Survey of Noise Attitudes 2014: Aircraft
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Background

- Obtain new and updated evidence on attitudes to aviation noise around airports in England, including the effects of aviation noise on annoyance, wellbeing and health.
- Obtain new and updated evidence on what influences attitudes to aviation noise, and how attitudes vary, particularly how attitudes vary with $L_{Aeq}$, but also other non-acoustic factors that may influence attitudes, such as location and time of day, and socio economic group of respondents.
- Examine whether the currently used measure of annoyance, $L_{Aeq}$, is the appropriate measure of annoyance for measuring the impact on people living around major airports.
- Consider the appropriateness of the policy threshold for significant community annoyance from aviation noise.
- Provide baseline results that can be used for a programme of regular surveys of attitudes to aviation noise.
Survey of Noise Attitudes (SoNA) 2014

- Continuation of previous surveys undertaken by Defra, but with the variable section of the survey on civil aircraft noise.
- Target of 2,000 face to face interviews
- Survey questionnaire, comprised of five sections:
  1. A general section
  2. An optional Road Traffic Noise section
  3. An optional Neighbourhood Noise section
  4. A Civil Aircraft Noise section
  5. A health section
- Two questions on noise annoyance that sought responses on a 5-point scale and an 11-point scale, recommended by ICBEN and ISO respectively, which allow direct comparison with the 2007 ANASE study
Survey design (1)

- Fieldwork was conducted between 5 October 2014 and 8 February 2015.
- Respondents selected at random, across 9 airports, according to the populations around the sample airports.
- All eligible households were located within the pre-defined noise exposure areas, with a minimum noise threshold being set at 51dB LAeq16h, in order to ensure that estimated noise exposure information remained reliable.
- Noise exposure was estimated for each respondent’s postcode location for the following noise indicators:
  - Average summer day LAeq16h, N70 and N65
  - Average annual 24hr Lden
Survey design (2)

- To account for changes in runway direction, LAeq16h noise data was also considered over different averaging periods as well as the summer average:
  - 100% westerly-mode
  - 100% easterly-mode
  - 7 day average modal-split prior to interview
  - 30 day average modal-split prior to interview
  - The highest noise level from either the 100% westerly or 100% easterly modes
Distribution of noise exposure

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

<table>
<thead>
<tr>
<th>Noise exposure variable</th>
<th>BHX</th>
<th>EMA</th>
<th>LGW</th>
<th>LHR</th>
<th>LCY</th>
<th>LTN</th>
<th>MAN</th>
<th>NCL</th>
<th>STN</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average summer day $L_{Aeq,16h}$ (dB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48-50.9</td>
<td>2</td>
<td>1</td>
<td>74</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>51-53.9</td>
<td>28</td>
<td>1</td>
<td>15</td>
<td>644</td>
<td>3</td>
<td>63</td>
<td>86</td>
<td>3</td>
<td>5</td>
<td>792</td>
</tr>
<tr>
<td>54-56.9</td>
<td>34</td>
<td>2</td>
<td>15</td>
<td>360</td>
<td>63</td>
<td>5</td>
<td>36</td>
<td>3</td>
<td>3</td>
<td>515</td>
</tr>
<tr>
<td>57-59.9</td>
<td>20</td>
<td>3</td>
<td>178</td>
<td>16</td>
<td>6</td>
<td>34</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>261</td>
</tr>
<tr>
<td>60-62.9</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>103</td>
<td>6</td>
<td>1</td>
<td>8</td>
<td></td>
<td></td>
<td>129</td>
</tr>
<tr>
<td>≥63</td>
<td>1</td>
<td></td>
<td></td>
<td>61</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>71</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>90</td>
<td>5</td>
<td>31</td>
<td>1,419</td>
<td>93</td>
<td>21</td>
<td>168</td>
<td>8</td>
<td>12</td>
<td>1,847</td>
</tr>
</tbody>
</table>
Distribution of respondents around Heathrow

Taken from Ipsos-MORI Survey Technical Report
Is $L_{Aeq,16h}$ still the most appropriate indicator to use to estimate the annoyance arising from aircraft noise?

- Mean annoyance score correlated well with average summer day noise exposure, $L_{Aeq,16h}$
- There was no evidence found to suggest that any of the other indicators $L_{den}$, N70 or N65 correlated better with annoyance than $L_{Aeq,16h}$. 
Correlation with annoyance

Average summer day $L_{Aeq,16h}$ (dB)

Average summer day number of noise events $\geq 65 \, dB \, L_{Amax}$
Is summer day, average mode, still the best time period to use as opposed to single-mode?

- Evidence was found indicating that easterly-mode noise exposure correlated best with mean annoyance score, however, westerly-mode noise exposure was found to have the poorest correlation.
- This occurs because respondents were found to be more annoyed by easterly-mode noise exposure compared to westerly-mode for a given noise level. Practically, this means that single-mode contours are unsuitable for decision making, but that they may be helpful for portraying exposure and changes to exposure.
- Of the average-day modes, the existing 92 day summer average mode was found to correlate better than shorter average modes.
- There was therefore no evidence found to support a change from the current practice of basing LAeq16h on an average summer day.
Mean annoyance score for easterly & westerly noise exposure

- Differing attitudes between respondents exposed to solely easterly or westerly mode noise
How does annoyance relate to exposure?

- Mean annoyance score and the likelihood of being highly annoyed were found to increase with increasing noise exposure ($L_{Aeq,16h}$). The relationship found was close to linear, though annoyance levels plateau at low exposure and do not reach zero annoyance.

![Graph showing mean annoyance score and % highly annoyed vs average summer day $L_{Aeq,16h}$ (dB)]
How do the results compare with ANIS, ANASE & Miedema?

- For a given noise exposure, a higher proportion of respondents was found to be highly annoyed than compared with ANIS:

<table>
<thead>
<tr>
<th>Average summer day noise exposure, $L_{A_{eq,16h}}$ (dB)</th>
<th>% Highly annoyed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANIS 1982</td>
</tr>
<tr>
<td>51</td>
<td>3%</td>
</tr>
<tr>
<td>54</td>
<td>5%</td>
</tr>
<tr>
<td>57</td>
<td>9%</td>
</tr>
<tr>
<td>60</td>
<td>14%</td>
</tr>
<tr>
<td>63</td>
<td>23%</td>
</tr>
<tr>
<td>66</td>
<td>34%</td>
</tr>
<tr>
<td>69</td>
<td>48%</td>
</tr>
</tbody>
</table>

- Annoyance scores were found to be comparable with those found for the ANASE restricted sites, but lower than found by the full ANASE study, and higher than found by ANIS.

- For a given noise exposure, a lower proportion of respondents was found to be highly annoyed than compared with ANASE, the results of which were considered unreliable.
How do the results compare with ANIS, ANASE & Miedema?

- Comparison of % highly annoyed for SoNA, ANIS, ANASE and EU (Miedema)
How do measures of health and well-being relate to exposure?

- Noise exposure and reported annoyance were compared against self-reported health rating (5 point scale) and the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS), a measure of well-being.

- Poorer health ratings and lower SWEMWBS scores were found to be associated with annoyance, but not with noise exposure.
What non-acoustical factors seem to influence annoyance?

- The following factors were found to have a statistically significant effect on annoyance:
  - Noise sensitivity
  - Approximated social grade
  - Expectations – prior to moving to the area and in the future
- These factors can substantially alter the relationship between noise exposure and annoyance.
- Urban/rural classification may be a non-acoustic factor, however, this was confounded by approximated social grade and the presence of double-glazing.
Questions?