Night Time Noise Impacts

Does the Industry or Government know how many people are adversely affected by Night Time Noise?

Dave Gilbert HCNF 26th Jan 2022

HCNG – Heathrow Communities Noise Group

People are woken up by Noise Events

- 10 x 60dB L_{Amax} events is a key threshold *
- Impact contours calculated through Modelling
- But Modelling is based on Assumptions

- Concern - Recent 2019 data have shown big differences from different Models
- Consider LHR impact at 10 x 60dB average night (11pm-7am) events

  - CAA/ERCD ANCON Modelling** says 0.97m (2018) and 1.1m (2019) people impacted

  - Heathrow AEDT/INM Modelling*** says 1.6m (2019) people impacted

- Numbers impacted are massive anyway (>1m people) but also the differences between the models, nearly 50%
- What is happening?

* See WHO guidelines 1999

** Data from CAP 1901 & CAA

*** Data from Slightly Steeper Approaches Consultation

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Acronyms; ERCD - Environmental Research and Consultancy Department. ANCON - Aircraft Noise Contour Model, AEDT - Aviation Environmental Design Tool, INM – Integrated Noise Model

WHO 1999 Community Noise Guidelines

For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax* more than 10–15 times per night (Vallet & Vernet 1991), and most studies show an increase in the percentage of awakenings at SEL values of 55–60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995). For intermittent events that approximate aircraft noise, with an effective duration of 10–30 s, SEL values of 55–60 dBA correspond to a LAmax value of 45 dB. Ten to 15 of these events during an eight-hour night-time implies an LAeq,8h of 20–25 dB. This is 5–10 dB below the LAeq,8h of 30 dB for continuous night-time noise exposure, and shows that the intermittent character of noise has to be taken into account when setting night-time limits for noise exposure. For example, this can be achieved by considering the number of noise events and the difference between the maximum sound pressure level and the background level of these events.

* Note 60dB LAmax is an outside level, attenuation through an open window is assumed to result in a 45dB event

More recent studies have suggested a noise level of 42dB in the bedroom can disturb sleep (WHO 2009 Night Noise Guidelines for Europe)

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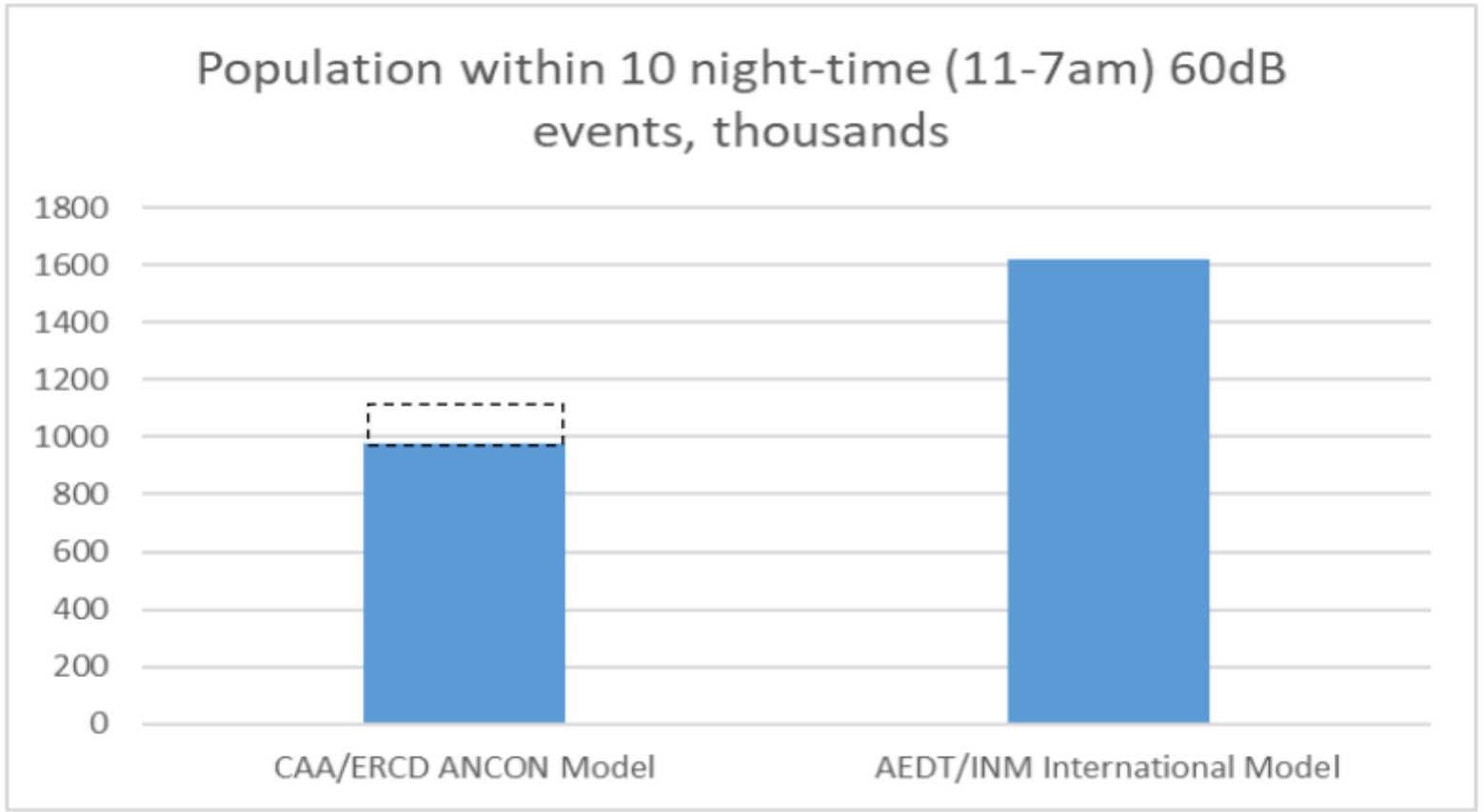
Acronyms; SEL – Sound Energy Level

Population Impact differences between CAA/ERCD ANCON & AEDT/INM models – for 10x Night Time N60 events

1.5 million

1 million



Source – CAP 1691/CAA

Source – Heathrow Analysis using AEDT/INM model from Slightly Steeper Approaches Consultation

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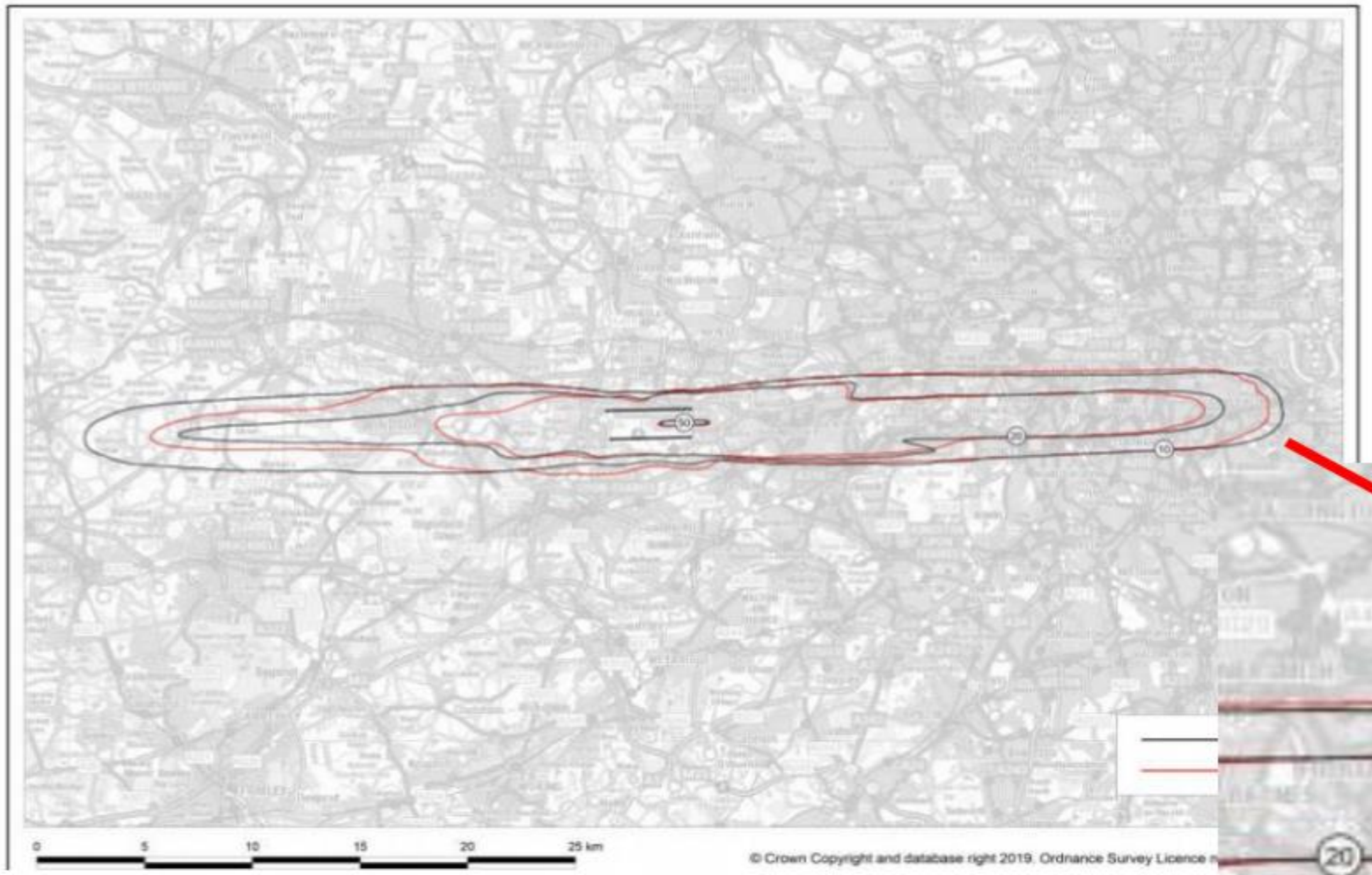
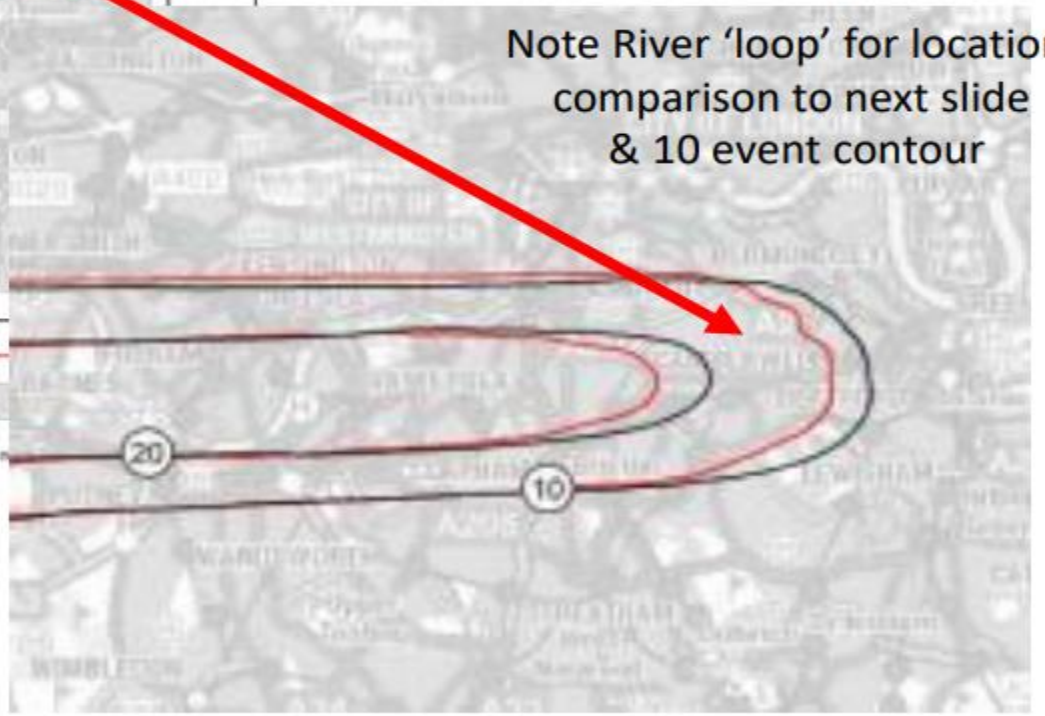
Figure B44 Heathrow 2018 and 2006 annual 8-hour night N60 contours



CAA/ERCD night noise modelling

Assuming steady fall off in noise with distance from threshold

Note River 'loop' for location comparison to next slide & 10 event contour



Red and black lines refer to 2018 and 2006 contours

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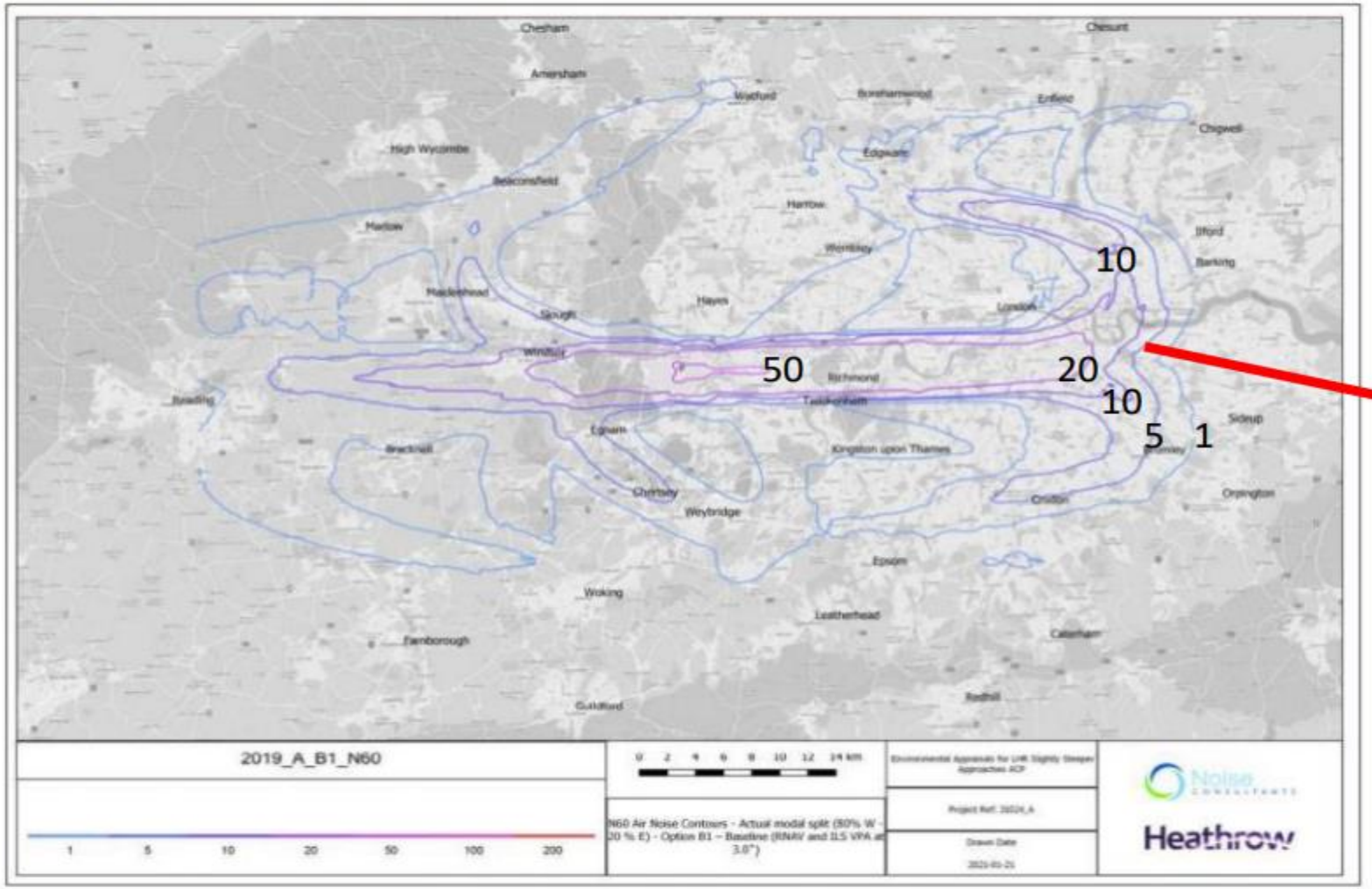
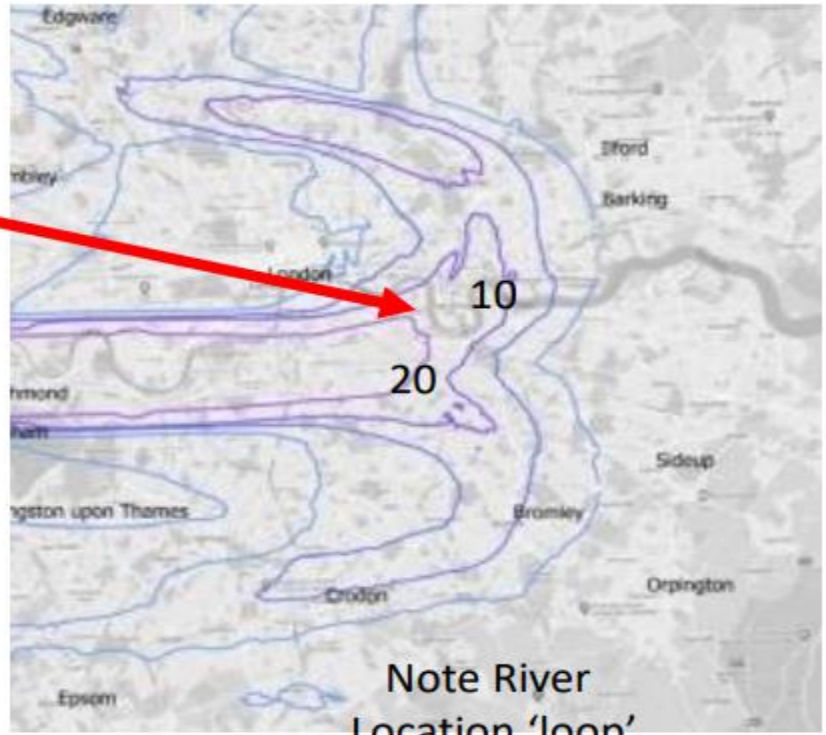
N60 (night) contours – Option B1 (Baseline) - 2019



Noise Consultant modelling using latest flight dispersion, heights and and curved segments based on AEDT / INM modelling



Note River Location 'loop' closer to 20 event contour

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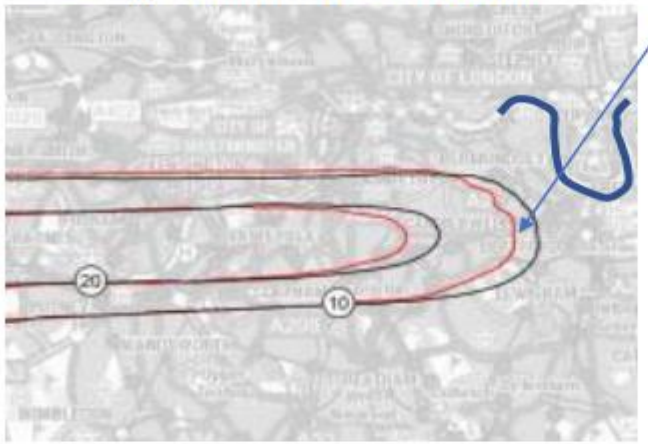
From Slightly Steeper Approach Consultation Appendix A

Comparison on same scale

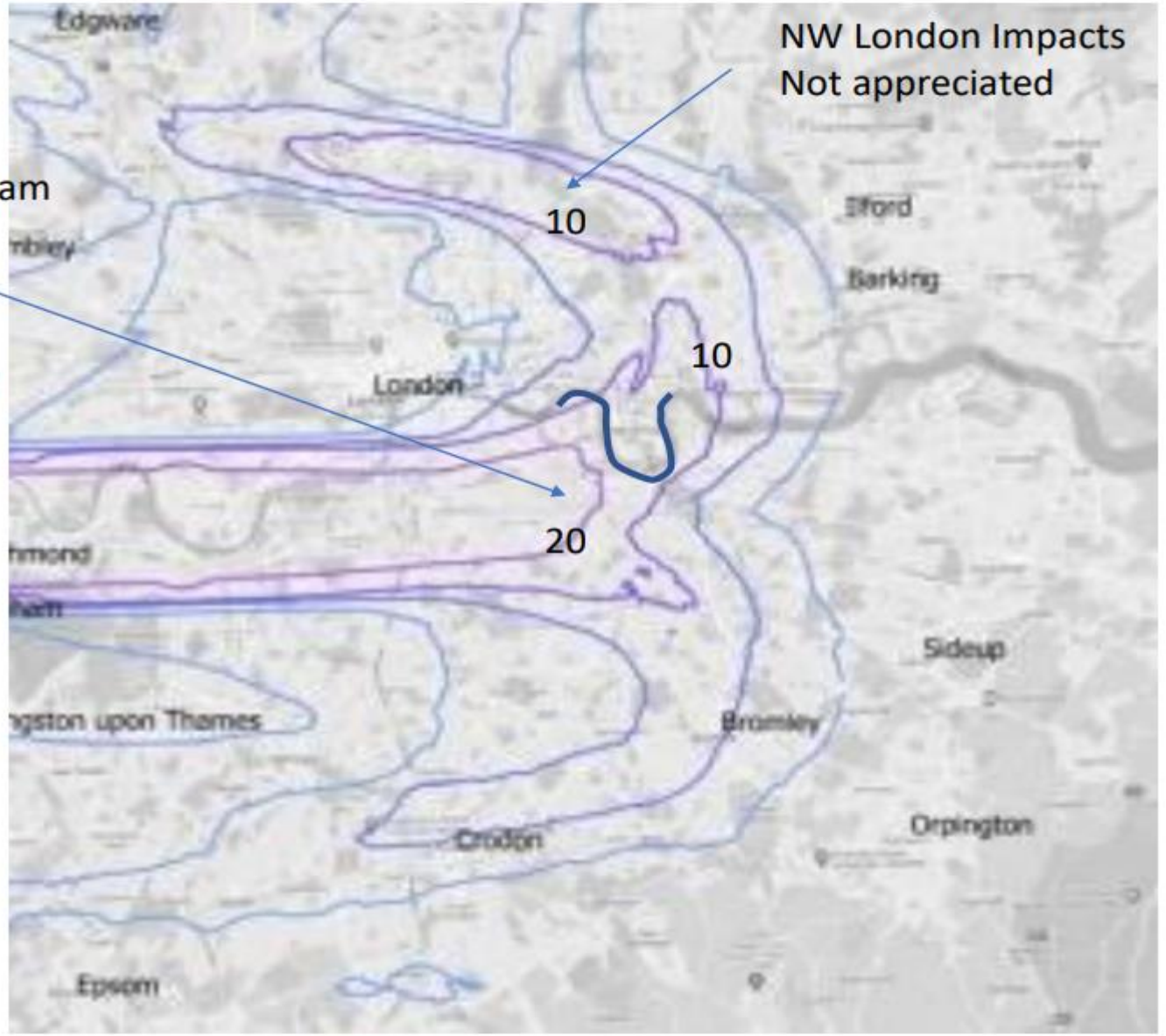
Bermondsey/Camberwell/Peckham

CAA/ERCD ANCON Model



Very Different?

?



The ANCON model places the 10 event contour at a similar position to the 20 event contour of the AEDT/INM model

(Use River Location 'loop' to compare contours)

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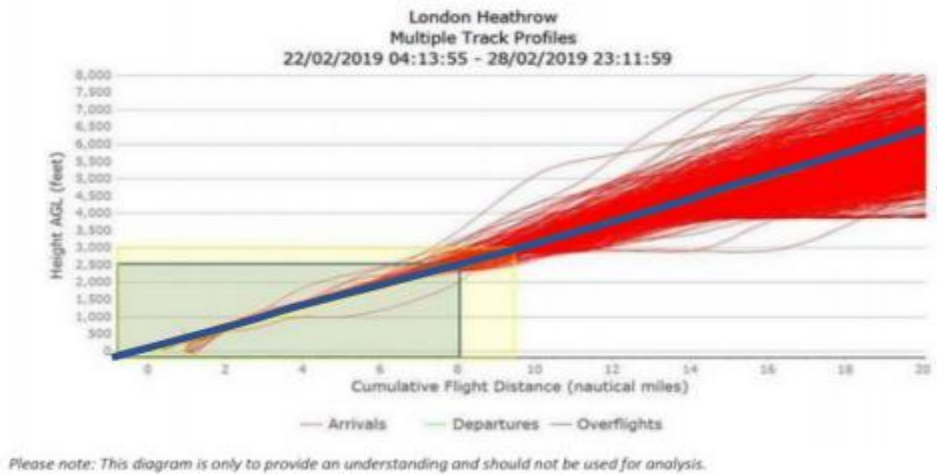
AEDT/INM Model

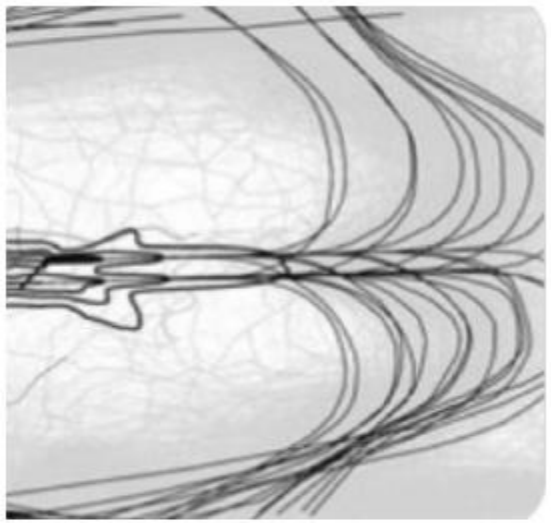
What could be causing these differences?

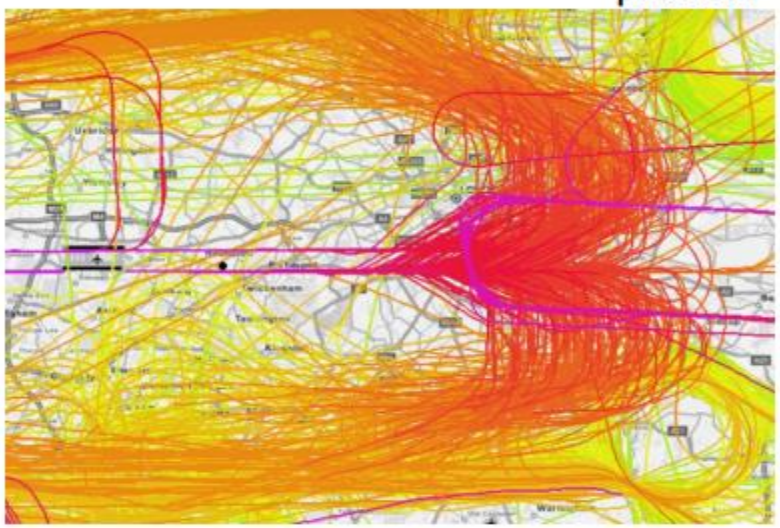


Please note: This diagram is only to provide an understanding and should not be used for analysis.

CAA/ERCD ANCON assumption – Continuous Descent Departures (CDO)?
Whereas AEDT/INM – uses real flight data

Data suggests real height dispersion with many lower planes?





AEDT/INM uses real flight data
- more concentrated?

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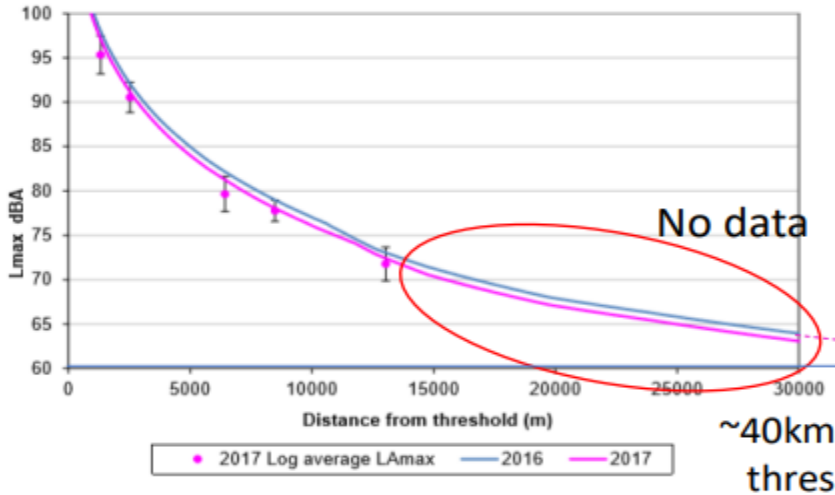
Improved validation required for CAA/ERCD ANCON Model?

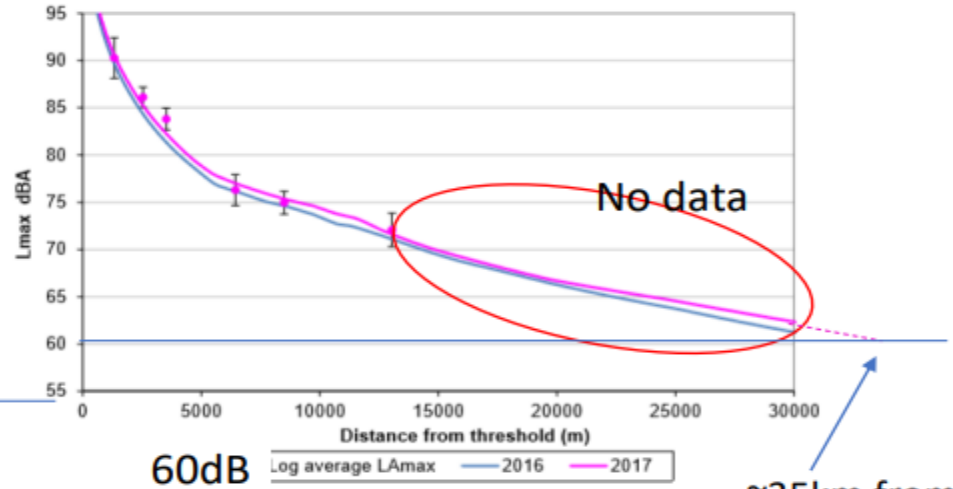
(Challenge is potentially to get noise monitors to record 60dB events - but some now in quiet locations so could be adjusted to lower settings?)

Figure E8 Boeing 777-300ER/GE engines arrival L_{max}



~40km from threshold

Figure E24 Airbus A380/EA engines arrival L_{max}



~35km from threshold

Figure E16 Airbus A320/CFM engines arrival L_{max}

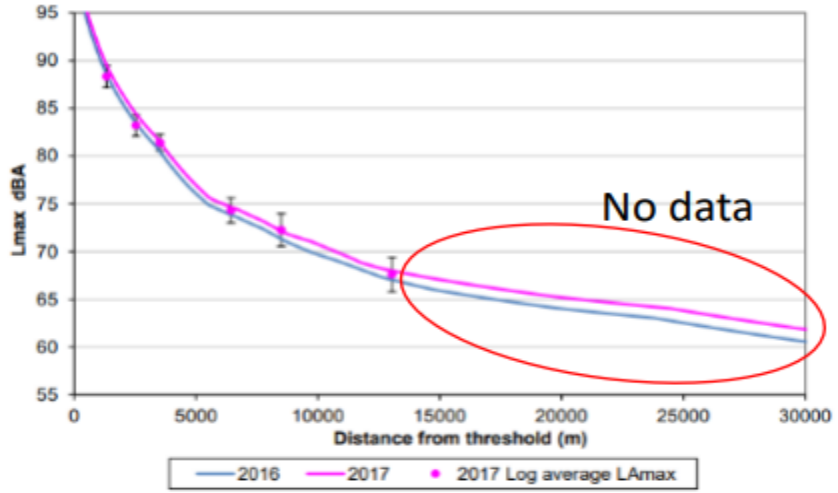
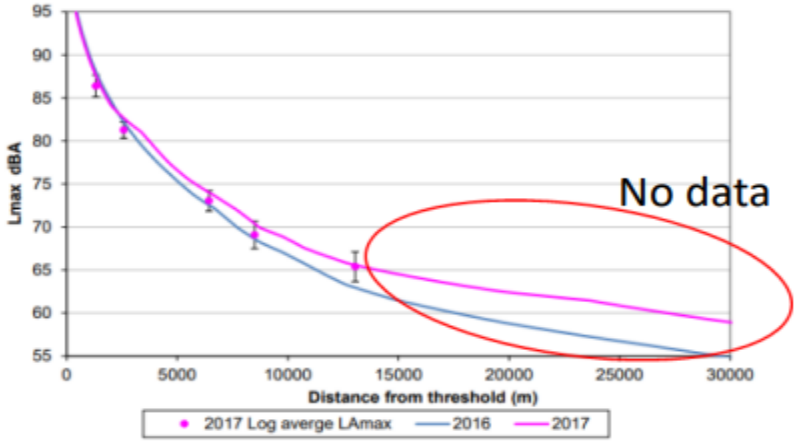


Figure E20 Airbus A320/IAE V2500 engines arrival L_{max}



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Conclusions

- Assumptions used in AEDT/INM more robust (e.g. real heights) and likely to better represent the real situation

- This means that many more people are affected by night noise than understood by aviation industry and Government
- More restrictive Night Time measures and operations are needed

- This applies to all UK airports
- Urgent need to get ANCON model validated

  - several noise sensors in lower noise positions (e.g parks or fields) so now possible

- Proposed action – HCNG noise representatives meeting with DfT to discuss issue in depth and routes forward

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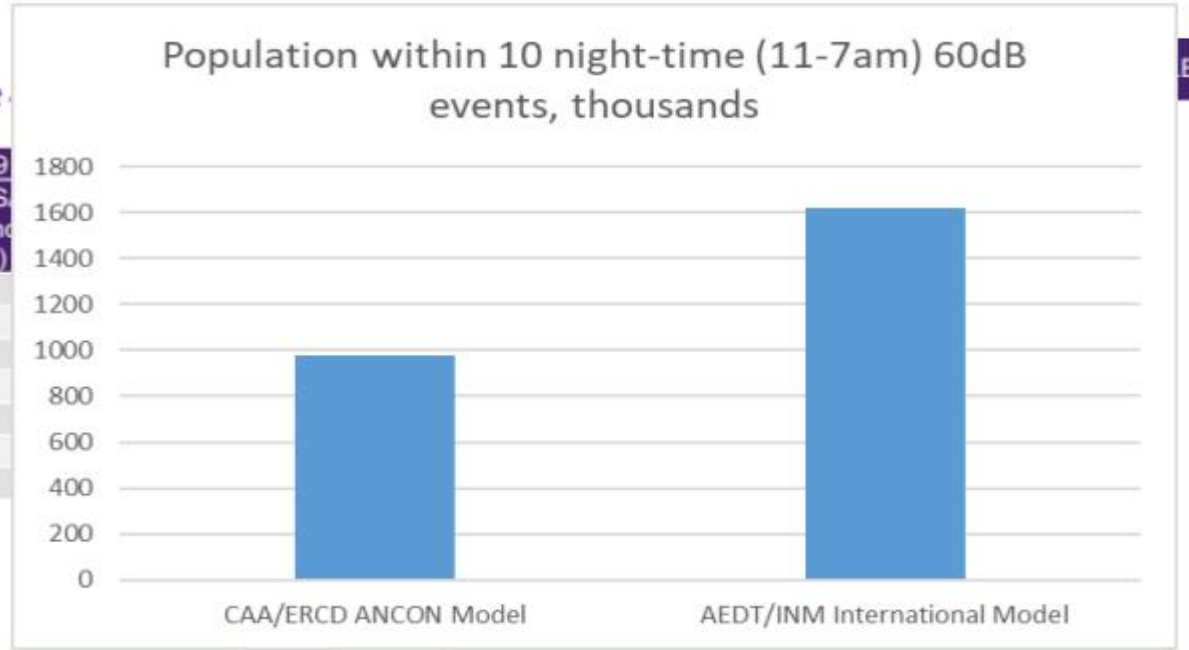
Reference Slides

Differences between CAA/ERCD ANCON & AEDT/INM models – Night Time N60 events



N65 and N60 Data Tables - 80% West 20% East

N65	Number of Dwellings, 2019	
	Option B1 – Baseline (RNAV and ILS VPA at 3.0˚)	Option B2 – SS (3.2˚ RNAV an 3.0˚ ILS VPA)
1	2316171	2312978

ERCD REPORT 1901 Chapter 3: Results

Table 25 Heathrow 2006 and 2018 annual average 8-hour night N60 contours - area, population and household estimates

N60	Area (km²)			Population			Households		
	2006	2018	change	2006	2018	change	2006	2018	change
> 10	184.4	211.8	+15%	837	974.5	6%		419.8	+8%
> 20	89.9	110.7	+23%	389.9		+34%			
> 50	0.5	0.5	0%	< 0.1	0.0	(n/a)			

Note: Populations and households are given in thousands. The 2006 population/household counts are based on a 20 CACI update of the 2001 Census. The 2018 population/household counts are based on a 2018 CACI update of the 2011 Census.

			1728952
20	1333103	1333324	1315768
50	614171	613823	625240
100	341603	341603	329682
200	185586	185586	184675

N60	Population Count, N60		
	Option B1 – Baseline (RNAV and ILS VPA at 3.0˚)	Option B2 – SSA (3.2˚ RNAV and 3.0˚ ILS VPA)	All aircraft operating 3.2o RNAV SSA
1	5472253	5460934	5390598
5		2685054	2644942
10	1619636	1618960	1602863
20		825356	817090
50	11802	11787	11909
100	0	0	0
200	0	0	0

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