Workshop
Issues with UK Survey of Noise Attitudes (SoNA)
14th August 2019

Heathrow Community Noise Group (CNG)

Stephen Clark & David Gilbert

Workshop Structure - key points to address

The workshop has been called to provide answers to the following issues;

1. **SoNA 2014 has not taken account of airspace change** – it is a static survey and resulting annoyance metrics levels need adjusting for situations where airspace change is taking place,
2. **SoNA 2014 cannot be used to inform setting of Lowest Observable Adverse Effect Level (LOAEL) as levels below 51dB L_{Aeq} were not measured** – present LOAEL levels are inappropriate and should be set at much lower levels
3. **SoNA 2014 actual evidence shows N> metrics and L_{DEN} have higher correlation with noise annoyance** – incorrect technical analysis was used to come to a conclusion that L_{Aeq} should not be changed

Overall proposition – SoNA 2014 is not a robust or reliable evidence base for setting UK aviation policy

Proposed Workshop approach

The workshop should include 3 sessions to address each point – communities will present a short summary of the evidence in these slides and conclusions, noise experts are then asked to debate the issue and provide other evidence. If possible facilitators should confirm and record points made then support the chair to summarise each section.

Why has this workshop been arranged?
History of challenges at HCNF and elsewhere – without answers

- Nov 2018 HCNF – '**SoNA vs WHO Noise Guidelines**' identifying major differences and suggested identifying the reasons

- Jan 2019 HCNF – '**SoNA follow up**' showed airspace change a big factor and problems with lowest observable affect levels (LOAEL) – Heathrow suggested a meeting with DfT

- Feb 2019 CNG & DfT – '**SoNA follow up**' but DfT refused to answer because of Judicial Review

- March 2019 AEF Noise Conference – '**Understanding the implications of changes in air space; WHO, SoNA and the missed evidence**' – showed sampling problems by SoNA and how Heathrow 2014 PBN trials increased sensitivity but have not been included into Govt thinking

- March 2019 HCNF – '**Deficiencies in SoNA and PBN trials**' – as above showed sampling problems in SoNA, confirmed change an issue by playing back results of PBN trials to Heathrow showing increased sensitivity

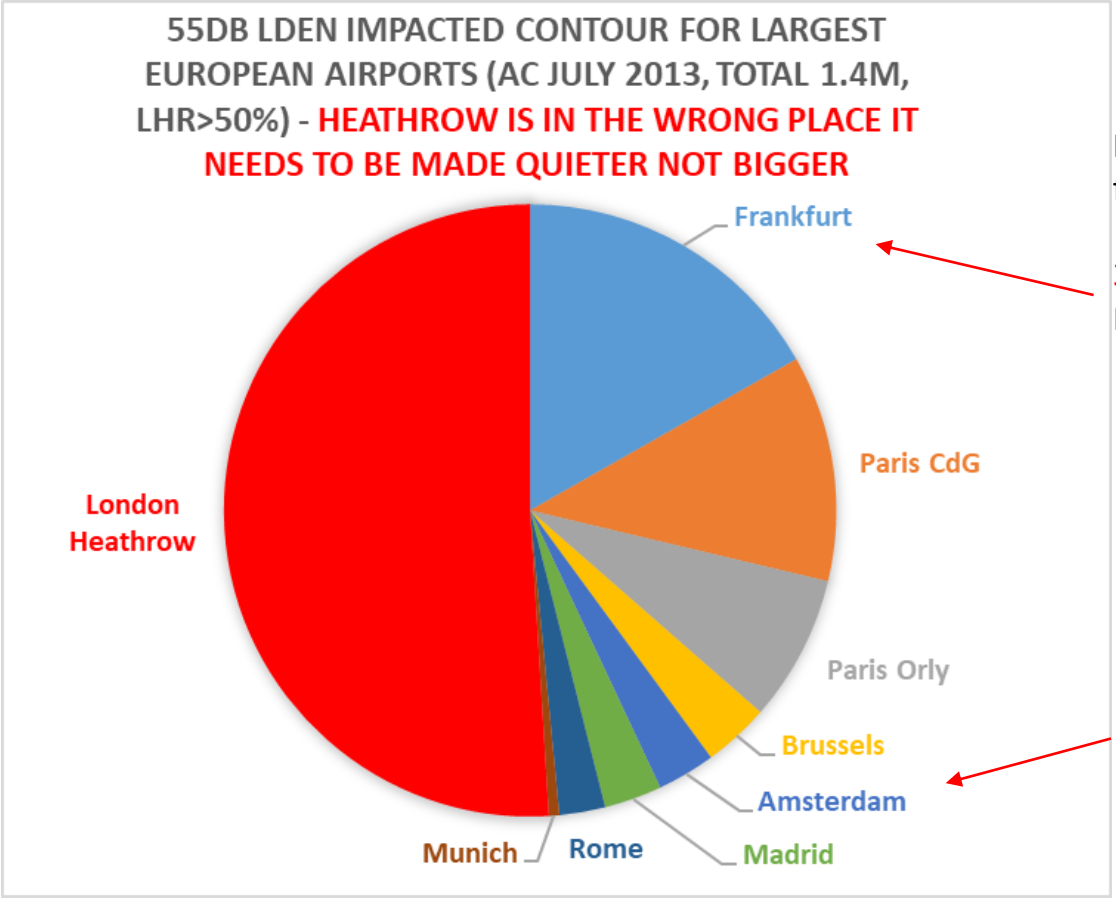
- Most recently 5th June to HCNF - '**SoNA a low rate of change survey vs high rate of change ANPS & Aviation 2050 Scenarios**' SoNA plotted against WHO and recent studies, experts arguing about 6-9dB change impacts, SoNA not an appropriate study to be used for change (ANPS) - Heathrow agreed to organise a meeting with experts prior to the next (July) HCNF

Why is this so important?

Heathrow affects so many people – any error in annoyance metrics will have massive impacts on health and economic costs

In 2017 Heathrow impacted **182 sq. km** in and around London at 55dB L_{DEN} or above.

699,600 people are being impacted at this level



Heathrow noise footprint is;

3x worse than Frankfurt

10-15x worse than Amsterdam

As Heathrow, Frankfurt and Amsterdam (Schiphol) **all have similar amounts of air traffic movements**
Heathrow's noise performance is the worst in Europe at **every level as it impacts so many people**

Evidence base

Proposition 1

SoNA 2014 has not taken account of airspace change

It is a **static survey** and resulting annoyance metrics levels need adjusting for situation where airspace change is taking place

CAA have advised;

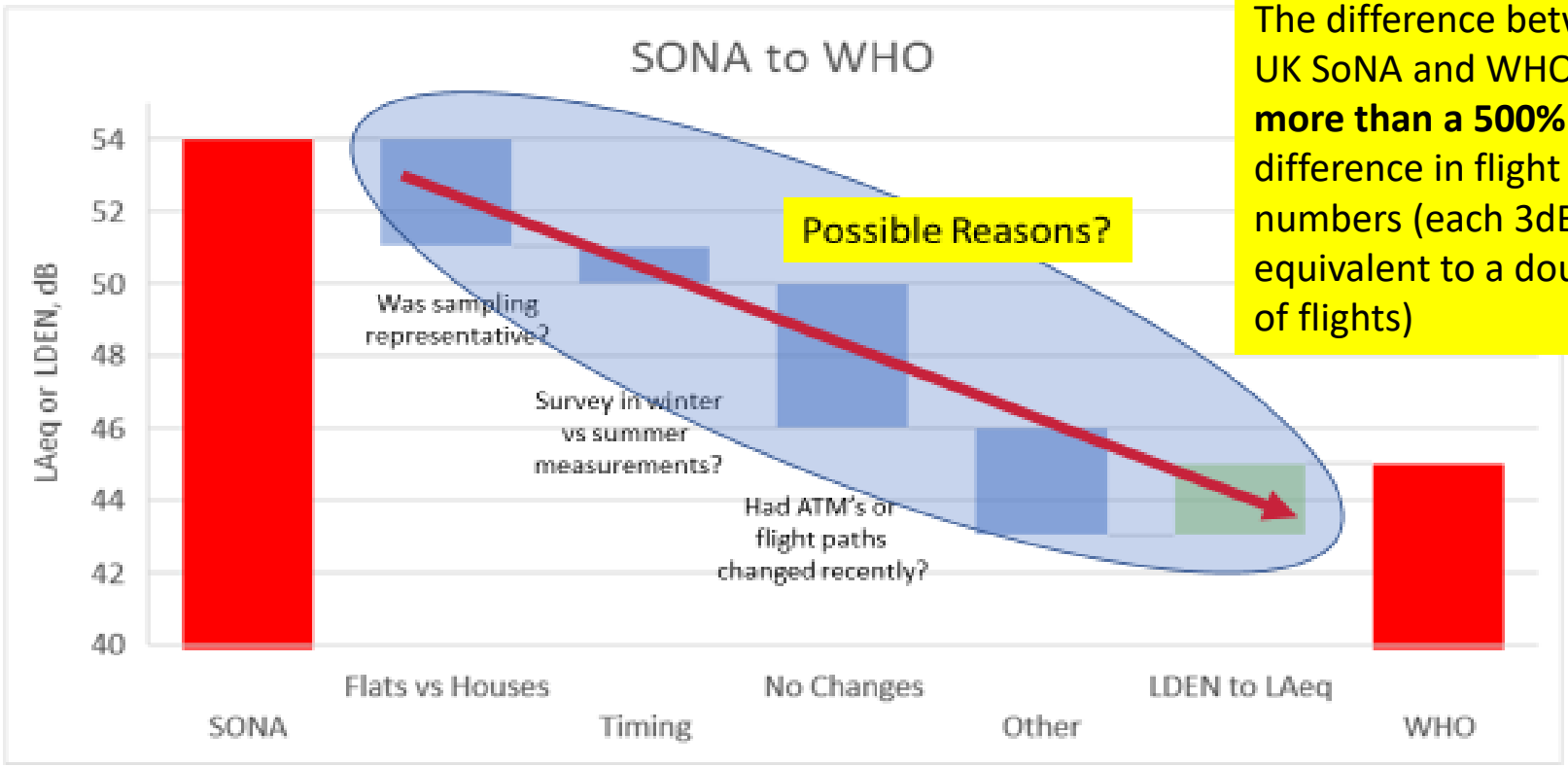
1. SoNA was intentionally undertaken as a static survey (AEF Conference March 2019); but

2. Change has an impact on annoyance, confirmed to the June 2019 HCNF

The enormous differences between SoNA and WHO findings

(previous slide from Nov HCNF 2018)

Proposed Project – Part 1. Independent Consultant to advise most likely reasons for differences



The difference between UK SoNA and WHO is **more than a 500%** difference in flight numbers (each 3dB is equivalent to a doubling of flights)

SoNA
<2,000 Respondents
1 study run by CAA
2 reviewers (one noise, one social science)

WHO
17,094 Participants in 12 studies
International Panels of Expert Reviewers
Full WHO conflict of interest process

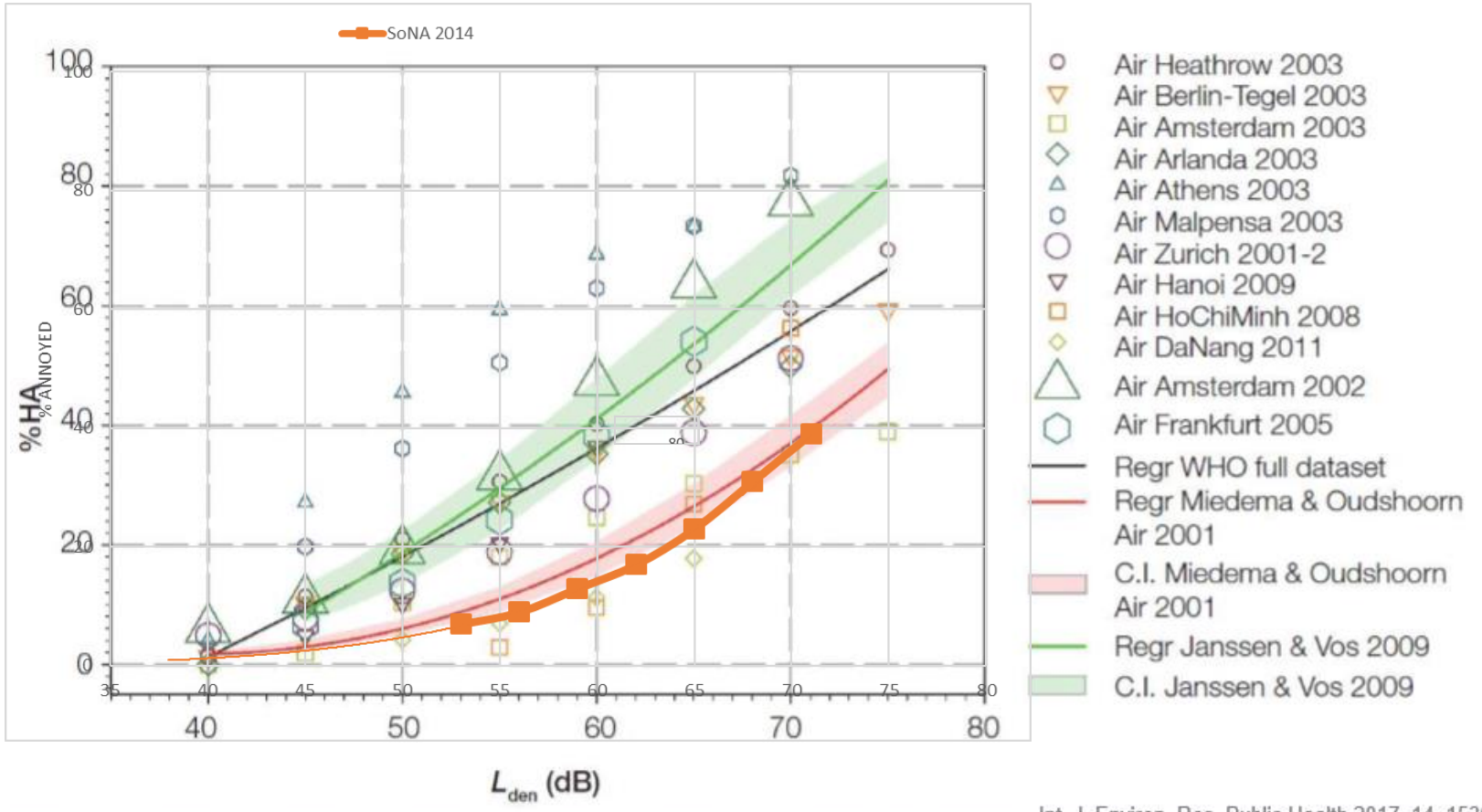
WHO reviews show the UK SoNA as an outlier

WHO 2018 – aviation vs SoNA 2014

A comparison of WHO guidance and SoNA

The SoNA 2014 annoyance curve (orange squares) superimposed on WHO studies

The WHO annoyance curve is shown by the 'Black line'

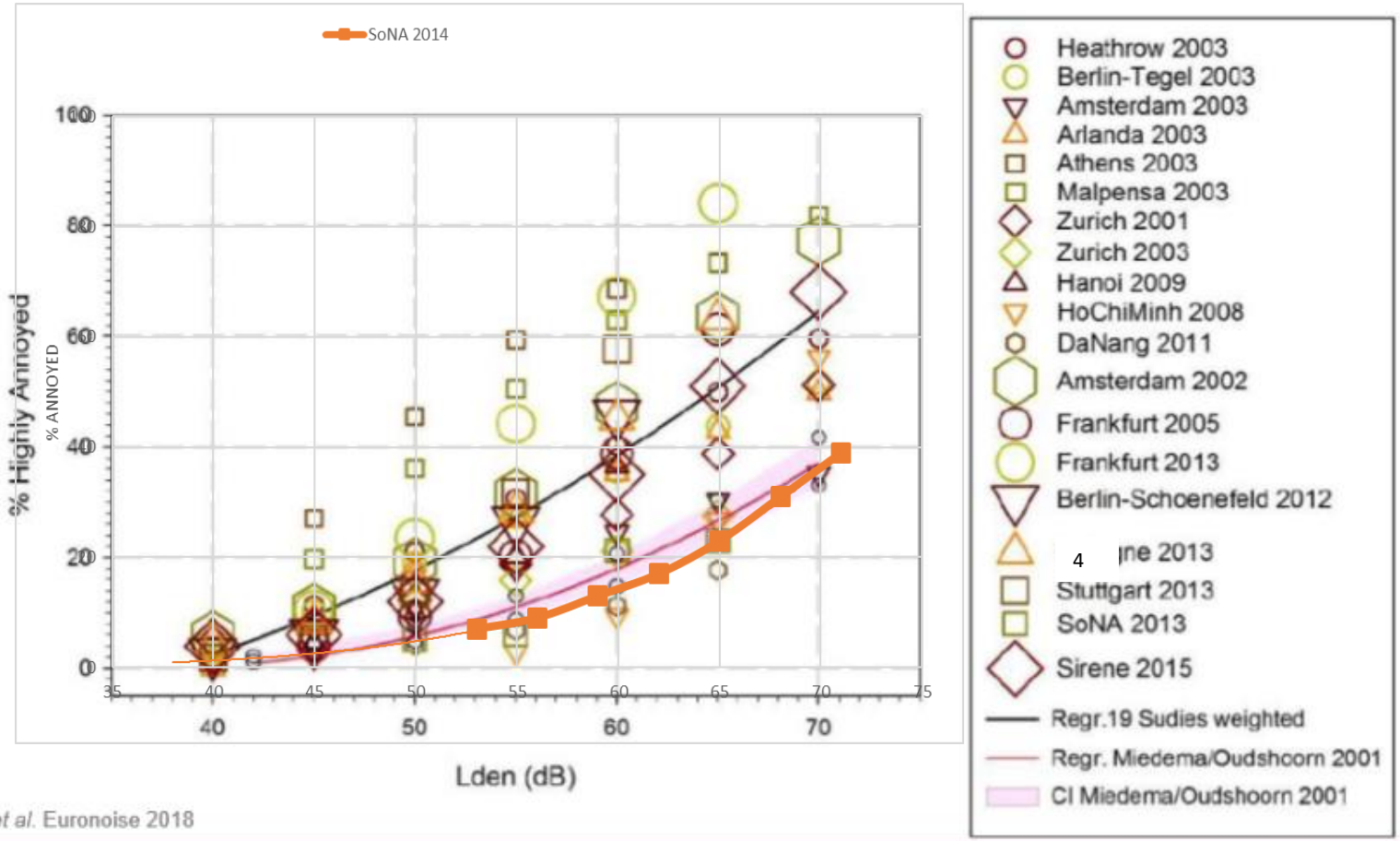


Int. J. Environ. Res. Public Health 2017, 14, 1539

Recent and old studies show SoNA as an outlier

The most recent evidence (including post WHO sources) shows the divergence between SoNA and current international research even more markedly.

SoNA is an outlier (the mauve curve is based on a 20 year old research)

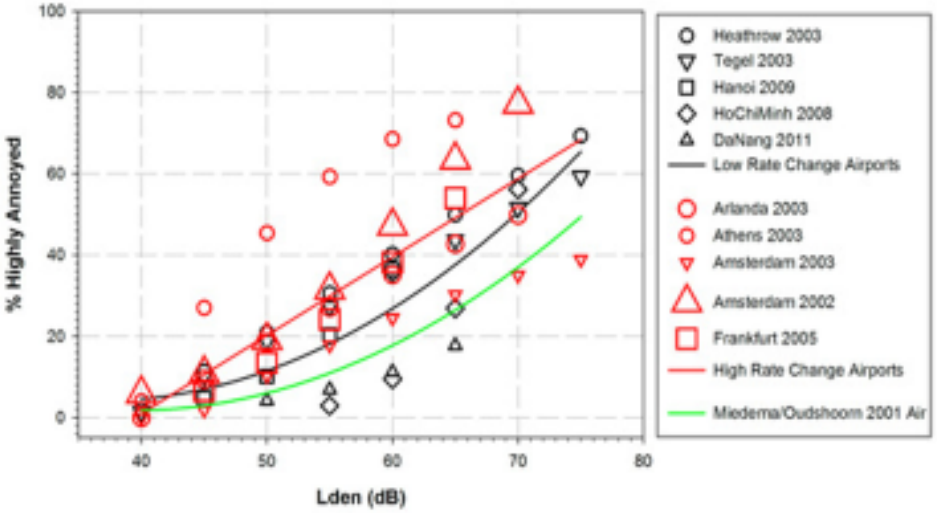


Guski *et al.* Euronoise 2018

Change impacts noise sensitivity

(previous slide Jan HCNF 2019)

A possible explanation – reviews of noise studies show that CHANGE increases noise impacts



From; Int. J. Environ. Res. Public Health 2017, 14(12), 1539
Rainer Guski, Dirk Schreckenberg and Rudolf Schuemer
WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Annoyance

The **red symbols** indicate the airports where change has taken place, the 'high-rate change' airports.

The **black symbols** indicate 'low-rate change' airports.

At the time of the SoNA survey Heathrow & other UK airports were low change airports.
It is inappropriate to use data based on no or low change situation to assess the impacts of change.

The use of a 'low/no change' UK SoNA position in 2014 is likely to massively underestimate the impact of a new runway at Heathrow by anywhere between 3-6dB L_{Aeq}.

A key factor is that change increases noise sensitivity not assessed by SoNA

Leading Noise Experts are arguing about the level (not the effect)

Quote from International Journal of Environmental Research and Public Health 'A Systematic Review of the Basis for WHO's New Recommendation for Limiting Aircraft Noise Annoyance' December 2018 Truls Gjestland SINTEF DIGITAL, N-7465 Trondheim, Norway; truls.gjestland@sintef.no; Tel.: +47-932-05-516

'Gelderblom et al. [20] have applied this "high-rate/low-rate" classification to 62 aircraft noise annoyance studies conducted over the past half century. They show that there is a difference in the annoyance response between the two types amounting to about 9 dB. To express a certain degree of annoyance people at a high-rate change (HRC) airport on average "tolerate" 9 dB less noise than people at a low-rate change (LRC) airport. Guski et al. [2] report a similar but somewhat smaller, 6 dB, difference. Any attempt to develop an average dose–response curve from at set of studies will therefore be highly dependent on the types of airports that are included.'

Ref 2 Guski, R.; Schreckenberg, D.; Schuemer, R. 'WHO Environmental Noise Guidelines for the European Region. A systematic review on environmental noise and annoyance' Int. J. Environ. Res. Public Health 2017, 14(12), 1539

Ref 20 Gelderblom, Femke B.; Gjestland, Truls; Fidell, Sanford; Berry, Bernard 'On the Stability of Community Tolerance for Aircraft Noise' Acta Acustica united with Acustica, Volume 103, Number 1, January/February 2017, pp. 17-27(11)

CNG July 2019

A 6dB difference is equivalent to 4x more flights of the same loudness, a 9dB difference 8x more

The UK Govt does not seem to have reflected change in its development of airspace policies by only using SoNA

"…It is therefore not possible to determine the "exact value" of %HA for each exposure level in any generalized situation. Instead, data and exposure–response curves derived in a local context should be applied whenever possible to assess the specific relationship between noise and annoyance in a given situation. If, however, local data are not available, general exposure–response relationships can be applied, assuming that the local annoyance follows the generalized average annoyance."

From WHO (2018) Environmental Noise Guidelines for the European region

SoNA (2014) is a UK based survey with 75% of respondents from around Heathrow it could be considered 'local'. However SoNA (2014) only provides **a static (LRC) measure** of annoyance.

The ANPS and 'Aviation 2050' are expansion scenarios, each involving extremely high rates of change (HRC)

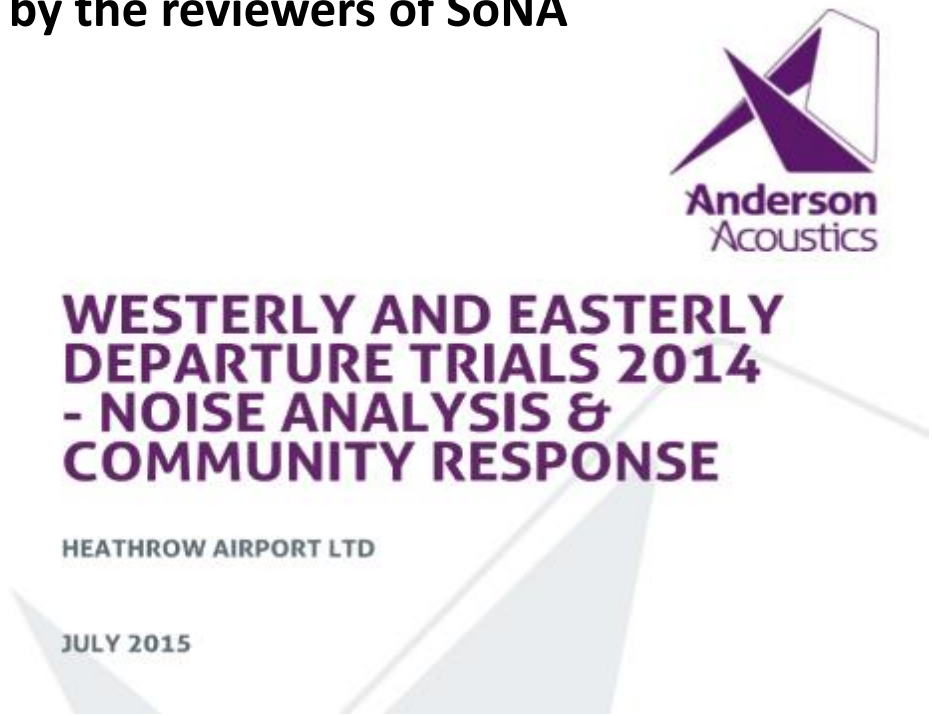
It is therefore not appropriate to apply SoNA to either the ANPS or airspace modernisation. In reality annoyance levels will occur 6-9dB lower and in consequence the **significant adverse impacts will be far higher than recognised in UK aviation policy**.

The Government (DfT) needs to re-evaluate its policies on the basis of this clearly proven research.

Morally Heathrow, as a responsible corporation, needs to apply latest understanding of airspace impacts in its planning.

What local evidence is there for impact of change?

Key evidence from 2015 not considered by the CAA within SoNA published in 2017 or apparently by the reviewers of SoNA

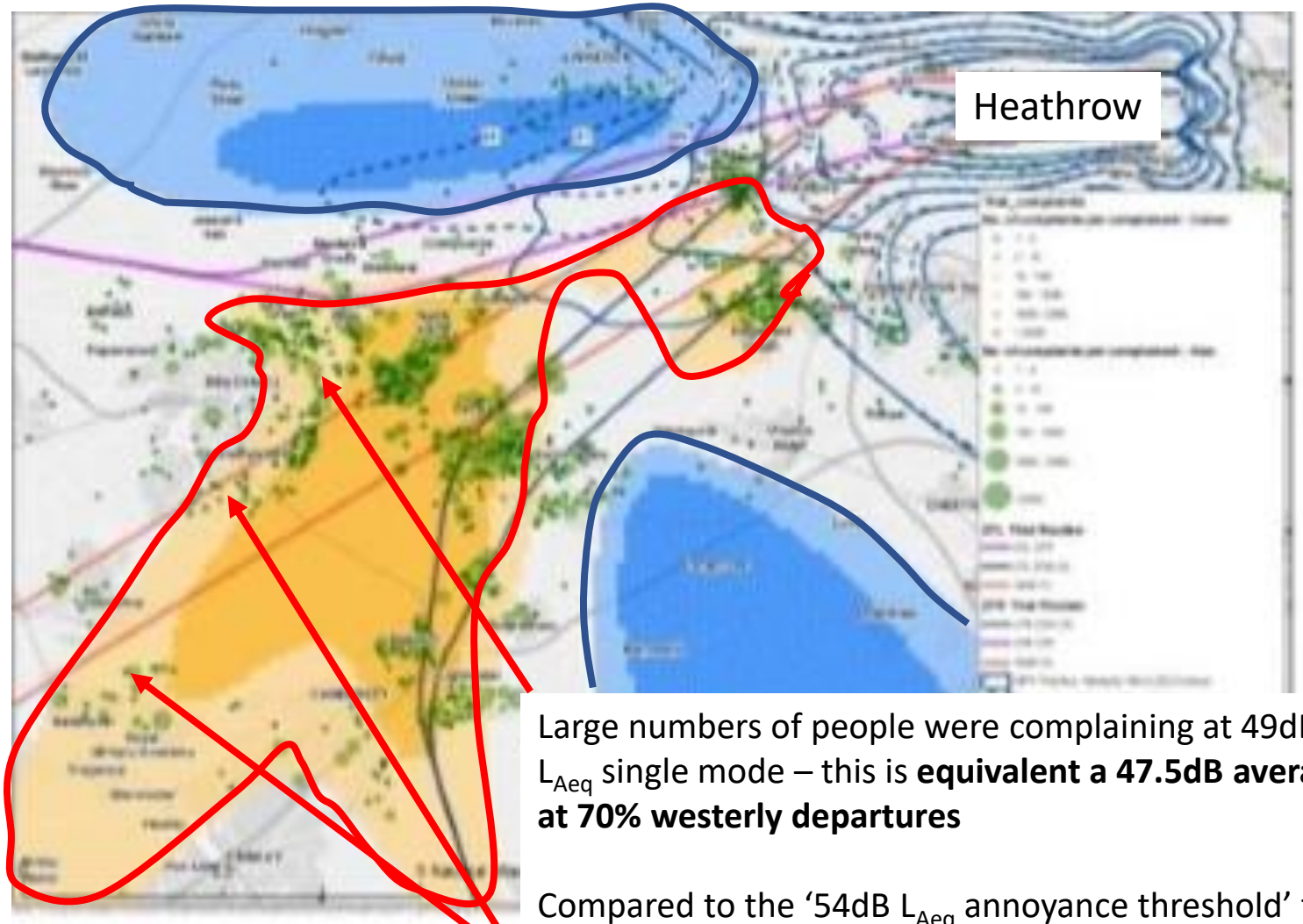


Anderson's report contains crucial evidence for identifying realistic noise level thresholds, what metrics to use in change situations and the impact of the introduction of PBN over highly populated areas

Report available on Heathrow Website. Graphics on the following slides come from this report.

West side impact shown by complaints

(Blue areas less noise; Orange/Red area more noise)



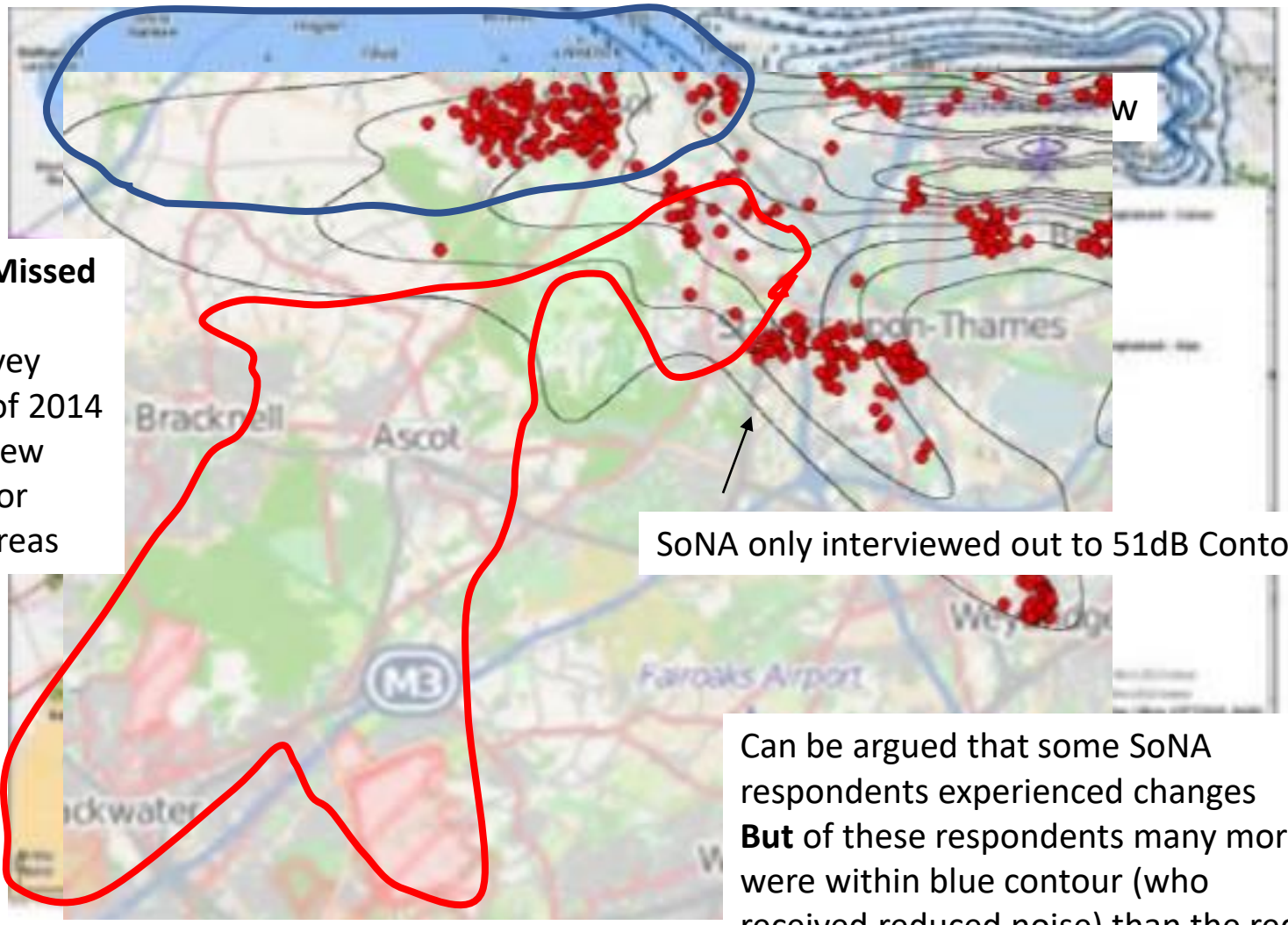
- Green spots are complaints

Large numbers of people were complaining at 49dB L_{Aeq} single mode – this is **equivalent a 47.5dB average at 70% westerly departures**

Compared to the '54dB L_{Aeq} annoyance threshold' this would be a **6-7dB impact due to a change**.
People were complaining well below this level

SoNA survey respondents (red dots)

Focussed on areas that received less noise in 2014 (base year for survey which coincided with the trials)



Opportunity Missed

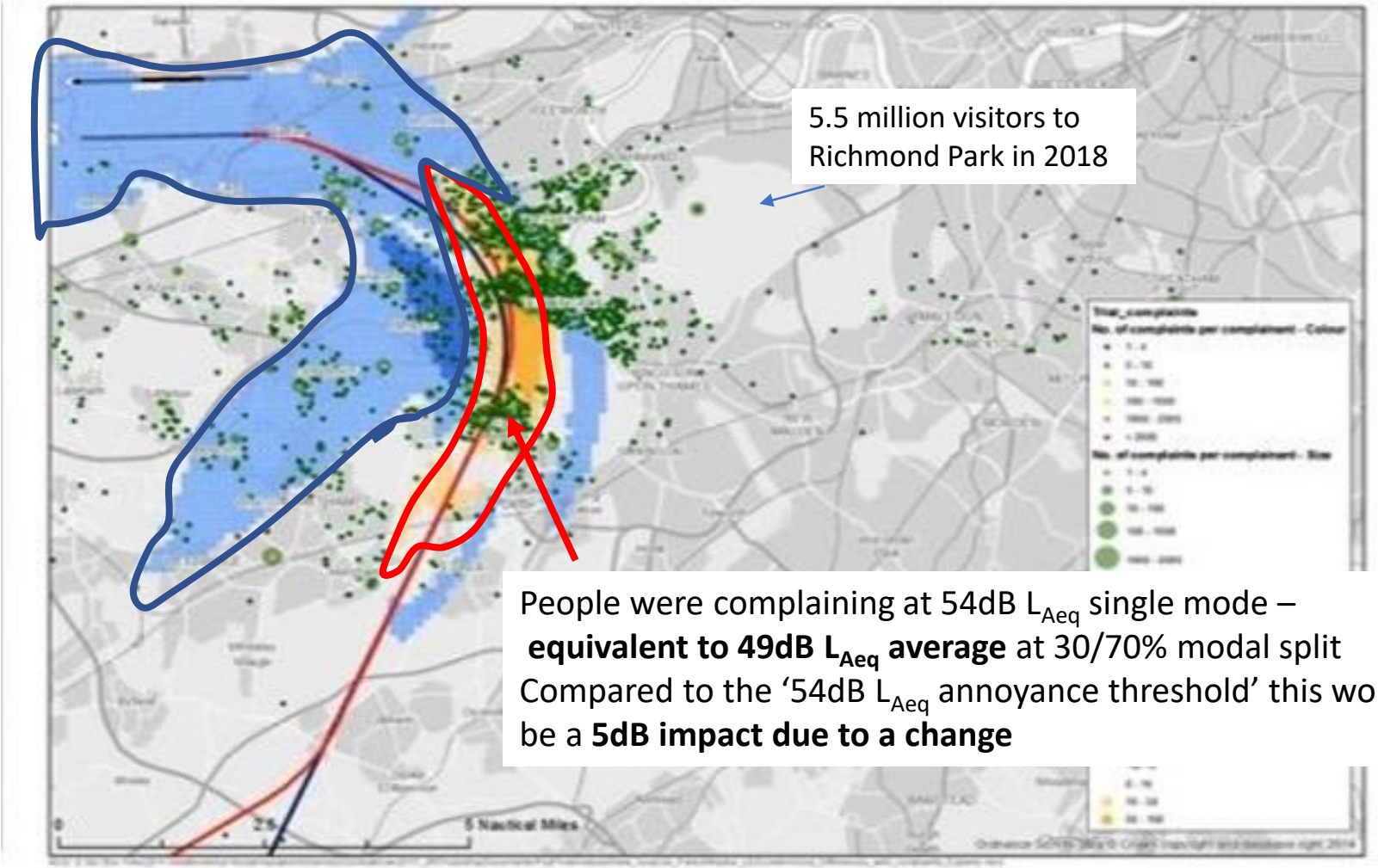
The SoNA survey in the winter of 2014 did not interview around Ascot or surrounding areas

SoNA only interviewed out to 51dB Contour

Can be argued that some SoNA respondents experienced changes **But** of these respondents many more were within blue contour (who received reduced noise) than the red contour (who experienced increased noise)

East side impact shown by complaints

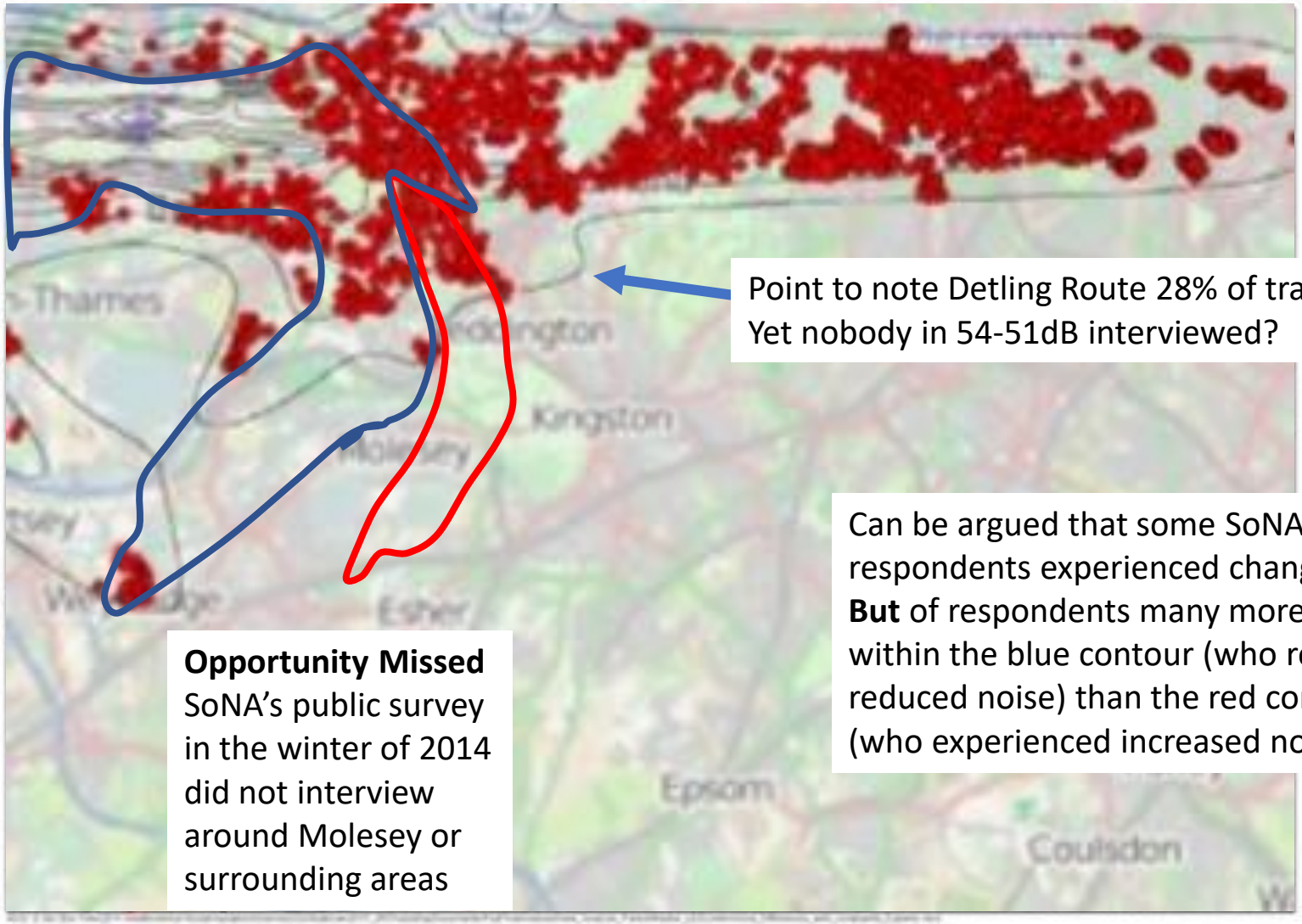
No change identified in L_{Aeq} levels but N>65dB L_{Amax} reveals the true picture
(Blue areas less noise, Orange/Red areas more noise)



- Green spots are complaints

SoNA survey respondents (red dots)

Many respondents received less noise in 2014 (base year for survey which coincided with the trials)



Point to note Detling Route 28% of traffic
Yet nobody in 54-51dB interviewed?

Can be argued that some SoNA respondents experienced changes **But** of respondents many more were within the blue contour (who received reduced noise) than the red contour (who experienced increased noise)

Opportunity Missed
SoNA's public survey in the winter of 2014 did not interview around Molesey or surrounding areas

East side – evidence average L_{Aeq} metrics do not work

The assessment of 'adverse effects' is fundamentally flawed over the most impacted population by Heathrow

Anderson Acoustics

6.2.2 There were no people exposed to a substantial increase in average noise level from flights using the easterly trial routes.

Table 6.5 below presents the change in population exposed to noise levels from aircraft on the trial specific routes during easterly operations. During use of the easterly trial routes, 0% of people experienced a substantial increase in noise level.

Table 6.5: Population exposed to change in noise levels for flights using trial routes

Noise level change	Change description	Easterly trial routes (MID, SAM)		
		> 48 dB	> 54 dB	> 57 dB
-5-10dB		0%	0%	0%
-3-5dB		10%	7%	1%
-3 to +3 dB		90%	93%	99%
+3-5dB		0%	0%	0%
+5-10dB		0%	0%	0%

Note: there were no areas where noise levels were greater than 48 dB L_{Aeq} in the baseline or the trial periods where the change was greater than +/- 10dB

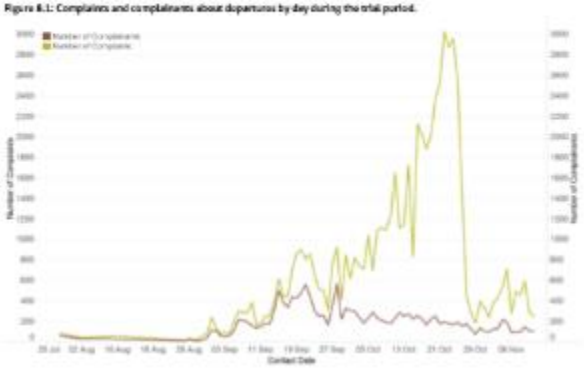


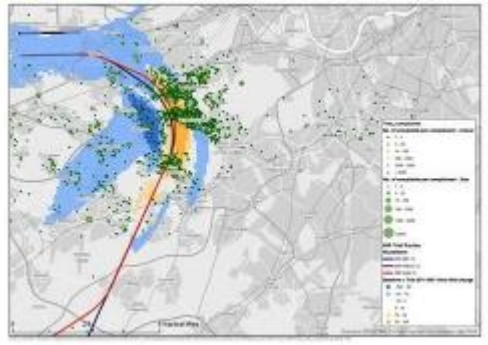
Table 8.1: complaints and complainants about dep

Complaints		Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Total
Overall [1]	No. of complaints	63	507	12,987	42,927	4,652	61,136
	No. of complainants	43	201	4,587	1,928	540	5,887
Westerly [3]	No. of complaints		382	4,236	34,986	3,515	43,119
	No. of complainants		145	1,344	1,416	384	2,410
Easterly [4]	No. of complaints	63	21	5,721	789	219	6,813
	No. of complainants	43	13	2,911	204	89	3,095
Both	No. of complaints		104	3,030	7,152	918	11,204
	No. of complainants		55	1,294	909	267	2,026

Table notes:
[1] The total number of complainants in each month is the number of unique people that have complained. This does not sum across to the total column - the total is the number of unique people complaining across the whole trial.
[2] The easterly operations trial began on the 28 July 2014 and ended on the 12 November 2014.
[3] The westerly operations trials began on the 25 August and ended on the 12 November 2014.
[4] Complaints are reported in the table for the period 28 July to 12 November 2014.

L_{Aeq} contours showed no increase in population negatively impacted – health impacts due to Noise used in Environmental assessment and webTAG would show no negative changes

Yet complaints rocketed!



The metric that AA found that showed best correlation with complaints was single mode N>65 event

Notes – reduce single mode L_{Aeq} by 5dB to get average at 30% days overflown
Change descriptions need correction – blanked out

Conclusions from Andersen Acoustic's report

Anderson's report makes a long list of points within a highly informative and detailed analysis

This is one conclusion from p37;

- During westerly departures most complaints came from areas *outside* the areas that would normally be used to define and assess noise impacts (54 or 57 dB $L_{Aeq,16hr}$ and the UK Government's standard average noise contours), but were from areas that the modelling indicates a *substantial increases* in the noise level and/or change in number of events.

Heathrow recognised that the PBN trials involving change caused enormous social impact in its 2016 European consultation response

Nothing has changed

https://www.easa.europa.eu/sites/default/files/dfu/CRD%202015-01_0.pdf

comment	*103* comment by: *Heathrow Airport Limited* Whilst Heathrow Airport Limited fully supports airspace modernisation, this document does not support current UK CAA guidance and is not in line with current UK airspace projects such as LAMP. The time scale suggested here is unrealistic and could jeopodise these projects. In addition, as subsequent comments highlight, we have the following concerns: • The Social Impact of PBN trials in the UK has been enormous, therefore this should be considered and not dismissed in one sentance. • There does not appear to be an environmental assessment of this proposed change in terms of noise. • The Benefit section takes no account of the cost of airspace consultation which results in an incomplete assessment. • Mixed conventional and PBN operations are not supported by the UK CAA. Consequently, this NPA is not supported by Heathrow Airport Limited.
response	*Noted.*

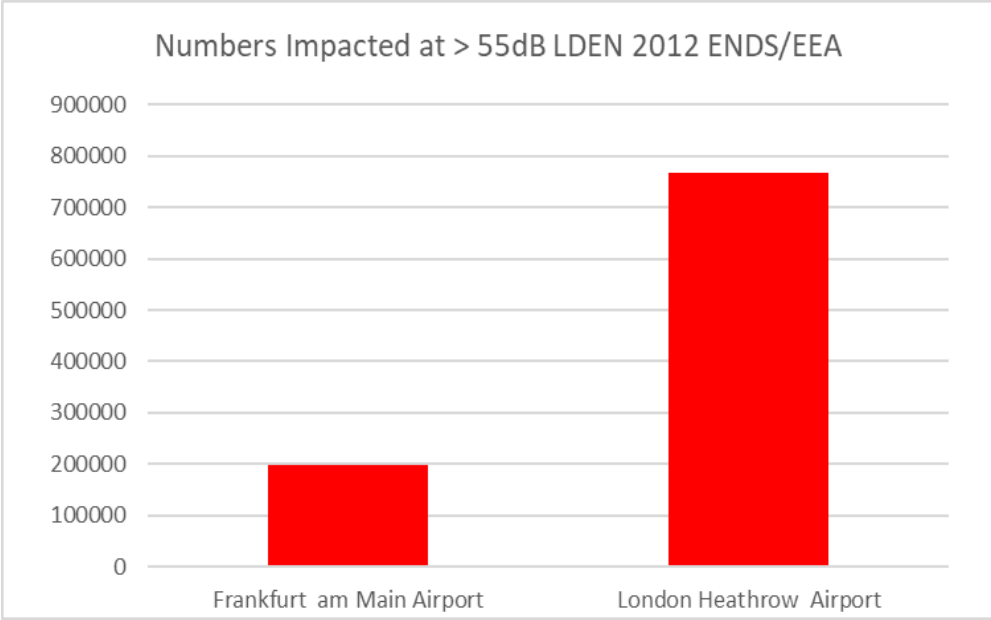
How long does increased sensitivity last?

- Since the 2014 Heathrow trials communities have become more sensitive to noise and have continued to complain in high numbers
- Protests continue at Frankfurt – 7.5yrs after operation

The AEF reported on January 7, 2017; '*The 4th runway at Frankfurt was opened in October 2011. Due to re-alignment of flight paths, with thousands of people either newly overflown, or with more flights than before, there was uproar.*'

The 270th protest took place on Monday 14th January 2019 the protestors message is 'Our protest is getting louder'

Heathrow impacts 3x as many people as Frankfurt (without expansion);



Have Heathrow's PBN trials in 2014 impacted SoNA?

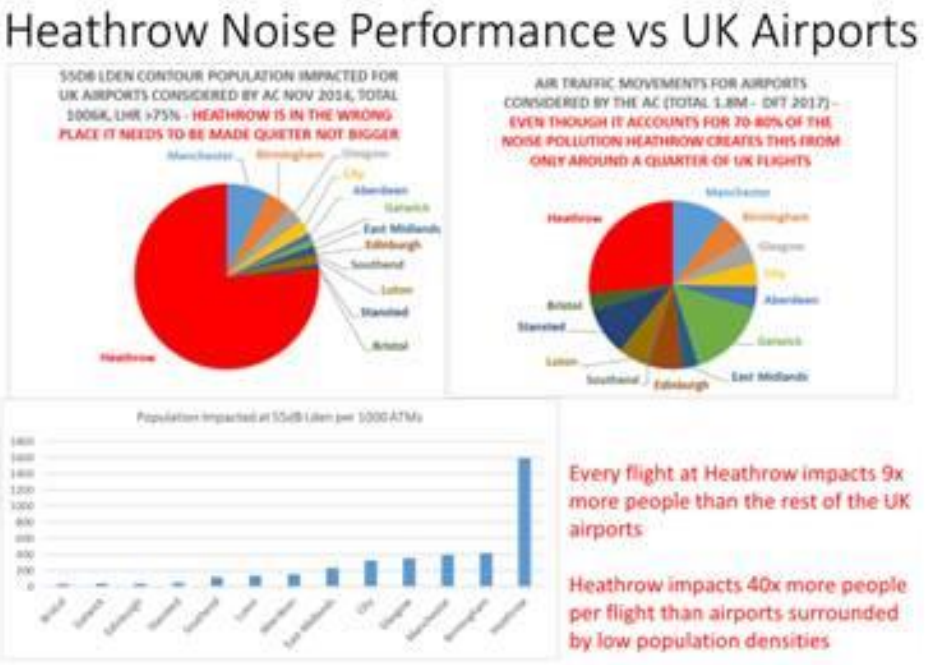
- Previous slides indicate the SoNA survey area **generally did not include areas that were impacted** by the 2014 PBN departure trials **at lower levels**

- The CAA have suggested that some SoNA respondents (51dB L_{Aeq} and above) experienced changes but previous slides show, of these respondents experiencing change, many more received **reduced noise** than those who experienced increased noise

- The CAA have also suggested PBN changes at Gatwick would have been reflected in the overall results – however this area only included 31 respondents (in line with UK noise impact) in survey, therefore little impact in the context of 1847 total surveyed, even if all 31 were impacted

Table 8: Respondents categorised by 2014 summer average mode $L_{Aeq,16h}$ (N=1,847)

Noise exposure variable average summer day $L_{Aeq,16h}$ (dB)	Airport									
	BHX	EMA	LGW	LHR	LCY	LTN	MAN	NCL	STN	Total
48.0 – 50.9			1	74			2		2	79
51.0 – 53.9	28	1	15	644	3	7	86	3	5	792
54.0 – 56.9	34	2	9	360	63	5	36	3	3	515
57.0 – 59.9	20		3	178	16	6	34	2	2	261
60.0 – 62.9	8	1	1	103	6	1	8			129
≥ 63	1			61	5	2	1		1	71
Total	90	5	31	1,419	93	21	168	8	12	1,847



CAA, Public Health England and leading UK consultancies positions on change impacts

The CAA has confirmed it avoided change when undertaking noise surveys (such as SoNA 2014) as it distorts [increases] the annoyance levels

Public Health England (PHE) in its submission to the Heathrow Expansion DCO scoping documents notes;

"There is a growing evidence base on a "change effect" with respect to annoyance reactions to aviation noise. In order to more accurately predict impacts on health and quality of life, PHE suggests that the population affected by aviation noise is split into four categories…. [including those who experience change both in terms of average noise and flight numbers]'

'and the best available evidence with respect to the change effect used to quantify the associated health impacts…"

Leading UK consultancies (Ricardo & Andersen Acoustics) are arguing that SoNA was based on those 'habituated' to noise and therefore incorrect to apply to a change situation (see Manston DCO documents)

CAA have offered the following comments on airspace change;

High vs low rate of change airports

- No clear demarcation between high and low rate of change definition
- Although it was expressly intended to avoid change situations, SoNA survey occurred after or during:
  - From 16 December 2013 to 15 June 2014, trials took place on one easterly and one westerly departure route.
  - From 28 July 2014 to 12 November 2014 trials took place which affected 2 easterly departure routes to the south. The remaining 4 easterly departure routes were not affected.
  - From 25 August 2014 to 12 November 2014, Heathrow undertook a series of westerly departure trials. These affected three of the six routes.
- Further work planned to investigate potential differences between respondents exposed to no change and to change

A simple working definition seems obvious?

- Rainer Guski has suggested the following definition for a high rate of change (HRC) situation;

  *'*High Rate Change studies: Studies performed in the context of expected, ongoing or recently finished airport change, e.g., a new runway, significant increase of traffic'*

- So a HRC situation would include anyone newly experiencing aircraft noise (such as with a new runway or flightpath)
- Significant perhaps is the only debate for example it would be reasonable to say > 20-25% increase in events or noise levels when experiencing aircraft noise would be significant (so around 0.5-1dB LAeq when accounting for averaging due to wind direction changes)

- A low rate of change (LRC) situation is simply one not covered by above

- In addition we should note we can have a sub-LRC where people have received less noise than usual – which seems to be the SoNA position as shown in the next slides

CAA – seem to be suggesting SoNA incurred some change but not provided the detail behind trails shown here;

- From 16 December 2013 to 15 June 2014, trials took place on one easterly and one westerly departure route.

From DOKEN trial report (westerly operations) p25 Heathrow Airport, Flight Performance Trial period: 16th December 2013 to 15th June 2014

Change in noise between pre-trial period and during the trial

In general, the overall average noise contours reduce in area during the trial. Some of these differences may be due to variation in fleet mix, operations and flight track dispersion between the two periods

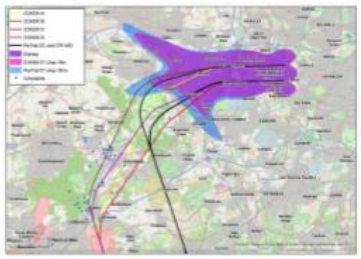


Figure 21: 57 dB $L_{Aeq,16hr}$ contour comparing trial & pre-trial periods.

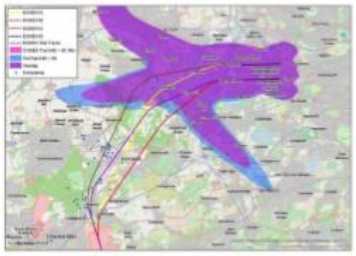
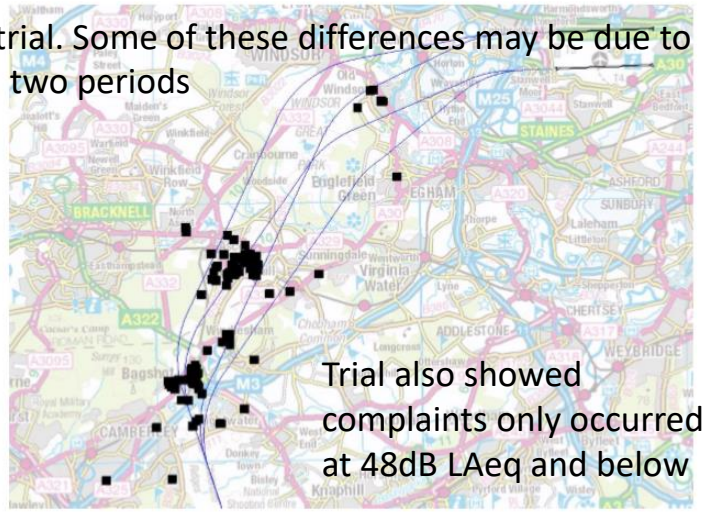


Figure 22: N65(16hr)>50 contour comparing trial & pre-trial periods

Complaint locations during the trial



Trial also showed complaints only occurred at 48dB LAeq and below

From Heathrow Airport Easterly Midhurst departure trial (16th December 2013 to 15th June 2014) p32 Helios Report Commissioned by Heathrow Airport

7.7 Noise Analysis

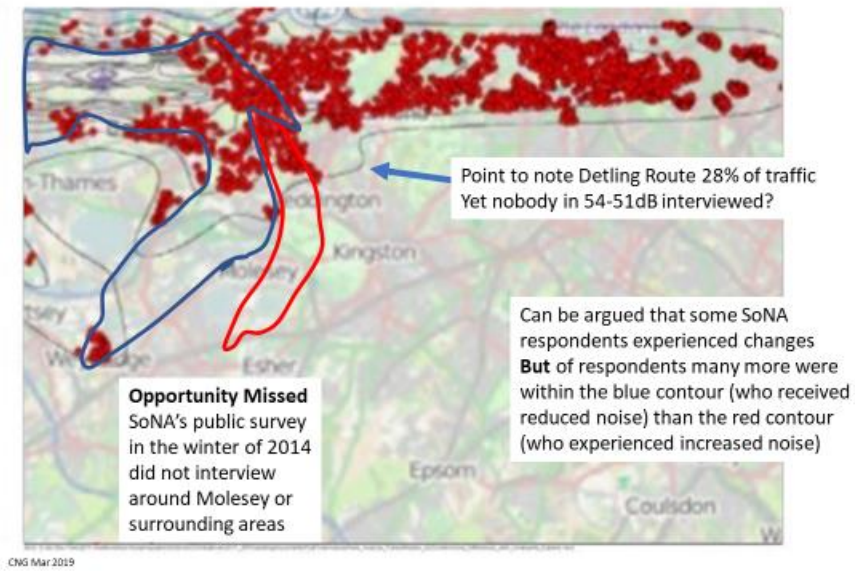
Overall average noise levels (runway 09R): Average noise levels and noise contours for runway 09R prior to the trial were compared to those during the trial31.The worked showed there was likely to be no significant change to average noise levels as a result of the operation of the RNAV1 trial routes MID 1M and MID 1N. Similarly the noise contours were not significantly affected by the operation of these trial routes.

CAA – seem to be suggesting SoNA incurred some change but not provided the detail behind trails shown here;

- From 28 July 2014 to 12 November 2014 trials took place which affected 2 easterly departure routes to the south. The remaining 4 easterly departure routes were not affected.

SoNA survey respondents (red dots)

Many respondents received less noise in 2014 (base year for survey which coincided with the trials)



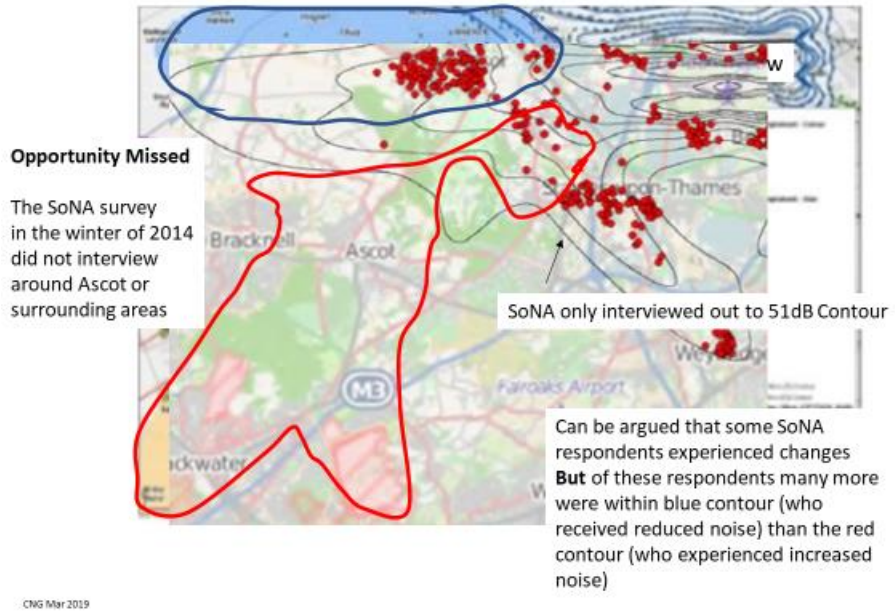
Conclusion - more people experienced reduced noise than increased noise

CAA – seem to be suggesting SoNA incurred some change but not provided the detail behind trails shown here;

- From 25 August 2014 to 12 November 2014, Heathrow undertook a series of westerly departure trials. These affected three of the six routes.

SoNA survey respondents (red dots)

Focussed on areas that received less noise in 2014 (base year for survey which coincided with the trials)



Conclusion - more people experienced reduced noise than increased noise

Conclusion on Change Comments from CAA

- Many people in the survey around Heathrow did not experience change
- Of those that may have been affected by trials, the majority experienced a decrease in noise levels
- The SoNA survey sits between a LRC and sub-LRC situation

Conclusions and Actions - based on evidence

The central challenge in Point 1 is that 'SoNA 2014 has not taken account of airspace change and is not appropriate to be used for aviation policy'

The evidence is clear;

1. Airspace changes increase the level of annoyance from aviation noise

2. The impact of change is equivalent to circa 6-9dB L_{Aeq} increased sensitivity

Conclusion

SoNA 2014 is a static survey and requires revision for situations where significant airspace changes are taking place

Required Actions

1. The Government (Defra, PHE & DfT) need to delay any active airspace developments and reissue aviation noise guidelines based on latest evidence
2. SoNA needs reviewing and updating urgently. This work should be undertaken independently as the CAA have conflicting duties in relation promoting airspace change and growth
3. Heathrow, as a responsible corporation need to rework its consultation materials including latest evidence

Debate between Noise Experts and presentation of other evidence relating to airspace change impacts

Evidence base

Proposition 2

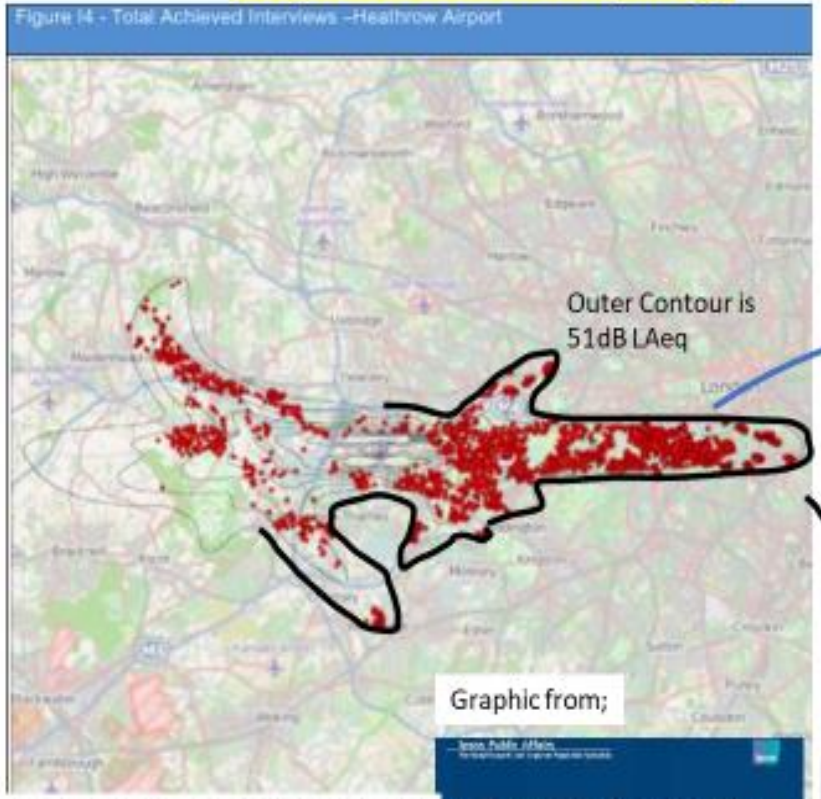
SoNA 2014 cannot be used to inform setting of Lowest Observable Adverse Effect Level (LOAEL) as levels below 51dB L_{Aeq} (~53dB L_{DEN}) were not measured

Present LOAEL levels are inappropriate and should be set at much lower levels

SoNA did not plan sampling below 51dB L_{Aeq}

(previous slide from HCNF Jan 2019)

Was the population sampling in SoNA appropriate?

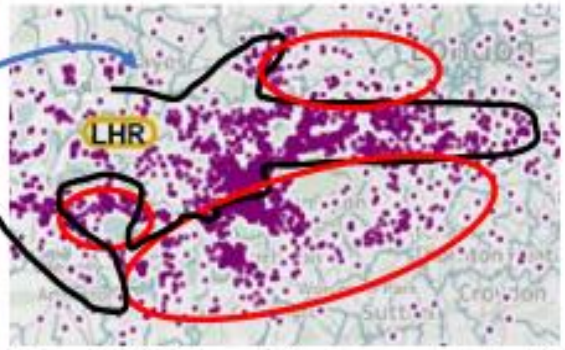


This level is important as the DCO judges adverse effect on numbers impacted between SOAEL (Significant Observable Adverse Effect Level) and LOAEL (Lowest Observable Adverse Effect level)

CNG Jan 2019

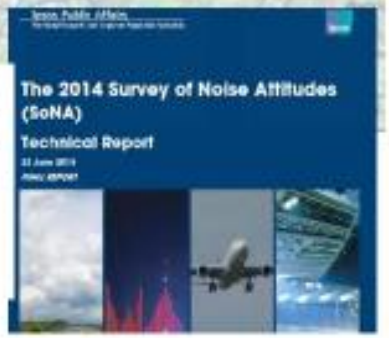
SoNA did not plan to cover any areas where there was noise below 51dB.

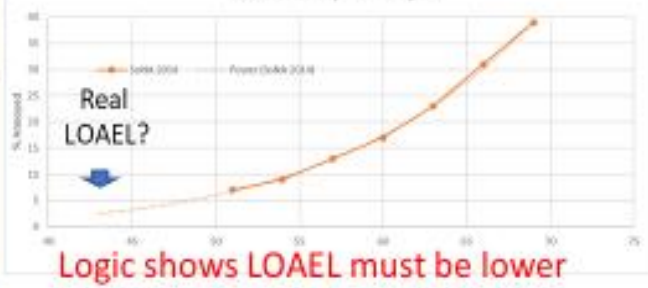
Extract from Complaints (purple spots) mapping
(to support feedback we request LHR provide contours on these complaints maps – black line is indicative)



Even at 51dB it found 7% annoyance levels which is therefore not a LOAEL level. As 792 people where interviewed in this band it would have taken only 16 more people to make this the significantly annoyed level

Graphic from;





SoNA did not sample below 51dB L_{Aeq} as it was resource constrained; a set budget was allocated of circa £200-250k (compare that to £m to multi £bn decisions being based on this survey)

Ipos MORI originally assumed sampling was only down to 54dB L_{Aeq} given the budget

A less statistically robust compromise with clustering was finally agreed to 51dB L_{Aeq}

Most other comparable studies assess noise impacts at much lower levels

SoNA 2014 selected a very different sample to previous Defra led survey in 2013

Table 3: Dwelling Information for SoNA 2014 compared with SoNA 2013

	SoNA 2014 N=1,847 % (N)	SoNA 2013 N=2,383 % (N)
Type of house (Question A2)		
Purpose built flat/maisonette	31.6% (584)	9.7% (232)
Converted flat/maisonette	8.9% (165)	3.1% (74)
Semi-detached/end of terrace house	20% (370)	34.7% (827)
Mid-terrace house	11.7% (216)	19.0% (454)
Detached house	8% (148)	20.9% (497)
Bungalow	18.3% (337)	12.0% (285)
Cluster home	0.6% (11)	n/a
Other	0.8% (15)	0.6% (14)
Access to garden or other private outdoor space (Question A3)		
No	29.6% (546)	6.9% (164)
Yes	70.4% (1300)	93.1% (2219)
Double glazing in the home (Question Dblglaze)		
Missing information	5.1% (95)	n/a
Yes	69.1% (1275)	n/a[24]
No	12.5% (231)	4.6% (111)
Don't know	13.3% (245)	n/a
Age of home (Question H2)		
Before 1919	16% (295)	17.6% (419)
1919 – 1940	16.3% (301)	17.4% (415)
1941 – 1960	14% (258)	14.0% (335)

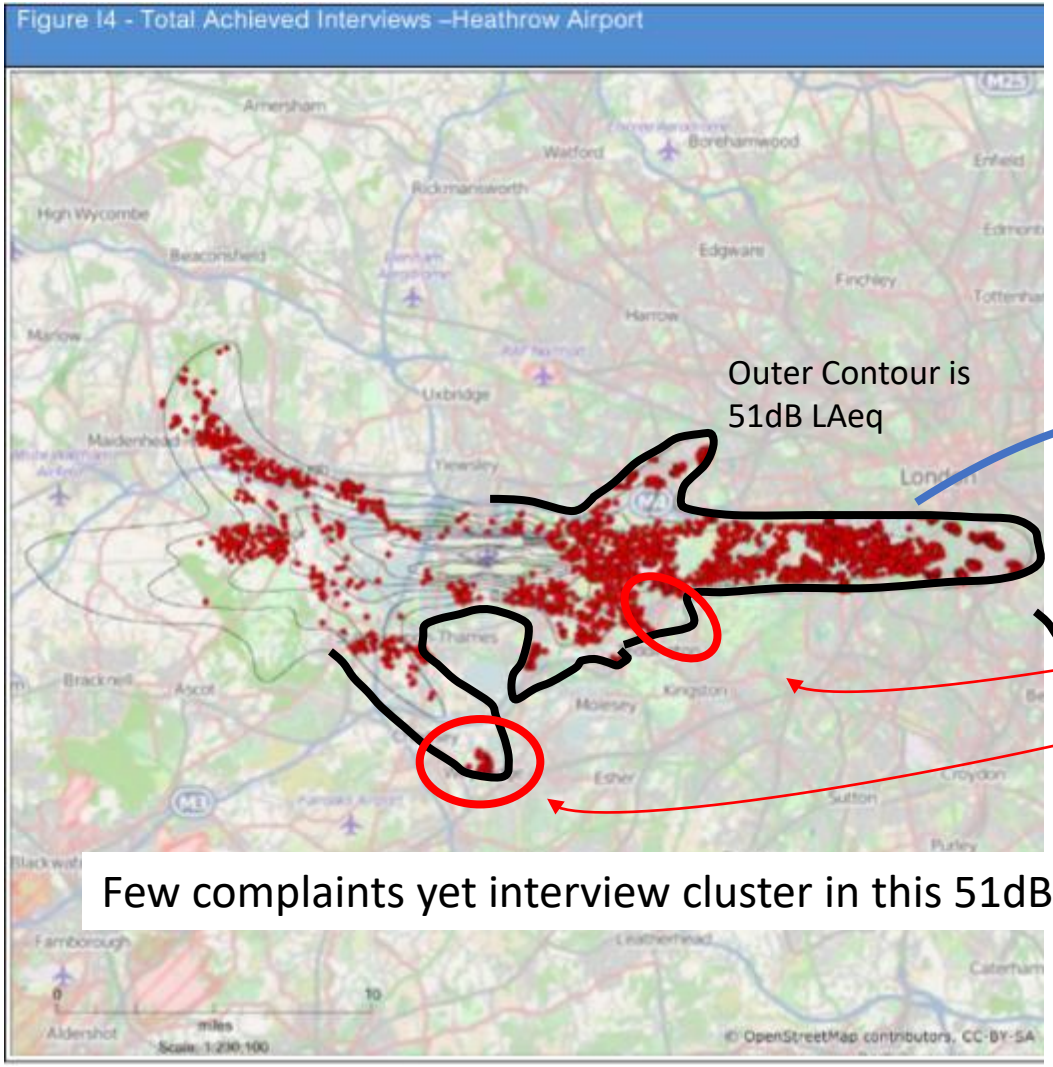
13% (2013) to 41% (2014) — More Flats

86% (2013) to 58% (2014) — Less Houses

Big changes – from 93%/7% to 70%/30%

Less access to Gardens

Was the population sampling in SoNA appropriate?



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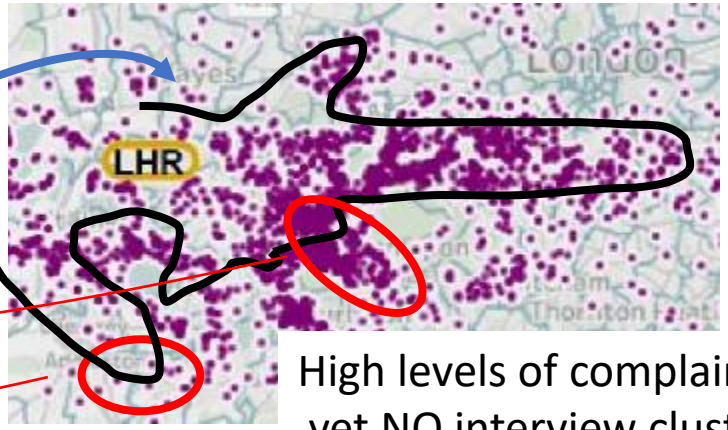
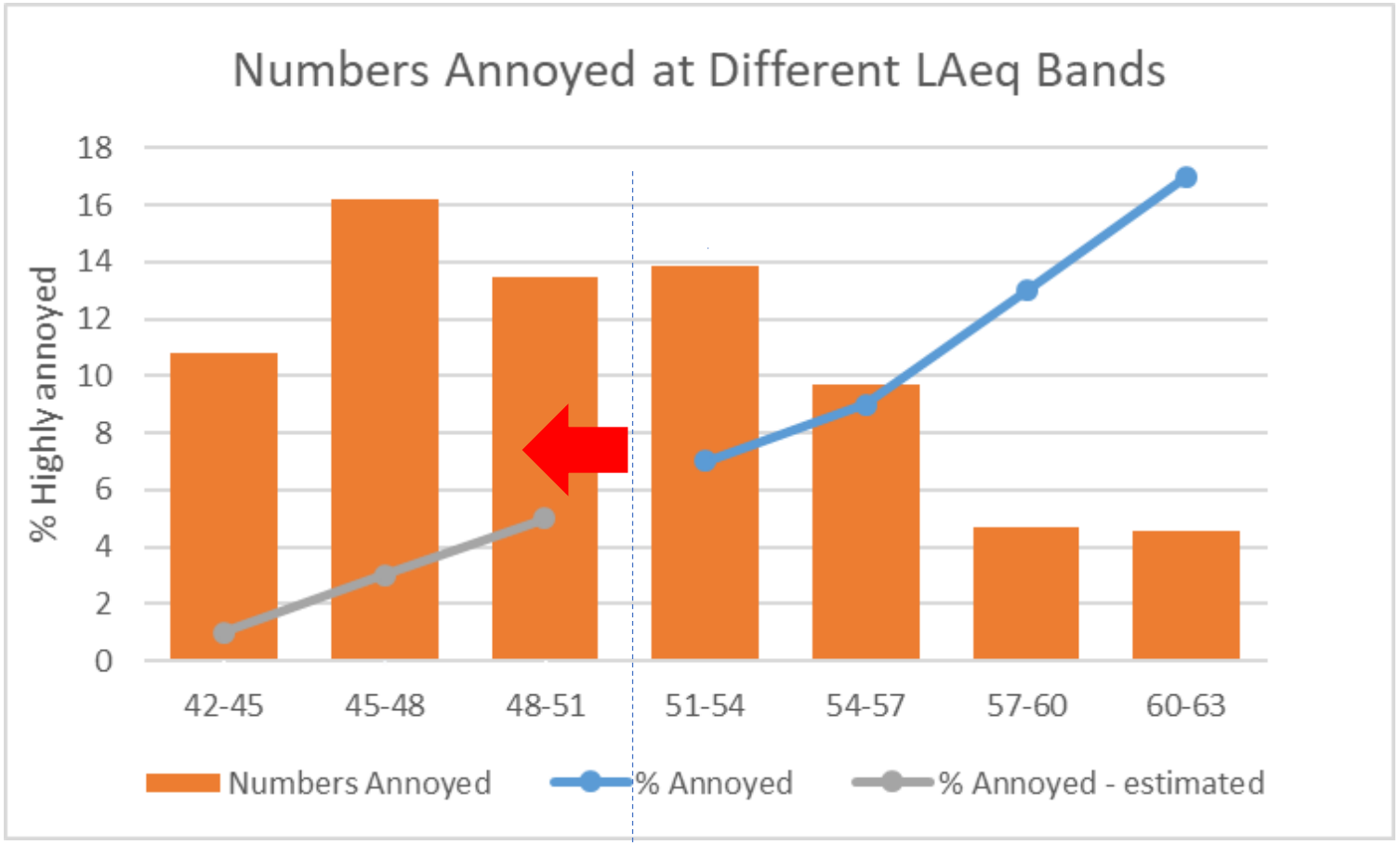
Extract from Complaints (purple spots) mapping
(to support feedback we request LHR provide contours on these complaints maps – black line is indicative)



High levels of complaints yet NO interview clusters in this 51dB area

Even at 51dB, with a questionable sampling approach, SoNA found 7% annoyance levels which is therefore not a LOAEL level – certainly not where significant changes in the noise environment occur. As 792 people where interviewed in this band it would have taken only 16 more people to make this the significantly annoyed level.

Highly Annoyed Numbers below 51dB L_{Aeq} LOAEL



50% of people Highly annoyed are below 51dB L_{Aeq}

Numbers calculated using FoI figures of numbers in noise bands in 2030

This analysis should be undertaken and shared by the responsible Government Departments

CNG Aug 2019

What does a 51dB L_{Aeq} LOAEL mean?

Newer generation Aircraft should be less noisy (if take-off weights do not increase)

However many more events will still be above 65dB loudness levels (L_{AMAX})

How many 65dB L_{AMAX} events does 51dB L_{Aeq} equate to in a 16hr day?

224 (quote from CAA/ERCD HCNF WG July)

So 14 per hour - Around one every 4-5 minutes - All day, every day

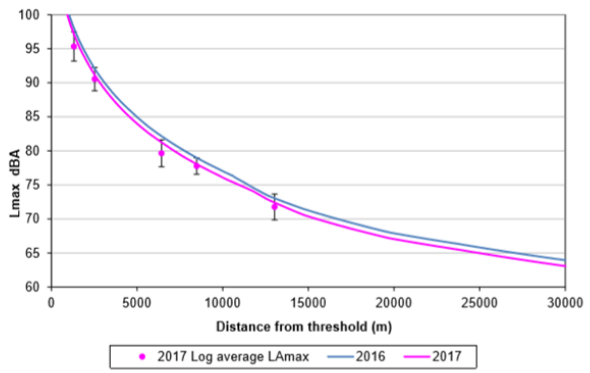
This surely cannot be a LOAEL level?

Further context - what does a 51dB L_{Aeq} level of noise mean?

Event Types	Single events All 65dB L_{AMax} / SEL of 75dB	Indicative Mix 65dB (75%) & 70dB (25%) SELs of 75 & 80dB
Planes an hour	*14*	*9*
Minutes between planes	*4.3*	*6.5*
Planes in a 16hr day	*224*	*149*
Planes only 70% of the time (e.g. arrivals scenario)		
Planes an hour	*20*	*13*
Minutes between planes	*3*	*4.6*
Planes in a 16hr day	*320*	*208*
With 50% respite, during time with planes (e.g. arrivals scenario today)		
Planes an hour	*40*	*26*
Minutes between planes	*1.5*	*2.3*
Planes in 8hr period	*320*	*208*

According to CAA modelling a 777 (twin engine wide bodied long haul plane) on arrival creates a loudness (L_{Amax}) event of 65dB even at 25km from touchdown and 70dB 16km from touchdown

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



Common Sense suggests that a LOAEL should be set well below this level?

Conclusions and Actions - based on evidence

The central challenge in Point 2 is that 'SoNA 2014 cannot be used to inform setting of Lowest Observable Adverse Effect Level (LOAEL) as levels below 51dB L_{Aeq} (~53dB L_{DEN}) were not considered or tested – present LOAEL levels are inappropriate and should be set at much lower levels'

The evidence is clear;

1. **Around 50% of people impacted are below the present LOAEL level, this is not 'the onset of community annoyance'**
2. **LOAEL levels need adjusting by 6-9dB**

Conclusion

The UK's LOAEL for aviation is incorrectly set

Required Actions

1. The Government (Defra, PHE & DfT) need to delay any active airspace developments and reissue aviation noise guidelines based on appropriate evidence
2. Heathrow, as a responsible corporation need to rework its consultation materials including latest evidence and to use a LOAEL at 6-9dB below the present level for the purpose of its DCO consultation and application

Debate between Noise Experts and presentation of other evidence relating to LOAEL

Evidence base

Proposition 3

SoNA 2014 contains key evidence that N> metrics and L_{DEN} have better correlation with aviation noise annoyance than long term LAeq averages

Incorrect technical analysis was used to come to SoNA's conclusion that L_{Aeq} should not be changed as the primary metric in assessing aviation noise impacts

Survey of Noise Attitudes (SoNA) analysis and rewrites

- There are many suggestions that event based metrics may be more appropriate to access annoyance
- The CAA was asked to evaluate if other metrics (N>, L_{DEN}, single mode etc) were more suitable than L_{Aeq} as part of its remit in analysing the survey data
- This was potentially a world leading analysis
- However the final SoNA report concluded that 'there was no evidence to suggest other metrics correlated better'
- Communities identified that an incorrect analysis approach had been used by the CAA/ERCD (not apparently identified by reviewers) and asked for further information through a FoI request. A number of draft reports were supplied.
- Through the FoI request the following quotes have been found;

  - 1st Draft 5th July 2016 'It could be argued that N65 could replace $L_{Aeq\ 16hr}$ as the standard indicator'

  - 2nd Draft 3rd November 2016 'The results indicate a slightly stronger correlation with N65 than $L_{Aeq\ 16hrs}$. A change from $L_{Aeq\ 16hr}$ to N65 would also have broader policy implications'

  - 3rd Rewrite and final report 2017 'There was no evidence found to suggest that any of the other indicators L_{DEN}, N70 or N65 correlated better with annoyance than $L_{Aeq\ 16hrs}$'

SoNA Report 1st Draft - version 20160705

Using the cross-tab data presented in Tables 9 to 12, it is possible to fit regression functions and identify their corresponding correlation coefficients. Table 13 shows the linear and second-order polynomial regression coefficients for each of the noise indicators (based on 92 day summer average exposure), using percentage highly annoyed as expressed through responses to question CAN 1i.

Commented [redacted] 25]: For the lay reader, you need to explain why this approach is useful and what it can tell

Commented [redacted] 26]: Confusing / jargon – we need to explain what these are

Commented [redacted] 27]: Why this and not CAN34?

Table 13: Linear and second-order polynomial regression coefficients for cross-tab data in tables 9-12

Commented [redacted] 28]: Description should include what the indicators are being regressed against (Can1?)

Commented [redacted] 29]: This table implies that increases in noise are positively (and very strongly - R2 of more than 0.6 are impressive!) associated with annoyance. If this is true, can we explain really clearly?

Commented [redacted] 30]: I have to admit my stats knowledge doesn't stretch this far – please explain what this means for the lay reader (and me!)

Noise indicator	Linear regression R^2	2nd order polynomial regression
$L_{Aeq,16h}$	0.840	0.840
L_{den}	0.826	0.996
N70	0.683	0.887
N65	0.666	0.754

There are several problems with such an approach. In the case of the $L_{Aeq,16h}$ and L_{den} indicators, the cross-tab reduces the data set down to just six groupings, whereas for N70 and N65 it leaves eleven groupings. The fact that the number of grouping is not equal across the different indicators will affect the regression fit and thus we cannot rely on this comparison of the regression coefficients.

Commented [redacted] 31]: If there are problems are we confident that it must be included?

Commented [redacted] 32]: I.e. the figures aren't directly comparable?

Secondly, there is a marked difference on the regression coefficient depending on whether the function chosen is linear or a 2nd order polynomial for all except the $L_{Aeq,16h}$ indicator.

An alternative approach is to use logistic regression, which is particularly suited to analysis where the dependent variable is a categorical value, such as the coded response for high annoyance, which has a value of zero or one. Logistic regression also permits the analysis to be performed on the full data set without any prior grouping or cross-tabulation of the data. Table 14 presents the results of logistic regression using the four different noise exposure indicators, each estimated for an average summer day.

Table 14: Logistic regression results for 92 day average summer noise exposure

Commented [redacted] 33]: What do the numbers in this table mean?

Noise indicator	Weighted responses	Odds ratio	-2 x Loglikelihood	Chi-square	Nagelkerke R^2	Sig
$L_{Aeq,16h}$	1,847	1.122	1736.370	52.789	0.045	<0.001
L_{den}	1,462	1.122	1332.211	47.193	0.052	<0.001
N70	1,826	1.004	1735.159	39.886	0.035	<0.001
N65	1,462	1.003	1331.072	48.332	0.053	<0.001

Although some conclusions may be deduced from the results in Table 14, the weighted responses differ between the noise indicators, because L_{den} and N65 were available only for a smaller sample of airports. To correct for this, results are presented in Table 15 for the smaller sample of matched records across all four indicators.

Commented [redacted] 34]: What conclusions?

Commented [redacted] 35]: Does this mean you dropped cases where noise info wasn't available for all indicators?

Table 15: Logistic regression results for 92 day average summer noise exposure using matched records

Noise indicator	Weighted responses	Odds ratio	-2 x Loglikelihood	Chi-square	Nagelkerke R^2	Sig
$L_{Aeq,16h}$	1,462	1.122	1336.285	43.119	0.048	<0.001
L_{den}	1,462	1.122	1332.211	47.193	0.052	<0.001
N70	1,462	1.004	1350.322	29.082	0.032	<0.001
N65	1,462	1.003	1331.072	48.332	0.053	<0.001

Commented [redacted] 36]: Interesting that the ORs are exactly the same for Tables 14 and 15

Although the odds ratios suggest that N70 and N65 are poorly correlated with annoyance, it must be remembered that N70 and N65 are numerically much larger in magnitude than $L_{Aeq,16h}$ or L_{den}, which is reflected in the lower odds ratio for a given unit change of N70 or N65. Other indicators of goodness of fit, such as -2 x Log likelihood, suggest that L_{den} or N65 best correlate with annoyance, closely followed by $L_{Aeq,16h}$. In contrast N70 is more poorly correlated, most likely because it tends to zero for noise exposures where annoyance still occurs.

Commented [redacted] 37]: Too dense

The results suggest [show?] there is no compelling case to change from $L_{Aeq,16h}$ as the standard indicator of long-term noise exposure. Whilst L_{den} was found to have a slightly better correlation annoyance, this would result in day and night effects (annoyance and sleep disturbance) being integrated into a single indicator. A separate report will examine the association between self-reported sleep disturbance and L_{night}.

Commented [redacted] 38]: This feels like a policy recommendation. Are we comfortable with this coming out in this report? Should it be something separate, but accompanying this report? Alternatively should it be moved to a 'policy implications' section? I'm uncomfortable about it appearing in a key finding section.

Regarding number above indicators, the findings are that N65 correlates better with annoyance than N70. It could be argued that N65 could replace $L_{Aeq,16h}$ as the standard indicator. However, a number of health impact relationships recommended by WHO are defined in only in terms of $L_{Aeq,16h}$ and thus it would not be feasible to replace $L_{Aeq,16h}$ with N65. There is, however, merit in using N65 as a supplementary indicator to $L_{Aeq,16h}$.

Commented [redacted] 39]: This argument does not arise from the survey data analysed – suggest it is removed

Reviewers comment – 'I have to admit my stats knowledge doesn't stretch that far' and this is referring to relatively simple regression - this suggests the CAA/ERCD have used non experts to review document

July Version – L_{DEN} & N65 better than L_{Aeq}

SoNA Report Draft 2 - version 20161103

Correlation between noise indicators and percentage highly annoyed

5.33 Although the associations between each noise indicator and the percentange highly annoyed (e.g. Figure 5) appear close to linear, a logistic regression function was fitted through the data. A logistic regression function is preferred as it is naturally bounded between 0 and 100%, unlike other types of functions. Unlike for conventional linear or non-linear regression, logistic regression does not yield a regression coefficient (r or r^2). Instead, various parameters indicating the goodness of fit of the logistic function are shown in Table 22.

Table 22: Correlation coefficients for mean annoyance score with noise indicators

Noise indicator	Weighted responses	Odds ratio	-2 x Log likelihood	Chi-square	Sig
92 day LAeq16h	1,460	1.134	931.429	34.652	<0.001
92 day N70 16h	1,460	1.004	943.029	23.052	<0.001
Annual L_{DEN} 24h	1,460	1.137	925.785	40.296	<0.001
N65	1,460	1.004	924.070	42.012	<0.001

5.34 The correlation between the percentage highly annoyed and each noise indicator is statistically significant ($p<0.001$). In addition the goodness of fit for each regression does not vary considerably between the different indicators.

5.35 Although L_{DEN} is seen to correlate with annoyance slightly better than $L_{Aeq,16h}$, this does not mean that $L_{Aeq,16h}$ is no adequate. A change to to L_{DEN} would also change the time period from 16 hour day to a weighted 24h period and have broader policy implications which are discussed in Chapter 7.

5.36 N70 is found to be less well correlated with mean annoyance score, especially compared with N65. It is possible that this due to the fact that N70 tends to zero for noise exposure levels between 51-54 dB $L_{Aeq,16h}$, i.e. the noise events that contribute towards an LAeq,16h of 51-54 are predominantly associated with single event noise events less than 70dB L_{Amax}. The results indicate a slightly stronger correlation for N65 than $L_{Aeq,16h}$. A change from $L_{Aeq,16h}$ to N65 would also have broader policy implications, which are discussed in Chapter 7.

R squared not delivered from logistic regression

Key findings

8.5 Annoyance scores calculated from the 5-point and 11-point scale questions are consistent.

8.6 Annoyance scores are lower than found by ANASE, but higher than found by ANIS

8.7 There is no evidence to suggest that annoyance does not correlate with average summer day noise exposure, $L_{Aeq,16h}$.

8.8 N70 correlates less well with annoyance, most likely because the majority of single event noise levels are less than 70dB L_{Amax} when average day exposure is less than 54dB $L_{Aeq,16h}$.

8.9 Whilst N65 is slightly better correlated with annoyance than $L_{Aeq,16h}$, the lack of dose-response relationships associating N65 (rather than $L_{Aeq,16h}$) with health impacts precludes a complete shift away from $L_{Aeq,16h}$ to N65.

8.10 There is, however, merit in adopting N65 as a supplemental indicator alongside $L_{Aeq,16h}$.

8.11 For a given noise exposure, a higher proportion of respondents was found to be highly annoyed than compared with ANIS: the same percentage of respondents reporting to be highly annoyed occurs at an $L_{Aeq,16h}$ noise exposure level approximately 3-4 dB lower.

8.12 For a given noise exposure, a lower proportion of respondents was found to be highly annoyed than compard with ANASE.

)ctober 2016 Pa

Nov Version – L_{DEN} & N65 still better than L_{Aeq}

'A change from LAeq to N65 would have boarder policy implications'

Is this questioning whether policy should not be based on technical evidence?

Final SONA version

R squared not delivered from logistic regression but now delivered using 'ordinary least square regression' ?

Relationship between different noise indicators and mean annoyance score

5.22 In order to identify whether one noise indicator is more strongly associated with mean annoyance score, a logistic function was fitted through the mean annoyance scores plotted for each noise indicator. A logistic function[29] is preferred as it is naturally bounded between 0 and 100%, unlike other types of functions. The correlation of determination (r^2) of a logistic function fitted using ordinary least-squares regression for each noise indicator is shown in Table 17.

Table 17: Coefficients of determination between different noise indicators and mean annoyance score

Noise indicator	Weighted responses	r^2
92 day $L_{Aeq,16h}$	1,460	0.874
Annual L_{den} 24h	1,460	0.707
92 day N70 16h	1,460	0.598
92 day N65 16h	1,460	0.619

5.23 Whilst numerically the r^2 values show that $L_{Aeq,16h}$ correlates better with mean annoyance score, in practice, all the noise indicators show adequate correlation. There is, however, no evidence to suggest that any of the indicators assessed is better than $L_{Aeq,16h}$.

Is $L_{Aeq,16h}$ still the most appropriate indicator to use to estimate the annoyance arising from aircraft noise?

8.7 The study compared reported mean annoyance scores against average summer-day noise exposure defined using four different noise indicators: $L_{Aeq,16h}$, L_{den}, N70 and N65.

8.8 Evidence was found that mean annoyance score correlated well with average summer day noise exposure, $L_{Aeq,16h}$ (r^2=0.87)[40]. There was no evidence found to suggest that any of the other indicators L_{den}, N70 or N65 (r^2=0.60-0.71) correlated better with annoyance than $L_{Aeq,16h}$.

8.9 Having said this, the study recognises that residents can struggle to understand the concept of a time-averaged metric such as $L_{Aeq,16h}$ and Lden and the fact that it is measured and reported on a logarithmic scale where a change of 3 dB representatives a doubling or halving of noise energy.

Final Version – L_{Aeq} found to be better (!), with no evidence (?) other metrics correlated better.

We were surprised to see the analysis in the earlier reports and then the jump to the statement that there is no evidence to suggest other metrics correlated better

SoNA – CAA technical errors in supporting average L_{Aeq} metrics rather than number of events metric N70 or N65

Data from 'Survey of noise attitudes 2014: Aircraft CAP 1506, published 2017' otherwise referred to as SONA

Figure 1: Plot of mean annoyance scores in SoNA 2014 survey as a function of average summer day $L_{Aeq,16h}$ noise exposure

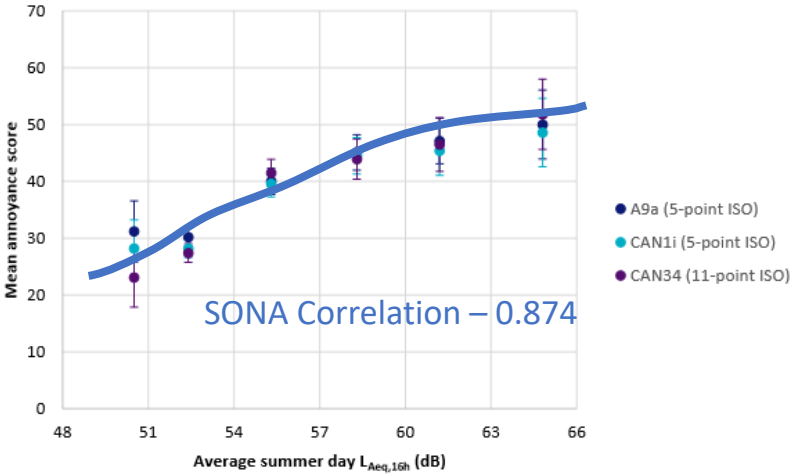
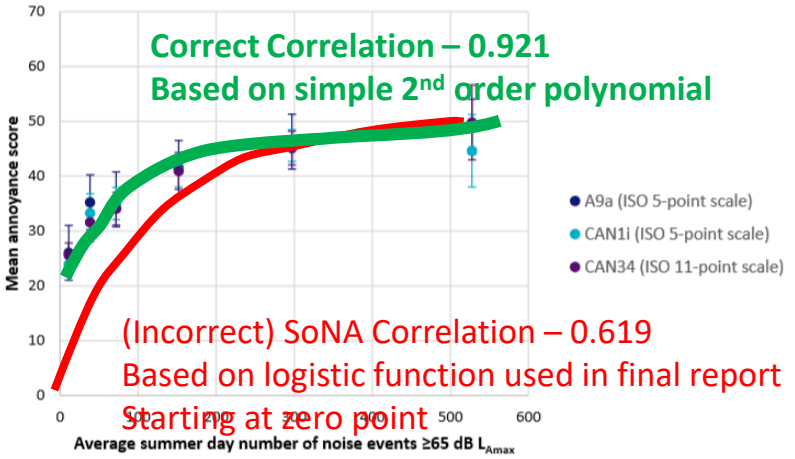


Figure 4: Plot of mean annoyance scores in SoNA 2014 survey as a function of average summer day, 16 hour N65 noise exposure



Curves are indicative

In the final report the CAA/ERCD seem to have decided to try and fit a 'logistic' curve through the data. This is like a sloped 'S' shape. This requires annoyance to start at zero which is never going to be the case for N65 curves as annoyance is caused by events lower than 65dB e.g. at 60dB, so this function should not be used. The CAA/ERCD has then used a correlation based on how well this fits the data – which for N> metrics will always give a worse result.

Both metrics correlate with annoyance

Data from 'Survey of noise attitudes 2014: Aircraft CAP 1506, published 2017' otherwise referred to as SONA

Figure 1: Plot of mean annoyance scores in SoNA 2014 survey as a function of average summer day $L_{Aeq,16h}$ noise exposure

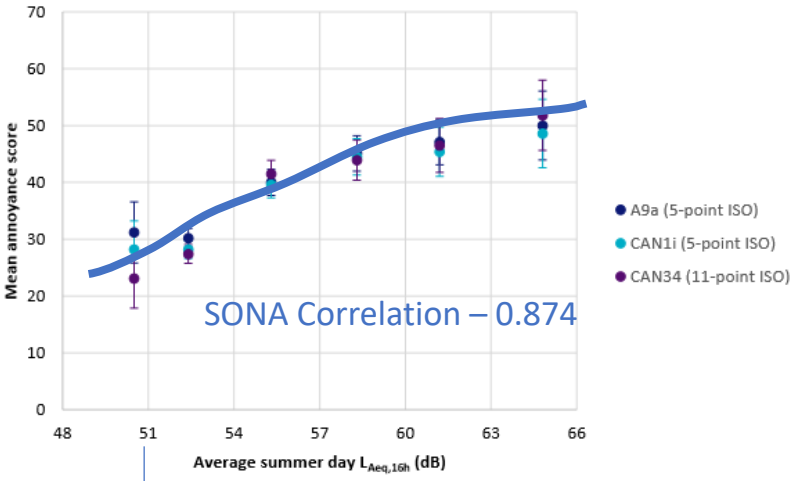
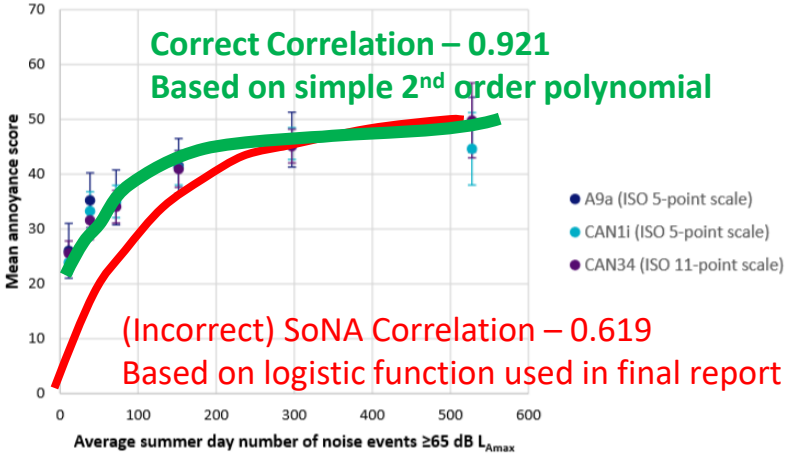


Figure 4: Plot of mean annoyance scores in SoNA 2014 survey as a function of average summer day, 16 hour N65 noise exposure



Curves are indicative

Example 51db L_{Aeq} can be equal to either 64 or 224 events depending on the mix*

So if planes get less noisy, the same amount of sound energy would result in many more planes which the SONA data on N> metrics shows will be more annoying and so impact health, but is being missed by only using L_{Aeq}

BOTH metrics must be used otherwise the Government will miss real health affects

* In this example 224 65dB events have been used and 64 65dB and 75dB events split 75/25%

Conclusions and Actions - based on evidence

The central challenge in Point 3 is that 'SoNA 2014 actual evidence shows N> metrics and L_{DEN} have higher correlation with noise annoyance – incorrect technical analysis was used to come to a conclusion that L_{Aeq} should not be changed

The evidence shows;

1. **N> event metrics show highest correlation with annoyance**
2. **Using L_{Aeq} alone will lead to the wrong conclusions**

Conclusion

UK aviation policy should use event metrics to access airspace change, backed up by L_{DEN} dose response relationships

Required Actions

1. The Government (Defra, PHE & DfT) need to delay any active airspace developments and reissue aviation noise guidelines based on latest evidence
2. Heathrow, as a responsible corporation need to rework its consultation materials including event based metrics and L_{DEN} (only L_{Aeq} analysis has been presented)
3. SoNA data based on N events should now be compared to single mode and directional analysis

Debate between Noise Experts and presentation of other evidence relating to N> metrics

Further thoughts – Additional slides

- This analysis potentially shows why concentrated PBN does not work over densely populated communities
- It has been noted that people's sensitivity to aviation noise is increasing – one part of the explanation could be that event numbers are actually driving the apparent increase in sensitivity (not L_{Aeq} values)
- This analysis suggests serious impact and timeline issues around the 3rd Runway DCO process to avoid the UK making incorrect decisions
- Economics are often used to excuse reduced regulation but the full picture must be assessed

A number of slides illustrate these points further

The introduction of concentrated flight paths using PBN will make an expanded Heathrow's impacts so much worse

There are no successful precedents over densely populated areas such as Heathrow anywhere in the world

Phoenix Noise

Mayor of Phoenix Greg Stanton and his representatives explain FAA's policy of disregard for United States citizens.

Boston Noise

U.S. Rep. Steve Lynch in dogfight with FAA over NextGen aircraft noise and pollution. Calls FAA most unresponsive agency in government.

Santa Cruz Noise

Santa Cruz attorney cites destruction of pristine natural habitat by FAA's dirty NextGen transportation system.

Washington, D.C.

Arizona Senator John McCain sends letter to FAA Administrator Huerta urging changes to noisy flight tracks.

California

California Bay Area Resident files lawsuit against Federal Aviation Administration for unbearable aircraft

Chicago Noise

Chicago political activist Jac Charlier challenges Mayor Emanuel to come out from hiding re: O'Hare jet noise.

San Diego Noise

San Diego taxpayers give FAA hell over NextGen aircraft noise and pollution. FAA sits stone-faced, deaf and mute.

Chicago

Chicago political activist John Kane says meeting with Mayor Rahm Emanuel over aircraft noise a waste of time.

Chicago

Convenient for Chicago Mayor Rahm Emanuel: Air traffic over his home delayed until 2021.

Chicago

Chicago residents sing their

New York Noise

N.Y. Rep. Grace Meng introduces "Quiet Communities Act of 2015" to benefit all communities across U.S.

New York

New York Congressman Steve Israel calls the FAA the "Federal Arrogance Administration."

Brooklyn Noise

Park Slope, Brooklyn resident says FAA and Port are green-washing filthy NextGen air transportation sytem.

Air France

Air France sponsors Paris UN climate conference, but who are they really kidding?

Washington, D.C.

Washington, D.C. Congresswoman Eleanor Holmes

Chicago

ongresswoman Schakowski says if ou are not at the table then you are obably on the menu re: aircraft noise.

Maryland

Maryland residents in for rude akening from FAA's NextGen aircraft oise and aircraft pollution strategy.

Toronto

onto residents unite to fight for their rspace saying Nav Canada appears y accountable to the airline industry.

Germany

rman protesters flow into the streets opposition to airport expansion and aircraft noise and pollution.

Germany

rmans protest against aircraft noise error in the busy airport terminal. oudly, just like the jets disturb their peace and quiet.

living beneath constant air traffic and loss of quiet enjoyment from FAA's NextGen.

Chicago

Chicago residents join forces to reduce property tax due to O'Hare aircraft noise and FAA's NextGen.

Santa Cruz

Santa Cruz Save Our Skies: "An incessant assault. . you feel helpless . . . you can't stop it. . . you can't go outside"

Chicago

Chicago residents break U.S. record, logging more than 1 million O'Hare noise complaints!

Charlotte, N.C.

Charlotte, North Carolina residents bombarded by FAA NextGen noise and pollution.

is a bad neighbor for Queens' residents.

New York

New York State Senator Tony Avella from Queens to Federal Aviation Administration: "This is not acceptable!"

Washington, D.C.

New York's U.S. Senator Charles Schumer sells out New Yorkers and all of America in his 2012 FAA Reauthorization bill vote.

New York

Queens, NY jet engine sound monitors reveal residents suffer from levels of jet noise considered unhealthy.

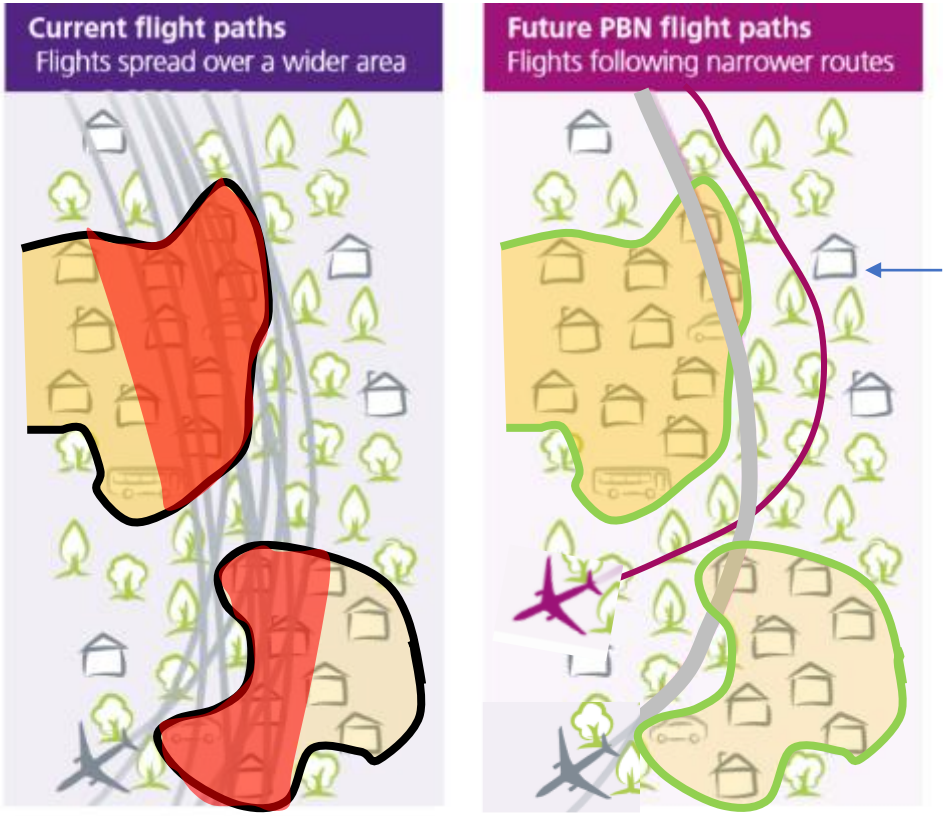
New York

NYC Councilman Dromm together with Queens environmental groups, criticize FAA NextGen aircraft noise and misery.

New Zealand

Auckland, New Zealand families starting to feel the pain and misery of living under NextGen aircraft noise flight tracks.

Where might PBN work?

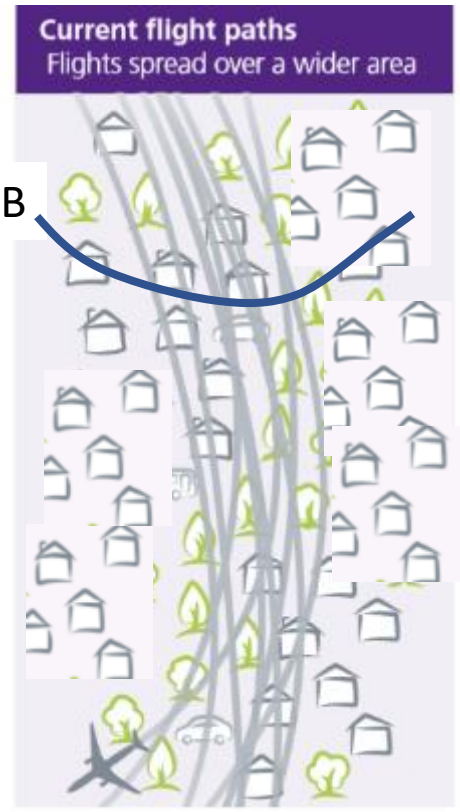


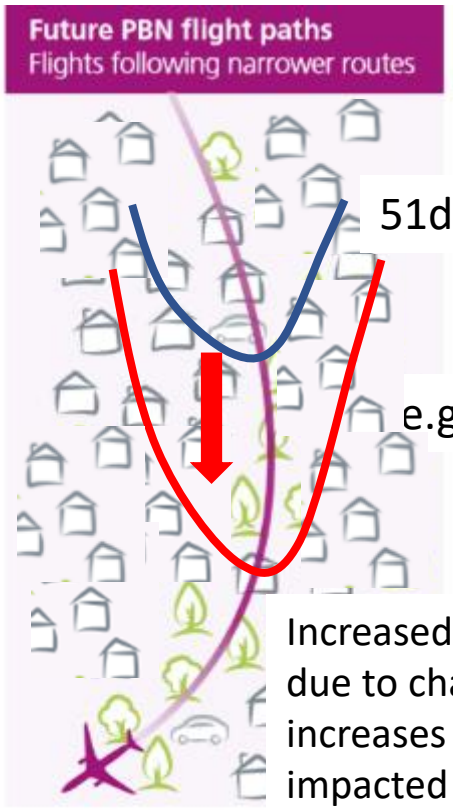
If change made those affected **people will need significant compensation** or the **choice to have their properties acquired**

Opportunity to use PBN over rural setting to manage noise impacts
- if villages and towns can be avoided

Figure is indicative

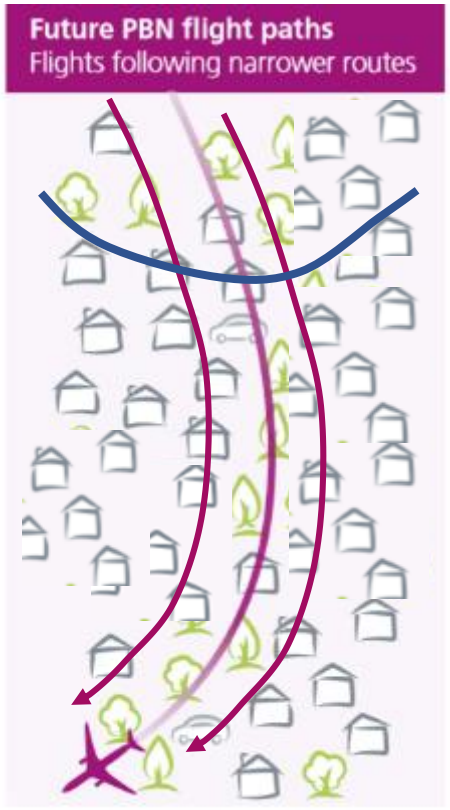
Why PBN does not work over high population densities



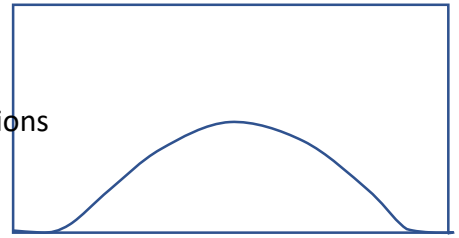


e.g. if 45dB

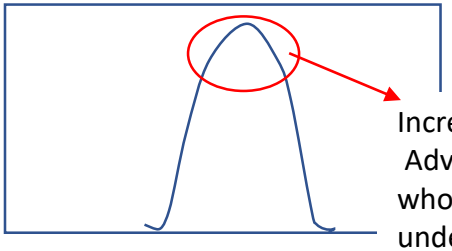
Increased sensitivity due to change increases those impacted



Noise Distributions



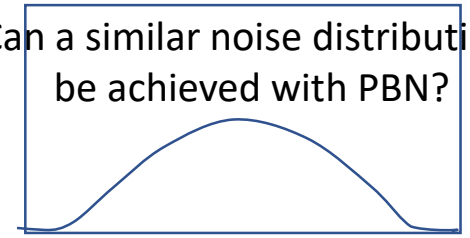
Today



Increased Significant Adverse Impacts - who will want to live under a PBN route?

Possible future – major change

Can a similar noise distribution be achieved with PBN?



Similar to Today?

THIS CANNOT BE MITIGATED OVER LONDON

Figure is indicative

Increasing Sensitivity to noise

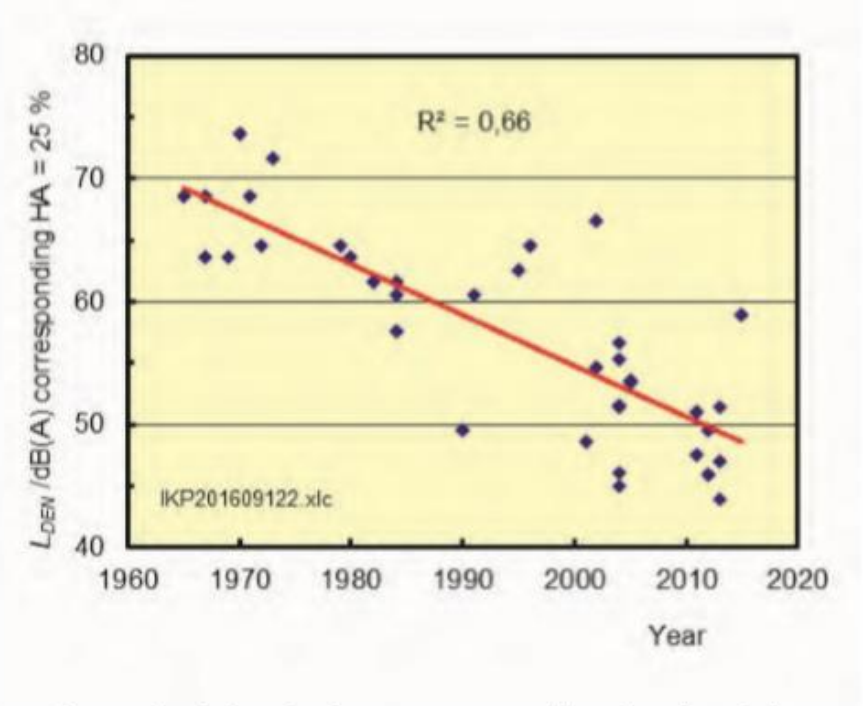


Figure 14: Changes in the levels of annoyance caused by aircraft noise between 1965 and 2015. The figure presents how the L_{DEN} level of outdoor noise, at which 25% of respondents state that they are highly annoyed by noise, has changed during the past 50 years. The curve explains 66% of variation in observations. It is assumed that $L_{DEN} \approx L_{DN} + 0.6$ dB, $L_{DEN} \approx L_{Aeq,day} + 2$ dB and $L_{DEN} \approx L_{Aeq,24h} + 5$ dB, when there is also night-time traffic. The trend curve, which is an approximate second-degree polynomial, has been defined in conjunction with this report.

'When it is examined how aircraft noise at an identical LDEN level has changed around large airports similar to those included in the studies presented in Figure 14, the general trend is that the intensity of noise coming from individual overflights (take-offs, in particular) has decreased, while the number of planes (traffic frequency) has increased'

This observation supports the fact that number metrics must be used or LDEN must be adjusted to model future scenarios

The impact of change in Heathrow's flight paths would be massive because they fly over London's high population density

Static SONA

- Significant Annoyance Threshold - presently set at 54dB
- 550,000 people
- Lowest Observable Adverse Effect Level – presently set at 51dB
- 1,000,000 (~2x) people

WebTAG impact today £350-400mpa

CHANGE Brings 6-9dB increased sensitivity

'Change' ANPS/Aviation 2050

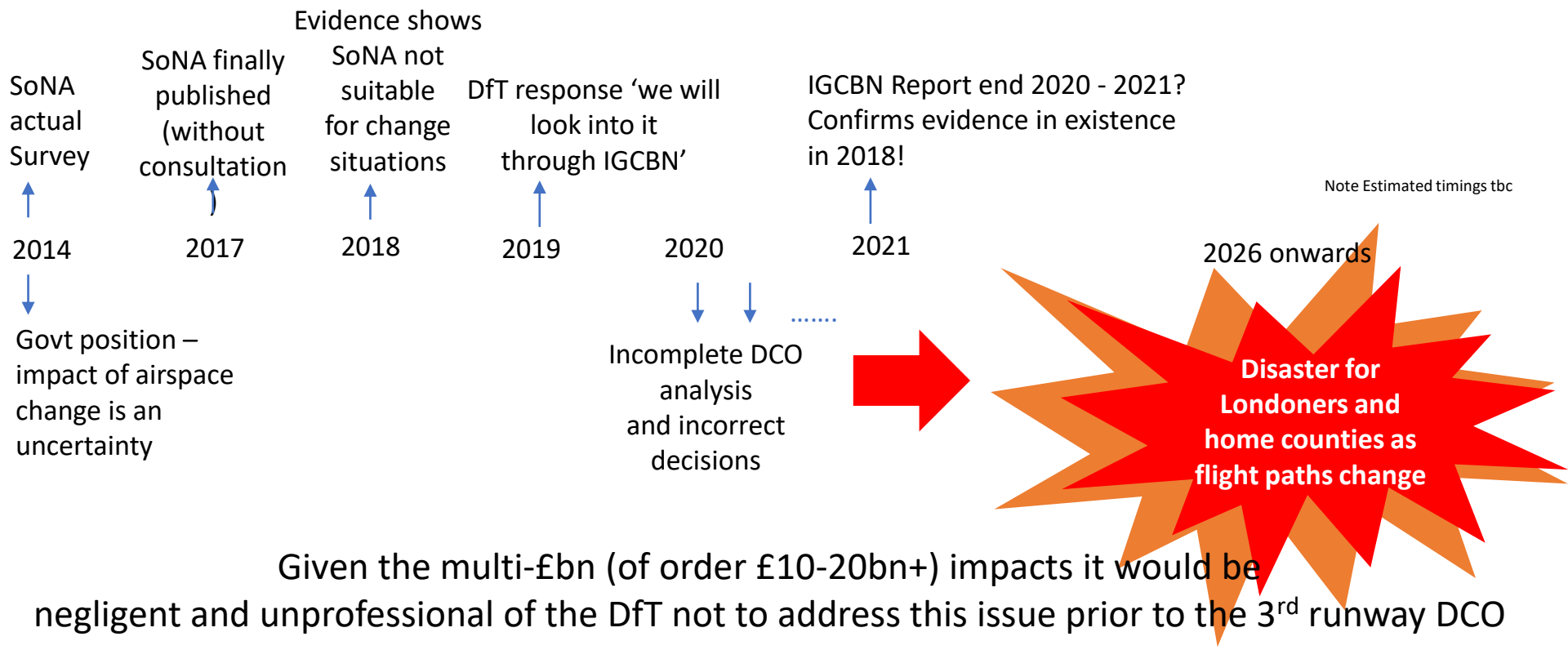
- 45-48dB Significant Annoyance Threshold
- >2,000,000 people?
- 42-45dBdB LOAEL – Lowest Observable Adverse Effect Level
- >4,000,000 people?

WebTAG financial impact after change >£1bn a year?

In ANPS terms that could reduce the NPV by order £10-20bn+ on an already marginal case.

Note Decibel levels are average sound energy levels or LAeq's not loudness
Population impacts based on 2030 figures obtained through FoI

Timelines – flaws in SoNA

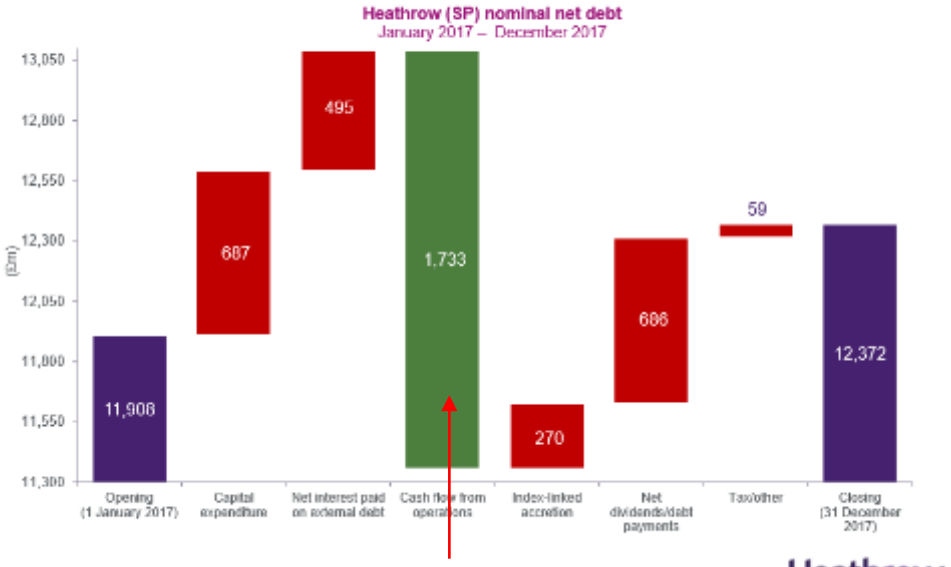


Given the multi-£bn (of order £10-20bn+) impacts it would be negligent and unprofessional of the DfT not to address this issue prior to the 3rd runway DCO

Economic Arguments

- Economic arguments are often used by Heathrow and Airlines not to implement noise improvement measures but these need to be set in context;

Operating cash flow significantly exceeds capital expenditure and interest payments



Heathrow
Making every journey better

Heathrow generates £1.7bpa cash flow paid to shareholders or bond holders

BBC News 22nd July 2019

Rising profits

British Airways is part of International Airlines Group (IAG), which also owns Spanish carrier Iberia. Last year, it reported a pre-tax profit of €3bn, up almost 9.8% on the previous year.

British Airways contributed £1.96bn to that, up 8.7% on 2017.

It also rewarded investors with a total dividend pay-out of €1.3bn.

Meanwhile – Health impacts from noise fall on the cash strapped NHS and communities who have no choices or financial compensation. The DfT WebTAG tool puts the negative cost of noise to the NHS & Communities at ~£400mpa