RESPONSE FROM ANDERSON ACOUSTICS LTD

DISCUSSION PAPER 05: AVIATION NOISE

AIRPORTS COMMISSION

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ANDERSON ACOUSTICS LTD RESPONSE TO AIRPORTS COMMISSION DISCUSSION PAPER 05: AVIATION NOISE

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1 INTRODUCTION

The Airports Commission was set up in September 2012 tasked with identifying and recommending to government options for maintaining the UK's status as an international hub for aviation. As part of the process the Airports Commission have published a number of discussion documents with Discussion Paper 05: Aviation Noise being published in July 2013. The paper aimed to provide a review of existing research and literature on aircraft noise and to open up a number of key issues for debate including measurement, assessment and abatement. The document requests views and evidence, and sets out a number of specific questions of interest.

The discussion paper requests submissions to assist the Commission in their consideration of the noise impacts of potential airport developments. This response is being submitted by **Anderson Acoustics Ltd.** We welcome the opportunity to contribute to the debate on the future of the UK aviation industry and help develop further understanding of aviation noise issues.

Anderson Acoustics is a conscious acoustics consultancy. Our goal is to make an active contribution to a sustainable future and improved quality of life. Since formation in 2006 the company has grown from 1to 18 employees and as such we are now one of the largest specialist acoustic consultancy practices in the UK.

We have specialist skills in many aspects of acoustics and are involved in some of the most significant infrastructure projects of the last decade (including Crossrail and Heathrow Airport). Within we have expertise in the strategic management of aviation noise, with our staff having many years of experience in developing aviation noise policy, optimising noise mitigation schemes, modelling aviation noise and assessing its effects.

The authors have around 50 years combined experience in aviation noise and sustainability. We currently provide specialist support to Heathrow Airport on strategic noise policy issues and we conducted all of the noise analysis for their submission to the Commission on options for Heathrow. Anderson Acoustics also positively contributes to further understanding of noise, its effects and control by constantly researching key issues.

Our contribution aims to add value to the Commission's work, by proposing new elements to be considered, supported by high quality research and academic views. We see this as an opportunity for innovation in the delivery of sustainable solutions to increase UK airport capacity and connectivity.

2 OVERVIEW

Overall we consider that the discussion paper presents the complexity of this issue in a balanced manner. As noise management consultants, we recognise that noise can have adverse effects on people and also acknowledge the complexity of the relationship between noise and its effects.

Corresponding to the section "How noise affects people", we consider that the effects of noise on health are influenced by many other factors in addition to noise exposure levels. We highlight in particular the complexity of human response to noise and it interdependencies with many non-acoustical factors, such as tolerance and habituation. In addition, we challenge the traditional concept of annoyance as a good way to understand noise effects and propose alternative views for explaining annoyance prevalence. Note should be taken of new hypothesis relating to future demographic implications of expanding airport capacity, based on the unquestionable role that airports have on the creation and development of the economy of an agglomeration.

Regarding the section "Measuring aviation noise", we consider that the Commission points to a significant number of metrics and that it ought to be possible to use these (plus a small number of others not presented) to objectively describe the noise impact of an airport and if used appropriately should be sufficient to establish policy. However, we consider that it is critical to use metrics that are fit for the purpose when using them as a basis for a Balance Score Card. We also raise the point that people have different preferences (based on different values, situations, and attitudes towards noise), which lead to different decisions. Comparing airport options in terms of pure population numbers does not account for non-acoustic modifiers to behaviours. We recognise that quality of life is not just about noise and so we urge the Commission to not place too much weight on simple approaches such as population within a contour.

For the section of "Quantifying noise effects", our main comments explore the current lack of consensus, which seems to be the rule and not the exception, among the academics when defining the existence of a link between noise and impacts, its quantification and monetisation. New research has found that are still significant uncertainties in dose-response relationships and no agreement in the literature on thresholds levels, especially for cardiovascular disease. The current evidence base would suggest that in context the impact of aviation is insignificant when considered relative to the impacts of road schemes and the day-to-day risks we all face in life.

Concerning monetisation of noise effects, we advise that gaps in the evidence base and uncertainties associated with the quantification of health noise effects prevent a reliable single monetisation methodology. Since there is a lack of consensus on thresholds and relationships we advise that current monetisation methods are unreliable. Also, we believe that the limitations of the hedonic pricing approach reveal it as an inherently unreliable technique. We also advise that since the value of noise (or quiet) varies between people, locations, situations and circumstances a single formulaic approach, such as Webtag, is not appropriate.

We advocate 'precautionary and responsible principles' as guides for airport mitigation and compensation. Whilst there is uncertainty about the precise relationships there is sufficient evidence to suggest that there are links of some description. This should serve to drive inclusion of the noise externality into an airports cost, by fair and generous mitigation and compensation schemes (eg protection for schools from impairment of cognitive development). Mitigation should not be seen as an add-on but as a fundamental cost of aviation business operations.

We have also included as an Appendix a review of these issues from a US perspective commissioned from one of our US partners.

Whilst not a strictly noise related issue, we would like to make one additional comment. The commission must consider that it is not the airports that drive demand and the market but the airlines. If the airlines don't want to fly somewhere then they won't, if they don't want to grow at an airport they won't whilst there is a reasonably close alternative such as those already offered in other parts of Europe. Regardless of the solution it is the airlines that will drive its success. That is largely why today Stansted, despite many attempts, has been unable to grow as a truly international airport even though it clearly is in a good location when considering local community impact.

Overall, we support policy objectives that aim to share benefits between local communities and the airport community and we look to support and be part of key further research.

3 HOW DOES NOISE AFFECT PEOPLE

General Comment

We consider that the noise effects analysis in the consultation document underplays the complexity of the relationships, links and pathways and requires a more comprehensive view, with additional understanding of the multiple interactions with other factors besides the pure acoustical ones.

Human response to noise is complex, research has shown the influence of non-acoustical factors, exposure response modifiers and confounding factors leading to significant variability of response between individuals. Babisch (Babisch W., 2012) identified amongst other things that physical characteristics of housing, use of noise reducing remedies and coping habits were found as significant modifiers for the effects of noise on hypertension and annoyance. The perception that people can do little about noise increases annoyance.

There is agreement that non- acoustical factors play a critical role to determine annoyance. Personal, attitudinal and situational factors and noise exposure levels influence the response to noise. According to results of COSMA Project (Community Oriented Solutions to Minimise Aircraft Noise Annoyance), acoustical parameters explain just 20% of the variance in annoyance judgments.

The role of habituation in sleep disturbance is fundamental. According to research (London Health Commission, 2003) people are generally good at adapting to nocturnal noise and unfamiliar noises are far more likely to disturb sleep than familiar, regular patterns of noise. Domestic and idiosyncratic factors have much greater effects than aircraft noise events (JA Horne, 1994).

Key point I: The effects of noise on health are influenced by many other factors, in addition to noise exposure levels.

As stated in the National Physical Laboratory Report (B Berry, I Flindell & N Porter, 1998) *"the general link between an effect and its impact on health is even more complex, and depends on many aspects including how one effect can modify another, the role of other modifiers and confounding variables, the number of effects, cumulative noise exposures, the susceptibility of individuals and the risk factors associated with multi-origin health conditions."*

To this end, academics have proposed different models that represent the complexity of the multiple interrelations within noise, effects and non-acoustical factors.

Below we have presented two alternative models. Firstly, in the National Physical Laboratory Report (B Berry, I Flindell & N Porter, 1998) refer to Dr. Job' "Causal Connections" model clearly indicates there are many links and potential feedback paths.

Also, ERCD report (K Jones, 2013) uses Babisch "Reaction model" to explain the effects of noise in the body. According to Babisch, noise either directly or indirectly affects the autonomous nervous system and endocrine system, which in turns affects the physiological balance of the body and increase the risk of manifest disorders in the lung run. *"Indirect in this respect, means that the subjective perception of sound, it's cognitive interpretations and the available coping abilities play a role in physiological reaction. Direct, on the other hand, means that the activation of the regulatory system is determined by direct interaction of the acoustic nerve with other parts of the central nervous system".*

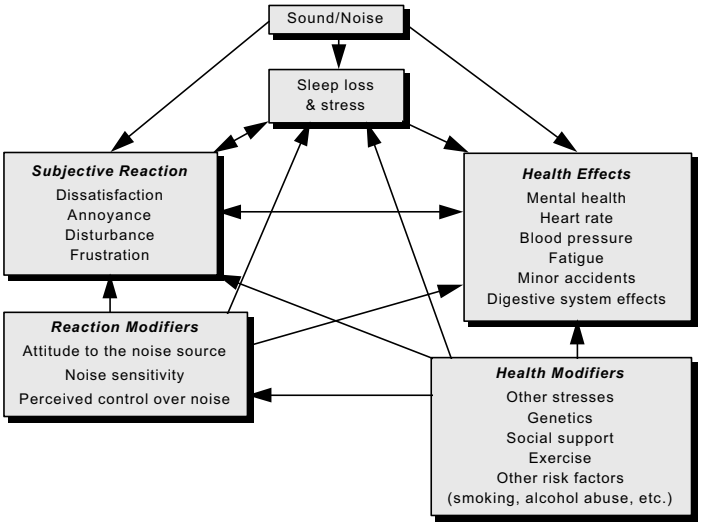

Figure 1. A model of the causal connections between noise, community reaction, modifiers and health effect. From NPL Report CMAM 16.

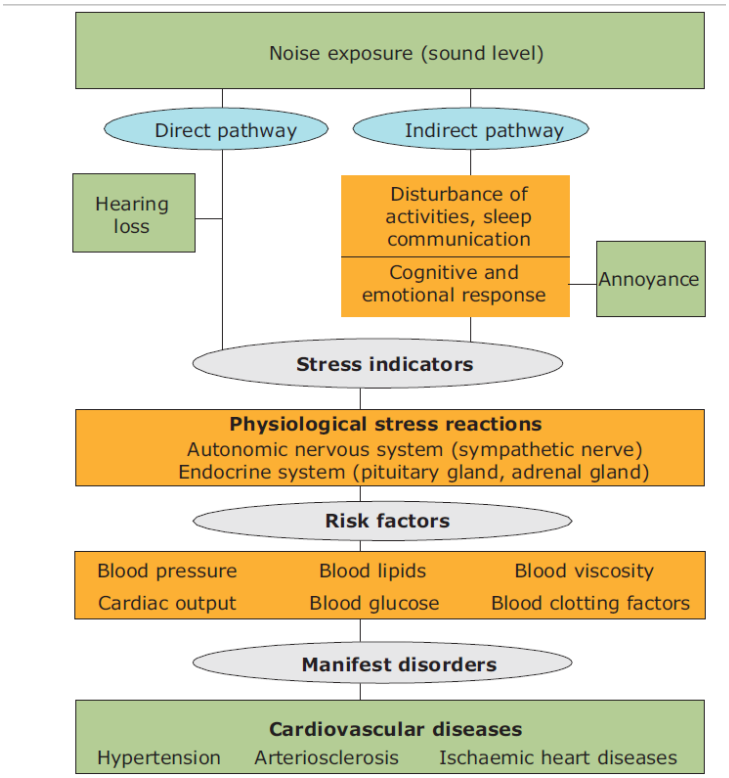

Figure 2. Babisch Reaction Model. (taken from ERCD 1208 Report).

As stated above, the extent of annoyance is influenced by a number of non-acoustic factors such as personal, attitudinal and situational factors in addition to noise exposure levels. Therefore, as annoyance feeds into the health effects pathway (e.g. into cognitive and emotional response), effects of noise on health are also influenced by annoyance and those non-acoustical factors.

Tolerance is one of the main factors that determine the level of annoyance. US academics (S Fidell, 2011) had pointed out that annoyance (in terms of %HA and prevalence rates) are well accounted by tolerance, which is being measured by single free parameter: the Community Tolerance Level (CTL). Comment below brings a deeper analysis of this approach and its implications.

Recommendation

Due to the complexity of how noise affects people, we suggest that the Commission considers all available models that represent the multiple interrelations between acoustical and non-acoustical factors and potential impacts and develop a clear model from which to work. Also, we encourage the Commission to support research for further understanding of the implications that non-acoustical factors such as habituation, tolerance and exposure modifiers have on people's responses.

Key point II: Is annoyance a good way to understand and measure noise effects?

Exposure-response annoyance curves indicate that higher noise levels increase the proportion of people annoyed within a given circumstance (the relationship will vary as all communities respond differently and that the response around Heathrow is likely to be very different to that around Stansted). It would therefore be a reasonable hypothesis that as noise levels increase closer to an airport there would be higher rates of annoyance which in turn you would intuitively expect an increase in the number of complainants and therefore complaints.

The authors' experience of Heathrow's noise complaints data indicates that this is not the case. Total numbers of complaints are distorted by a small number of individuals who register significant complaints. If it is considered that a person who complains once is just as important as someone who complains multiple times and plots of complainants are undertaken using GIS it is clear that the vast majority of complainants (note a complainant is an individual who may complain 1 or multiple times) are from neighbourhoods such as Richmond, Fulham, Putney rather than equally densely populated areas such as Hounslow where noise levels are significantly higher. This result must mean that there are additional non-acoustic factors involved in the response and would suggest that tolerance plays a significant role.

Whilst we are unable to present evidence, anecdotally the hypothesis here could be that people living in the areas of Hounslow have a higher degree of tolerance to the airport because they recognise the benefits that is brings (economic, social, community), there is often a direct association to the airport and therefore they consider there to be a reasonable provided Heathrow is seen to make a fair contribution (paying its social cost). This is the fundamental basis for the concept of tolerance. This could suggest that the location and number of complainants may be an indicator of community tolerance (or lack thereof) rather than annoyance. However, we would consider that just because people are more tolerant does not mean that they should not be protected.

In addition, looking at the analysis prepared by the Interdepartmental Group on cost and benefits noise subject group, their first report (IGCB(N), 2008) suggests that the different sources provide evidence of increased sensitivity to noise. While noise has not increased significantly, complaints have increased. For example, the National Attitudes Survey done by DEFRA in 2000, illustrate that while between 1990 -2000 there was a increase of the population reporting hearing noise, the noise levels indicators had fallen.

In our experience as noise management consultants, we consider that options for mitigating the extent of the effects of noise should not just be limited to reducing noise levels (on the basis that this will reduce the number of people annoyed) but to also work on developing methods to increase community tolerance. This will require developing a comprehensive understanding on the impacts of airports on society, bringing together the positive and negative effects, sharing information adequately, transparently and in a balanced fashion (without overstating positives and negative effects), and considering real people's preferences that guide decision making (e.g. buying a house near an airport, acknowledging the existence of it).

There have already been valuable efforts to research and enhance the understanding of the prevalence of annoyance from transportation and specifically aircraft noise including proposals for using alternative metrics that include non-acoustical factors.

We would draw the Commissions attention to the work done by Sanford Fidell on Community Tolerance Level (CTL) should be included in the Commission's review. In his paper Fidell has shown that the rate of growth of the annoyance with noise exposure (as reported in attitudinal surveys of aircraft noise annoyance) is similar to the exponential rate of change of loudness with sound level (S Fidell, 2011). Also he demonstrated that the proportion of %HA and the variability in annoyance prevalence rates in communities are well accounted for by a community tolerance level (CTL). CTL values appear to be related to airport type, economical factors such as median housing values and annual household incomes and are little influenced by airport size per se. (S Fidell, V Maestre, B Berry, et al, 2011).

Recommendation

We suggest that the Commission takes note of drivers of community tolerance in understanding the extent of the effects of noise.

Key point III: Airports are a motor that drives the economy of an agglomeration. Any option for increasing airport capacity will attract people into the area. The Commission's analysis should consider future demographic implications in the longer term as a result of expanding airport capacity.

Airports have become a crucial factor that drives an agglomeration's economy. According to European Union (ESPON Programme) "*Global economic functions tend to cluster on specific locations in urban agglomerations*" and *"city centres and airport areas are the most dynamic and global interlinked places of cities"*. In fact, the EU is funding a project on airports as drivers of economic success in peripheral regions in Europe. (ESPON- ADES Project)

Prosperous areas attract people; populations living near airport areas have increased in the last 10 years. Hounslow area registered an increase of 17.6% in the number of residents from 2001 to 2011, and was the fifth largest growth nationally. This is a result of the agglomeration process (based on economies of scale) created by major hubs. According to Krugman's economic geography theory, the introduction of an economic activity of that type (that requires generation of mixed services, transport links, proximity, and specialized hand labour) generates, inherently, demographic mobility towards the area (Krugman, 1996).

We should not forget that London's airport was moved to Heathrow from Croydon because it was in a less densely populated area. Population has moved towards the airport as the economy of London has grown and Heathrow Airport has fed the local economy.

Recommendation

The Commission should consider the long-term future demographic implications of expanding airport capacity when assessing hub options. There may well be a low population at the current time, but the population will move towards the airport in search of the economic and social benefits that the airport will bring.

4 MEASURING AVIATION NOISE

General comment

Reading the discussion paper it is clear that there are already a significant number of metrics already available that could be used to describe the noise impact of an airport and there is perhaps an argument to say that no more are needed. The metrics available today, if used appropriately, should be sufficient to establish policy and understand relationships between noise and its effects. It may be the case that some causal relationships have not yet been defined because of use of the wrong metric. However, it is for research organisations to determine the appropriateness of metrics and causal relationships.

The problem as we see it is one of understanding. The plethora of complex metrics only serves to confuse the local community. So we would see that there are a number of purposes for metrics and where the local community is concerned alternative metrics or a collection of metrics are required to explain the impact of airports to them. For example, an annual noise contour is a long- term average, which very few people understand, cannot relate to and does not reflect the on the day experience. Whereas concepts such as "Time Above" (TA), "Number of events above XX" (Nxx) or "short term (perhaps single on the day) contours" are much more straightforward to communicate and for the others to understand.

Key point IV: Balanced Scorecard based on metrics that fits purpose

Given the wide range of metrics available we would agree that there is some merit in a "balanced scorecard" of measures for noise or indeed noise impact. However, given the range of metrics, it is important that any metrics used are:

- Fit for purpose (i.e. the metric reflects the purpose for which it has been selected),
- Reflect the experiences of the local community,
- Be simple to understand,
- Enable some context (perhaps comparing noise from other sources); and
- Enable comparability across airports.

A scorecard needs to consider the best choice of comparisons against assessment criteria.

We see value in all the metrics introduced in the discussion paper though we would urge the commission to consider the point about being fit for purpose. We also recommend that the use of shorter term measures are considered in addition to the longer-term averages usually adopted for analysis. Details of these are including in the recent Anderson Acoustics paper (N Porter and A Knowles, The role of noise contours in communicating aircraft noise exposure, IOA Spring Conference 2013).

We have not provided a review of the metrics as we consider that the Commission's appointed experts will already be aware of the benefits and limitations of each and from time to time in this document we refer to some of these.

Metrics should not just be about defining the number of people annoyed but should also provide a broad understanding of the environment that is to be created and how it will affect the individual – breaking this down to a post code level may be helpful, but no more so than a grid type approach.

In our opinion it was wrong for noise to be a critical factor in withdrawing support of the previous 3rd runway proposals at Heathrow since this was largely based on population within long-term average noise contours. Whilst remaining important, regardless of which option is selected in the future, we would caution against placing so much weight on population numbers from long term average noise contours. Quality of life is about much more than aircraft noise and if the research is clear on anything it is just that. Rather than withdrawing completely, the Airport should have been asked to provide greater clarity and consideration of the social cost of its proposals and how, through working with all stakeholders (including the local community), it intended to address these such that benefits would be shared by all.

In regards to alternative metrics, the Community Tolerance Index (CTL) (referred in Key Point II) is also a metric worth consideration. Work in the US by Sandy Fidell in 2011 has looked at how CTL can be used to predict the prevalence of aircraft noise annoyance from a tolerance perspective.

Recommendation

We suggest that the Commission should use a balanced scorecard, based on relevant noise metrics and operational information (number of flights, number of events above XX dB) comparisons. No new metrics are required at this time, although consideration could be given to using shorter-term metrics tailored to specific purposes and those that can help inform on community tolerance.

The key, as we see it, is that in isolation the metrics available are insufficient but when combined should be sufficient to provide a balanced view of what is happening.

Key point V: It is essential to consider the existing environment. There should be a greater value placed on introducing new aircraft noise into quiet rural areas that do not currently experience it.

As noise consultants we would always consider existing ambient and/or background environment as part of an impact assessment whether an air handling unit or major infrastructure development. Most Codes of Practice would include relativity as an important consideration (eg BS5228 Code of Practice for the control of noise from construction sites).

The existing environment is critical for a number of reasons. The first is that significance of impact is determined by level itself (where exposure-response relationships exist), the degree of change that it brings to the existing and the difference. Second, the value of noise is different is different between different locations, circumstances and individuals. In an urban area there is less value placed on noise, whereas in a rural environment there would be a significant value placed on "quiet". Therefore we think there should be greater weight placed on noise being introduced into rural quiet areas (of which there are none in London). The impact on those in a quiet area is likely to be more significant than those in an already noisy urban area and although there are fewer people in rural areas these would all be newly impacted. Furthermore, quiet, or lack of noise, generally forms a large part of the decision and choice to live in a rural location. A small number of people currently living in rural quiet is at least as important as a larger number of people currently who have made a choice to live with urban noise.

Impact assessment can be conducted in accordance with three comparisons as set out in the Draft BS9142: Assessment methods for environmental noise — Guide. These are a comparison against absolute criteria (eg health thresholds, sleep disturbance, conversation/TV interruption), change in specific noise level and comparison against a residual noise level. We agree with these general principles and endorse such an approach.

Key point VI: Critical consideration of Adaptation/Habituation into current metrics

Tolerance and the ability of human beings to adapt are important considerations. The clinical significance of longer-term health outcomes is related to the body's ability to adapt to a stimulus. It is also important to consider future population migration. It is well known that people move to areas where there is a strong economy so where there may well be a small number of people currently, population will move towards airports and this should also be considered in any future assessments and not be restricted to current population exposures.

Also, whatever decision is made there will be a short-term outcry and then people will get used to it and carry on. Provided communities feel that the benefits outweigh the negatives and that the airport is "doing the right thing" in terms of recognising social cost and delivering appropriate mitigation and compensation schemes the vast majority of people will not be opposed to airport growth.

Key point VII: People have different preferences (based on different values, situations, and attitudes towards noise), which lead to different decisions. Comparing airport options in terms of population affected does not account for these modifiers.

People value noise in different areas differently. When people make choices regarding living in one area or another, noise is only one factor in an individual's choice and sometimes it is not significant consideration. Comparing people affected across airports will "homogenize" the experience and the "value" that people puts on noise. Not all those who live within a contour feel "annoyed" or affected".

Studies have shown, that most residents accept the overall balance of advantages and disadvantages of where they live and aircraft noise plays only a small and mostly unimportant part in this balance (assuming that aircraft noise is not already present). While most residents can nevertheless be annoyed or disturbed from time to time, this need not affect acceptability providing that the residents have a good understanding and trust that the 'authorities' are behaving fairly.

The value of tranquillity, as well as the value of noise (and many other externalities with no "pound" value) depends on preferences of the specific community who experience quiet or noise. We have argued above that the value of noise or quiet will vary significantly from one place to another. Those in a rural area will likely place greater value on quiet than those in an urban area will place on having less or even no aircraft noise. We believe that there is currently insufficient evidence to suggest what the difference in value would be but it would be highly unreliable to apply the same "value" model to different areas.

As stated above, we believe that people in rural communities will place significant value on the quiet that they currently have and that this would be probably be greater than the value people in urban areas would place on removing some of the noise that they experience. We therefore, as argued above, consider that greater value and weight should be applied to new noise in quiet rural areas than some additional in a noise urban area and therefore that existing ambient and background conditions are taken into consideration (this may involve a significant baseline noise exercise to establish in the key areas what the existing conditions are like – as would be expected in any environmental impact assessment).

<u>Recommendation</u>

We recommend the Commission to set up an expert panel, which represents the interest of all stakeholders, to review the value of noise or quiet in different areas. However, given the degree of uncertainty and lack on consensus at this current time, the timescales for this may not be in the Commission's favour. But we think it is essential that this is undertaken to ensure that a robust value methodology can be used to assess options.

5 QUANTIFYING NOISE EFFECTS

5.1 How noise is assessed

Key point VIII: New research has found that there are still significant uncertainties in dose-response relationships and no agreement in the literature on thresholds levels.

Cardiovascular diseases

The scientific evidence for exposure - response relationships that would provide the basis to derive a threshold is inconclusive or lacking for most of health outcomes.

Further analysis of studies suggests "inconsistencies" between conclusions. Babisch's chapter in the WHO Report (WHO, 2012) about dose-response relationships for cardiovascular disease highlights the difficulties of setting unique cut-off levels of risk. In Babisch's words "*since the pooled effect estimate (data from HYENA study) is based on different studies with different noise level ranges, no clear cut level for the onset of the increase in risk can be given*". This point about identifying the threshold level is important for quantification purposes; the use of different thresholds leads to significant differences on results.

In spite of this, in a new overview paper (Babisch, 2013), Babish presents pooled effects estimates of dose–response curves derived from meta-analysis published before 2010, and proposes thresholds levels. For aircraft noise and hypertension 5 studies were considered, and for aircraft noise and myocardial infarction just one was included, compared with road traffic noise and hypertension, which was based on 24 studies.

The results shows that "*The exposure-response curves show increases in risk of approximately 7-17 % per 10 dB(A) noise level increment. However, with respect to the onset (threshold) of the exposure-response relationships large variations can be seen ranging from LDN 40 to 60 dB(A). This is due to the fact that, particularly, older noise maps only considered the primary road network and did not provide noise levels below certain lower cut-off levels*". Note that this comment is somewhat different from that in the chapter of the WHO report (above).

At Internoise 2012 Conference Lazslo and Berry concluded, that evidence for exposure responses is inconclusive for most of health outcomes, since few studies have looked at full range of noise exposure. In their own words, "*there are limitations to the most widely used exposure-response relationship between transportation noise and myocardial infarction risk, such as established in 2006 by Babisch and used in the 2011 WHO publication "Burden of disease from environmental noise" and in the 2010 European Environment Agency "Good practice guide on noise exposure and potential health effects."*

"In particular, this curve cannot be used to establish a NOAEL/LOAEL (No observed adverse effect level / Lowest observed adverse effect level). A small number of good quality studies investigating the relationship between environmental noise and CVD risk have been published since then [2006] but more studies are needed examining the full range of exposures to better define the exposure-response relationship and investigate the possibility of threshold levels." (H E Laszlo, B Berry, P Abbot & A Hansell, 2012).

<u>Recommendation</u>

It is crucial that the Commission take full account of these differences and keep this topic under review since understanding of this topic is still evolving and this field of research is still very active.

Sleep disturbance

As the Commission has pointed out, while there is sufficient evidence that night time noise can cause awakenings and changes in sleep stage, it's not possible to conclude that noise can cause decrements in performance. Also there is still uncertainty about chronic long- term health effects related to sleep disturbance. (B. Berry & I. Flindell, 2009).

Furthermore, no single dose response relationship could be recommended for quantifying sleep disturbance as part of a valuation methodology. There is insufficient evidence available to be able to justify the use of any published dose-response relationship over any other to inform policy on adverse health effects.

Also, no consensus has been found around metrics (e.g. Lnight vs Lmax) and thresholds/ limits. The uncertainty regarding the responses for night-time aircraft noise is large, and such responses can be considered as indicative only (EC. Working group 2 Dose/ Response effects. , 2002)

Cognitive impairment in children

Regarding this particular issue, the current picture is even less clear that the one presented in the Commission's paper.

In addition to what the Commission summarized about RANCH Study, is worth noting that for aircraft noise exposure no consistent findings can be seen due to difference in exposure metrics and adjustments for confounders. Once again, confounders play a significant role in limiting the application of the conclusions to policy making.

Although the European RANCH study proved an association between aircraft noise exposure and reading comprehension for children in primary school, its follow up study could not demonstrate the existence of long – term effects (C. Clark, J Head, S. Stansfeld., 2013).

This updated study showed a non-significant link for poorer reading comprehension and no association was found with psychological or health effects for the same children analysed in RANCH, now during secondary school.

Recommendation

We recommend the Commission consider this new study and the needs for further research regarding this sensitive topic. Consideration also needs to be given to the scale of any relationships in the context of other factors.

5.2 Monetisation

Key point IX: Gaps in evidence base and uncertainties associated with the quantification of health noise effects prevent a reliable monetisation methodology.

Monetisation requires two major inputs. First, the quantification of "ends points"; second a reliable methodology. The current debate is focussed on the second one, largely ignoring the crucial implications of the first one.

As presented in Key Point VIII, there are lots of uncertainties and no agreement on thresholds levels over relationships between noise and health effects. Additionally, confounding factors and potential overlaps between health and amenity and health and productivity, are majors limitations for

monetisation purposes (IGCB(N), 2008). Without this, it is impossible to apply reliable monetisation principles applicable and suitable for all sources of noise. Those that already exist are likely to overestimate the "true" value.

Recommendation

We recommend the Commission to set up an expert panel, which represents the interest of all stakeholders, to define the future agenda on monetising health effects.

Key point X: Strong limitations to hedonic prices methodology to value noise.

A general overview of the literature suggests that most of the authors agree that house prices around airports are adversely affected by aircraft noise to at least some extent. However, due to the different methodologies used, there is no consensus on the magnitude of that implication. In addition, some studies show that it is not possible to generalise the effect since it depends on the particular aspects of each residential areas - the facilities provided, accessibility, employment opportunities, schools, parks etc.

Hedonic prices studies, presents a series of limitations that in our opinion discards it as a potential methodology for valuing noise if used alone.

First, asymmetry of information about the relevant characteristics of the properties leads to decisions that are not fully informed. This means, that people could either over or under estimate the amount and the potential effects.

Second, as it seems likely that people get used to noise to some extent, their valuation of noise might change over time, which cannot be reflected with initial house prices.

Third, the "revealed preference" expressed in a house price is also affected by many other variables, which are impossible to consider all in one study. Also, it has been difficult to separate its effects on people choices, and models results. Accessibility and mobility, economic impacts on jobs and growth, and benefits of proximity, as well as air pollution, congestion, etc., are key confounders.

Fourth, people have the ability to move in and out residential areas around airports. In fact, the existing market demand at Heathrow area, has pushed prices up (not down), showing the willingness of some people to live there, even acknowledging the existence of the airport noise.

Finally, the hypothesis supporting hedonic pricing as a valuation method is flawed in this situation. Hedonic pricing is based on the assumption that if you have two identical properties differentiated only by noise, then the difference in house price reveals a value for not experiencing the noise. The problem is that noise can never be the only difference – if you take away the noise the location fundamentally changes and so the properties are no longer identical in every other way.

Research commissioned by Heathrow to property consultant CBRE (Heathrow Airport Limited, 2013) demonstrates that houses prices (since 1995) in surrounding areas have moved in line with overall London-wide trends and that 7 out of 10 residents in areas affected by noise have lived in their homes less than 10 years, with 1 in 3 of those less than 5 years. According to A Quieter Heathrow Report, "*CAA figures show that there are 16% more homes now than in 1991 within the 57 decibel Leq noise contour around Heathrow. It is unlikely that these properties would have been developed if there was not a market to sell or rent them.*"

Key point XI: Monetisation might be simpler than we think. Principles of responsibility and fairness might be the key.

As a conclusion to our points above, the main difficulty in this field is that while it is usually possible to find ways to monetise noise impacts in different situations, actual values vary between different people in different situations and at different times. This means that there is a wide range of different values reported in the literature, and extrapolation from any one situation investigated in research to any other situation is unlikely to be reliable.

Recommendation

We encourage the Airports Commission to support and promote research designed to find solutions to the problem of recognizing that actual values vary for different people in different situations depending on many different variables additional to noise.

At this point, perhaps monetisation is simpler than has been considered to date. Since people, on balance, think that the benefits outweigh the negatives, then perhaps the cost is that of a scheme to reach target internal noise levels for residential, schools and hospitals, and that is the social cost that is added to the airport charges and goes direct to a local fund. Fair and comprehensive mitigation and compensation might be the key.

There is enough evidence to adopt the "precautionary principle" and agree responsible values to deliver sustainable airport's operations. Maybe this intuitive proposal is what community might claim as the social cost of noise. We would draw your attention to a recent article in the Financial Times (www.ft.com) on a cooperative approach to additional runways where the local community are shareholders in the additional capacity. Perhaps there is a question over whether this is a step to far for the airport community or a private company with existing shareholders but it is certainly something worthy of debate and consideration in line with the precautionary principle and sharing of benefits.

6 MITIGATION

General Comment

We have many years experience with mitigation schemes for airports. We agree with and support the ICAO Balanced Approach as a basic principle however we believe the issues of social cost and mitigation need to addressed more significantly by the industry as a whole. Over the last 30 years the industry has been focussed on how to reduce the number of decibels and not really looked at the issues of tolerance (towards the industry as a whole, not just local airports) discussed earlier.

Decisions today should consider how much further this might go in the future, providing the industry with appropriate incentives to invest in all aspects of mitigation whilst enable growth and enabling benefits to be shared - it is often said (indeed the Commission refer to this) that many of the technology improvements have come about because of the importance of Heathrow to airlines.

Key point XII: Technology advances are the social cost paid by the industry but that is an international cost. Noise is a local issue and so social costs should be recognised within mitigation schemes funded through airport charges.

Technology is clearly making aircraft quieter but they will never be silent. The Commission paper points to open rotor technology as being quieter than today, but noisier than turbofan could be, but environmentally more efficient than the current/imminent technology. We would not consider this to be a problem. Quieter than today and environmentally better is a sustainable solution with a sensible balance. It is important to consider that noise is a local issue only and airport implemented mitigation is only of benefit to local communities. Technology based benefits are beneficial to all and the cost of advanced technologies is the industry's input to the social costs of noise.

On a local basis, airports (and the airlines that operate) should recognise their social cost alongside their benefits and we have advocated a "precautionary principle" approach as a starting point. As an example, intuitively it would seem reasonable to expect that if a child's concentration is regularly interrupted by any noise events (not just aircraft) that development would be hindered at that time. We would consider this to be an obvious social cost to airports who should then fund insulation to schools, provide appropriate ventilation (including lifecycle costs). The funding would through a social cost portion to the landing charges to the airlines based on the noisiness of the aircraft used. Whilst this approach may be considered controversial by some the reality is that this is one of the tangible social costs.

Key point XIII: There is a tension between minimising the number of people overflown and providing people with respite. There is an over reliance on the population exposed as an indicator.

Operational measures for mitigation are largely to do with reducing contour area and minimising people overflown (as per the Aviation Policy Framework). These include steeper approaches (though this is probably limited to 3.2 degrees where a range of aircraft sizes is involved), displaced thresholds, concentration on small number of routes (departure and arrivals routes), aircraft procedures, navigation procedures etc etc. GPS technology is enabling advanced navigation techniques to be employed to enable aircraft on approach to be routed in a manner more similar to departures rather than the current straight in approach. This means that, to an extent, arrivals can be routed over less densely populated areas.

The question of "concentration versus dispersion" is raised by the Commission. If the aim is to minimise the population overflown (and also minimise the size of the contour) then the approach has to be concentration on the minimum number of routes possible and apply mitigation schemes to

"compensate" in some form. This means that by carefully designing routes a smaller population is exposed, albeit to higher levels of exposure without break.

Introduction of respite mechanisms provides communities with a break from aircraft noise but is likely to increase the area of the contour and increase the number of people overflown. So there is tension between the policy objective and the reality of providing a break from aircraft (for which it seems logical there would be some value).

Dispersion increases the number of people overflown, but the degree to which they are exposed reduces.

On the subject of respite: we consider this to be a key aspect of future mitigation options for airports – the ability to give people a break from anything that is adverse is important. However, current research is inconclusive about what respite actually means. Some think it's about no audible aircraft for a day, others an hour, other's the gap between aircraft. There are questions over whether it's noise based or just overflight based and also what metrics apply to describe it. Then there are questions of whether predictability is important or whether it's just about providing relief.

What value respite has to residents, how to define and explain it and assuming there is value and benefit the best means to implement it are all at this time unclear. The Commission may take a different view, but our experience at Heathrow would suggest that there is further work to understand what it really means before implementing a solution that actually has no/little value to the community.

Overall we see that improve tolerance is a key part of mitigation programme. Mitigation and compensation should be integral to the costs of the business not seen as an add-on or inconvenience. They should be recognised as the social costs of doing business.

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APPENDIX A

A US PERSPECTIVE

INTRODUCTION

This document presents a brief review of the Airports Commission Discussion Paper 5 on Aviation Noise from a US perspective. We considered that as the Commission refers to some aspects of the way in the US views noise impacts that it would be appropriate to provide an overview to assist. We commissioned one of our US partners to conduct this piece of work.

Overview

The Airports Commission paper clearly indicates three objectives consistent with the U.K.'s Aviation Policy Framework. They are (1) to limit or reduce the number of people significantly affected by noise; (2) find a balance between the negative impacts of noise and the positive impacts of economic growth; and (3) future benefits of reduced noise should be shared by both the public and the aviation community. The Commission also recognizes there is a lack of consensus on how to address issues of aviation noise, and thus is looking into three main areas – an improved means of assessing it, alternatives for compensating for its impacts, and ways of establishing noise "envelopes".

The Commission's report indicates some familiarity with work done in the U.S.; for example, it makes brief mention of Chicago's approach to sound insulation. However, in the sections that follow, Relevant details that are not present in the paper have been added and also several examples of how and where the Federal Aviation Administration (FAA) and/or airports in this country have worked to address the Commission's three topic areas, and more specifically, to answer some of the Commission's direct requests for information raised throughout its document.

HOW DOES NOISE AFFECT PEOPLE?

Sleep Disturbance

The FAA first prescribed use of the Day-Night Average Sound Level (DNL) as the accepted means of addressing aircraft noise in the U.S. when it promulgated Title 14 of the U.S. Code of Federal Regulations, Part 150, entitled "Airport Noise Compatibility Planning" in 1984[1]. Though the regulation and related FAA Orders have been updated several times since, the rationale for DNL has not. It was described in Section §150.1 -- Scope and Purpose of the regulation as generally providing "a highly reliable relationship between projected noise exposure and surveyed reaction of people to noise" The surveyed reaction is widely recognized as Schultz's dose-response curve cited in Chapter 4 of the Commission's paper.

Though much research on noise effects has been accomplished subsequent to Schultz (most of it outside the U.S.), there have been advances in this country in the area of sleep disturbance; in fact, counter to the observation in paragraph 2.19 of the Commission report, we would maintain there IS a link between outdoor noise exposure (heard indoors) and sleep disturbance.

Based on a re-evaluation of sleep studies at Los Angeles and Denver International Airports and Castle Air Force Base, Anderson and Miller (2007)[2] developed a statistical method for predicting numbers of people awakening from multiple events occurring throughout the night. The method was subsequently adopted as a standard[3] by the American National Standards Institute (ANSI), and in

[1] Docket No. 18691, 49 FR 49269, Dec. 18,1894
[2] Anderson, G.S., and Miller, N.P., "Alternative Analysis of Sleep-Awakening Data", Noise Control Engineering Journal, 55(2), 2007 March-April.
[3] American National Standard, ANSI / ASA S12.9-3-2008/ "Quantities and Procedures for Description and Measurement of Environmental Sound – Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes"

December 2008, was found by the Federal Interagency Committee on Aviation Noise (FICAN)[4], of which FAA is a participant, to be the best method currently available for analyses of behavioural awakenings to aircraft noise.[5]

Because the topic of sleep disturbance is controversial for airports, applications of the analysis method at specific airports have been few. We are aware of three – one as part of a 14 CFR Part 150 Noise Compatibility Study at San Diego International Airport, which included an assessment of the change in awakenings likely to result from implementation of a nighttime preferential runway use program[6]. The benefits were deemed not to outweigh the costs of increased flight time and fuel burn, so the measure was never formally proposed for adoption. The other two applications were at Los Angeles International Airport. The first instance was for an California-mandated environmental analysis of airport improvement projects included in a Specific Master Plan Amendment Study (SPAS) [7], and the second to support a proposed use restriction that would eliminate easterly takeoffs during late night hours and light winds, most of which operations make wide sweeping turns over the City as they head west to Pacific-rim destinations while all other operators take off to the west over the ocean to conform with the Airport's voluntary preferential runway use program[8].

Impacts of Noise on School-age Children

FICAN has also developed findings pertaining to other impacts of noise. These are listed on the FICAN web page cited above but include summaries of two studies including a 2000 literature review entitled "FICAN Position on Research into Effects of Aircraft Noise on Classroom Learning" and a July 2007 summary of a pilot study funded by FICAN on the "Relationship between Aircraft Noise Reduction and Changes in Standardized Test Scores".[9]

As part of the literature survey, FICAN found and cited a number of the same studies referenced in paragraphs 2.30 to 2.32 of the Commission report. However, it also cited work by Working Group 42 of the ANSI S-12 Noise Committee co-chaired by D. Lubman and L. Sutherland on a proposed ANSI standard for classroom noise. The standard was subsequently adopted in 2010[10] and though compliance is voluntary, many school districts and agencies have adopted it for new and renovated buildings.

The later pilot study, which does not appear to be referenced in the Commission report, investigated changes in standardized test scores at 35 public schools in grade levels 6 through 12 where abrupt changes in noise exposure had taken place, either through sound insulation treatments or airport closures. Interfering aircraft noise exposure levels were defined utilizing school-day Equivalent Sound Levels (LAeq) for the 9-hour period from 7 AM to 4 PM.

Regression analyses of test scores for children experiencing the noise reduction compared to a control group found "(1) a substantial association between noise reduction and decreased failure (worst score) rates for high-school students, and (2) significant association between noise reduction and increased average test scores for student/test subgroups."[11] Because the tests used in the pilot study were administered in classroom settings, it was postulated that the observed improvements attributable to noise reduction occurred either because students learned more during the year

[4] http://www.fican.org/pages/fican.html
[5] http://www.fican.org/pdf/FICAN_Sleep_Dec08.pdf
[6] http://www.san.org/documents/airport_noise/part150/DRAFT_NCP_Text_Jan10_E_ Version_comp.pdf
[7] http://www.lawa.org/LAXSPAS/
[8] http://www.lawa.org/LAXPart161.aspx
[9] http://www.fican.org/pages/findings.html
[10] American National Standard, ANSI / ASA S12.60-2010/, Parts 1 and 2, entitled "Acoustical Performance Criteria, Design Requirements and Guidelines for Schools"
[11] http://www.fican.org/pdf/FICAN_Findings_on_school_study.pdf

following the improved noise environment ("reduced chronic stress"), or because they were less stressed while actually taking the test itself ("reduced acute stress"). The study concluded that further research on the subject was needed.

That follow-on research is currently underway in a project funded by the FAA through the Airport Cooperative Research Program (ACRP), which is managed by the Transportation Research Board (TRB) of the National Academies. It is entitled "Assessing Aircraft Noise Conditions Affecting Student Learning"[12]. For years, the FAA has funded sound insulation programs for schools exposed to DNL values greater than or equal to 65 dB, but it initiated the practice and continues to fund the programs, with the only supporting evidence of its benefits being the 2007 FICAN pilot study and its finding that test scores of poorly performing students increased following noise reduction. The present study is designed to address the questions of what level of exposure aircraft noise begins to impact learning and when should mitigation be implemented. The final report is scheduled to be released at the end of November 2013.

Health Effects

Very little work in the U.S. has focused on health effects in recent years. A literature review of potential health effects of aircraft noise was published in 2010[13] under one of the FAA's Centers of Excellence -- the Partnership for AiR Transportation Noise and Emissions Reduction (or PARTNER). The Center is co-sponsored by the FAA, the National Aeronautics and Space Administration (NASA), and Transport Canada. It is headed by the Massachusetts Institute of Technology (MIT) and comprised of various academic institutions, consultants, airlines and others. The review emphasizes cardiovascular effects and cites sleep disruption and noise-induced stress as potential causal factors, much of the original research for which was conducted in Europe and some of which is cited in the Commission's own paper.

The only on-going research project in the U.S. of which we are aware is also being conducted under PARTNER. It is entitled "Aviation-Related Noise Effects on the Elderly"; a brief summary of the project is at: http://partner.mit.edu/projects/aviaion-related-noise-effects-elderly. PARTNER's web site gives contact information for the co-lead investigators at Boston University School of Public Health and Harvard School of Public Health, but no findings have yet been published and the site gives no indication of a completion date.

MEASURING AVIATION NOISE

By FAA Order, DNL remains the cornerstone of every FAA-funded noise analysis conducted for U.S. Airports. Even when supplemental metrics (essentially all of which are discussed in the Commission report) are used to expand the public's understanding of an airport's noise environment, underlying decisions regarding alternative development options or mitigation measures are still based almost entirely on numbers of people within the DNL 65 dB noise contour. This is largely because there still is no underlying scientific basis for judging the relative benefits of project alternatives using alternative metrics.

Nevertheless, FAA recognizes that the DNL metric has weaknesses. A June 2011 study conducted by K. Plotkin et al from Wyle, entitled "Updating and Supplementing the Day-Night Average Sound Level (DNL)"[14] discusses annoyance as a multivariate function dependent on direct acoustic and indirect

[12] http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2797
[13] Swift, H., "A Review of the Literature Related to Potential Health Effects of Aircraft Noise", PARTNER Project 19, Report No. PARTNER-COE-2010-003, July 2010
[14] Plotkin, K., et al; "Updating and Supplementing the Day-Night Average Sound Level (DNL)", DOT/FAA/AEE/2011-03, The Volpe National Transportation Systems Center, Cambridge, MA

non-acoustic factors rather than just DNL alone. Identified areas for improvement include modifying the time of day and weighting factors used in calculating exposure, accounting for the influence of non-acoustic factors, and use of supplemental metrics which have anecdotal support but do not have a scientific basis for their value. It concludes that if DNL is to be modified or replaced, or if a supplemental metric with supporting science is needed, then a significant new social survey is required to support them.

A follow-on project under the PARTNER Center of Excellence is now underway to further investigate improvements to the prediction of annoyance using a modified noise metric.[15] Characteristics of the noise source, other than just its A-weighted level and duration, are being examined and include "spectral balance", "roughness", and "fluctuation strength" as well as the presence of tones and low frequency content. Other elements of the project are designed to determine an improved method of accounting for the number of events over time and whether different modes of transportation are judged differently for their effect on annoyance so that those differences may be accounted for in noise modeling. The project also includes development of a portable indoor sonic boom simulator to test subjective response to sonic booms from next-generation aircraft and to test the physical responses to the booms inside homes of various construction types. A final element of the study will examine whether old survey data may be re-used to validate the relationship of the new noise metric to annoyance.

MITIGATION

The approach to aircraft noise mitigation in the U.S. is often described by the FAA as a three-legged stool consisting of reduction of noise at the source, operational measures, and use restrictions. The fourth element, land use planning mentioned in the Commission paper, while desirable, is the responsibility of local jurisdictions in this country and is not considered something over which the FAA or airports have control, except to the degree that they can provide funding for sound insulation and purchase programs in high-noise areas.
The reality of mitigation from an airport's perspective, however, is more like a one-legged stool. This is because the FAA is solely responsible for source reduction, and in the case of use restrictions, has structured the approval process to be so difficult and costly to an airport that it is effectively a useless leg. This leaves operational measures and management of sound insulation programs as airports' primary tools. Several examples considered in the Commission paper are discussed below.

Operational Procedures Using New Performance Based Navigation

Recent advances in the U.S.'s Next Generation Air Traffic Control System (NextGen) now permit airports, in consort with the FAA and airlines, to examine, propose, and implement new flight procedures whose benefits include optimization of traffic flows, more direct routing, reduced fuel burn and shorter flight times. Ancillary environmental benefits include fewer greenhouse gas emissions and reduced noise over many (but not all) surrounding areas. As the new satellite-based GPS technology becomes more common in today's aircraft, these once widely-dispersed tracks will become more finely aligned in narrow corridors. The two images below are before and after examples of the new Performance Based Navigation (PBN) procedures at Phoenix International Airport[16].

[15] Davies, P. and Sparrow, V., "Noise Exposure Response: Annoyance", PARTNER Project Number 24
[16] http://events.aviationweek.com/html/rnp09/Terry%20Locke%20&%20Curt%20Faulk.pdf

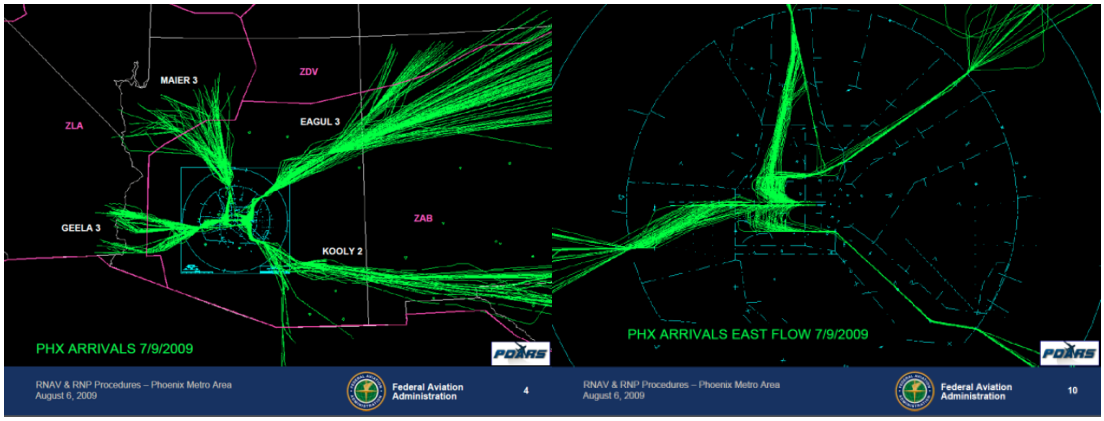

Figure 1. Radar Traces of Aircraft Arrivals at Phoenix International Airport, before and after Implementation of PBN Route

It is noteworthy that the tendency of the aviation industry in this country is to promote the new procedures as viable means of achieving noise abatement as well as saving fuel and flight time. That is not always the case and it is important to manage public expectations. New PBN procedures implemented in the U.S. seldom alter noise exposure within the 65 dB DNL contour because the first waypoint on departure or the last waypoint on final approach are far enough from the runway ends that the aircraft are essentially overflying the same neighborhoods as they did with existing procedures.

Farther out, exposure levels can increase or decrease and FAA Order 1050.1E specifies that airspace changes be examined for changes in exposure of 3 dB or more from DNL 60 to less than 65, and 5 dB or more from DNL 45 to less than 60 (though neither of those deltas constitutes what FAA refers to as "significant impact" – a term that connotes the need for mitigation). Our recent assessment of proposed PBN procedures for Seattle International Airport[17] found that the changes in exposure attributable to the proposed action in its first full year of implementation (2014) would be at most a 0.9 dB increase in DNL and at best a -0.8 dB decrease in DNL over a study area of nearly 3,200 square miles (approximately 8,200 square kilometers) and to an altitude of 18,000 feet (approximately 5,500 meters) above ground level. Closer to the airport, DNL changes were more on the order of a few tenths of decibels, and at no location did we identify what FAA would term a significant impact[18].

Noise Envelopes

One notable example of a U.S. Airport whose noise is limited by an envelope is Denver International. Land for the new airport was annexed to the City of Denver from the surrounding county through an intergovernmental agreement[19] that set noise limits at 101 grid locations to the northwest, west, and southwest of the airport, some as far as 15 miles (24 kilometers) from the runways. Limits are specified in terms of annual average L_{Aeq24} and set at levels ranging from a low of 31.4 dB to a high of 51.7 dB. In addition, the agreement requires that every annual DNL 65 contour stay completely within the original DNL 65 contour developed for the full 12-runway airport envisioned in the project's Environmental Impact Statement. Fines for the exceedance of any of the 102 conditions are set at $500,000 per occurrence per year. A depiction of the criteria defining the noise envelope for the airport is shown in Figure 2.

[17] FAA, "Final Environmental Assessment for Greener Skies Over Seattle; Proposed Arrival Procedures to Seattle-Tacoma International Airport", volume 1, 1 November 2012; Renton, WA.
[18] A DNL increase of 1.5 dB or more in a location where the DNL is 65 dB or greater, per FAA Order 1050.1E, Chg. 1, FAA National Policy, Subj: Environmental Impacts: Policies and Procedures, March 20, 2006.
[19] http://extras.mnginteractive.com/live/media/site36/2013/0215/20130215_061429_IGA-1988-on-annexation.pdf

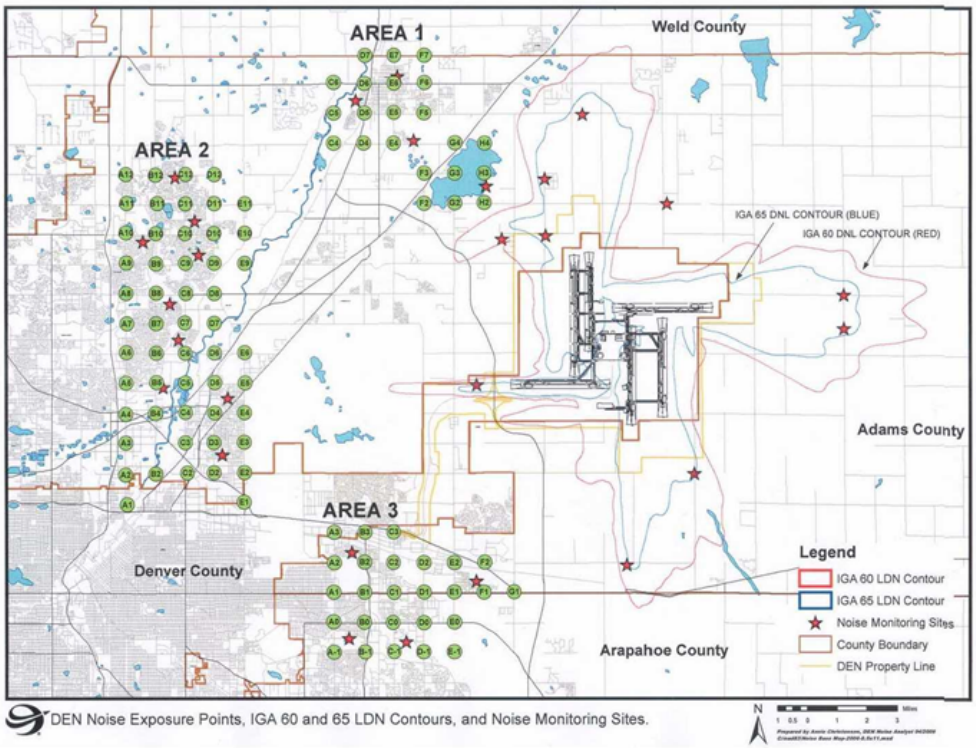

Figure 2. Grid Points and DNL Noise Contours Limiting Annual Noise Levels at Denver International Airport

Although early years of operation at the new airport resulted in fines in excess of $20 million (returned to the county and primarily used for residential sound insulation), subsequent noise mitigation efforts and quieter airline fleets have typically resulted in 0 to 2 violations per year. A copy of one of the Airport's annual noise reports is available on the Airport's web site at http://business.flydenver.com/community/noise/reports/2010_ar.pdf.

Compensation

Sound insulation programs for significantly impacted residences and schools, and even individual treatments of hospitals and places of worship, have been a major part of many U.S. airport noise mitigation programs since the promulgation of 14 CFR Part 150 cited earlier[20]. Some $3 billion have been spent on these programs since 1992, approximately $1.9 billion of which was provided through the Airport Improvement Program authorized by public law, and another $1.1 billion of which has come from individual airports' passenger facility charges[21]. The Federal share of the cost of the programs depends on the type of airport; for large and medium hub facilities (those having at least 1% of the annual passenger enplanements, and those having at least 0.25% but less than 1%, respectively), the Federal share is 80%. For smaller airports, the share is typically 90%. State or local shares make up the balance.

[20] See also http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl for amended regulation

[21] http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_089.pdf

Eligibility for sound insulation under an approved 14 CFR Part 150 Noise Compatibility Plan is primarily determined by the exposure level at the noise-sensitive land use, which for most facilities is determined by the 65 dB DNL contour. Homes outside the contour are occasionally added to a program, for example to provide consistent treatment along a city block. Additional eligibility requirements demand that individual sound insulation projects must achieve an interior DNL of 45 dB.

With the large number of homes that have been treated over the years, numerous additional implementation issues have cropped up including changing eligibility questions as noise exposure changes, questions on acoustic test methods, use of sampling techniques to reduce costs, and many others. The FAA issued a Program Guidance Letter (PGL) 12-09 in August, 2012, to help clarify some of these issues; it was followed quickly by a revised memorandum and answers to frequently asked questions (FAQs) to correct or clarify the PGL. A new ACRP Report 89, entitled "Guidelines for Airport Sound Insulation Programs"[22] released in 2013 provides updated guidance for improved management of remaining sound insulation programs.

CONCLUSION

While a number of the Airport Commission's questions are not addressed here, it is hoped this U.S. perspective on several current aviation noise issues could prompt additional debate and aid the Commission.

[22] Ibid.