heathrow is supported, including a further new runway and additional capacity to be delivered as soon as possible ... but only if stringent environmental limits can be met”

“An urgent programme of work and consultation will be started to examine this issue further and to consider how best use can be made of the existing airport”

Background

Environmental conditions included:

A noise limit – no increase in the size of the area significantly affected by aircraft noise (as measured by the 57 dBA Leq noise contour in 2002;

Air quality limits – being confident of meeting European air quality limits around the airport, in particular for nitrogen dioxide (NO₂) which is the critical pollutant around Heathrow; and

Improving public transport access to the airport

Background

Adding Capacity at Heathrow Airport published November 2007, consultation closed February 2008:

Sought views on:

- a third runway, 2,200m in length, to increase capacity to around 700,000 air transport movements per annum (current limit is 480,000)
- mixed-mode operations on existing two runways to increase capacity to 540,000 air transport movements ahead of any new runway capacity (when it would cease)

Background

Environmental conditions:

A noise limit – **no increase in the size of the area** significantly affected by aircraft noise (as measured by the 57 dBA Leq noise contour in 2002)

Air quality limits – **being confident** of meeting European air quality limits around the airport, in particular for nitrogen dioxide (NO₂) which is the critical pollutant around Heathrow

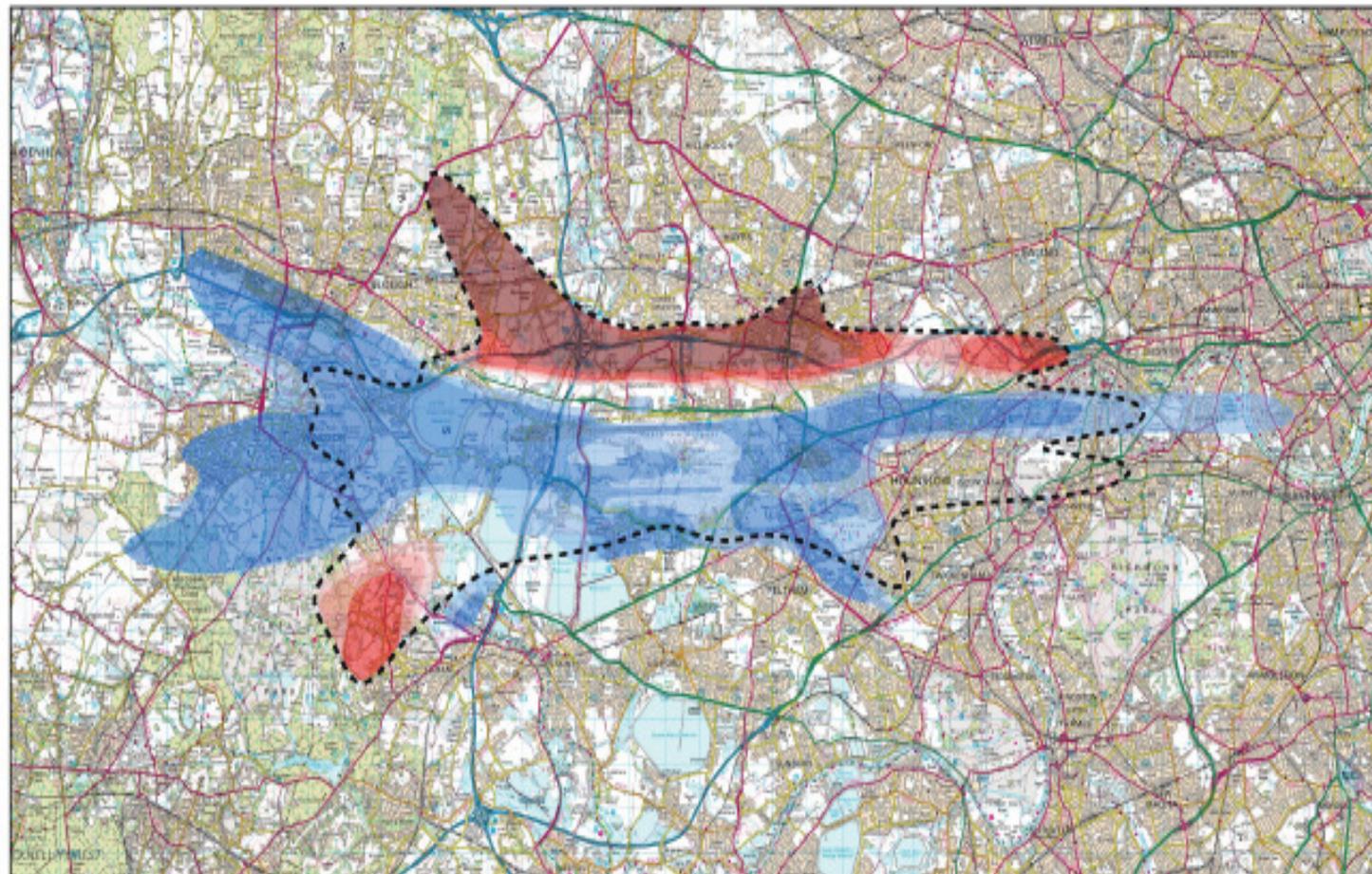
Table 7: Noise – Size of area affected (sq km), assuming continued westerly preference and Cranford agreement¹⁹

L _{eq} Contour Level	Area in 2002 461,000 ATMs	Area in 2020	Area in 2030	
		Three runways 605,000 ATMs	Two runways 480,000 ATMs	Three runways 702,000 ATMs
>54	235.7	230.2	138.8	202.4
>57	126.6	126.7	77.0	112.9
>60	71.7	69.9	44.2	62.2
>63	43.8	39.8	26.4	34.2
>66	28.8	21.3	14.9	18.4
>69	16.3	11.1	7.6	9.8
>72	8.4	6.1	4.1	5.4

Table 8: Noise – Numbers of people affected (000s) assuming continued westerly preference and Cranford agreement

L_{eq} Contour Level	Population in 2002 461,000 ATMs	Population in 2020	Population in 2030	
		Three runways 605,000 ATMs	Two runways 480,000 ATMs	Three runways 702,000 ATMs
>54	561.5	614.9	345.7	534.6
>57	257.8	242.3	142.2	205.7
>60	123.3	101.6	66.3	86.6
>63	64.2	35.6	24.4	31.1
>66	29.7	9.5	6.7	8.1
>69	8.6	3.2	1.6	2.6
>72	3.0	0.3	0.0	0.2

Figure 4.2: Noise exposure changes for 2030 R3 'alternating' mode relative to 2002



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0 5 10 15 20 25 Kilometres

$\geq +9\text{dB}$
 $\geq +6$ to $+9\text{dB}$
 $\geq +3$ to $+6\text{dB}$
 $\geq +2$ to $+3\text{dB}$
 $\geq +1$ to $+2\text{dB}$
 < -1 to 2dB
 < -2 to -3dB
 < -3 to -6dB
 < -6 to -9dB
 $< -9\text{dB}$
■ 2030 R3 (Alternating)-
57dBA Contour

ANASE – Attitudes to Noise from Aircraft Sources in England

The study objectives were to:

- re-assess attitudes to aircraft noise in England (1982 ANIS study);
- re-assess their correlation with the Leq noise index;
- examine (hypothetical) willingness to pay in respect of nuisance from such noise, in relation to other elements, on the basis of stated preference survey evidence and contingent valuation.

Phase 2 work:

- 2,733 households interviewed at 76 random sites across the UK;
- Range of noise at any one site limited to 3.5 dBA Leq, LAmax and LAeq at each site measured;
- Interviews undertaken between August 2005 and January 2006;
- 4 advisory committees – steering group; international peer review; stated preference (SP) peer review sub-group, and non-SP sub-group.

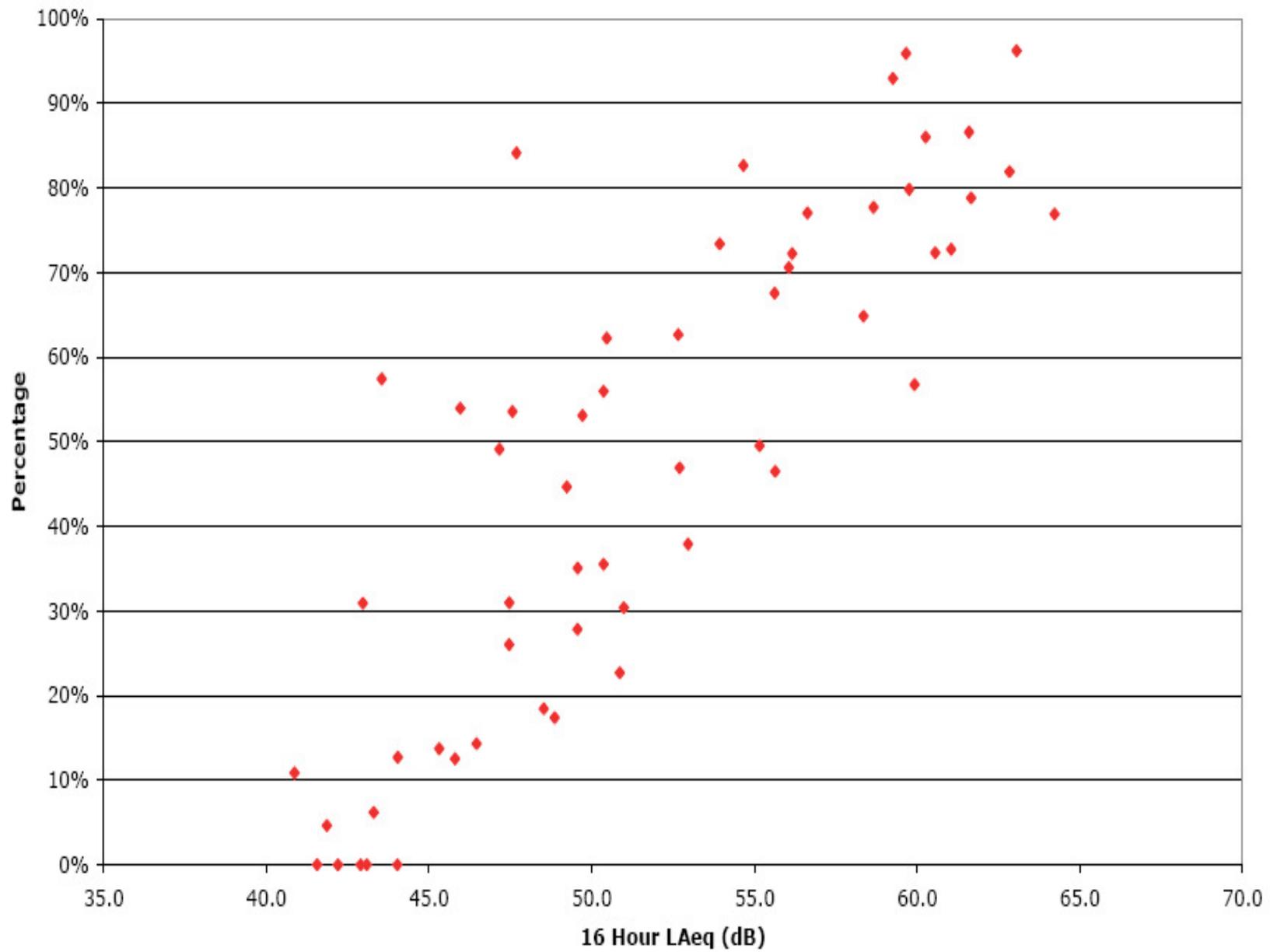


Figure 1 Percentage of Respondents at Least Very Annoyed with Aircraft Noise

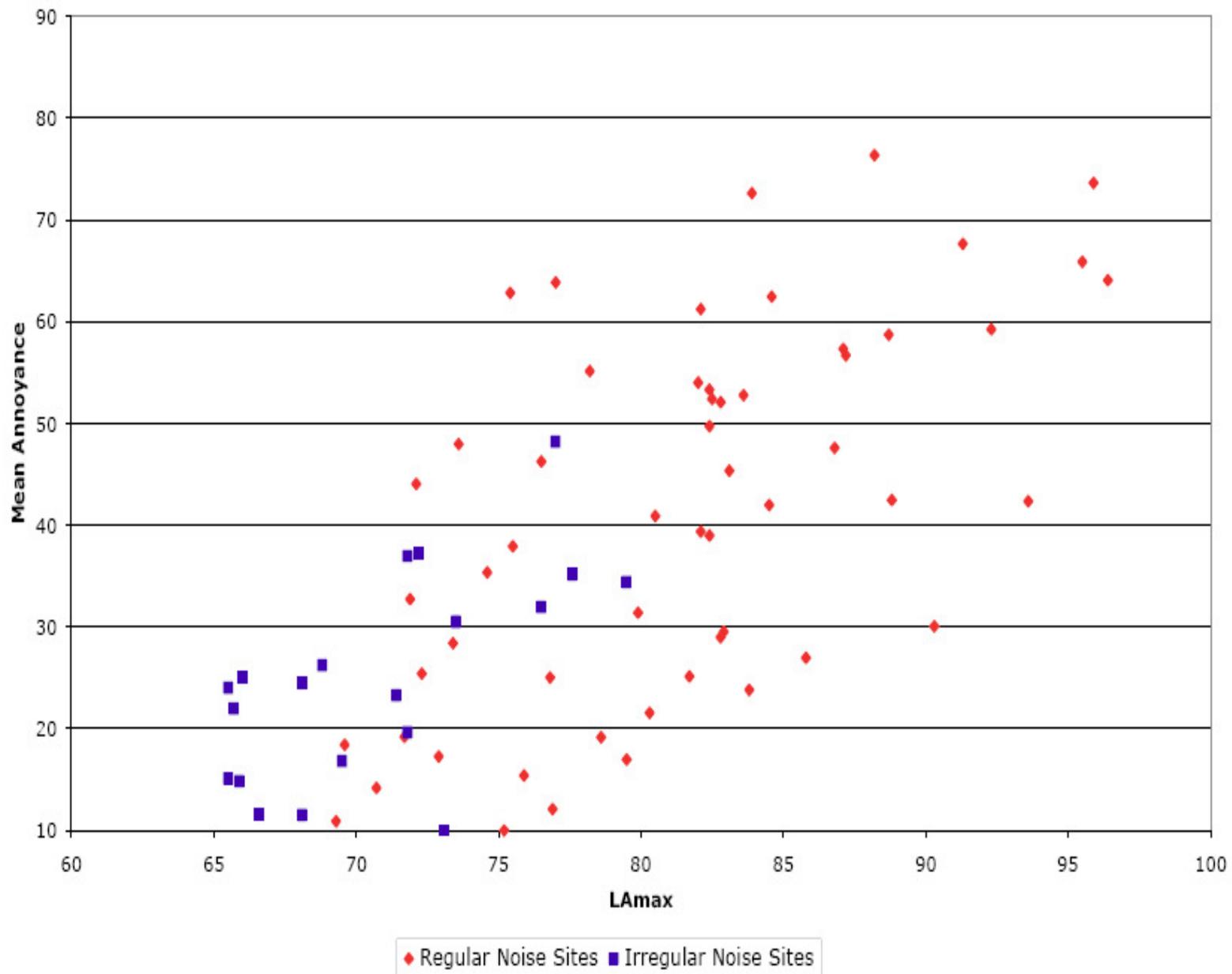


Figure 2 Mean Reported Annoyance with Aircraft Noise by LAmx

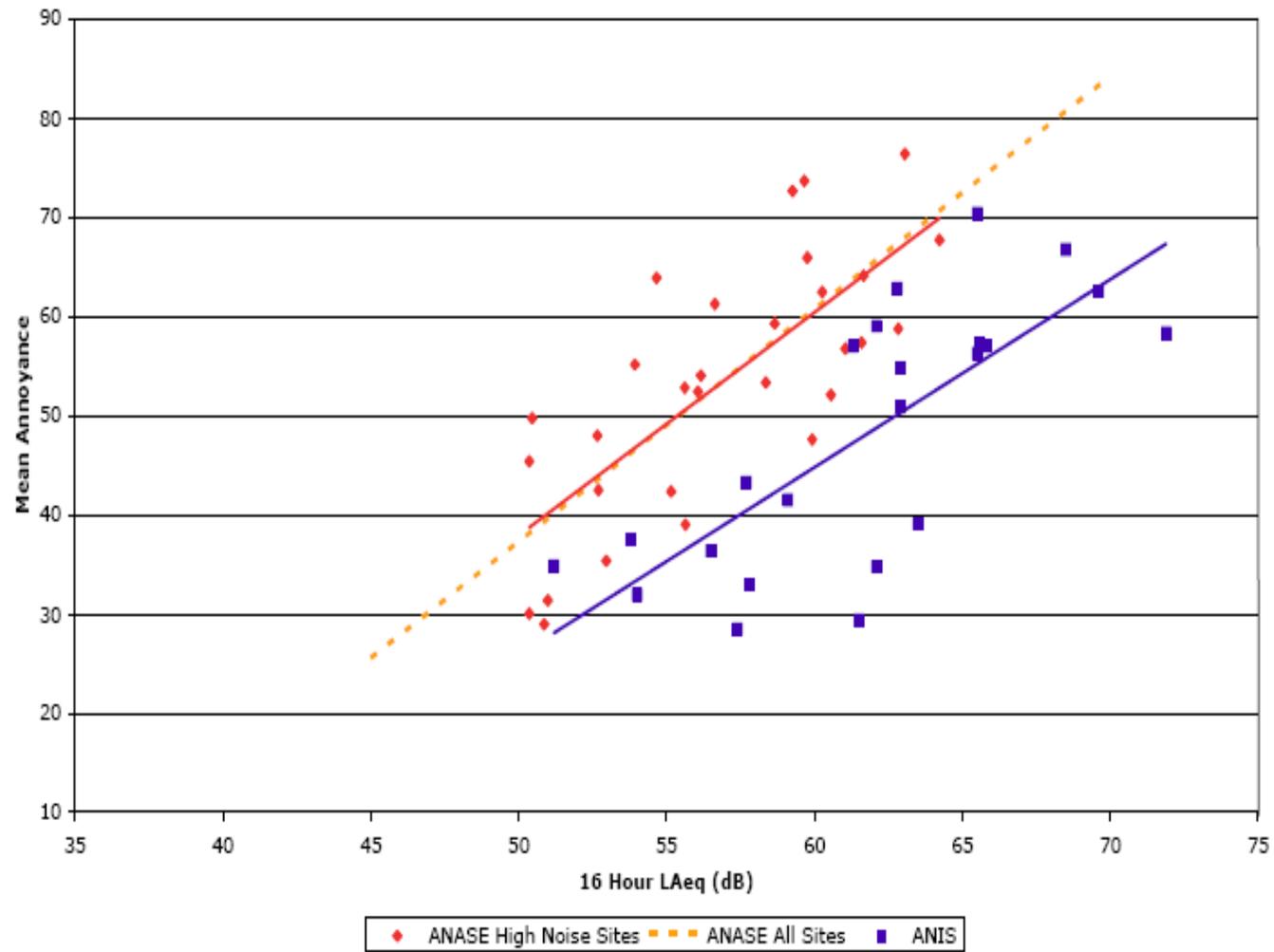


Figure 4 Mean Annoyance against LAeq for ANIS and ANASE for Higher Noise Sites

Time of Day Sensitivities

The results of the National SP model indicates that, relative to the **daytime**, and with some rounding, the sensitivity to the same aircraft noise at other periods are:

- 2300-0300: **80%** more annoying;
- 0300-0700: **35%** more annoying;
- 1900-2300: **15%** more annoying; and
- 1500-1900: **10%** more annoying.

Conclusions:

- for the same amount of aircraft noise, people are more annoyed in 2005 than they were in 1982 (at 57 Leq, 53% v 39%)
- ANASE showed strong influence of “number of events”, suggesting NNI more responsive than Leq to future changes

Peer review comments:

- ANASE noise levels inconsistent with published noise contours by 2-3 dB
- Some bias in scoring replies compared to ANIS
- Dismiss the consultant's claim that the results are supported by other studies as this was not part of the brief
- Study is inconclusive and "should be treated with caution"
- On stated preference, concern with modelling of data

Jim FitzPatrick:

Two key conclusions emerge from the study. First, that people are more annoyed by all levels of aircraft noise than they were in 1985, when the last major study in this field was carried out. Secondly, there is no identifiable threshold at which noise becomes a serious problem. Even relatively low levels of noise can cause some annoyance, which rises as the noise increases.

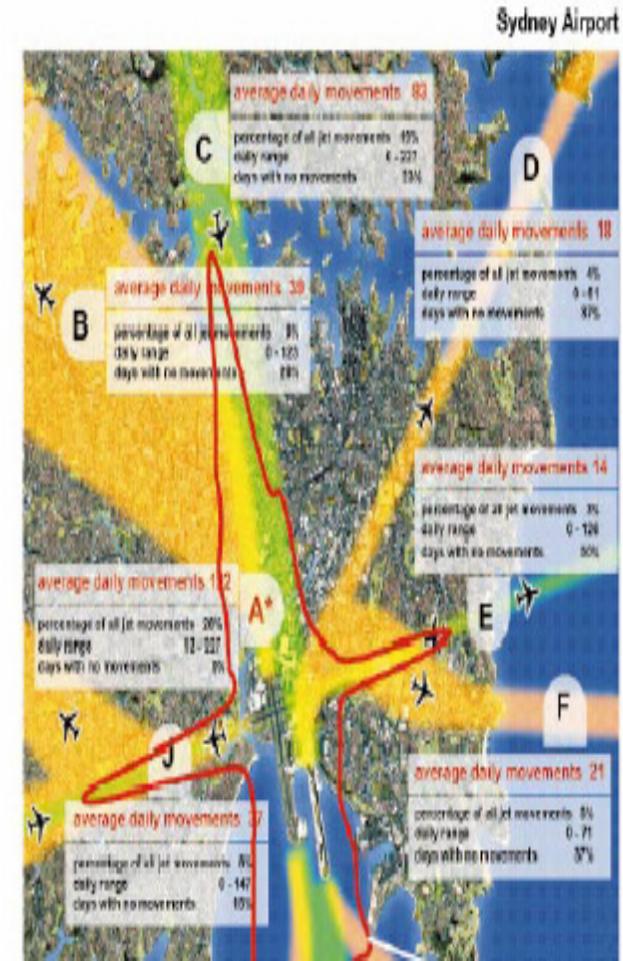
"The Government accepts that noise from aircraft is a growing concern and will take into account those people affected by aircraft noise when considering the costs and benefits of future projects. The ANASE study also makes clear that it is impossible to identify any particular level at which noise becomes a serious problem."

Communicating noise

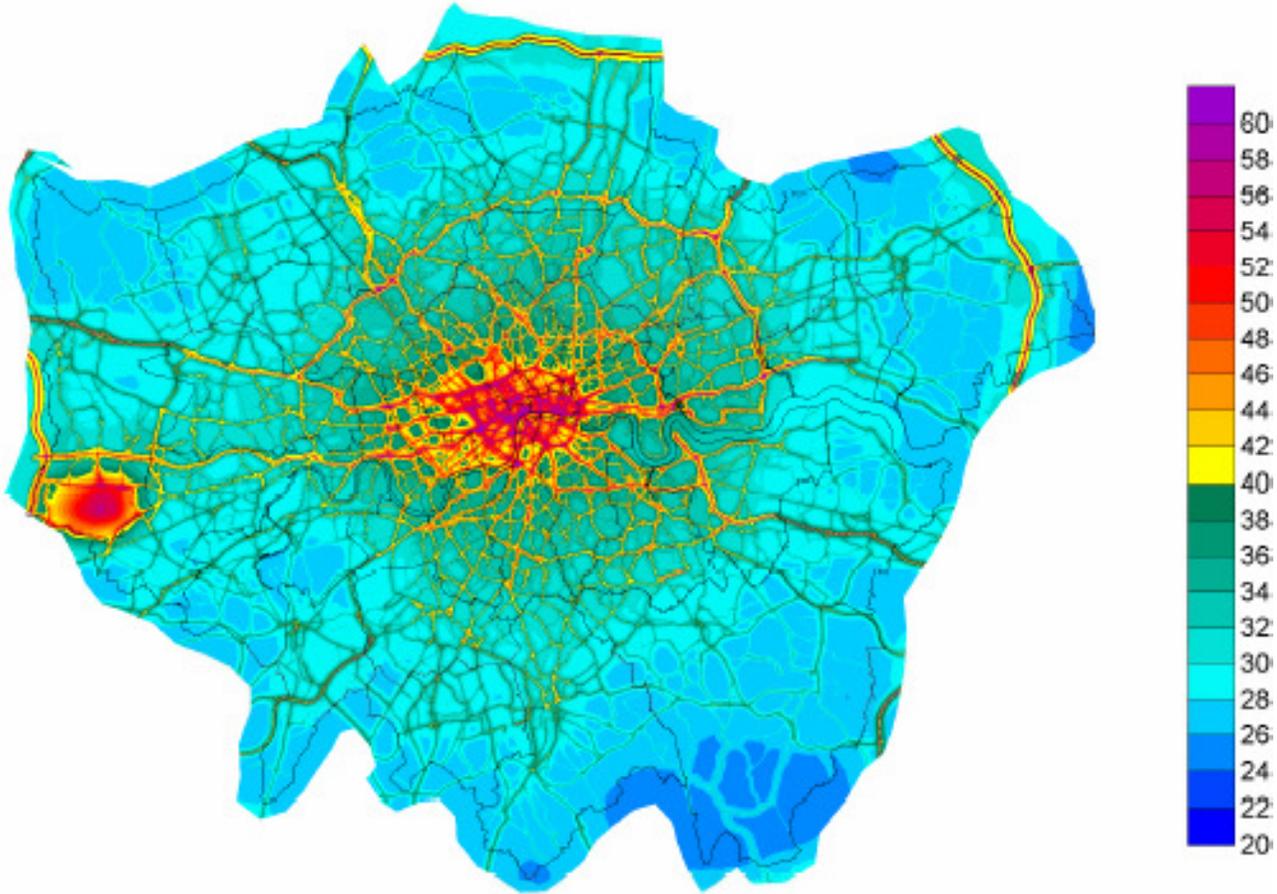
A better way?

Noise maps (produced in addition to contour maps) showing:

- Aircraft altitude
- Average daily movements on a flight path (and range between quietest and busiest days)
- Number of days when no flights
- Any “quiet” periods e.g. night curfew
- Number of events over a given threshold e.g 70 dBA
- Information can show seasonal, daily or hourly distributions



London's Predicted Annual Average Nitrogen Dioxide Level (2005) *Source: Mayor's Air Quality Strategy*



Sources of Uncertainty

a) Aircraft Sources

- The best aircraft emissions model has uncertainty of up to 30%. It leads to more sites being shown with underestimated than overestimated air pollution levels.
- Use of average values / certification tests could significantly underestimate future aircraft emissions.
- Temporal variations in the use of different types of aircraft have not been modelled. It is unclear whether and how this affects confidence.

b) Background Levels

- The background air quality data has uncertainty of up to 10%.
- An anomalous year (like 2003) could easily lead to much higher NO_x emissions than those predicted using the 'normal' base year 2002.
- Actual ground-level temperature and pressure may be quite different from those assumed. NO_x emissions are highly sensitive to these factors.

Sources of Uncertainty

c) Road traffic

- Vehicles' actual NO_x emissions can be much greater than the applicable European standard; the full reduction in NO_x due to improvements in vehicle engines may thus not be achieved.
- Other new sources of regional NO_x have not been modelled e.g. power station at Rochester, waste incinerator at Belvedere, growth in railway sources after 2010 etc. These could all increase the assumed baseline levels of NO_x.
- Assuming a 'no construction' scenario for the roads near Heathrow is probably unrealistic, given the development pressures on the area. Such a scenario would lead to an unrealistically low baseline of NO_x levels.

d) Exposure

- Depending on how much the population around the airport grows after 2002, the model could significantly underestimate the number of people affected by air pollution from the airport

Conclusions

- the total uncertainty arising from the model assumptions may well exceed the difference between the modelled levels of air pollution and the EU air quality limit.
- the uncertainties are large enough that Government cannot be 'confident' that EU NO_x standards can be achieved.

And on noise:

- Reaction to noise influenced increasingly by number of noise events
- Strong evidence for significant annoyance below 57 Leq
- Supplementary metrics are needed to improve communication

And generally:

- Benefits from continued improvements in technology and operational efficiencies will be eroded by growth in air traffic