

**TOWN AND COUNTRY PLANNING ACT 1990, SECTION 77
TOWN AND COUNTRY PLANNING (INQUIRIES PROCEDURE) (ENGLAND) RULES 2000
APPLICATION BY LONDON LUTON AIRPORT OPERATIONS LIMITED
FOR VARIATION OF CONDITIONS 8 (PASSENGER THROUGHPUT CAP), 10 (NOISE
CONTOURS), 22 (CAR PARKING MANAGEMENT), 24 (TRAVEL PLAN) AND 28
(APPROVED PLANS AND DOCUMENTS) TO PLANNING PERMISSION
15/00950/VARCON (DATED 13 OCTOBER 2017)**

**LPA REFERENCE NUMBER 21/00031/VARCON
PINS REFERENCE NUMBER: APP/B0230/V/22/3296455**

Rebuttal Proof of Evidence – Noise

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1. Introduction

- 1.1 This rebuttal proof of evidence has been prepared in response to the evidence of Seth Roberts on behalf of LADACAN. It does not intend to be exhaustive and does not respond to every point of disagreement with Mr Roberts. It simply seeks to address points which I consider it would be helpful to respond to in writing before the inquiry commences. I continue to rely upon my proof of evidence and the evidence that I shall give at the inquiry as necessary.

2. Technical issues

- 2.1 There are a number of technical claims made in Mr Roberts's proof of evidence that are fundamentally incorrect, principally relating to the definition of the decibel and the index based on it and the equivalent continuous sound level, L_{eq} or L_{Aeq} . These are of importance in understanding some key errors in his approach to assessment.
- 2.2 First, in his paragraph 4.2 Mr Roberts asserts "3 dB is actually representative of a doubling in the measured sound pressure." This is incorrect.
- 2.3 In fact a 3dB increase is representative of a doubling of sound intensity which is proportional to pressure squared. What this means is that a 3 dB increase is in fact representative of an increase of sound pressure of just over 1.4 times (i.e the square root of 2). A doubling of sound pressure would be a 6dB increase. A 3dB increase is a doubling of sound intensity, not of pressure.
- 2.4 Second, in his paragraph 2.4 Mr Roberts describes L_{eq} as "This average sound level metric".
- 2.5 This is wrong. L_{eq} is not an average sound level. It is an average of the sound intensity. This is an important distinction.
- 2.6 Figure 1 below shows the L_{Aeq} (A-weighted L_{eq}) value for a period of time during which there is a very prominent noise event, along with the average sound level for the same period of time.
- 2.7 The L_{Aeq} level is much higher than the average sound level because the intensity (in W/m^2) of a sound increases tenfold for every 10 dB increase, so that peaks within a time-series have a predominant influence over the average intensity, which is what L_{eq} represents.

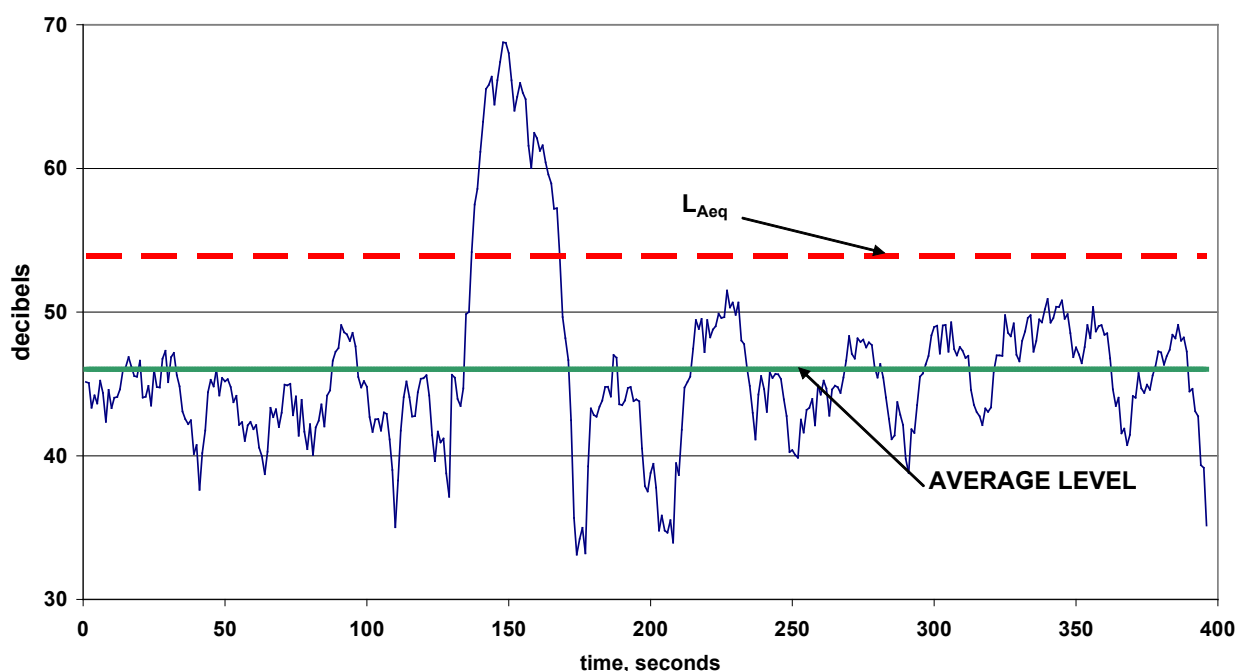


Figure 1 The relationship between L_{eq} and average level

- 2.8 In his paragraph 2.7 Mr Roberts incorrectly states that "The RMS value is typically calculated with either a fast or slow time weighting (100ms or 1s respectively)". In fact the RMS value is typically calculated with either a fast or slow time weighting (125ms or 1s respectively).
- 2.9 In his paragraph 4.7 Mr Roberts states "I do not consider it appropriate to assess the noise impact by looking at the average L_{Aeq} noise levels alone since this metric by its nature as an average does not indicate the changes to both number and level of maximum noise events during flyovers".
- 2.10 This statement is also incorrect. L_{Aeq} is not an average of noise levels. The L_{Aeq} index is sensitive to number of events, duration of events and sound level of events. In his paragraph 6.2 Mr Roberts also makes a similar assertion.
- 2.11 In his paragraph 4.2 Mr Roberts states "Whilst there is plenty of scientific evidence to justify the fact that perception of loudness is proportional to the logarithm of sound pressure, there is no such evidence to suggest that any kind of similar relationship exists in terms of the perceived numbers of aircraft flyovers."
- 2.12 This is incorrect as evidenced by the following example extracts from research reports spanning the past 37 years. There is a wealth of scientific evidence to suggest the relationship that Mr Roberts denies. In examining those extracts, it should be noted that the difference between L_{night} and L_{Aeq8h} is that the former is calculated for annual aircraft movements in the period 2300-0700, and the latter for aircraft movements 16 June to 15 September in the period 2300-0700.

DR Report 8402 United Kingdom Aircraft Noise Index Study: Main Report, Civil Aviation Authority 1985

"9.4 A good fit to the disturbance responses is found to be given by L_{eq} , a measure of noise energy. This corresponds approximately to a trade-off between noise level and (logarithm of) number of aircraft"

Attitudes to Noise from Aviation Sources in England (ANASE) Final Report for Department for Transport In Association With John Bates Services, Ian Flindell and RPS October 2007

"8.4 The L_{Aeq} metric is effective at explaining much of the reported variation in annoyance"

Survey of Noise Attitudes 2014: Aircraft Noise and Annoyance, Second Edition CAP 1506 Civil Aviation Authority 2017

Is $L_{Aeq,16h}$ still the most appropriate indicator to use to estimate the annoyance arising from aircraft noise?

"8.7 The study compared reported mean annoyance scores against average summer-day noise exposure defined using four different noise indicators: $L_{Aeq,16h}$, L_{den} , N70 and N65."

"8.8 Evidence was found that mean annoyance score correlated well with average summer day noise exposure, $L_{Aeq,16h}$ ($r^2 = 0.87$). There was no evidence found to suggest that any of the other indicators L_{den} , N70 or N65 ($r^2 = 0.66-0.73$) correlated better with annoyance than $L_{Aeq,16h}$."

"8.9 Having said this, the study recognises that residents can struggle to understand the concept of a time-averaged metric such as $L_{Aeq,16h}$ and L_{den} and the fact that it is measured

and reported on a logarithmic scale where a change of 3 dB represents a doubling or halving of noise energy."

"8.10 There is, therefore merit in considering greater use of 'Number Above' metrics as supplemental indicators to help portray noise exposure, but recognising that evidence-based decisions should continue to use LAeq,16h. In this context N65 is preferred over N70 as noise events in many areas are already beginning to occur at levels less than 70 dB LA_{Smax} and are forecast to reduce over time"

Survey of Noise Attitudes 2014: Aircraft Noise and Sleep Disturbance CAP 2161 Civil Aviation Authority 2021

Is LAeq,8h an appropriate indicator to use to estimate self-reported sleep disturbance arising from aircraft noise?

"8.8 The study compared reported mean night-time disturbance scores against average night noise exposure defined using three different noise indicators: average summer night LAeq,8h, annual average night L_{night}, and average summer night N60."

"8.9 All three noise indicators are highly correlated with night-time self-reported sleep disturbance ($r^2=0.822-0.883$). The r^2 for L_{night} (0.842) was slightly lower than for LAeq,8h (0.883). It is plausible that L_{night} is inferior to LAeq,8h as both Gatwick and Stansted airports experience significant seasonality with greater numbers of night flights during the summer months. N60 is found to correlate almost as well as LAeq,8h and L_{night}. Based on this exploratory analysis, there is insufficient evidence to change from the current practice of using average summer night LAeq,8h noise exposure for UK assessments."

3. Assessment Assumptions

- 3.1 There is lengthy discussion in Mr Roberts's evidence about the appropriate baseline to be used against which to assess the significance of noise effects which would result from the proposed scheme with a conclusion which he reaches that it is appropriate to use 12.4 or 12.4 mppa as the baseline. This is illogical and flawed on any logical basis.
- 3.2 The airport is currently permitted to operate at up to 18mppa with a noise contour having the area limits set out in the current Condition 10. It has already operated at that level. The application seeks to increase the number of passengers from 18mppa to 19mppa, and to temporarily increase the limits on the noise contour areas.
- 3.3 It is therefore necessary to assess the noise which would result from implementing the scheme applied for against what is already permitted under the current Condition 10 for each of the years to which the different contours areas apply. That means assessing 2023 19mppa against 2023 18mppa compliant with the current Condition 10, 2028 19mppa against 2028 18mppa compliant with the current Condition 10, and 2031 19mppa against 2023 18mppa compliant with the current Condition 10.

4. Statement of Truth

- 4.1 I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer.