

HACAN

Heathrow Association for the Control of Aircraft Noise

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PROOF OF EVIDENCE

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LANDING NOISE - THE OFFICIALLY IGNORED PROBLEM AT HEATHROW

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PERSONAL DETAILS

I hold the degrees of Bachelor of Science and Doctor of Philosophy of London University. I am a Chartered Chemist and a Fellow of the Royal Society of Chemistry.

I am now fully retired but during my working life I have been responsible for the research efforts of several units culminating in my role as Vice President for Research and Development of Wyeth Laboratories U.K.

I have lived and worked in the Heathrow area since 1951 and, for the last 26 years, resided in Isleworth approximately five miles from the airport itself. During this period I have become progressively aware of the environmental damage caused by overflying aircraft. My personal experience has shown that, contrary to some reports, the noise burden has worsened with every year that passes and has now reached a level which is truly insupportable for reasonable people with reasonable expectations for their domestic environment.

Unwillingly, and despite having a firm and long-standing relationship with the local community, I have now moved house away from the airport and thereby acknowledged that the area has, for me, become uninhabitable. It is my concern for those that I have left behind which occasions my continued interest in ensuring that the noise insult does not worsen further as it undoubtedly will should Terminal 5 ever receive planning approval.

LANDING NOISE

1. Scope of Evidence

- 1.1 Perception of noise is, almost by definition, subjective. What to one is a melody is to another a dissonance; what to one is a murmur is to another a roar. Nevertheless, the balance between the environmental disturbance which will undoubtedly occur should expansion at Heathrow be permitted and the economic benefit such expansion will produce will be the possible final arbiter in the decision making process in determining rejection of Terminal 5.
- 1.2 Despite much dialogue there is no agreement between the contending parties regarding the extent of current noise levels and the disturbance they cause. Agreement on what the future will bring is impossible.
- 1.3 My aim, therefore, has been to concentrate on those areas where a measure of agreement is apparent in order to assist the Inspector in coming to a decision. Where differences exist these will be pointed out and an estimate, albeit partial, given of where the balance of judgement might lie.

2. History

- 2.1 The assessment of the extent of the noise insult at Heathrow was a feature in the two previous public inquiries under Lord Justice Glidewell in 1979 and Sir Graham Eyre in 1984.
- 2.2 Glidewell concluded in his report that construction of Terminal 4 would slow down the expected improvement in the noise climate around Heathrow but to an extent which, in practice, would not have any marked impact (CD 3 Chapter 5 para. 12.2). He also reported that the noise of aircraft on the approach was the greater problem and that, overall, the levels of noise around Heathrow at that time were unacceptable in a civilised country (5.12.3). These views were based on the prevailing air traffic movements (ca. 275,000) along with conservative passenger growth projections. Both these provided, in the event, unreliable bases for decision making.
- 2.3 Eyre was less exercised by aircraft noise levels and, indeed, stated (CD 4, Chapter 42, para. 10.3) that “rejection of a proposal for the development of additional terminal accommodation at Heathrow on grounds relating to noise would be unjustifiable and unwarranted”. In arriving at this conclusion Eyre believed the maximum capacity of Heathrow to be 300,000 flights (Chapter 42 para. 9.39) and that “the difference in noise climate between a four or five terminal Heathrow will be imperceptible” (Chapter 42 para. 9.32). He believed the noise climate would improve significantly and perhaps to fulfil this belief he recommended that a total night flight ban be introduced (Chapter 42 para. 9.50). Clearly the protagonists for

expansion at the Eyre inquiry were persuasive even though the inquiry decision went against approval of Terminal 5, but for reasons other than noise.

- 2.4 While some still argue that the noise climate around Heathrow today is better than it was in 1984, it is clear that the level of protest against the overall noise burden has not abated in the intervening years and has recently increased markedly (see PS 7.3 Volume 1 Appendix 5)

3. Nature of the Problem Today

- 3.1 There are two factual differences between the situation today and that prevailing at the time of both Glidewell and Eyre.
- 3.2 First the number of atms has increased markedly: from 275,000 then to well over 420,000 today, and with little sign of slackening.
- 3.3 Second the overall mass of the average aircraft has increased, in part to meet increase in passenger numbers and in part for reasons of efficiency in handling traffic. Both BAA plc and British Airways are confident that this increase in average aircraft size will continue even to the extent of radically restructuring the total layout of Heathrow to accommodate an, as yet unidentified, New Generation Large Aircraft capable of carrying over 600 passengers.
- 3.4 Projections as to the effect construction of Terminal 5 would have on the overall noise climate differ. The proposers tend to suggest that differences would be modest and, in part, even beneficial (BAA 1 para. 18.17). Those opposed to the construction disagree. There is no consensus.
- 3.5 In the specific case of landing noise, however, there is broad agreement within all parties that Terminal 5 would cause an adverse effect on the noise climate between Heathrow and Central London. BAA claim (BAA 1 para. 18.18) that this arises from the increase in the number of large aircraft movements and later (BAA 1 para. 18.23) admit that: 'The additional movements and different fleet mix associated with the provision of Terminal 5 mean that about 107,000 people who would otherwise fall outside the 57 dBA contour in 2016 would fall within it if Terminal 5 was built'. If, as is widely believed, Terminal 5 were to provide capacity at Heathrow for 100 million passengers, then 126,000 extra people would suffer (BAA1 para 18.29).
- 3.6 It is not the intention of this proof to accept or deny the validity of the contours projected by BAA; that will be done elsewhere. However, Figure 18i in the BAA Statement of Case shows how the 57dBA Leq contour on the eastern side of the airport has extended in the years 1991 to 1994 and how it will further extend in 2016 with Terminal 5. Figure 18v shows further extension eastwards if passenger numbers with T5 increase to 100 mppa, while the projected contour from the

RUCATSE Base Case (CD 23) in the year 2025 (which assumes T5 but no extra runway) shows it to extend to Clapham aligned with Chelsea Bridge.

- 3.7 Accepting the agreement existing on this aspect of the disbenefits arising from further expansion at Heathrow this proof will now seek to identify the essentials of landing noise, its recent history and the potential impact it may have in the future.

4. Impact of Landing Noise

- 4.1 Given the nature of the prevailing winds in South East England, approximately 70-75% of aircraft land from the East over Central and West London to touchdown on runways 27L and 27R at Hatton Cross and Cranford.
- 4.2 Figure 1, drawn by BAA plc to represent the flight path adopted by aircraft on the 50th Anniversary flypast in July 1996, accurately reflects the Instrument Landing System (ILS) to runway 27R. It shows the area overflowed with aircraft at approximately 3000 ft at Westminster descending on a 3° slope to final touchdown some 12 miles to the West. The map attached (Figure 2), produced by the Heathrow Noise Information Office, shows how aircraft landing from the east swarm over Central London before adopting a rigidly demarcated flight path to touchdown at Heathrow every 90 seconds.
- 4.3 The population density of this area is above average even for London and far in excess of that experienced at most other airports. Even in 1979 this was apparent (Glidewell 5.12.3) while Eyre acknowledged the extent of population density under the extended flight paths sufficient to recommend (Chapter 42 para. 9.50) a total ban on night flights.
- 4.4 Both previous Inspectors relied upon incorrect assumptions of runway capacity at Heathrow. We now know that movements have increased by over 50% to 427,000 with the likelihood that, even without Terminal 5, the current demand for slots will see the number reach 450,000. Should Terminal 5 go ahead the terminal and stand capacity thereby generated would increase the pressure to allow movements to rise to a level in the range 500,000 to 550,000. Such an increase would, if it occurred, threaten retention of runway alternation, with devastating environmental impact.
- 4.5 In these circumstances, irrespective of the actual noise each aircraft produces, the sheer frequency of movements has created a noise environment substantially worse than that prevailing either in 1979 or 1984.
- 4.6 For large sections of the day, depending on alternation, from either 6 am to 3 pm or 3 pm to 11.30 pm, aircraft land over West London every 1 to 2 minutes. Even when the flight frequency was less and the size of 'plane much less Eyre was led to record witnesses' evidence (Chapter 42 para. 3.4) that "It is the frequency of the aircraft noise which is the irritation rather than the sheer intensity of the noise itself".

- 4.7 It is the intention of this Proof to show that what Eyre said in 1984 is overwhelmingly more relevant today with flight numbers greater and the average aircraft mass substantially larger.
- 4.8 An experiment to explore reducing the minimum spacing between aircraft on final approach from 3 nm to 2.5 nm (CD 97 para. 2.3) will, if successful, exacerbate this already acute situation, by reducing the time between arriving aircraft from around 90 seconds to about 75 seconds.
- 4.9 While the validity of noise contours in assessing noise disturbances is not universally accepted and will be discussed in other HACAN proofs, the steady extension eastwards shown in BAA 1 Figure 18i; and the RUCATSE Base Case projection for 2025 is dramatically (literally) reflected in reports of landing noise disturbance at the new Globe Theatre just south of Southwark Bridge and approximately fifteen miles from touchdown (see Attachment 1).
- 4.10 Noise contour boundaries are simply constructs. Even if they were valid it is clear that noise disturbance does not cease outside them. Indeed, examination of complaint data shows that residents far to the east of the 57dBA Leq contour suffer from landing noise (see Responses to Consultation Papers on Night Restrictions from October 22 1995 Dept. of Transport, as highlighted in HAC 33). Moreover, the proportion of complaints attributable to landing noise is increasing remorselessly (See Attachment 2).

5. Will Levels of Landing Noise Improve?

- 5.1 BAA (BAA 1 para. 18.23) quote Sir Graham Eyre in support of their case that, irrespective of contour, any change in the actual noise levels produced by T5 would not have “any marked impact”. Sir Graham’s opinion is worthy of quotation for historical interest, but it should be remembered that the projections on which the opinion was based are now known to be false. Atms have increased by 50% between 1983 and 1995 and passenger numbers doubled (BAA 1, Table 5).
- 5.2 BAA identify ex cathedra projections of what it will all mean topographically in BAA 1 Figure 18iv, where noise exposure levels seem never to increase by more than 2dBA whether Terminal 5 is approved or not.
- 5.3 BAA maintain that changes of this order represent only “small differences in average annoyance” (BAA 1 para 18.23). However, a less rosy indication of what these seemingly small changes really mean on the ground can be obtained from the DORA Report 9023 (CD 18) prepared by the CAA for the D.o.T. in 1990. This showed, from actual surveys, that “aircraft noise changes from a minor problem below about 55dB(A) Leq (24 hr) to a significant one above about 60dB(A)” (para. 2.4.2).

- 5.4 It is this threshold of 55dB(A) which is being breached in the densely populated large elongated tongue of land stretching out beyond Heathrow towards Kensington and Wandsworth which is delineated in the BAA Figure 18iv.
- 5.5 In a further CAA report, this time prepared for BAA (BAA 703), a cautious statement (para. 4.5) on the future of landing noise levels (perhaps designed to reassure) advises: “Approach footprints are not expected to shrink (sic) appreciably; as a consequence, approach noise will be a proportionately greater component of the overall noise exposure than has been the case in the past”.
- 5.6 Far from shrinking we know that, with T5, approach footprints will expand.
- 5.7 The CAA report continues (para. 4.8) gently to warn that “On approach the engine noise differences are rather smaller. Although further noise reduction through improved engine design cannot be ruled out, present indications are that this is likely to be relatively small. Moreover, even if such gains are made in the longer term, residual airframe generated noise is likely to limit the overall reductions that are achievable in approach conditions”. It goes on (para. 4.9) to state categorically that “it is apparent that the approach noise of the larger aircraft will be an important factor in the future Heathrow noise climate”.
- 5.8 Clearly aircraft size will be a very important factor in defining the future noise climate of West London and it is this which is addressed below.

6. So How Loud are Big Planes?

- 6.1 Measures of loudness of aircraft are complex and specific for various purposes. They also fall in and out of favour and their use changes with time. One seeming constant measure is dB(A) which relates to another measure EPNdB by the equation $L_{max} \text{ dBA} = \text{EPNdB} - 14$ (see BAA 703 para. 4.4). An earlier measure, still used to identify noise limits, is PNdB (see CD 154 para. 3) and relates to $L_{max} \text{ dBA}$ by the equation $L_{max} \text{ dBA} = \text{PNdBA} - 13$. A specific measure, SEL (sound exposure level), which also accounts for noise duration, approximates to EPNdB -3 (CD 23). While no doubt invaluable for acoustic engineers, the widespread and varied use of these several measures serves frequently to confuse rather than enlighten.
- 6.2 The current situation at Heathrow for departing aircraft is that their noise should not exceed 97dBA during the day and 89dBA at night. If the proposal described in CD 154 is brought into practice these limits will be reduced to 94dBA (day) and 87dBA (night).
- 6.3 If aircraft fail to meet the current (higher) limits at Heathrow they are fined. Breaches are infrequent, running at below 0.1% of departures (see Attachment 3).

- 6.4 Figure 3 of BAA 703 shows the current noise certification levels, expressed in EPNdB, along with generalised predictions for future aircraft at the flyover point. If we take the current day time noise limit at 97dBA (equivalent to 111EPNdB) it can be seen that no aircraft does nor will exceed it. Indeed, even if we assume the D.o.T. proposals to reduce this by 3dBA, again no aircraft will find difficulty in meeting the day time limits.
- 6.5 At night, some (perhaps 2) departing aircraft would have marginal difficulty in meeting the current limit (89dBA, equivalent to 103EPNdB) and a few more (perhaps 5) the proposed limit (87dBA, equivalent to 101EPNdB).
- 6.6 On this basis it would seem unlikely that the ANMAC proposals mentioned in CD 154 would worry airlines unduly. Yet despite this, IATA, representing the vast majority of airlines at Heathrow, made an appeal to the High Court. During this exercise BA claimed that the proposals would undermine international agreements, operate as a retroactive tax and increase their annual fines at Heathrow from £33,000 to £1.5 million. It should be remembered that the noise limits against which IATA and BA are appealing were set for Heathrow in 1959 - nearly 40 years ago.
- 6.7 With regard to landing noise, however, the situation is much less clear cut. CD 154 (para 5) tells us that ANMAC is beginning a study, expected to take around two years, of the feasibility of setting noise limits for landing aircraft.
- 6.8 To the best of the CAA (NATS) knowledge (letter from M. J. Gibson 15 February 1996) "few airports in the world monitor the noise of arriving aircraft and none set arrival noise limits".
- 6.9 Given that few, if any, major airports have the problem apparent at Heathrow, where a massive conurbation in London is overflowed to achieve touchdown, the failure to monitor landing noise may appear unremarkable. However, the fact that disturbance from landing noise is now evident from Greenwich in the east to Henley in the west indicates an urgent need to identify the problem in a frank, explicit, clear-cut manner. Indeed, failure to do so implies either dereliction or a desire to keep hidden a major problem at a time when proposals designed to worsen it are being discussed at this Inquiry.
- 6.10 Nevertheless, it is apparent that some authorities are becoming aware that the problem is there and may well worsen (Attachment 4). Thus Dr Ollerhead (letter 20 May 1996) agrees that noise levels on approach are greater than on departure (para. 4) but the approach footprint is smaller. Miss Elizabeth Duthie (letter 30 April 1996) recognises that landing noise is "a matter of increasing concern" (para. 5). Mr Mike Birchall, Head of Noise Policy at Heathrow, in his report dated 10 May 1996 page 2; para. 9), states that "departures noise is now less of an issue and many complaints are related to arrivals noise".

- 6.11 From this evidence alone the identification of the nature, degree and frequency of landing noise is of major importance and fundamental to the decision whether or not to allow expansion at Heathrow. The clear probability exists that the disturbance is already unacceptable and cannot be allowed to deteriorate.
- 6.12 Some assistance in identifying the true extent of the problem is provided by BAA 703 Figure 4. This shows graphically the certificated and projected levels of approach noise of aircraft using Heathrow. At first glance this might be thought to be using the same ordinates as those for Figure 3 (departure noise). This is not the case. While the x axis (take-off mass) is identical for the two graphs, the y axis (noise level scale) is subtly modified. Thus, in the case of take-off the levels measured are from 80 - 110 EPNdB, while in the case of landing noise the scale is from 90 - 110 EPNdB. This is shown more clearly in the positioning of the Chapter 3 limits which, while seemingly similar, start at 98 EPNdB for approach but only 89 EPNdB for take-off. The justification for these statistical constructs may, of course, be real, but their effect is confusion. To the untutored eye the graphs suggest that landing noise is less of a problem than it really is.
- 6.13 As stated above (para. 6.7) there is no noise limit for arriving aircraft. In the absence of same it would not be unreasonable to apply, albeit in theory, the same limits as those set for departures. If this is done and a similar analysis carried out as is described above (paras. 6.4 and 6.5) we discover that, whereas with departures no aircraft exceed the 97 dBA / 111 EPNdB daytime level and only one the projected 94 dBA / 108 EPNdB daytime level, when we come to night arrivals, many aircraft exceed the current limit of 89 dBA / 103 EPNdB and many, many more the proposed night-time limit of 87 dBA / 101 EPNdB.
- 6.14 This gloomy projection was, of course, recognised by the authors of BAA 703 (para. 4.8) when discussing the possibility of the future amelioration of aircraft noise by technological improvement in engine design (see para 5.7 above).
- 6.15 The language of BAA 703 is clearly guarded and possibly designed to allay concern regarding the proposal to build Terminal 5 (see also paras. 5.1 and 5.2). However, the message it carries is undeniable, namely that the noise from landing aircraft at Heathrow, already bad, is certain to worsen. In the words of the report (para. 4.9) "Nevertheless, it is apparent that the approach noise of larger aircraft will be an important factor in the future Heathrow noise climate". All authorities agree that if Terminal 5 goes ahead it will be ever larger aircraft that will dominate the skies around Heathrow.
- 6.16 Examination of BAA 703 allows some understanding of the implications of the proposal to build Terminal 5. The BAA case is that passenger throughput will increase from 50 million to 80 million. The local authorities believe that the increase will be from the current throughput (56 million) to 100 million. Irrespective of who is correct, any proposal to increase passenger numbers must

require more aircraft seats either in more aircraft (denied by BAA over 8%) or in bigger aircraft (suggested by BAA but questioned by opponents).

- 6.17 BAA 703 (Para B1; Figure B1) shows clearly that the number of seats is proportional to aircraft mass and that, in turn, aircraft mass is proportional to the event noise levels on landing (Figure 4. Paras 4.2 and 4.9). From this, the inescapable conclusion is that, irrespective of whether BAA is correct in believing that a passenger increase of 60% can be accomplished with an aircraft increase of only 8% or whether their opponents' belief is correct that more planes will be required, the effect will be much the same. Both solutions will generate more noise over the landing approaches to Heathrow, where noise disturbance is already unacceptable in a civilised country.

7. Noise Monitoring of Landing Aircraft

- 7.1 While the CAA/NATS believe that few airports in the world monitor the noise of arriving aircraft, as noted in para. 6.8 above, the D.o.T. is aware that "the noise of arriving aircraft (at Heathrow) has been monitored from time to time for many years for other purposes" (Attachment 5, para. 4, letter 11 March 1996), though the actual values obtained are not in the public domain.
- 7.2 Given the importance which attested levels of landing noise have for decision making in the current inquiry it is unfortunate that they are not readily available. Indeed, in their absence it is difficult to imagine how any reliable judgement can be achieved. Clearly such data must be provided by a reliable independent source and to that end the D.o.T.'s Aircraft Noise Monitoring Advisory Committee (ANMAC) is clearly the ideal body. It is surprising that it has not yet already been achieved, despite having been promised over four years ago (PS 7.2 Press Notice 265, page 2, bullet point 5).
- 7.3 Landing noise levels at many locations have been measured by opponents of the construction of Terminal 5 and will, no doubt, be presented by the Local Authorities. They will not be discussed here. Rather, it is useful to consider a study commissioned by Heathrow Airport Limited for the Heathrow Airport Consultative Committee (Report LHRARR13).
- 7.4 This study measured the noise emitted by several representative aircraft when landing at Heathrow.
- 7.5 Using several monitoring points at varying distances from touchdown it was possible to show (para 30) that noise levels vary with the height of aircraft over the monitor.
- 7.6 The aircraft studied in greatest detail (B757) is not a large plane in the spectrum of aircraft using Heathrow. Nevertheless, at the Causeway Nature Reserve, approximately 2 km east from touchdown, it reached a noise level of 87 dBA

(Chart 1). This is the current noise limit for night departures of all aircraft from Heathrow. The Boeing 757 is regarded as one of the newer “quieter” aircraft and rated QC 0.5 or 1.0 (See PS 7.2 Notice 265 Appendix 5 page A1/1).

- 7.7 The noise levels of aircraft other than the Boeing 757 were measured at the Causeway site but not given in the report because “many of the aircraft were below minimum height for the NTK printouts (Para. 10)”. It is unfortunate that this fact should result in the loss of the noise level measurements themselves.
- 7.8 However, some idea of what the noise levels might be can be identified by extrapolation of the graphs given in the report.
- 7.9 Thus, for the B737-200, 300, 400 and 500 the Lmax 1s (dBA) would appear to be around 87 at a height of 120 metres, while for the B747-200 it would seem to be close to 95 dBA. This latter value is very close to the current daytime limit for departures, marginally in excess of that proposed by the D.o.T. in CD 154 for the departure limits and well in excess of the current night-time departure limit.
- 7.10 The newer “quiet” B747-400 records less noise than its sister aircraft, but still appears to exceed 90 dBA at the Causeway.
- 7.11 Throughout this exercise one must remember that these are representative aircraft landing at Heathrow throughout the day and, in a limited fashion at night, at a frequency of up to 40 movements per hour.
- 7.12 If the levels of noise around Heathrow were unacceptable in 1979 it is difficult to describe adequately the impact they produce some 18 years later. All that we can say for certain is that if Terminal 5 is allowed the noise will worsen. All parties, proponents and opponents, are agreed on this.

8. Conclusions

- 8.1 While it is possible that the D.o.T. will provide landing noise data prior to the inception of noise Topic 5 its absence now is both surprising and unfortunate. Certainly, without it no valid judgement of the environmental impact of Terminal 5 can be made.
- 8.2 At this time all evidence to hand indicates that:
- (i) Landing noise is a very major part of the noise pattern at Heathrow, it is getting worse and there is no sign that technological advances will improve it.
 - (ii) Further expansion in passenger numbers must require either more aircraft or bigger aircraft or both. Either or both will occasion more landing noise.
 - (iii) As frequency of landing aircraft increases the disturbance to those on the ground increases disproportionately.
 - (iv) The density of population to the east of Heathrow, spreading back into Central London, is high, probably greater than that of any area contiguous with a major world airport. It has suffered enough. It requires less noise not more.
 - (v) On the basis of these facts, and on the detail given in the body of this proof, the environmental disturbance caused by the construction of Terminal 5 should it ever come about would turn substantial areas of West London into an acoustic slum; a disbenefit to the community far in excess of any commercial advantage the development might achieve.