

Understanding the basis for Government Aviation Policy and Sensitivities

- Reminder – At the last meeting DfT confirmed the Meidema (2001) annoyance relationship was used in monetisation analysis (TAG calculations)
- SoNA 2014 found a very similar annoyance relationship but has been shown to be flawed
- While Miedema (2001) is based on average 40 year old noise surveys
- More recent WHO work including recent studies (the same age as SoNA 2014) have shown a much more sensitive relationship between aviation noise and annoyance
- A key question is how sensitive are financial calculations to these relationships?
- If they are highly sensitive and have big financial impacts then more effort needs to be made to get robust data that all stakeholders support

Aviation noise and health – research to policy and practice

ANEG discussion group 28.04.2022

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TAG allows for sensitivity testing

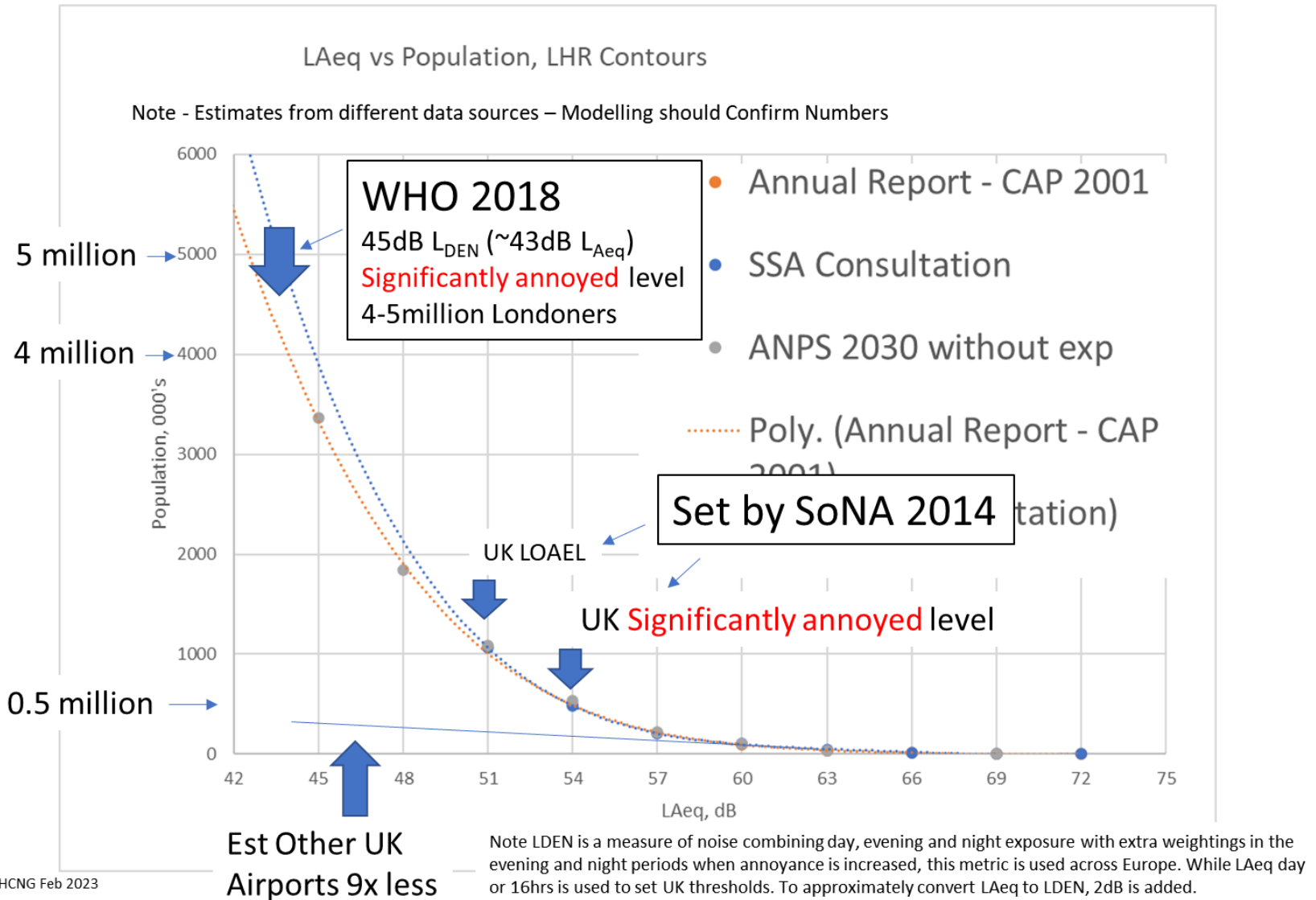
“2.1.2 Defra’s guidance and associated toolkit highlight several key areas of uncertainty in the appraisal of noise impacts.

...

Where noise impacts are particularly significant, sensitivity testing to reflect these various uncertainties may be required and further advice should be sought from the Department on an appropriate range of sensitivity tests.”

TAG Unit A.3 July 2021

Reminder; Heathrow Noise impact is highly sensitive



Valuing Annoyance



Department
for Environment
Food & Rural Affairs

www.gov.uk/defra

p15

Environmental Noise:

Valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet.

Key Formula used by TAG to value Annoyance

Valuing annoyance

47. The overall approach to valuing annoyance is provided in the following equation:

$$\text{Value of annoyance} = \text{population exposed} \times \text{proportion highly annoyed} \times \text{disability weight} \times \text{health value}$$

48. The first term in this analysis is the population exposure to environmental noise. This modelling may be undertaken through a range of different tools and processes. The precise approach will depend upon the decision under consideration and therefore we do not recommend a specific approach.

49. Once the exposure has been quantified, it is then necessary to estimate the population impacted by annoyance. Following existing IGCB(N) guidance the proportion of the population highly annoyed (%HA) should be quantified using the following dose response functions:

- Road: %HA = $9.868 \times 10^{-4} \times (L_{den}-42)^3 - 1.436 \times 10^{-2} \times (L_{den}-42)^2 + 0.5118 \times (L_{den}-42)$
- Air: %HA = $-9.199 \times 10^{-5} \times (L_{den}-42)^3 + 3.932 \times 10^{-2} \times (L_{den}-42)^2 + 0.2939 \times (L_{den}-42)$
- Rail: %HA = $7.239 \times 10^{-4} \times (L_{den}-42)^3 - 7.851 \times 10^{-3} \times (L_{den}-42)^2 + 0.1695 \times (L_{den}-42)$

50. It is possible for the %HA equations go down to 42dB but data below 45 dB were excluded due to the unreliability of noise data at very low levels and the absence of a relationship at this level. Data above 75 dB is assumed to be constant due to a lack of data points to establish a robust relationship at these high levels²³.

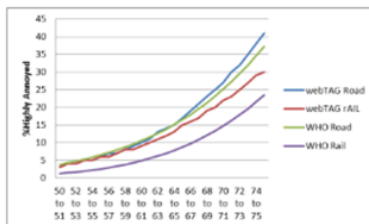
51. The WHO (2011) established a disability weight (DW) of 0.02 with a sensitivity range for the DW's between 0.01 and 0.12, reflecting the low/high range from their literature review. By combining this with the outputs of the above modelling it is possible to quantify the health outcome. These outcomes should then be valued in line with the prevailing guidance on valuing life and health, currently £60,000 per DALY.

Disability weight and health value defined

Formulas describe annoyance curves

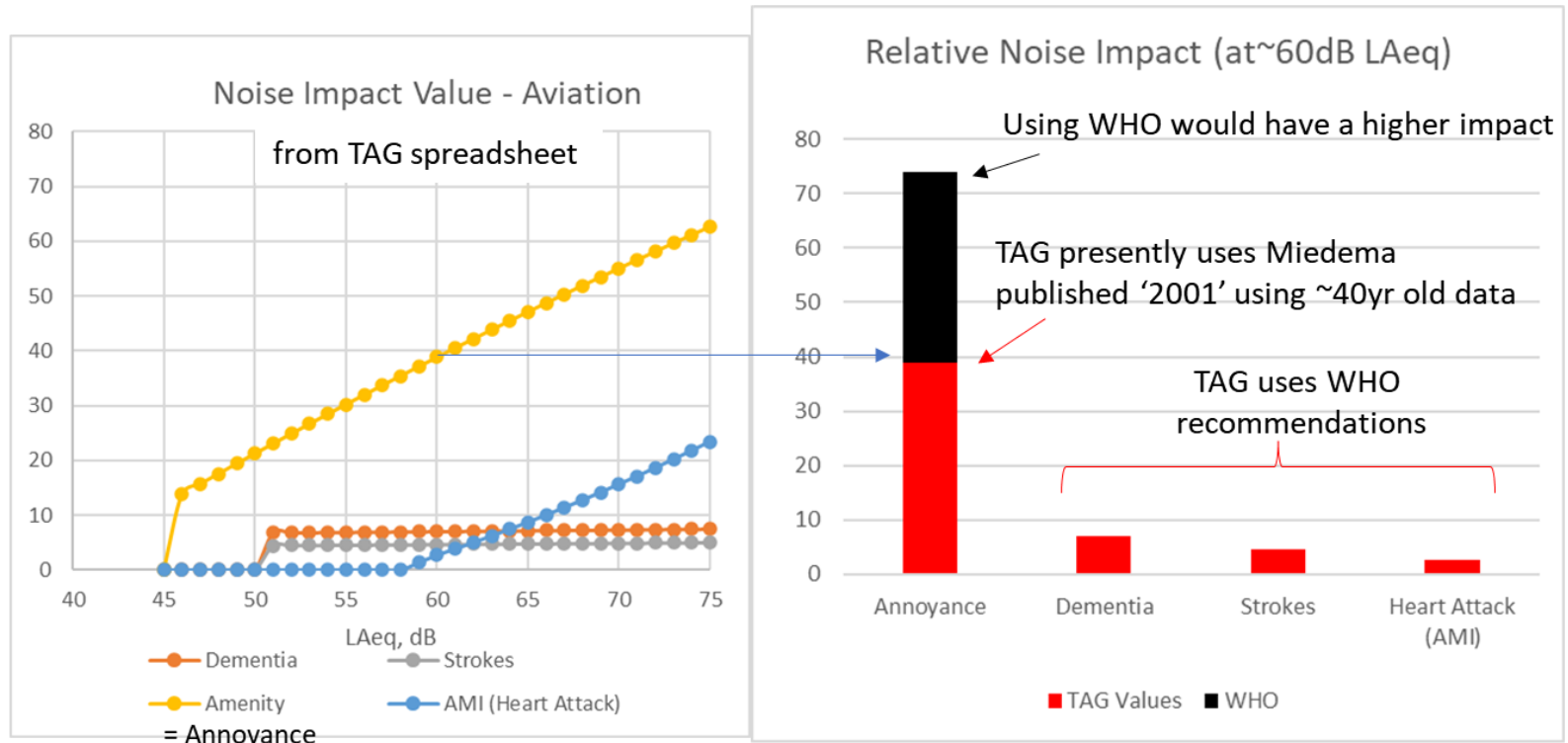
November 2014

Figure A3.1: Comparison between webTAG annoyance and %Highly Annoyed function



Valuing Annoyance & Other Health Impacts

- Values taken from TAG Model & WHO



- This shows that annoyance has the biggest influence on financial impacts
- This is the only value where the UK TAG model presently uses old data
- What are the potential financial impacts?

Valuing Negative Annoyance Impacts at Heathrow

= Pop Exposed x %HA x Disability Weight x Health Value

- Disability Weight Defra 2014 assumed 0.02 (as WHO) & Health Value £60kpa
- Compare Defra 2014 (based on Miedema) to WHO as a reasonable sensitivity

Significant impacts to 45dB LAeq

Band, dB LAeq	Pop in band, k	%HA - Defra 2014	Pop HA	Value, £m	%HA - WHO	Pop HA	Value, £m	
45-48	1525	4	54075	65	15	233015	280	
48-51	769	6	48131	58	20	157513	189	
51-54	570	10	54944	66	26	147264	177	
54-57	292	14	39831	48	31	91276	110	
57-60	109	18	19923	24	37	40148	48	
60-63	64	24	15091	18	43	27283	33	
63-66	28	29	8133	10	48	13391	16	
66-69	10	36	3519	4	54	5339	6	
69-72	2	43	1060	1	61	1497	2	
Total Noise Impact from Annoyance, £m pa				294	860			
Cost per passenger, £				4	11			

~3x

Noise impacts from sleep disturbance, and other health impacts like hypertension still need to be added in

Conclusions

- Heathrow's impact is particularly sensitive to annoyance levels
- Financial impacts need to be calculated to at least 45dB LAeq (not the UK LOAEL of 51dB to understand impacts)
- Negative impact from annoyance alone minimum £300mpa (a large number) but could be as high as £1bnpa – this cannot be ignored
- These numbers are for Annoyance only, other health impacts would add to these numbers
- Polluters should pay for the damage caused so a Noise charge of £5 - £15 per passenger needs to be considered for Heathrow
- To avoid these impacts there is strong case to reduce flight numbers at Heathrow
- Given the large sensitivity and financial impact the new ANAS noise survey needs to be robust – avoiding previous flaws and transparent to all stakeholders