Health impacts of aircraft noise – a UK communities’ perspective

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ABSTRACT

UK Air Navigation Guidance (ANG) regards 51dB $L_{Aeq16hr}$ for day time noise and 45dB $L_{Night}$ 8hr for night time noise as the levels at which aircraft noise annoyance occurs. World Health Organisation (WHO) guidelines (2018) concluded that health effects can occur at lower levels of 45dB $L_{den}$ and 40dB $L_{night}$.

Current policy recognises that noise annoyance can occur below 51dB $L_{Aeq16hr}$ yet it is not known how many people around UK airports may be adversely affected at these lower levels. This paper will seek to estimate the population size impacted by aircraft noise below 51dB $L_{Aeq16hr}$ around Heathrow airport. It will also seek to provide an international comparison of the noise policies of different airports in Europe and globally, the size of the population impacted and the minimum threshold for the onset of health effects.

The most radical changes in UK airspace history will take place in the next decade. If more people are adversely impacted by aircraft noise at lower levels then this has significant ramifications for the cost benefit analysis of airspace changes. It is crucial that communities can understand the full health impacts of the proposals.

1. EXECUTIVE SUMMARY

- Potentially 2-4 million people could be exposed to aircraft noise around Heathrow at WHO levels.
- Noise assessments need to be undertaken using WHO recommended levels as a benchmark, in particular for any airspace change proposals.
- Use of a range of metrics important for comprehensive understanding of impacts.
- The number of noise events has a disproportional effect on the level of disturbance experienced.
- Gaps in noise related health research need to be addressed
- More robust framework for translating academic research into policy outcomes is needed.

2. WHO GUIDELINES (2018)

The World Health Organisation (WHO) 2018 Guidelines for the European Region strongly recommend that the daytime level for aircraft is 45dB $L_{den}$ 24 hr (equivalent to 43dB $L_{Aeq,16h}$ around Heathrow Airport) and at night 40dB $L_{night}$ to reduce the risk of associated health effects. More

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than 10% of people will be highly annoyed by aircraft noise above these levels. These are lower levels than previously thought safe.

WHO’s night time guidelines, generally, are lower because the evidence showed that regular sleep disturbance can have a greater impact on health than annoyance. Therefore, the benchmark was set at a lower level. The recommended threshold was the level at which 3% of people were highly sleep-disturbed.

Other studies confirm that noise annoyance is occurring at lower levels. For example, a recent report from the UK Civil Aviation Authority, SoNA (Survey of Noise Attitudes, 2014), found that 7% of people become significantly annoyed at 51dB L_{Aeq16hr} and 9% at 54dB L_{Aeq16hr}. Whereas previous UK surveys, such as ANIS (1985), had found 57dB L_{Aeq16hr} to be the 10% highly annoyed level. These are slightly different metrics and a less dramatic finding than WHO but highlighting a similar trend of significant annoyance at lower levels than previously recognised.

The SoNA (2014) study was a research study to obtain new and updated evidence on attitudes to aviation noise around airports in England, and how they relate to the UK aircraft noise exposure indices. The study also examined where the use of L_{Aeq} is the appropriate measure of annoyance for measuring the impact on people living around major airports.

3. UK GOVERNMENT POLICY

The UK Government’s overall policy on aviation noise “to limit, and where possible, reduce the number of people in the UK significantly affected by aircraft noise”. Communities believe that this offers less protection than required by the EU’s Environmental Noise Directive which states “to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise”.

Air Navigation Guidance (2017) sets the levels of aircraft noise annoyance that should be measured by airports as 51dB L_{Aeq16hr} (average summer day) and 45dB L_{Aeq8hr} (average summer night). These levels are considerably lower than previous Government policy, but potentially still do not go far enough to address the health impacts of aircraft noise.

Current policy remains heavily reliant on SoNA (2014) which was not designed to look below 51dB L_{Aeq16hr} and thus potentially prejudged the lowest onset of the lowest observable adverse effect level (LOAEL). This has crucial health and economic implications for any airport considering an airspace change and for the communities that are overflown.

Indeed, disturbance from aircraft noise has negative impacts on the health and quality of life of people living near airports and under flightpaths. SoNA (2014) found that the public is becoming more sensitive to aircraft noise, to a greater extent than noise from other transport sources, and that there are health costs associated from exposure to this noise.

It is not clear what the DfT consider to be a successful outcome in terms of its noise objective or how progress might be measured against it. It is also not transparent what input the Department of Health (DoH) of the Department of the Environment, Food and Rural Affairs (DEFRA) have in terms of setting policy

3.1 Community View
HACAN’s membership has a wide geographical spread, many of whom are outside of the established noise contours, an indication that some people are so badly affected at lower noise levels, that they are motivated to join a pressure group for change.

Communities would like to see the core policy strengthened in line with WHO Guidelines to ensure that the total health impacts of aircraft noise are properly understood, analysed and reflected in both government policy and airport approaches to reducing noise. It is worth noting that across the EU, the annoyance reported by residents from a given level of aircraft noise has been shown to be greater than that caused by other transport sources.

Overflown communities around Heathrow believe that the use of average noise metrics serves to underestimate the total number of people adversely affected by aircraft noise, particularly given the use of runway alternation at Heathrow and the lack of respite for some communities. For example, an average of 200 daily movements at N>65 on average mode could equate to approximately 600 movements N>65 events for communities under easterly operations.

However, the evidence shows that there are health impacts at lower levels of noise. Consequently, the number of people potentially affected must be known and appropriate policy measures put in place. It should not be for local community groups to estimate the size of this impact when there are governmental organisations capable of producing the work.

There is also a significant issue of trust between communities, government and the aviation industry. This deficit was meant to be addressed by the creation of the Independent Commission on Civil Aviation Noise (ICCAN). However, ICCAN was recently abolished by the Secretary of State and its functions transferred to the CAA, which is not viewed by local communities as sufficiently independent of either government or industry.

4. HEALTH IMPACTS

Exposure to aircraft noise can lead to short-term responses such as sleep disturbance, annoyance, and impairment of learning in children, and long-term exposure is associated with increased risk of high blood pressure, heart disease, heart attack, stroke and dementia, and may contribute to long-term mental health issues.

The Government’s aircraft noise policy makes no specific reference to health-based noise targets. Despite this ANG (2017) does include health and quality of life in its definition of ‘adverse effects’, however no independent evidence base exists. This has had knock-on effects for other policies, including the process for flightpath changes, night noise restrictions at Heathrow, Gatwick and Stansted, and policies for noise insulation in schools.

The potential health impacts from aircraft noise associated with a third runway at Heathrow were assessed by the Airports Commission as costing up to £3.7 billion. But because the Commission used the Government’s aircraft noise policy to assess the impact, health impacts were significantly underestimated and thus were not a major consideration in its final recommendations.

All the studies are suggesting people can get annoyed by aircraft noise at lower levels than previously recognised. The volume, range and robustness of the academic evidence of the health impacts of aircraft noise continues to grow.

4.1 Cardiovascular
Hansel et al (2013) found that communities around Heathrow exposed to high levels of aircraft noise (levels > 63dB L_{Aeq 16hr}) had a 24% higher chance of stroke, 21% higher chance of heart disease, and 14% higher chance of cardiovascular diseases compared to people exposed to low levels of aircraft noise. Shahrbabaki et al (2021) report that sleep disturbance is linked to long-term cardiovascular disease and mortality. Similarly, Münzel et al (2020) describes for the first-time acute effects of noise on cardiovascular mortality, indicating that aircraft noise is a trigger for fatal acute coronary events.

4.2 Mental health and cognitive development

Seidler et al, (2017) as part of the NORAH study around Frankfurt Airport in Germany, which found that a 10 dB increase in noise is associated with an 8.9% increase in the risk of depression.

Jaurp et al (2008) in the HYENA study around major European airports, including Heathrow, found that where daytime noise levels exceed 50 dB L_{Aeq 16hr} on average, a 5dB increase in noise exposure is associated with a two-month delay in learning in UK primary school children. Over 460 schools around Heathrow are exposed to aircraft noise levels that may impair learning and memory.

4.3 Noise at Night

Numerous studies have found a link between night flight noise, annoyance, stress and ill-health. Research from Warwick Medical School published in the European Heart Journal in February 2011 found that chronic lack of sleep produces hormones and chemicals in the body, which increases the risk of developing heart disease, strokes and other conditions, such as high blood pressure and cholesterol, diabetes and obesity. The evidence gathered spanned 7 to 25 years from more than 470,000 participants across eight countries, including Japan, the US, Sweden and the UK. Professor Francesco Cappuccio concluded:

"If you sleep less than six hours per night and have disturbed sleep you stand a 48% greater chance of developing or dying from heart disease and a 15% greater chance of developing or dying from a stroke”.

The WHO Night Noise Guidelines for Europe (2009) found:

- If sleep is regularly disturbed for any reason, it has an effect on people’s health.
- Even if people don’t wake up, there is “sufficient evidence” to show that noise increases people’s heart-rate.
- There is some, but “limited”, evidence that noise at night can cause heart problems, depression and other mental illness.
- Children, including babies, because they spend longer in bed, are “considered a risk group” even though they usually sleep through noise better than adults.
- Since older people, pregnant woman and ill people find sleeping more difficult, they are particularly vulnerable to being disturbed by night noise.

4.4 Research Gaps

There remains a lack of clarity in existing policy as to how best to reduce the harmful effects of aircraft noise at night. This is exacerbated by gaps in research that need to be addressed in a systematic and robust matter.
WHO (2018) Guidelines increased the bar for evidence which had the benefit of placing it on a similar level to other environmental issues, such as air pollution. However, there remains a gap between statistically significant results and locally relevant findings.

Communities want to see the UK Government set out an independent research programme that seeks to ensure existing knowledge gaps are filled. This could include; protecting sensitive time periods, respite, noise insulation and the effectiveness of mitigation interventions. The abolition of ICCAN makes this work programme all the more vital, as it could help address the issue about how communities can access independent expert advice.

5. METRICS

Accurate metrics matter because only when there is a clear idea of the numbers impacted by noise from an airport can realistic policies be put in place to deal with that noise. Metrics can determine levels of compensation, whether efforts should be made to provide communities with relief and respite from the noise and, indeed, to assess the impact of any new capacity.

However, metrics only cover part of the problem caused by aircraft noise (the acoustic measures only account for one third of the reason behind the annoyance). Further, the impact of single mode intensity and effect of meaningful respite is not reflected in average LAeq or Lden. Some overflown communities may experience intense noise for 1 day in 3 (over 600 flights) which causes high annoyance, but this level of overflight is hidden in the use of average metrics.

Metrics need to be underpinned by independent health-based research, however it is not acceptable when engaging with communities, to tell them that they are not affected because they are outside of the contour.

The review of SoNA (2014) appears to suggest that small uncertainties exist in the calculations produced by the ANCON model when assessing the noise dose of aircraft. The peer review also recommended that noise monitors are placed at a wider range of distances from the start of roll on departures and thresholds on arrivals.

5.1 Non-Acoustic Factors

ICAO advises that only one third of annoyance can be accounted by long term average metrics (LAEq or Lden). Non-acoustic factors are of key importance. Those that are important for communities include the time of day, frequency of overflights, fairness in decision making, trust, and use of a range of metrics.

Indeed, Bartels et al., (2015) found that consideration of noise metrics related to the number of fly-overs and individual adjustment of noise metrics through the inclusion of non-acoustic factors can improve the prediction of short-term annoyance, compared to models using equivalent outdoor levels only.

5.2 Size of the noise problem

Using WHO (2018) guidance, the European Environmental Agency Report (2019) estimated that of the millions exposed to aircraft noise across the EU, around 3.2 million people were highly annoyed and 1.4 million suffered from high sleep disturbance around the 47 major airports.

The number of people exposed to more than 50 aircraft noise events exceeding 70 dB per day was estimated to be 1 million in 2017 for the same airports; a 60% increase on 2005.
The EEA predict that these population levels could stabilise and even decrease by 2030, if the latest aircraft types entering the fleet deliver their expected noise benefits. This forecast assumes that there will be no further airport expansion and no change in population around these airports. Furthermore, around 110 airports could handle more than 50,000 annual aircraft movements by 2040, compared to 82 airports in 2017, thereby affecting new populations.

6. HEATHROW

The current impact of aircraft noise at Heathrow is underestimated because of the continued use of an out of date benchmark and failure to provide data on the impacts to the WHO (2018) recommended levels. Consequently, any analysis of the costs of damage to the health of overflown communities is unlikely to present an accurate result.

The number of flights at Heathrow has risen from 225,000 per annum in the 1970s to 475,861 in 2019, significantly increasing the individual number of noise disturbances caused. According to CAA’s CAP1763 (2018) document, the number of people exposed to aircraft noise from airports in the UK in the 55Lden contour as 948,400 in 2016. Similarly, the European Environment Agency (2019) places this figure at 1,108,900 in 2019 with 682,500 of those being in London.

CAA ERCD CAP1901 document reveals that the total population around Heathrow in the 55Lden contour in 2018 was 611,300. The different metrics and populations sizes are summarised in Table 1 below. It also shows the cumulative estimates of the areas, populations and households within the 2018 summer day actual contours. This shows that 497,300 people were in the 54dB L_{Aeq16hr} noise contour.

However, as Government policy now recognises that 51dB L_{Aeq16hr} sees the onset of annoyance, it is crucial to understand the size of population at this level and lower. 7% of people are highly annoyed when the noise averages out at 51 dB L_{Aeq,16h}. In Heathrow terms these are people living between 17 and 20 miles from the airport, where the typical height of the aircraft varies from a little under 4,000ft to about 4,500ft.

HACAN has many members living even beyond the 51dB L_{Aeq16hr} noise contour who were utterly distressed by the noise, who never open their windows in the summer and who played ‘white noise’ day and night to try to block out the aircraft. Why is data for the number of people who are exposed to aircraft noise at 51dB and lower not made available or included in regulatory, industry and government analysis? This is a requirement of ANG (2017) for any airspace change proposal.

Heathrow’s own consultation on the introduction of Slight Steeper Approaches in 2021 calculated that over 1 million people would be exposed to aircraft noise over 51dB L_{Aeq16hr}, however this document is no longer available online.

It is increasingly recognised that it is the number of noise disturbances that cause the largest annoyance. CAP 1901 also reveals that 724,700 people are exposed to at least 50 aircraft movements a day at 65dB and 394,500 are exposed to up to 100 aircraft movements a day and 178,900 are exposed to 200 movements a day.

Table 1 - Size of Heathrow’s noise impact

<table>
<thead>
<tr>
<th>Metric Used</th>
<th>Size of Population</th>
<th>Year of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>55dB L_{den}</td>
<td>611,300</td>
<td>2018</td>
</tr>
<tr>
<td>54dB L_{Aeq16hr}</td>
<td>497,300</td>
<td>2018</td>
</tr>
</tbody>
</table>
SoNA (2014) also found that 9% of people are highly annoyed when the average is 54 L\textsubscript{Aeq 16hr}. In geographical terms from Heathrow that goes as far as about Clapham to the east and about 2 miles past Maidenhead to the west.

### 6.1 Heathrow Population at WHO (2018) recommended levels

The population size in the 45dB L\textsubscript{den} (day) and 40dB L\textsubscript{den} (night) for the Heathrow area are not known. Graph 1 below shows the best estimate that can be provided based on available data of the potential size of population exposed to aircraft noise at the WHO daytime 45dB L\textsubscript{den} (approximately 43dB L\textsubscript{Aeq 16hr} at Heathrow Airport) level is over 4 million.

Further analysis of data undertaken by the Transport Select Committee in relation to the proposed third runway at Heathrow showed that 2.3 million people would experience noise over 45dB L\textsubscript{den} which is equivalent to 43dB L\textsubscript{Aeq 16hr}.

**Graph 1: Estimate of population impacted by aircraft noise from Heathrow at 45dB L\textsubscript{den}.

Key for Graph 1
- SSA - [Steeper Approach Consultation](https://www.heathrowairport.com/consultation) (Heathrow)

N.B. It should be noted that extrapolating under 54dB L\textsubscript{Aeq 16h} has huge associated uncertainties.

The proper calculation would require the plotting of the contours into a GIS map and access to local authority data on the number of households within the contour area. The average household size could then be used to ascertain the population total. However, even this is not entirely accurate and requires estimations. It is appreciated that variability in aircraft position in the air at these greater distances from the airport, and airport noise being closer to background noise levels, results in a lower level of certainty around the impact.
6.2 Heathrow Night Noise

The data from CAA, CAP 1901, shows that between 2006 and 2018 there has been a significant rise in the number of disturbing night-time noise events at Heathrow. In 2006, the N60 figure of 10 or more affected 837,000 people, but by 2018 this had risen to 974,000 (a 16% increase).

The number of people experiencing >20 events grew from 389, 900 in 2006 to 523, 500 in 2018, an increase of 34%. The size of area experiencing >10 noise events rose by 15% and >20 noise events above 60dB also increased by 23% in the same period.

It appears that despite the best efforts of the industry more people across a larger area are being disturbed and annoyed by aircraft noise at night. It should be a key policy priority to reduce this impact and to understand what is causing this increase in annoyance.

7. MITIGATION COMPARISONS

Table 2 below shows the number of people overflown and the number of flights at European airports. The information is taken from a 2018 report by the European Environment Agency (EEA). The EEA used the figures which Governments are required to provide the European Commission under the terms of the EU Noise Directive. The figures are for 2017.

### Table 2 - Top 30 Airports that overfly the largest populations in EU.

<table>
<thead>
<tr>
<th>Position: number overflown</th>
<th>Airport</th>
<th>Numbers overflown</th>
<th>Number of flights</th>
<th>Position: flight numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Heathrow</td>
<td>683,700</td>
<td>475,000</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Lisbon</td>
<td>288,000</td>
<td>159,795</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>Berlin Tegel</td>
<td>278,000</td>
<td>182,200</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Frankfurt</td>
<td>189,000</td>
<td>469,026</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Charles de Gaulle*</td>
<td>170,000</td>
<td>475,654</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Orly*</td>
<td>110,000</td>
<td>229,052</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>Manchester</td>
<td>102,300</td>
<td>192,000</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>Cologne Bonn</td>
<td>101,400</td>
<td>123,241</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>Naples</td>
<td>85,000</td>
<td>64,712</td>
<td>54</td>
</tr>
<tr>
<td>10</td>
<td>London City</td>
<td>75,200</td>
<td>85,000</td>
<td>43</td>
</tr>
<tr>
<td>11</td>
<td>Luxembourg</td>
<td>66,400</td>
<td>68,621</td>
<td>49</td>
</tr>
<tr>
<td>12</td>
<td>Valencia</td>
<td>64,100</td>
<td>62,798</td>
<td>57</td>
</tr>
<tr>
<td>13</td>
<td>Francisco Sa Carneiro</td>
<td>62,400</td>
<td>63,634</td>
<td>55</td>
</tr>
<tr>
<td>14</td>
<td>Brussels</td>
<td>62,100</td>
<td>231,528</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>Zurich</td>
<td>61,100</td>
<td>302,000</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>Dusseldorf</td>
<td>56,700</td>
<td>210,720</td>
<td>17</td>
</tr>
<tr>
<td>17</td>
<td>Birmingham</td>
<td>53,600</td>
<td>113,000</td>
<td>31</td>
</tr>
<tr>
<td>18</td>
<td>Warsaw</td>
<td>51,400</td>
<td>136,605</td>
<td>25</td>
</tr>
<tr>
<td>19</td>
<td>Il Caravaggio</td>
<td>49,300</td>
<td>67,674</td>
<td>50</td>
</tr>
<tr>
<td>20</td>
<td>Glasgow</td>
<td>45,900</td>
<td>97,900</td>
<td>36</td>
</tr>
<tr>
<td>21</td>
<td>Schiphol</td>
<td>44,500</td>
<td>470,800</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>Madrid</td>
<td>42,600</td>
<td>342,601</td>
<td>6</td>
</tr>
<tr>
<td>23</td>
<td>Milan Linate</td>
<td>36,800</td>
<td>112,804</td>
<td>33</td>
</tr>
<tr>
<td>24</td>
<td>Stuttgart</td>
<td>35,000</td>
<td>124,452</td>
<td>28</td>
</tr>
<tr>
<td>25</td>
<td>Berlin Schonefeld</td>
<td>34,600</td>
<td>70,324</td>
<td>48</td>
</tr>
<tr>
<td>26</td>
<td>Milan Malpensa</td>
<td>32,800</td>
<td>166,509</td>
<td>23</td>
</tr>
<tr>
<td>27</td>
<td>Budapest</td>
<td>31,700</td>
<td>96,705</td>
<td>37</td>
</tr>
<tr>
<td>28</td>
<td>Geneva</td>
<td>32,600</td>
<td>131,669</td>
<td>26</td>
</tr>
<tr>
<td>29</td>
<td>Helsinki Vantaa</td>
<td>23,400</td>
<td>86,297</td>
<td>42</td>
</tr>
<tr>
<td>30</td>
<td>Bologna</td>
<td>21,300</td>
<td>65,471</td>
<td>53</td>
</tr>
</tbody>
</table>

This shows the size of the noise problem at Heathrow is double the nearest airport and is many times the size of the problem across the rest of Europe. This is due to the size of the airport and the geographic location on the edge of an incredibly densely populated urban centre.
7.1 International Airports

The UK mitigation offer is relatively poor compared to international airports. At Heathrow, the level of exposure at which affected persons are able to apply for compensation under the day noise scheme is the 69dB $L_{Aeq16hr}$ footprint, and for the night noise scheme the footprint covers those overflown by the noisiest aircraft regularly operating between 11.30pm–6.00am.

In Europe, compensation schemes also often cover a wider area around the airport than occurs in the UK. In France, compensation arrangements are governed by ACNUSA (the independent Airport Pollution Control Authority), which establishes a compensatory regime out to the 55Lden footprint. All of Spain’s major airports have compensation arrangements within the 60Lday and Levening, and/or 50dB(A) LNIGHT, footprints.

**Frankfurt Airport**

Residents surrounding Frankfurt Airport are entitled to the statutory reimbursement for the cost of noise insulation for residents who occupied the building before 13th October 2011. Buildings located within both the 55 and 60dB LAeq contours are eligible for improvements.

**Sydney Airport**

To be eligible, residential buildings needed to be located within the 30 ANEI (Australian Noise Exposure Index) and above noise contours. This is equivalent to approximately 63dB $L_{Aeq16hr}$. The total programme cost approximately A$400m and was funded through an aviation noise levy. The program resulted in 94% of brick houses achieving a noise reduction greater than 34 dB (A).

**US Approach**

In the US, schemes typically insulate dwellings down to noise exposure levels of 65 DNL (equivalent to approximately 63dB $L_{Aeq16hr}$), and cover a greater percentage of the costs. Chicago O’Hare’s Residential Sound Insulation Programme (RSIP) is the largest of its kind in the country, insulating to date around 8000 homes at a cost of $270 million.

In the US, airports may purchase properties in areas that are severely impacted by noise near to an airport. US airports have the right to acquire private properties for public use (i.e. the power of eminent domain) however, the appropriate compensation must be issued (FAA, 2021).

Further, the US Neighbourhood Environmental Survey (2021) indicates 400% increase in acknowledged noise sensitivity which has led to the creation of a Quieter Skies Caucus in the US Congress opposed to the process of airspace modernisation.

8. AIRSPACE MODERNISATION

It is not clear how the Airspace Modernisation Strategy (AMS) will achieve the goal of government policy to “limit and, where possible, reduce the number of people in the UK significantly affected by adverse impacts from aircraft noise.” There has been no baseline set of the total number of people currently adversely affected by noise, nor any estimation of how the strategy will ensure this number is reduced.

The strategy does not set out any principles or targets for how noise emissions should be reduced. As the CAA recognises, the AMS may facilitate additional growth in flight numbers. It is
not clear how noise reductions can be achieved alongside such increases. The desire to enhance the capacity of the airspace means that any possible reductions in noise may well be wiped out by the increase in traffic.

Rather than aiming for the AMS to deliver reductions in average noise level per flight, the focus should be on the optimisation of flight paths to reduce noise impacts, particularly for those communities already adversely impacted.

The DfT framework for assessing airspace changes – and indeed major infrastructure projects such as Heathrow expansion - is based on a cost benefit analysis model called Transport Appraisal Guidance (TAG). This can only be as good as its inputs – in particular the DfT’s thresholds and values attributable to proposed changes.

Notwithstanding that the cost benefit model used to assess the impact of change, SoNA (2014) was produced on the basis of static assumptions. It did not address the impact of high rates of change to the noise environment - the very thing it needed to assess in the context of an airspace change. It is widely recognised in various studies that change is critical to understanding public sensitivity and health and wellbeing impacts of aviation. The impact of airspace change is particularly significant, especially as SoNA seemed to show that a ‘change’ scenario can increase sensitivity to noise by 6-9 dB LAeq.

Clarification is required of how the assessment of health impacts is factored into Airspace Change Proposals (ACP), for example, what impact the creation of a respite route could have in terms of reducing the total adverse health of the ACP. In particular, communities are concerned about the physical and mental health impact of concentrated flight paths on overflown communities. We suggest that a robust assessment should be undertaken, including engagement with stakeholders on the terms of reference, to fully understand the range of impacts of concentration.

It is disappointing to see no mention at all made in the AMS of the impact of aircraft noise on mental health. Aircraft noise has a particularly negative impact on those people with serious mental health illness (SMI).

Nobody has identified a way of satisfactorily introducing Performance Based Navigation (PBN) over high density populations (e.g. the US experience). Before any airspace change decisions are made, Heathrow needs to find and demonstrate with successful trials, acceptable solutions to introducing PBN over dense populations.

9. FUTURE TECHNOLOGY

Technological improvements, fleet renewal and increased operational efficiency have been able to partially counterbalance the impact of recent growth, but there has still been an increase in overall noise and emissions since 2014.

2019 analysis on noise forecasts from the CAA (CAP 1731) anticipates that by 2050 the geographical area exposed to noise around all UK airports may shrink, but that the total number of people exposed to aircraft noise will increase.

Flights at Heathrow have also tended to become more concentrated over the last decade or so, both on landing and departure. These days it tends to be the sheer volume of aircraft passing overhead which most disturbs people – not something that can be solved by a slightly quieter aircraft.
The Sustainable Aviation Noise roadmap reveals that any further improvement delivered by UK aerospace manufacturing will be incremental. The report estimates (based on historical trends) that the rate of noise reduction will be around 0.1 decibels per annum.

Thus, technological improvements will only produce a 1dB decrease in noise over the next 10 years, which is insufficient to reduce the harm imposed upon local communities. This means that operational restrictions or improved procedures, such as better departure and arrivals and dispersal of flights, will be needed to actually deliver any reduction in noise.

10. CONCLUSIONS

1. Time for a proper debate about the economic, environmental, health and social impacts aviation noise has on overflown communities.

2. As strongly recommended in WHO guidance, it is evident the UK’s LOAEL and ‘annoyance’ thresholds for aviation need to be lowered and factored into cost benefit analysis and wider appraisal methodologies.

3. All Governments should commit to developing specific long-term targets to protect the public from the health impacts of aircraft noise.

4. The implications of the health impacts of concentrated flight paths on overflown communities remain unknown. The experience to date shows a huge amount of disruption and increasing numbers of noise events. It is not clear how Governments propose to assess and address this issue.

5. Creating a more robust mechanism for assessing and translating academic evidence into policy.

6. Governments are insufficiently proactive in commissioning research to fill evidence gaps or to improve data quality. Communities around the world would like to see a more active strategy, where the gaps are identified and work commissioned work to address them.

7. Adoption of a more precautionary approach should be taken when there is emerging evidence of harm, but insufficient firm research to make definitive policy decisions.

11. REFERENCES


CAA (1985) Attitude of Noise Index Survey (ANIS).
https://publicapps.caa.co.uk/docs/33/ERCD%208402.PDF

https://publicapps.caa.co.uk/docs/33/CAP1731AviationStrategyNoiseForecastandAnalyses_v2.pdf

CAA (2019) Environmental Research and Consultancy Department Heathrow Airport 2018 Summer Noise Contours and Noise Action Plan Contours, ERCD REPORT 1901