Note: Plymouth Airport – Response to SHH: Noise

22nd January 2018

1. Aims of this note

The aims of this note are to respond to the noise issues raised in the hearing statement on behalf of Sutton Harbour Holdings PLC (PCA Limited). Consequently, this note:

- Outlines the noise issues.
- Describes how the policy interpretation on aviation noise applies to the scheme.
- Describes how the evidence base on the effects of aviation noise has recently changed
- Discusses the PCA submitted noise contours for the future use of Plymouth Airport

2. Noise issues at Plymouth Airport

The PCA submission include noise contours describing modelling of noise from aircraft taking off and arriving at the airport. These noise contours are based on a hypothetical historical scenario regarding possible fleet mix and flight numbers in 2012 i.e. after flights to and from the airport were suspended. In the past residential and other noise sensitive land uses areas around the airport were and would be if the airport were to be re-activated, subject to varying degrees of aircraft noise. This is common for virtually all airports in the UK and is an inevitable consequence of this type of transportation infrastructure.

Notwithstanding the question of whether the noise contours presented in the PCA submission accurately reflect the possible future distribution of aircraft noise. The PCA submission goes on to incorrectly state that the future operation of the airport would be unacceptable in noise policy terms as residential properties would be likely to be subject to noise levels that would to result in adverse effects in policy terms.

3. Noise Policy

National planning policy and guidance regarding noise establishes the following concepts:

- Lowest Observed Adverse Effect Level (LOAEL)
- Significant Observed Adverse Effect Level (SOAEL)
- Unacceptable Adverse Effect Level (UAEL)

Policy and guidance interprets the above concepts as meaning:

- Below LOAEL no mitigation of adverse effects is required.
- Between LOAEL and SOAEL mitigation and minimisation of adverse effects is required (although this does not mean these effects cannot occur).
- Above SOAEL significant adverse effects are to be avoided e.g. by noise insulation.
- Above UAEL the unacceptable effects of noise are so severe they must be prevented.

Importantly noise policy and guidance qualifies the concepts of LOAEL, SOAEL and UAEL as follows:

1. Noise management should provide effective management of noise within the context of Government policy on sustainable development. This includes considering not only the environmental effects of the noise, but also the social and economic benefits of the activity giving rise to the noise.

2. Noise should be considered alongside other relevant issues and not considered in isolation. The wider benefits of a particular policy, development or other activity must be given adequate weight when assessing the noise implications.

3. Where the impact lies somewhere between LOAEL and SOAEL. Policy requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

Unfortunately, the Government has not provided decibel based noise level thresholds for all the above concepts.

In seeking guidance regarding values for LOAEL, SOAEL and UAEL for aviation noise the draft National Policy Statement (NPS) for a third runway at Heathrow is of limited use, although it does reference the Aviation Policy Framework, and paragraph 52 of the draft NPS does say that the guidance of national policy on airspace applies.

Section 2.72 of the Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace, advises that following the SONA14[1] study the LOAEL for aviation noise can be taken as low as 51 dB LAeq,16 hr i.e. the point at which mitigation should be considered, not the SOAEL threshold which justifies stopping a scheme. However, the airspace policy does not state what is SOAEL or require that the other standards e.g. the WHO Guidelines should be regarded as such.

In the absence of a policy statement of what levels are SOAEL for aviation noise the next best option is to have regard to decisions by Secretaries of State which directly consider the question.

Recently[2] the Secretary of State has made important decisions regarding planning inquiries where the principle issue has been the question of aviation noise; and decided what levels can be regarded as representing LOAEL, SOAEL and UAEL. These decisions are:

- Heathrow Airport “The Cranford Appeal” - 2nd February 2017: APP/R5510/A/14/2225774.

  And;

- London City Airport Development Programme Appeal - 26th July 2016: APP/G5750/W/15/3035673.

The Cranford appeal and The London City Airport CADP decisions make it clear that the Secretary of State's view is that an interpretation that aviation noise of less than 64 dB LAeq,16 hrs represents SOAEL/UAEL that stops a scheme going ahead is not policy compliant.

Instead the Secretary of State decided that:

- Aviation noise of 54 Decibels (London City) or 57 Decibels (Heathrow) (both LAeq,16 hrs) represents LOAEL i.e. mitigation and minimisation of aviation noise is required above these levels.
- Aviation noise of 63 Decibels (LAeq,16 hrs) represents SOAEL i.e. above this level the significant adverse effects of aviation noise should be avoided e.g. by noise insulation.
- Aviation noise of 69 Decibels (LAeq,16 hrs) represents UAEL i.e. aviation noise impacts are so severe they are considered unacceptable and should be prevented.

The above shows that the Secretary of State has been able to set a specific value for SOAEL for aviation noise at 63 dB LAeq,16 hrs.

4. Recent changes to the evidence base on the effects of aviation noise

4.1. SONA14/CAP1506

On the 2nd February 2017 the CAA released the survey of noise attitudes 2014: Aircraft – SONA14/CAP1506.

The current UK civil aircraft noise exposure index, LAeq,16h was adopted in 1990, based on an aircraft noise attitude survey undertaken in 1982 and reported as the UK Aircraft Noise Index Study (ANIS) in 1985.

Contours of equal noise exposure, rather like geographical height contours, are plotted around an airport, along with estimates of the area and population contained within the contours. Following the ANIS study the 57dB LAeq,16h contour was chosen as the threshold of low community annoyance because it '*indicated a marked increase in some reported measures of disturbance*', with 63 dB and 69 dB LAeq,16h representing medium and high community annoyance respectively, and these criteria were subsequently incorporated into planning policy guidance.

Internationally there have been several studies that show increased sensitivity to aviation noise in the last decade or so i.e. after the ANIS study which informs current UK policy was carried out in the early 1980s. In 2002 a UK study found similar results, but was rejected by the Government on the recommendation of the peer reviewers of the study.

Consequently, the SONA14/CAP1506 report describes a research study to obtain new and updated evidence on attitudes to aviation noise around airports in England, and how they relate to the UK aircraft noise exposure indices.

The SONA14/CAP1506 study shows that nowadays the population is more sensitive to aviation noise and the same proportion of persons (9%) is Highly Annoyed at 54 dBA LAeq,16 hrs nowadays compared to 57 dBA LAeq,16 hrs in the early 1980's when the ANIS study was carried out.

However, this increase in sensitivity to aviation noise is only up to 63 dBA LAeq,16 hrs (23% Highly Annoyed). Above this level the SONA14/CAP1506 study found that the proportion of the population highly annoyed is less than under the ANIS study from the early 1980's. As shown below in the table 31 reproduced from SONA14/CAP1506.

Table 31: Percentage highly annoyed as a function average summer day noise exposure, $L_{Aeq,16h}$

Average summer day noise exposure, $L_{Aeq,16h}$ (dB)	% highly annoyed	
	ANIS 1982	SoNA 2014
51	3%	7%
54	5%	9%
57	9%	13%
60	14%	17%
63	23%	23%
66	34%	31%
69	48%	39%

The SONA14/CAP1506 study has established that the highly annoyed dose response curve appears to have pivoted around 63 dBA LAeq,16 hrs, with an increase in sensitivity below this value and a reduction above.

The peer reviewers of the SONA14/CAP1506 study report that the conclusions are robust and can be relied upon when forming aviation noise policy.

Consequently, the SONA14/CAP1506 can be interpreted as justifying a reduction in the sound level that represents LOAEL for aviation noise to 51 decibels (LAeq,16hrs) due to increased sensitivity at relatively low aviation noise levels nowadays; whilst at the same time bolstering the case for 63 decibels (LAeq,16hrs) remaining as the SOAEL for aviation noise as sensitivity to moderately high levels of aviation noise has not increased.

5. PCA submitted noise contours for the future use of Plymouth Airport

Crucially it is not possible to establish if the noise contours included in the PCA submission take account of the increasing proportion of less noisy Chapter 14[3] aircraft in the fleet mix compared to the 2012 fleet mix used to produce the noise contours, and the imminent and future reduction in aircraft noise that is expected over the next 15 to 25 years. Aircraft are currently classified according to the noise levels they produce by the International Civil Aviation Organisation (ICAO). Classification is based upon an international scale of 'chapters'.

These classifications include:

- Unclassified – the first generation of jet aircraft, which are now banned by international agreement (with rare exceptions) e.g. the Trident, Comet and Boeing 707;
- Chapter 2 – the older, noisier aircraft which have been phased out or upgraded by 2002. For example the BAC1-11, Boeing 727 and Boeing 737-200;
- Chapter 3 – the more modern, quieter aircraft. For example, the Boeing 757, Boeing 767 and Boeing 737-300;
- Chapter 4 – in force for new aircraft designs from 2006 and 10 dB EPNL (cumulatively) quieter than chapter 3. For example, the Airbus 318, Boeing 737-600 and Bombardier CL-600-2B19, and
- Chapter 5 – modern propeller aircraft including the BAE Advanced Turbo Prop and 'Shorts'.

Over the past 30 years, improvements in aircraft technology have resulted in substantial reductions in the noise of individual aircraft and most of the current UK fleet already achieves a noise target equal to or better than the Chapter 3 standards. However, further improvements to achieve Chapter 4 standards, which impose a further substantial reduction on Chapter 3 standards, have been in place since 2006; and as the older aircraft in the UK fleet are retired, they will be replaced with aircraft that meet the newer, even quieter Chapter 4 and better standards, and individual aircraft will become progressively less noisy.

In March 2014, the ICAO Council meeting adopted amendments to Annex 16, as proposed by the Committee on Aviation Environmental Protection at its 9th meeting in February 2013 (CAEP/9). The amendments include a new noise standard for jet and propeller-driven aircraft (Annex 16, Volume I, Chapter 14). This new noise Standard (Chapter 14) for jet and propeller-driven aeroplanes includes a cumulative reduction of 7 decibels relative to the current Chapter 4 levels. The new Standard is applicable to new aeroplane types submitted for certification on or after 31 December 2017 at or above 55 tonnes in weight, and on or after 31 December 2020 for aeroplanes less than 55 tonnes in weight.

In addition to the above substantial reductions in how noisy individual aircraft will be in future, the aviation industry aspires to making future aircraft types significantly quieter than specified in the ICAO Chapter classification, for example:

- The Sustainable Aviation (SA) Noise Road-Map, A Blueprint for Managing Noise from Aviation Sources to 2050. Assumes a 0.1 dB per year baseline rate of improvement from the Generation 1 introduction dates (assuming no technology step-changes or major configurational changes); and,
- Flightpath 2050, Europe's Vision for Aviation (2011, European Commission) - aims for a reduction of 65% in the perceived noise emission of flying aircraft relative to the capabilities of typical new aircraft in 2000.

The SA Noise Road-Map identifies two categories of future less noisy aircraft e.g.

- Imminent aircraft types - incorporating Generation 1 technology with significant fuel burn and noise benefits. These have recently entered, or are currently offered for sale to the market, and include all-new aircraft as well as re-engined aircraft. The reduction in noise of these aircraft compared to current aircraft is up to approximately 5 dB for departure and up to about 3 dB for approach; and,

- Future aircraft types incorporating Generation 2 technology, which aim to achieve the noise goals set out in Flightpath 2050. These types are envisaged to eventually replace the Imminent Generation 1 aircraft. The reduction in noise of these aircraft compared to current aircraft is up to approximately 2 dB for departure and up to about 0.5 dB for approach.

The SA noise road map concludes that “Based on the information presented in this document SA believes that future growth in UK aviation to 2050, as predicted by the 2013 DfT Aviation Forecasts, can be achieved while reducing UK aviation noise output by an average of 20%. The precise nature of this change will vary from airport to airport depending on the traffic mix, rate of introduction of newer aircraft types and other local factors.”.

There are concerns that although individual aircraft may get quieter in future; that airports will off-set this gain by having more flights; for example if in future individual aircraft are a barely perceptible 3 dB quieter than at present, in theory an airport could have twice as many flights and the area covered by noise contours based on the LAeq,T index would not change. However, the Aviation Policy Framework (APF) recognises this conundrum and seeks to achieve a more reasonable weighting between the conflicting interests of allowing airport expansion and restricting the noise impacts on those who may be adversely affected, by stating at paragraph 3.3 the following;

“*We want to strike a fair balance between the negative impacts of noise (on health, amenity (quality of life) and productivity) and the positive economic impacts of flights. As a general principle, the Government therefore expects that future growth in aviation should ensure that benefits are shared between the aviation industry and local communities. This means that the industry must continue to reduce and mitigate noise as airport capacity grows. As noise levels fall with technology improvements the aviation industry should be expected to share the benefits from these improvements*.”

Clearly, when predicting future airport noise levels, it is important to consider how the reduction in the noise due to introduction and increasing proportions in the fleet mix of the less noisy aircraft described above is included in the estimate of future noise levels or areas covered by noise contours. On the face of it the 2012 noise contours submitted by PCA do not include reasonable assumptions about how the fleet mix may change and become less noisy or how various means of managing how aircraft fly to and from the airport could be used to mitigate and manage the noise impacts.

If the submitted noise contours for 2012 do not include reasonable assumptions about how the fleet mix may change and become less noisy, then the resulting noise contours potentially represent a substantial over estimate of the actual area likely to be covered.

6. Conclusions

Policy expects noise effects above UAEL to be prevented, or above SOAEL to be avoided, and between LOAEL and SOAEL to be mitigated and minimised.

Notwithstanding that it is not clear if the predicted future aviation noise contours in the PCA submission take account of the trend for aircraft becoming less noisy or how managing the way aircraft fly to and from the airport could be used to mitigate and manage the noise impacts; virtually all the noise sensitive properties under the contours are predicted to be below the aviation noise levels recently decided by the Secretary of State as SOAEL, and lie between the range of LOAEL values and SOAEL i.e. they are policy compliant and policy does not mean they can not occur.

Recognising that the noise contours in the PCA submission may over estimate the spread of noise, a very small number of residential properties i.e. twenty, fall within the 63 dBA LAeq,16 hr contour. This would put these premises in the SOAEL category. The Aviation Policy Framework and the decisions in the Heathrow Cranford and London City Airport appeals, and the Draft aviation NPS recognise that this can occur and require airport operators to provide financial assistance with noise insulation of noise sensitive premises in such circumstances to avoid significant adverse effects.

Noise policy and guidance states that noise should not be considered in isolation and that below UAEL i.e. 69 dB LAeq,16 hr, the social and economic benefits of a scheme should be weighed against the noise dis-benefits.

In short, the PCA submission fundamentally mis-interprets noise policy by suggesting that where adverse noise impacts arise between LOAEL and SOAEL an airport scheme should be refused.

Instead the Policy requires that the noise impacts of re-activating the airport should be mitigated and minimised by implementing a Noise Management Plan which could include the following:

- Restricting the aircraft that use it to those within specified lower noise categories.
- Prescribing noise preferential routes for aircraft to arrive and depart the airport to minimise. the number of persons overflown.
- Limiting the normal opening hours of the airport.
- Capping the total number of Air Traffic Movements to and from the airport.
- Setting a maximum area to a specified noise envelope/contour.
- Specifying the steepness of approach and departure flight profiles to maximise altitude over noise sensitive areas.
- Having a fines and incentives programme to encourage compliance with the noise management system and use of less noisy aircraft and flight methods.

- Having a noise monitoring programme.

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