ANASE Study

2.2.41 In point A1.8 of its Regulation 19 Request letter, LBN have requested that London City Airport consider how the recently published results of the ANASE study might be used to better inform the nature and extent of the impact from its proposals to increase the annual limit of 73,000 air transport movements to 120,000 aircraft movements.

Current Government Policy and Context

2.2.42 The noise chapter of the Environmental Statement appraised the effects of air noise on the basis of current Government guidance. The impact of airborne aircraft noise is assessed using noise contours indicating the dB $L_{Aeq,T}$[1] values. The use of these values results from detailed work undertaken for the Government in 1982 and published in 1985 as the ANIS study (United Kingdom Aircraft Noise Index Study) which related community annoyance to aircraft noise levels. This work forms the basis of current Government policy for rating the effect of airborne aircraft noise on the community.

2.2.43 In summary, the Government guidance is that daytime air noise should be taken into account when it exceeds 57 dB $L_{Aeq,16h}$, and that this level represents the onset of significant community annoyance, whereas 63 dB $L_{Aeq,16h}$, represents moderate levels of significant community annoyance and 69 dB $L_{Aeq,16h}$, high levels of significant community annoyance.

2.2.44 Since 1982, the overall amount of air traffic has increased substantially whilst sound levels generated by individual aircraft events have significantly reduced as older, noisier aircraft types have been replaced by more modern aircraft types with quieter engines and much improved climb performance. In addition, it is possible that attitudes to aircraft noise may have changed due, for example, to the general growth in personal income, and that the aircraft noise indicator adopted after the ANIS study (L_{eq}) may be less appropriate for present day conditions. The ANASE study was commissioned by the Department for Transport (DfT) to consider whether the current understanding of the links between reported annoyance and aircraft noise levels still held.

1 $L_{Aeq,T}$ – Equivalent continuous sound level. This is a notional steady sound level which would cause the same A-weighted sound energy to be received as that due to the actual and possibly fluctuating sound from 07.00 to 23.00 (day-time, 16h) and 23:00 to 07:00 (night time, 8h).

2.2.45 The ANASE study has recently been published and reports on some detailed work relating aircraft noise to community response. This report suggests that the degree of annoyance for a given level of aircraft noise is greater now than reported in the 1985 ANIS study on which Government policy is based. Peer reviewers, selected by the Government, have however expressed concern about aspects of the study. As a result, the Aviation Minister has advised that the report is not sufficiently robust to lead to a change in policy. The Environmental Statement for the LCY Interim Application therefore appropriately relies on current Government guidance for rating air noise. This maintains consistency with the criteria adopted in all other airport environmental assessments and master plans issued to date in response to "The Future of Air Transport" White Paper published by the Government in 2003.

2.2.46 Notwithstanding the above, this section considers how the findings of the ANASE study might affect any rating of the impact associated with this application.

The ANASE Study

2.2.47 The Department for Transport commissioned a consortium led by MVA Consultancy Ltd to conduct the ANASE project which commenced in December 2001. The results and findings of this study "The Attitudes to Noise from Aviation Sources in England (ANASE)" have recently been published by the Department for Transport as a Final Report dated October 2007.

2.2.48 The study objectives were to:

1. *Re-assess attitudes to aircraft noise in England;*
2. *Re-assess their correlation with the L_{eq} noise index; and*
3. *Examine (hypothetical) willingness to pay in respect of nuisance from such noise, in relation to other elements, on the basis of stated preference, "SP", survey evidence.*

2.2.49 The main findings of this study are set out in Appendix B2. Appendix B3 provides information on some of the subsequent reviews and comments by interested parties on the report.

The Findings

2.2.50 The findings given in the ANASE report are summarised in Appendix B2. The key findings relating to Objectives 1 and 2 of this assessment are set out below. (Note that Objective 3 is not relevant to the query raised by LBN under Regulation 19 and is not considered further in this section).

Objective 1 – Re-assess attitudes to aircraft noise in England

- Based on results of ANIS and ANASE, for a given level of noise exposure, measured in L_{Aeq}, people are more annoyed in 2005 than they were in 1985.
- For 57 dB L_{Aeq} (described as the onset of significant annoyance), the modelled value of annoyance (of 39) rates as slightly higher than "a little annoyed" on the ANIS scale whereas for ANASE the value (of 53) rates as somewhat higher than "moderately annoyed" on the ANASE scale. Thus, annoyance is about 14 points greater in ANASE than it was 23 years ago (where a difference of one category on the ANASE annoyance scale is allocated 20 points).
- A particular issue affecting the size of the difference (in annoyance response between ANASE and ANIS is whether an exaggerated response was generated by introducing playback equipment into the respondent's home.
- Results have shown people to be much more sensitive to aircraft noise at night, particularly around midnight and the early hours thereafter.
- In contrast, people are least sensitive to aircraft noise in the morning and early afternoon.
- Ideally, therefore, a metric that reflects attitudes to aircraft noise must reflect these time-of-day sensitivities better than the existing L_{Aeq} which does not weight by time of day.

Objective 2 – Re-assess their Correlation with the LAeq Noise Index

- The relationship between reported annoyance, sound level and number of aircraft has not been stable over time. The weight on aircraft numbers has risen from 6 in ANIS to over 20 in ANASE, so the contribution of aircraft numbers to annoyance has increased quite markedly.
- Because of its instability over time, use of L_{Aeq} to predict future annoyance may be misleading. In particular, where numbers of aircraft are increasing significantly, the ANASE data suggest that under-prediction of annoyance is likely.
- Overall, whilst L_{Aeq} continues to be a good proxy for measuring community annoyance at a point in time, the relationship between L_{Aeq} and annoyance is not stable over time.
- Income growth has led to some increase in reported annoyance between the ANIS and ANASE surveys, although this is unlikely to be the full explanation of

the difference in attitude that is apparent. There is evidence that intolerance of aircraft noise has grown.

- The results suggest that L_{Aeq} gives insufficient weight to aircraft numbers, and a relative weight of 20 appears more supportable than a weight of 10, implied by L_{Aeq}.
- An NNI-type[2] measure appears better than L_{Aeq} for estimating future levels of annoyance in response to changing numbers and types of aircraft.

Relevance to London City Airport Application

2.2.51 From the above findings, two critical matters arise with regard to London City Airport's application proposals described in the Environmental Statement, and also for airport development in general throughout the UK.

2.2.52 The first is that this study finds that people are more annoyed in 2005 than was apparent from the previous study (ANIS) which was used to support the key noise policy matters used by Central Government, and in most Airport Master Plans. The findings of ANASE support the view that the adoption of the 57 dB $L_{Aeq,16h}$ value as representing the onset of significant community annoyance is now incorrect, and a lower value should be adopted.

2.2.53 The second is that in order to predict the likely annoyance in the future arising from an increase in aircraft movements, the L_{Aeq} index provides insufficient weight to the change in movement numbers and thus its use could underestimate future annoyance levels.

2.2.54 Each of these points is explored below in the context of the London City Airport proposals.

Current Levels of Annoyance at London City Airport

2.2.55 The Environmental Statement noise chapter has adopted the current Government guidance level of 57 dB $L_{Aeq,16h}$ as the onset of significant community annoyance. This guidance is summarised in CAP 725[3] which identifies the relationship between noise and annoyance as the percentage of people Highly Annoyed (as defined under CAP 725) at 57 dB $L_{Aeq,16h}$ would be about 9%.

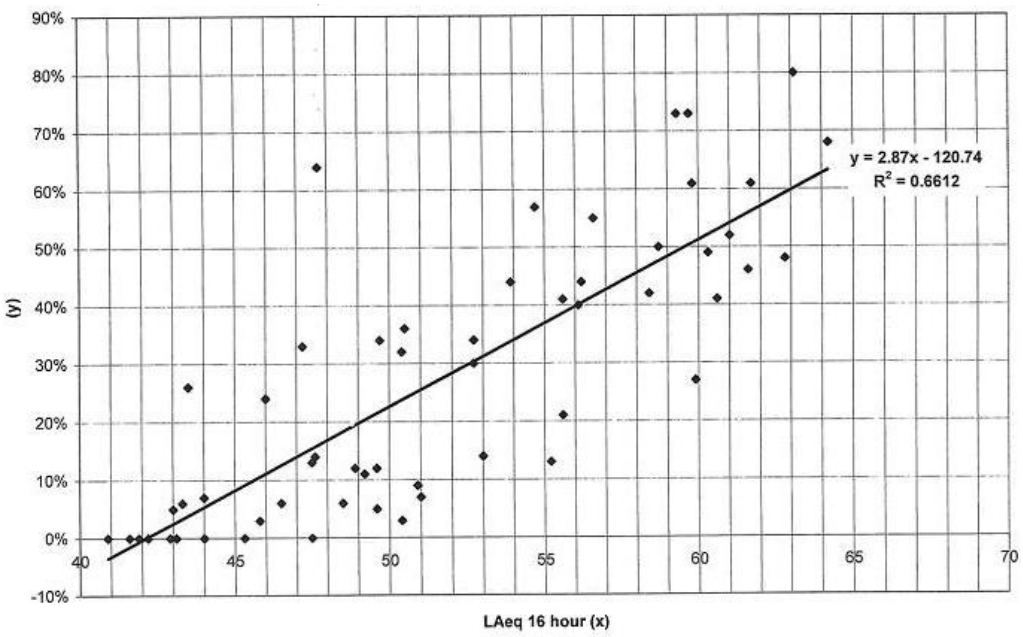
2 NNI – Noise and Number Index which weights aircraft numbers using a factor of 15. As a result of the findings of ANIS in 1985, the NNI was replaced by the LAeq index as a means of describing aircraft noise for environmental planning and community response rating.

3 CAP725: CAA Guidance on the Application of the Airspace Change Process – Environmental Requirements – Noise.

2.2.56 On the basis of the results from the ANASE study, the percentage of Highly Annoyed at 57 dB $L_{Aeq,16h}$ would be about 43%. Figure 2.13 illustrates the spread of the ANASE results, and a simple mean line through the results of percentage very annoyed and noise expressed as dB $L_{Aeq,16h}$. It should be noted, this information was not presented in this format in the draft ANASE report.

2.2.57 On the basis of the results from the ANASE study the noise level related to 9% Highly Annoyed would be around 45 dB $L_{Aeq,16h}$. The percentage very annoyed (i.e. Highly Annoyed under CAP 725) at 57 dB $L_{Aeq,16h}$ in contrast is 43%.

Figure 2.13: Percentage very annoyed against noise level, dB LAeq,16h (ANASE)



2.2.58 Table 2.25 copies the CAP 725 information showing percentages of people highly annoyed by aircraft noise within a contour band. It also shows the ANASE equivalent percentages.

Table 2.25: Computation of ANIS/ANASE Noise Annoyance Relationships

Contour Band	% Highly Annoyed	
	ANIS derived	ANASE derived
54-57	6.6	39
57-60	11.1	47
60-63	18.0	56
63-66	28.0	64
66-69	40.7	73
69-72	54.9	82
72-75	68.2	90

2.2.59 ANASE includes in its analysis a direct comparison expressed in terms of mean annoyance. Here it shows that the level of mean annoyance that occurred at 57 dB $L_{Aeq,16h}$ with ANIS is now occurring with ANASE at a level just over 50 dB $L_{Aeq,16h}$. This, as for the % Highly Annoyed parameter, suggests that the onset of significant community annoyance is occurring at lower levels of exposure to aircraft noise.

2.2.60 The ANASE study presents an annoyance scale for rating responses to a question put to respondents concerning whether they were bothered by aircraft noise. These descriptions and the associated scale for the ANASE study are shown in the table below, copied from the ANASE report. It can be seen that each descriptive category is separated by 20 points. The ANIS study used slightly different descriptive categories for this question and equivalent mean annoyance scores are also shown in the table below. On this scale, a mean annoyance for those exposed to 57 dB $L_{Aeq,16h}$ is 53 based on ANASE data, whereas based on ANIS data, the mean annoyance is 39.

Table 2.26: Weights used to calculate mean annoyance for ANIS and ANASE (Original report ref: Table 9.3)

ANIS Scale		ANASE Scale	
Very much annoyed	87.5	Extremely annoyed	90
Moderately annoyed	62.5	Very annoyed	70
A little annoyed	37.5	Moderately annoyed	50
Not at all annoyed	12.5	Slightly annoyed	30
		Not at all annoyed	10

2.2.61 The ANASE results therefore suggest that instead of adopting a noise level of 57 dB $L_{Aeq,16h}$ as the onset of significant community annoyance, a level in the order of 50 dB $L_{Aeq,16h}$ (or even lower) would be the appropriate level.

2.2.62 At London City Airport, this finding is surprising and in contrast to the community response which the Airport has received over the years regarding environmental noise. The current record of noise complaints received by the Airport annually is low and has remained reasonably consistent, as is apparent from the table below.

Table 2.27: Air noise complaints per year at LCY

LCY Categorisation Year (Apr-Mar)	Number of Complaints re: Air Noise
2000/1	23
2001/2	35 (1)
2002/3	38 (2)
2003/4	20
2004/5	28
2005/6	23
2006/7	24

(1) 24 complaints came from the same three complainants

(2) 22 complaints came from the same two complainants

2.2.63 It is of note that at London City Airport there are no night flights. Aircraft activity at night is one of the matters raised in the ANASE study as giving rise to adverse community response, over and above that recorded during the day. This may explain in part the low level of complaints received at this airport.

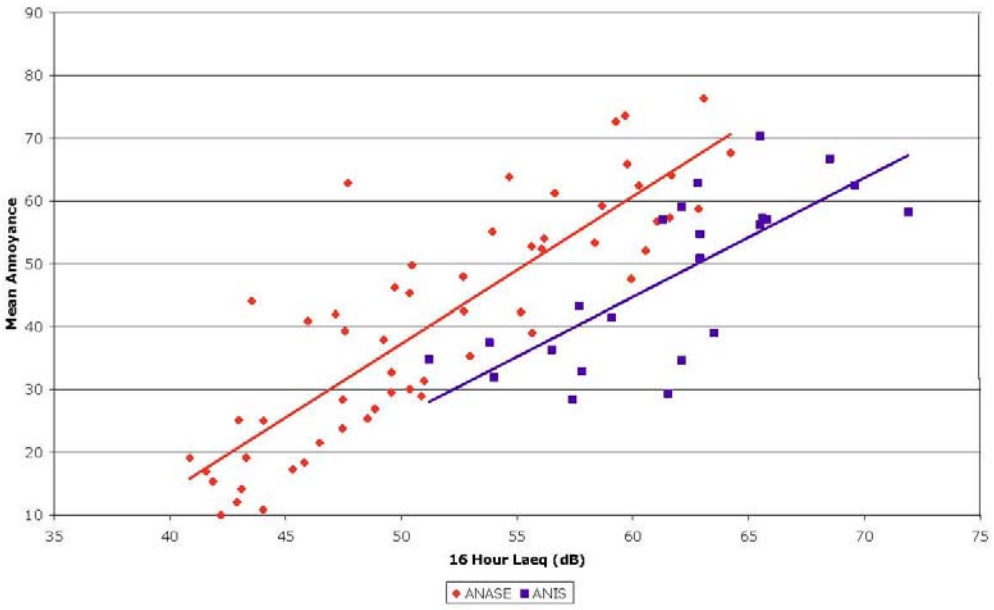
2.2.64 It is apparent from the ANASE study and subsequent Government guidance that people are generally more annoyed now by aircraft noise than they were in 1982. Taking the results of the ANIS and ANASE study combined, the percentage of the population exposed to aircraft noise at a level of 57 dB $L_{Aeq,16h}$ that are likely to be, at least, highly annoyed lies in the range 9% to 43%. It cannot be determined more accurately at this stage where in this range the actual percentage lies but, given the complaint record over the years, the expectation is that it lies toward the lower value at London City Airport.

2.2.65 The key question is whether the current level of aircraft activity is giving rise to unacceptable levels of environmental noise. If based on the above (and the findings of the Environmental Statement), it is determined that current levels of activity are acceptable, the next question is whether the proposed increases in aircraft movements in the future will give rise to acceptable or unacceptable changes in environmental noise.

Effect of Change in dB $L_{Aeq,16h}$

2.2.66 Figure 2.14 below (extracted from the ANASE report) indicates the assumed increase in mean annoyance between the original ANIS study (1985) and the recent ANASE (2005) study for the same dB $L_{Aeq,16h}$ values.

Figure 2.14: Models of Mean Annoyance against LAeq for ANIS and ANASE (Orig. Figure 9.2)



2.2.67 This figure relates, for the two studies, to the following equations:

Mean Annoyance = -68.9 + 1.9 x $L_{Aeq,16h}$ [ANIS]

Mean Annoyance = -74.6 + 2.2 x $L_{Aeq,16h}$ [ANASE excluding sites below 50 dB L_{Aeq}]

2.2.68 Using these formulae it is possible to compute the change in mean annoyance where the noise level increase is 1.0 dB. Using the formula related to ANIS the increase in mean annoyance is 1.9 points. Using the formula related to ANASE the increase in mean annoyance is 2.2, whereas for a 3 dB increase, the increase in mean annoyance is 6.6 points and for a 4.5 dB increase, the increase in mean annoyance is 9.9 points.

2.2.69 As indicated in Table 9.3 of the ANASE report (reproduced as Table 2.26 above), mean annoyance categories are intervals expressed in 20.0 points, i.e. to change from slightly to moderately annoyed requires a change of 20 points. It is logical to conclude therefore, that a change of around 2.2 points is not compatible with material harm or such as to cause an unacceptable disturbance; that is, a 1 dB increase. Even a 3 dB increase in aircraft noise only equates to an increase in 6.6 points i.e. one third of one category. Similarly, a 4.5 dB increase equates to one half of one category.

2.2.70 To assess the implications of the above for London City Airport and the future noise environment under expanded operations, it is possible to consider only the change in aircraft movements between now and 2010 (with consent). This is because in the future, the mix and average noisiness of aircraft will remain much as now. An increase in the future from 73,000 air transport movements (around 80,000 aircraft movements) to 120,000 aircraft movements by 2010 represents a 50% increase in movements between now and 2010.

2.2.71 Using the L_{Aeq} index relationship, a change from 80,000 movements to 120,000 movements would give rise to an increase of 1.8 dB. This would equate under ANASE to an increase of 4 points on the annoyance scale.

2.2.72 In contrast, if the NNI type relationship were adopted, which used a factor of 15 rather than 10 to account for any change in aircraft movements, an increase of 2.6 dB would result. This would equate under ANASE to an increase of 5.7 points on the annoyance scale, just over one quarter of one category.

2.2.73 The ANASE study suggests that a factor of 20 rather than 10 may be appropriate to account for any change in aircraft movements. It finds however that there is little difference between adopting a factor of 15 or 20. It also shows that by adopting the NNI type metric (using a factor of 15), it could provide a better fit than L_{Aeq} to the combined data set of ANIS (1985) and ANASE (2005).

2.2.74 These findings therefore indicate under ANASE that expansion of operations at LCY to 120,000 movements per annum would bring about an increase in mean annoyance of 5.7 points. This corresponds on the ANASE annoyance scale to just over a one quarter increase in one category, each category being 20 points.

2.2.75 In other words, for those people now who are “slightly annoyed” by the current level of aircraft activity at LCY, they will experience in the future under full implementation of the consented scheme, an increase in annoyance of about one quarter of a category. This represents about one quarter of the way from “slightly annoyed” towards becoming “moderately annoyed”.

2.2.75 In contrast, using the ANASE findings but maintaining reliance on the L_{Aeq} index (i.e. an aircraft movement number weighting of 10), these same people would experience in the future an increase in annoyance of one fifth of a category. In broad terms, the change in annoyance is less but little different from that predicted by applying a

weighting of 15 to the number of aircraft movements as suggested in the ANASE report.

2.2.76 Whichever approach is considered, the increase in annoyance is not dissimilar to that described in the Environmental Statement which is based on current Government guidance. For example, a change from a “slightly annoyed” level of aircraft noise (compatible with a level of 57 dB $L_{Aeq,16h}$) to “moderately annoyed” (compatible with 63 dB $L_{Aeq,16h}$) represents a change of 6 dB. A change of 3 dB therefore amounts to a change of one half of a category and, to a first approximation, a change of 1.5 dB a change of one quarter of a category. A 3 dB change is often considered to be the limit between minor and moderate subjective impression in environmental noise terms.

2.2.77 On this basis, it is concluded that the change in air noise level expected as a result of this application, even when assessed under ANASE, is unlikely to give rise to any significant impact.