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Response to Davies Commission Discussion paper on Airport Noise

1 Introduction

This document sets out the authors'[1] response to questions raised by the Davies Commission Discussion Paper on Airport Noise. It responds principally to questions raised on issues surrounding the effects of aircraft noise on communities near airports.

Based on their extensive experience in the field of aircraft noise (see below), both authors believe that the Airports Commission is making the noise assessment of alternative options either too complicated – or not nearly complicated enough. Decisions between alternative options should be made firstly on the basis of relative cost-effectiveness alone, and only then should the subsequently calculated costs of mitigation and/or compensation be added in. Compensation should be as generous as required to achieve properly informed public acceptance, but no more. Our reasons for reaching this recommendation are summarised below;

- Current methods of noise assessment are mostly based on large scale cross-sectional exposure-response surveys which do not provide a reliable basis for predicting community annoyance and other effects for future development. The current reliance on the 57 LAeq contour to define 'the onset of significant annoyance' is misplaced because it was derived from a long out-of-date survey, ANIS (published 1985) which was carried out in 1980 and 1982 using methods which no longer comply with current best practice. The next major study, ANASE, carried out in 2005/6 and published in 2007 was much better designed and executed and found significantly different exposure-response relationships. Recent research has shown the results of the ANASE study to be entirely consistent with similar research carried out around major European airports at around the same time. Criticism of the ANASE study by the CAA in 2007 has since been shown to be largely unfounded. However, while it might seem that on the basis of the available scientific evidence, the Airports Commission should adopt the findings of the ANASE study, it should be noted that all studies of this kind become increasingly out-of-date as we move into the future. In addition, none of these studies can be used to show how people might respond to new aircraft noise in new situations. The most important noise issue which should be considered by the Airports Commission is NOT how many people are either inside or outside of contours assumed to represent some threshold of significant annoyance. Instead, the Airports Commission should be addressing the question of mitigation and/or compensation for those that might be adversely affected by any new development. Current research using open-ended qualitative methods is showing that most people resident around airports do not find aircraft noise to be unacceptable within the overall balance of advantages and disadvantages of living where they do, particularly if they believe that reasonable mitigation or fair compensation has been applied, irrespective of whether they find aircraft noise to be annoying from time to time, or not.

- In addition, the Airports Commission need not be overly concerned with current efforts by aircraft manufacturers and operators to continue to reduce physical aircraft noise.

[1] Views expressed are those of the authors and do not necessarily represent the University of Southampton

Considerable progress has been made over the past 50 years, and the benefits apply to all airport development options. If there is a problem with engineering and operational control of aircraft noise it is that the public in general are not fully aware of the progress that has been made, and that past claims have not always been in accord with subjective perception. This latter point is important as it has led to a climate of mistrust from many members of the public towards those involved in aviation. This is a complex issue, but it can be resolved by improved communication between both sides. Airports and aircraft operators need to listen to residents instead of simply providing technical information which residents have little or no interest in and often appears counter-intuitive when they do start to understand some of it. Most people are not interested in aircraft noise as a technical subject and mistrust authorities when they are told 'facts' which are not consistent with their own subjective experience.

The authors have extensive experience in the field of aircraft noise. Dr Ian Flindell is a recognised authority on issues surrounding public response to aircraft noise. Dr Rod Self is the Manager of the Rolls-Royce University Technology Centre in Gas Turbine Noise and is an expert in the prediction of aircraft noise. We are aware of course that our opinions summarised above may appear to at least some extent, controversial, but we are also aware that to provide detailed justification would require many pages of text which the Airports Commission may not have the time to digest fully. However, we would be able to provide more detailed justification if the Airports Commission would find this helpful. For the remainder of our response, we have simply focussed on the questions put by the Airports Commission within the context of Discussion Paper 05. Please note that many of the questions put by the Airports Commission are a lot more complex than they seem and while in the interests of brevity we have attempted to keep our responses short, there is often considerably more that could be and perhaps should be, said.

2 How Does Noise Affect People?

People can respond in different ways to incident sound depending on their attitudes and sensitivities to the source of the sound and on the situation and context within which the sound is heard. Most sound is positive, such as sound conveying useful information about the environment, wanted speech, preferred or appreciated music, etc. Some sounds are unwanted (for any reason) and are then classified as noise. There are no measurement instruments which can tell the difference between sound and noise, this is simply according to the opinion of the person who hears or is disturbed or annoyed by a 'noise'. For example, sounds during the night may be classified as noise if they wake people up, or if people believe they have been woken up, but may otherwise be entirely neutral, or even helpful such as warning sounds. In many situations and for many types of sound, the physical magnitude of the sound is often much less important than the psychological and/or physiological orientation of the listener to that sound. This can be significant for noise control purposes where beliefs about the nature of the sound and its avoidability can be as, or more important, for subjective perception than actual physical sound levels. Adopting 'improved' or 'supplementary' noise metrics to describe different features of physical sound can sometimes be helpful for public understanding but is unlikely to improve the statistical relationship between exposure and response except perhaps in the limited and constrained circumstances of a particular research study, and in some situations simply causes additional confusion. Current metrics such as LAeq and Lden are not very good as proxies for human effects (even if human effects could be measured directly), but it is probably impossible to devise anything any better for the general case.

3 Measuring Aviation Noise

The report discusses a number of metrics that are currently in use and raises a number of questions:

What metrics or assessment methods would an appropriate 'scorecard' be based on?

This depends upon what aspect of the noise problem it is intended be captured and how the information thus acquired is to be used. Standard metrics such A-weighted sound levels and PNdB used for aircraft noise certification are fine for engineering and contractual purposes but are only correlated with human response if they happen to represent the particular features of the sound or noise which are significant in particular situations. Long time averaged metrics such as LAeq and Lden are also fine for engineering and administrative purposes providing it is recognised that they are generally poor proxies for annoyance or other human effects variables. For example, in many situations where the number of aircraft events is relatively more important than the sound levels of those events, as seems to be case around many airports under present-day conditions, the trading relationships between number and sound level implied by energy based metrics such as LAeq do not reflect public perceptions. If aircraft sound levels were much higher than today and there were many fewer of them, as was the situation 50 years ago, based on current evidence the trading relationship between number and sound level might be completely different.

Noise metrics form part of the overall debate and are used to communicate with the public. Recent research strongly suggests that the use of highly technical derived metrics is understood by only a small minority of the public and leads to frustration and exclusion of many individuals.

To what extent is it appropriate to use multiple metrics, and would there be any issues of contradiction if this were to occur?

Using multiple metrics to describe essentially the same thing in lots of different ways is not helpful. However, choosing the right metric to describe precisely the variable or feature which is important or significant in any particular case is useful. For example, there is little point in using long time averaged metrics such as LAeq or Lden to compare exposure with or without runway alternation at Heathrow because these metrics average out over both noise exposed and noise not-exposed periods of the day. Similarly these metrics are too blunt to show any significant variation due to, say, small differences in night-time restrictions. The metric should recognise the difference which the measure, such as runway alternation or night-time restrictions, is intended to provide. No contradiction arises if only the most appropriate metrics are used in any particular case.

Are there additional relevant metrics to those discussed in this chapter which the Commission should be aware of?

Yes! The authors have considered a number of averaging techniques for quantifying dosage and recommend that the commission explore these possibilities in the light of all the evidence they collect.

Reference has been made above to what we call "sensitivity". Some aspects affecting sensitivity to noise are included in current metric. For example, A-weighted metrics attempt to account for the inherent sensitivity of the human ear to different frequencies and Number-noise indices try to account for changes in sensitivity because of the varying

number of events. However, research suggests that that the issue is far more complicated. Our research suggests that people's sensitivity to noise also depends on issues such as:

1. Anticipation. Unexpected noise (e.g. such as during a respite period) can result in far higher sensitivity
2. Past history. Sensitivity to current noise varies depending on past experience of noise events
3. How the airport is viewed. Those individuals who have a positive view of the airport are likely to be less sensitive to noise.

Thus we would recommend that subsidiary metrics that quantify sensitivity be introduced and will further elaborate if requested. We believe that sensitivity is at least as important as dosage in determining annoyance. Such metrics would allow airports to develop appropriate policies for increasing public acceptability.

What baseline should any noise assessment be based on? Should an assessment be based on absolute noise levels, or on changes relative to the existing noise environment?

This depends on the precise objective of any assessment.

How should we characterise a noise environment currently unaffected by aircraft noise?

The authors suspect the Commission might be thinking about a threshold below which effects are assumed to be not significant. Choosing contour values to define `onset of significant annoyance' may have benefits in regulatory matters but is undesirable within the context of public engagement. Someone experiencing an increase in noise but who is outside the 57dB contour is unlikely to be assuaged when told they "do not suffer significant annoyance".

4 Quantifying Noise Effects

This chapter discusses how the impact of noise on communities and individuals should be assessed and how this can be monetised for cost benefit analysis. For the former a number of studies are cited including the Wilson report and the more recent ANASE study.

How could the methods described in this chapter be improved to better reflect noise impacts and effects?

In terms of assessing a baseline exposure level the authors would broadly follow the recommendations of the ANASE report. However, given what has been said above such baseline needs to be supplemented by sensitivity multipliers to account for local conditions. This requires further research.

Is monetising noise impacts and effects a sensible approach? If so, which monetisation methods described here hold the most credibility, or are most pertinent to noise and its various effects?

While there is some consistency in current research into noise monetisation, there is no consensus in terms of what the actual values should be. Indeed, it is becoming increasingly

apparent that perceived values vary in different situations, even for the same amount of noise. Hedonic price data is grossly unreliable in this area and while stated preference data is intrinsically more reliable, it is essentially hypothetical and might not reflect actual behaviour.

Monetisation of noise annoyance should be viewed as a cost associated with compensation for airport activities and this is discussed further below. The authors are broadly sceptical of derived valuations that seek to associate variations in property prices with variations in noise as such changes are likely to be far less when averaged than they are for any particular individual. We therefore recommend as simple and robust approach as possible.

Are there any specific thresholds that significantly alter the nature of noise assessment, e.g. a level or intermittency of noise beyond which the impact or effect significantly changes in nature?

For different individuals this is probably true, but when averaged across populations, because individual attitudes and sensitivities vary to such a large extent, no.

To what extent does introducing noise at a previously unaffected area represent more or less of an impact than increasing noise in already affected areas?

If the noise is measured only in terms of standard metrics such as LAeq, then of course the actual impacts are likely to be different. This is because standard metrics such as LAeq are actually very poor proxies for actual effects. However, if the noise was measured using metrics with much closer relationships to actual outcome effects, such as by taking into account individual attitudes and sensitivities (if known) then much better assessments would result.

5 Mitigation

The report discusses measures that those involved in the provision of aviation can employ to mitigate the impacts of noise.

To what extent is the use of a noise envelope approach appropriate, and which metrics could be used effectively in this regard?

In terms of regulation and target setting the use of envelopes based on appropriate metrics will continue to deliver a reduction in noise emissions per aircraft event and average exposure. Industry is broadly performing well in reducing noise at source. Whether a noise envelope approach is useful or not depends on exactly what is proposed, but any approach which fails to take into account the key input variables of most importance to public perception is very likely to fail.

To what extent should noise concentration and noise dispersal (as described in paragraph 5.17) be used in the UK? Where and how could these techniques be deployed most effectively?

There is no 'scientific' answer to this because it involves comparing noise exposures between different populations and is therefore essentially a question concerning social attitudes.

What constitutes best practice for noise compensation schemes abroad and how do these compare to current UK practice? What noise assessments could be effectively utilised when designing compensation arrangements?

Compensation is a highly individual matter and this is not a case of "one size fits all". Some individuals find aircraft noise extremely intrusive while many others are little concerned and view airports as beneficial. The majority of the population who use airports and benefit in other ways from civil aviation are unaffected by aircraft noise. It is far more important that affected individuals feel that they have been fairly treated than that any compensation scheme is consistent, or not, with compensation schemes in other countries or even at other airports. Consequently compensation schemes should be based on individual attitudes and opinions. In the simplest form this could take the form of offering to "buy-out" anyone who wished it. This is unlikely to be as expensive as may be imagined because only a small number of residents would take it up and there is then an asset that can be realised in exchange. Future research based on hypothetical trading experiments using stated preference methods can potentially provide a good indication of how different people might be likely to react in different future scenarios.

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