

Question 3

Respondents

a) Specific: 2M, CAA, EANAG, Hacan, HAL, Hammersmith & Fulham Council, Hillingdon Council, Kensington and Chelsea Council, LAANC, RHC, Richmond Council, Wandsworth Council, Windsor & Maidenhead Council, Mayor of London, Gatwick (15)

b) Other: Reports submitted by AEF, NATS and Virgin Atlantic that are not question specific

Question

What are the prospects for significantly less noisy aircraft at Heathrow over the next ten years and are the prospects in any way dependent on the development of the proposed third runway? To what extent is there a conflict between the optimum reduction of aircraft noise and carbon emissions?

Background

In its evidence to the Heathrow Terminal Five Public Inquiry the Government and the aviation industry stated that after the phase-out of Chapter 2 aircraft in 2002 there would be limited scope for further reductions in noise per aircraft. Further concerns have been raised that it is not possible to reduce both aircraft CO2 emissions and aircraft noise. We would like clarification on both points; and on whether a third runway at Heathrow would affect the rate at which less noisy aircraft (if feasible) would be introduced.

Template updated 15 Dec 14 PJW

2M, Hillingdon Council and Kensington and Chelsea Council

Whilst we are not experts in this field, we do have concerns over the use of over-optimistic assumptions for future aircraft in terms of predicted noise and emissions reductions. We have examined the CAA annual noise contours for Heathrow Airport, as provided by the Richmond Heathrow Campaign. What these indicate is a significant (approximately 50%) reduction in the noise contour area from 1991 to around 2003, as the noisiest of aircraft such as Concorde were retired. Our concerns arise in relation to the annual contours from the last 10 years which do not show any significant annual reductions. Given that the CAA report "Managing Aviation Noise" cautions that the introduction of new aircraft types is a "slow and typically cyclical process that can be fraught with delays and issues", it would be helpful to seek independent advice as to the likely extent of any significant change in this trend.

CAA

In terms of new aircraft designs, Airbus A380 operations began at London Heathrow in 2008, followed by the Boeing 787 in late 2012. These aircraft represent a step change in environmental performance, in terms of both noise, CO2 and local air quality emissions. The CAA recently published CAP 1191, commissioned by Heathrow Airport Limited, which analysed Boeing 787 noise levels around Heathrow, and found that noise levels are consistent with it producing a noise footprint on takeoff or landing of half the size of the aircraft it is most likely to replace.

Over the next five years, the A380 and B787 will be followed by the Bombardier C Series, the Airbus A350, A320 NEO, A330 NEO and Boeing 737 MAX. Each of these aircraft has a take-off noise footprint around one-half the size, and an arrival noise footprint two-thirds to half the size of the aircraft it is likely to replace, all whilst also reducing fuel burn and engine emissions. The Airbus A380 noise characteristics were also directly driven by a requirement to meet Heathrow's stringent night noise limits, illustrating the power of strict controls at Heathrow to drive manufacturer development and airline purchasing choices.

ICAO recently updated its own independent expert review of manufacturing noise-reduction progress, which resulted in the adoption of a long-term technology goal to reduce noise at a range of 0.1 dB/year, equivalent to halving an aircraft's noise footprint every 30 years. European industry has adopted a more challenging target as part of the ACARE Flightpath 2050 goals (source: www.acare4europe.com), which, over 50 years, is equivalent to a reduction of 0.3 dB/year, or a halving the noise footprint every ten years.

These developments are not directly dependent on the expansion of Heathrow. However, in the past, Heathrow's commercial importance has enabled it to influence manufacturer noise goals, (for instance the noise requirements placed on the Airbus A380 design). Many in the aviation industry suggest that capacity expansion is an important factor in sustaining the commercial importance of Heathrow, indicating that Civil Aviation Authority associated tighter controls on noise may again incentivise focus on noise performance. In addition, adding capacity to an airport like Heathrow is likely to lead to airlines purchasing more aircraft, reducing the average fleet age and thus environmental impacts of the overall fleet.

Carbon reductions also reduce fuel burn, lowering airline costs, and providing a natural incentive for industry. While there are tradeoffs between reducing noise and carbon, these continue to be at the margin, such that at present industry is continuing to reduce noise and carbon with each new design. While some technology roadmaps may shift this balance more towards carbon or noise, resulting in either carbon or noise performance being less optimised, at least for the foreseeable future industry appears to be focussed on both noise and carbon reduction. For instance, the recently announced Rolls-Royce Ultrafan, will provide further reductions in both noise and carbon emissions.

EANAG

Reduction in the noise produced by newer aircraft is largely mythical. The noise certification obtained by a new aircraft in test conditions is quite different from the noise the aircraft makes when loaded and in operation, eg the Airbus A380 in practice is as noisy as the Boeing 747 it is replacing. After the Boeing 787 there do not appear to be new aircraft on the horizon, and even if there were, any reduction in the noise made is likely to be minimal. Heathrow's claim that there would be less noise with a third runway is unrealistic, not to say fraudulent.

Hacan

Heathrow sets out its case for quieter planes on pages 14 and 15 of *Air and Ground Noise Assessment - 01: Air and groundnoise assessment*. HACAN doesn't have the technical knowledge to assess the accuracy of these claims but they have been questioned by two recent reports; *Managing Aviation Noise*:<http://www.caa.co.uk/docs/33/CAP%201165%20Managing%20Aviation%20Noise%202.pdf>, published by the CAA; and a report published by Transport for London (TfL) :<http://www.tfl.gov.uk/cdn/static/cms/documents/t-aviation-noise-modelling-heathrow-options.pdf>

The CAA acknowledges aircraft will become quieter but is less confident than Heathrow about how quickly the quieter planes will be introduced. Its report says: "Introducing new aircraft types is a slow and typically cyclical process that can be fraught with delays and issues, as recent experience with the introduction of both Airbus and Boeing's new models, the A380 and 787, has shown. Even when new aircraft types are available, reflecting [converting the whole fleet to quieter planes] is a lengthy and expensive process for airlines, with significant resource impacts." It goes on to point out that hundreds of the aircraft types would need to be removed by 2025/6 if Heathrow Airport were to meet its target: "in early 2014, British Airways' long-haul fleet consisted of 55 Boeing 747-400s, 21 Boeing 767-300s and 55 Boeing 777s." It could be 25 years before some of these planes are replaced.

Transport for London is even more doubtful than the CAA that the fleet mix will be as Heathrow Airport predicts by 2025/6 when a 3rd runway would open. It cites as evidence the fact that: “IAG (BA and Iberia) are still placing orders for conventional A320’s [one of the aircraft types that would need to be phased out].” It is also sceptical the new aircraft would be significantly quieter than the existing ones: “An older Boeing 747-400 has an Lmax (peak noise event impact) when arriving at 1,000 ft of 86dB. An Airbus A380 has an Lmax arriving at 1,000 ft of 85dB. This represents a relatively insignificant difference, despite the A380’s much heralded status as a quieter aircraft.”

The reports all tend to use different end dates. It would be useful for the Committee to get clarity from the different parties what they think the fleet mix will be in (a) 2025/6 when any third runway would be expected to open and (b) in 2040 when Heathrow expects it will have reached capacity. It would also be crucial to explore the *actual* difference the quieter planes would mean to people on the ground.

HAL

We believe the prospects are good. Over the coming decade we expect to see the introduction of A350s and new variants of A320 and B777s for example. Heathrow’s status as an important hub means that airlines tend to deploy their newest and quietest aircraft on Heathrow routes, a feature of strong competition on premium routes. We also provide a strong financial incentive for airlines to use the quietest planes through our variable landing charges (which are currently the only landing charges in the UK that split the current quietest standard – Chapter 4). We continue to look at how we can incentivise the early adoption of new aircraft at Heathrow and are committed in our Noise Action Plan to regularly reviewing our charging structure.

As a result, over 98% of aircraft at Heathrow meet the quietest current international noise standard. More airlines use the latest Airbus A380 “Superjumbo” and Boeing 787 “Dreamliner” than at any other European hub. Nevertheless there is more we can do and the introduction of a new noise category (Chapter 14) in 2017 will allow further differentiation as part of our variable landing charges. In addition a third runway offers opportunities to further incentivise less noisy aircraft, for example through “green slots” where only the quietest category of aircraft are allocated new slots.

There are interdependencies between noise and carbon emissions. These are complex and require careful evaluation prior to regulatory, operational or design decisions. However aircraft manufacturers are confident that new generations of aircraft will be more fuel efficient AND quieter than today’s equivalents.

Hamersmith & Fulham Council

The airport, airlines and aircraft manufacturers are best placed to answer this question. We look forward to seeing any comments they make to the APPG on this issue.

Hillingdon Council

See 2M

Kensington & Chelsea Council

See 2M

LAANC and Wandsworth Council [text colour: black- common to both submissions, green-LAANC only, red-Wandsworth only]

We are concerned LAANC believes that predictions made by Heathrow Airport in terms of the noise performance of its future fleet are over-optimistic in terms of landing noise performance. It is also the case that since the retirement of Concorde just 10 years ago there has been no step change in reduction of noise around Heathrow in terms of population affected within the government's 57dB contour area – the numbers remain at around 240,000 citizens. Over the last 10 years since the retirement of Concorde there has been no step change in terms of population within the government's 57dB contour area, it remaining at around 240,000.

The CAA, the UK independent aviation regulator, says that while it believes aircraft will become quieter, it is less confident than Heathrow Airport about how quickly the new generation planes will be introduced. Its recent report "Managing Aviation Noise" the CAA reports that "Introducing new aircraft types is a slow and typically cyclical process that can be fraught with delays and issues, as recent experience with the introduction of both Airbus and Boeing's new models, the A380 and 787, has shown. Even when new aircraft types are available, refueling [converting the whole fleet to quieter planes] is a lengthy and expensive process for airlines, with significant resource impacts."

The CAA report also notes that hundreds of the aircraft types would need to be removed by 2025/6 if Heathrow Airport were to meet its target.

We would also caution that on current evidence from the CAA, improved noise performance of new and next generation aircraft may not be achieved on arrivals (see CAA reports ERCD 1106 - for Airbus A380 aircraft and CAP 1191 for the Boeing 787). Our concerns are also shared by Transport for London who quote specific data. TFL say "An older Boeing 747-400 has an Lmax (single event noise impact) when arriving at 1,000 ft of 86dB. An Airbus A380 has an Lmax arriving at 1,000ft of 85dB.

A 1dB(A) difference in terms of a single event level would not be perceptible on the ground.

The consequence of using over-optimistic assumptions for future aircraft efficiency in terms of noise and emissions reductions is that they are translated without question or sensitivity testing into future predictions of community impacts by policymakers. If these projected improvements do not translate to actual in service noise levels, this will result an increased environmental burden and social impact upon the local communities. We believe that if aircraft fleet assumptions were to be subjected to a critical independent peer review process, this would go some way to gaining confidence in what the future noise climate is actually likely to be in terms of community impact. It would be helpful if the Parliamentary Group could investigate this option.

With regard to the future priorities between designing for noise reduction or for emission reduction we would refer the Parliamentary Group to the CAA Managing Aviation Noise report. This suggests that concerns over climate change and local air quality could increase the likelihood of trading off designing for emission reductions against improved noise performance. (page30). More evidence is needed to clarify this and to ensure that this is appropriately factored into the future fleet assumptions.

Richmond Heathrow Campaign

Noise Reduction versus Carbon Reduction

It has not been possible in the time available to research the extent of which there is a conflict between optimum reductions in emissions from aircraft of noise and carbon. But this issue is important and must not be over-looked in the third runway debate. Specifically for the APPG Inquiry, it is important to establish whether the forecasts for reductions in noise and carbon are based on the same set of assumptions or have different sets of assumptions.

The risk from using different sets of assumptions is that unduly optimistic forecasts are produced for reducing both noise and carbon emissions at the discussion stage, whereas in reality only one reduction or

the other may be deliverable due to technological incompatibilities between the two policy objectives. In terms of their relative importance, reducing carbon must be given the priority. But that means (a) accepting that aircraft noise cannot be reduced to the extent that it is theoretically possible, and (b) producing noise forecasts that reflect the limitations of what can be achieved in practice.

Less Noisy Aircraft

According to the Government's aircraft noise matrix (the 57 decibel noise contour), Heathrow's air traffic noise peaked in the late 1970s (mainly due to the impact of Concorde) but decreased dramatically to 2004 (when Concorde was withdrawn from service and Chapter 2 aircraft - the next noisiest class of aircraft - had completed their ten-year phase out). But the situation has been somewhat different since 2004. It can be seen from the table below that the size of the contour contracted by less than 1 km² per year over the nine years between 2004 and 2012, with an irregular trend of increases in some years.

Year	Size of 16-hours 57 dBA contour		Number of aircraft movements			
	Km ²	%	16-hours	24-hours	calendar year (000)	
						%
2004	117.4	100.0	1 263.0	1 300.5	476 (470)	100.0
2005	117.2	99.8	1 248.7	1 309.7	478 (472)	100.4
2006	117.4	100.0	1 248.0	1 306.8	477 (471)	100.2
2007	119.6	101.9	1 258.2	1 317.8	481 (476)	101.1
2008	123.1	104.9	1 264.8	1 308.7	479 (473)	100.6
2009	112.5	95.8	1 230.5	1 276.7	466 (460)	97.9
2010	108.3	92.3	1 263.8	1 246.6	455 (449)	95.6
2011	108.8	92.7	1 268.6	1 317.8	481 (476)	101.1
2012	110.1	93.8	1 255.1	1 297.8	475 (471)	99.8

Sources: Civil Aviation Authority: *Noise Exposure Contours for Heathrow Airport* for the size of the aircraft noise contour and the number of aircraft movements per 16-hour day (mid-June to mid-Sept). Civil Aviation Authority: *UK Airport - Movement, Passenger and Cargo Statistics* for the number of aircraft movements per year. The number of aircraft movements per 24-hour day (Jan to Dec) have been calculated from the number of movements per year.

Notes: The percentage columns for the size of the noise contour and the number of movements take 2004 as the base year for observing the extent of subsequent changes. The numbers marked in bold indicate that there was an increase in the size of the contour and/or in the number of movements compared with the preceding year - see comments below). The numbers in brackets in the column for the number of movements per year are the numbers of *air transport movements* (i.e. engaged in the transport of passengers, cargo or mail).

As we explained in our response to Question 2, Vandermeer's Terminal Five Public Inquiry Report was critical of the reliance that the Government placed on the 57 decibel contour for assessing the noise impact of air traffic. But even the 57 decibel contour now suggests that the noise climate at Heathrow has not improved by much over the last nine years. And if the rate of reduction in the contour size over the past nine years were to continue, it would take another 110 years before the contour disappeared.

In their evidence to the Heathrow Terminal Five Public Inquiry, the Government and the aviation industry advised that there would be limited scope for further reductions in noise per aircraft after Concorde and Chapter 2 aircraft had been phased out. That advice appears to have been born out by the 57 decibel figures since 2004. But HAL's noise assessment for a third runway has put hope in "quieter aircraft" (i.e. less noisy aircraft) back on the agenda.

The table below shows HAL's forecast contour sizes for two runways (480 000 movements in 2030 and

2040) and for three runways (570 000 movements in 2030 and 740 000 movements in 2040). The table shows that under all scenarios the contour size would be smaller than in 2012 (110.1 km² - see table on previous page). However, the adverse gap - between the two runway scenario on the one hand and the three runway scenarios on the other hand - would be wide in 2030; and even wider in 2040.

Runway scenarios	2030		2040	
	Km ²	Index	Km ²	Index
Two runways	69.5	100.0	66.1	100.0
Three runways - Option R (maximise respite for people overflown)	85.0	122.3	95.8	144.9
Three runways - Option T (minimise total number of people overflown)	87.8	126.3	99.1	149.9
Three runways - Option N (minimise number of people newly overflown)	91.7	131.9	103.4	156.4

Source: Heathrow's North-West Runway - Air and Ground Noise Assessment, Table 5.2 (page 39). We have made the comparison on the basis of the size of the exposed area rather than the size of the population within the exposed area on account of the uncertainties about HAL's population estimates that we have commented on in our general remarks on HAL's noise assessments. We have made the comparison on the basis of the ANCON forecasts in Table 5.2 because it is HAL's preferred matrix and for the sake of simplicity.

The table below looks more closely at HAL's assessment of the timing of the introduction of less noisy aircraft. It must be inferred from the figures that the air fleet would have largely changed to less noisy aircraft by 2030, hence the contour for the two runways would be down by 40.6 km² compared with 2012, but then down by only a further 3.4 km² by 2040. These rates of change are equivalent to an annual reduction of 2.3 km² over the eighteen years between 2012 and 2030 (compared with an annual reduction of less than 1 km² in the nine years between 2004 and 2012) and an annual reduction of less than 0.5 km² in the ten years between 2030 and 2040.

The foregoing analysis suggests that HAL may be unduly optimistic about (a) the scope for significantly less noisy aircraft and (b) the rate at which they would replace the existing air fleet. In particular, HAL needs to explain by what proportion the less noisy aircraft would have replaced the existing air fleet before the first full year in which a third runway would be in service.

Runway scenarios	Km ²				
	2012	2030	+/-	2040	+/-
Two runways	110.1	69.5	- 40.6	66.1	- 3.4
Three runways - Option R (maximise respite for people overflown)	-	85.0	-	95.8	+ 10.8
Three runways - Option T (minimise total number of people overflown)	-	87.8	-	99.1	+11.3
Three runways - Option N (minimise number of people newly overflown)	-	91.7	-	103.4	11.7

Source: As for the previous table.

Richmond Council

Our understanding is that there will be some technological noise reduction improvements but that they are likely to be incremental rather than significant. The era for any step change improvements seems to be over and in any event eventually there comes a point where you cannot push a large tube of metal through the air anymore quietly regardless of technology improvements. The trade-off clash between improvements in noise and climate change emissions seems set to continue. We cannot rely on a win-win on this to be just round the corner. Whilst reductions of both forms of pollution are important, we would certainly not want noise emissions to be allowed to get worse, in order to accommodate a greater than fair share of climate change emissions. The position is plain, that Heathrow has reached the limit of its expansion, and that 'enough is enough'.

Royal Borough of Windsor and Maidenhead

RBWM would like to echo the concerns raised by LBH and the caution put forward by the Civil Aviation Authority (CAA) in their Managing Aviation Noise (CAP 1165) document - highlighting that there has been little improvement since 2000".

It is clear therefore that the claims being made by LHR, with regard to aviation noise projections, need to be independently verified - so that clearer conclusions can be made as to the anticipated noise climate ten years from now and into the future.

Mayor of London

The rate of progress in developing less noisy aircraft is slowing, and the population affected by noise at Heathrow is remaining steady

3.1. Technological developments cannot be relied upon to reduce the impacts of aviation noise. Whilst individual aircraft may become marginally quieter in the short to medium term, it is unlikely that aircraft will be objectively quiet, certainly not in the foreseeable future. Furthermore, in terms of impact on the ground, any reduction in the noisiness of individual aircraft could be offset by increased numbers of flights.

3.2. Significant changes have been accomplished in the last 50 years, however, current trends reveal the rate of progress in aircraft noise reduction is slowing fast. Older Boeing 747-400s have an Lmax when arriving, at 1,000-2,000 ft, of 89dB. The much heralded Airbus A380 when arriving, at 1,000-2,000 ft, is only 7dB quieter, at 81.5dB¹.

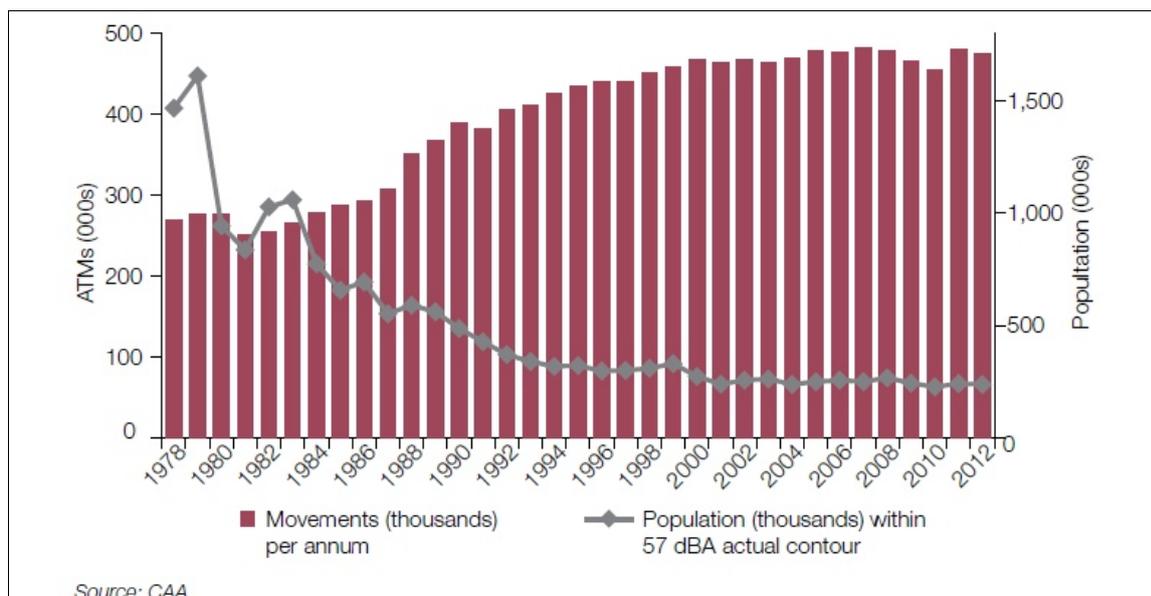
3.3. Improvements in individual aircraft noise performance have generally been accompanied by increases in flight numbers at many airports, including at Heathrow, therefore the overall benefit for those living under the flight path may be overstated².

3.4. Figure 1 (from the Airports Commission Interim Report) shows that over the past 15 to 20 years there has been virtually no change in the size of the population within the Heathrow 57dB LAeq noise contour, this reflects the slowing of technological developments in reducing noise. The reduction in noise from the early 1980s to the early 1990s was due to the retirement of the first generation of jet aircraft, notably the Hawker Siddeley Trident and Boeing 707 in 1984/1985. Another very noisy aircraft, the Vickers VC-10, was retired in 1981, and in 2003 Concorde services were discontinued¹⁹. From 1990 the fleet is increasingly made up of Chapter 3/4 jets such as Airbus A320 and Boeing 737-300²⁰. The rate of reduction in aircraft noise has slowed dramatically since the introduction of chapter 4 standards and improvements beyond this will probably be increasingly difficult to achieve.

¹ London Airspace Consultation Appendix J Standard Tables of Aircraft Noise Impact, NATS, 2013

² Airports Commission (2013) Interim Report

Figure 2: Number of people living within 57dB LAeq contour and number of ATMs
There is evidence which suggests that more fuel-efficient technologies are noisier



3.5. In taking forward new technologies and operating approaches there is – as the Sustainable Aviation Noise Road map acknowledges – an increasing tension between noise and emissions objectives. Open-rotor technology for instance, achieves lower fuel burn and reduced carbon dioxide emissions, but is noisier than using turbofans³. More generally, use of maximum thrust takes a departing aircraft out of the population impact zone more quickly – but is significantly worse for emissions impacts on the ground. Noise improvements may be sacrificed to deliver lower emissions and better fuel economy.

3.6. Regardless of how quiet a new aeroplane may be, the existing noise environment may not be improved until the operations of the noisier current aircraft fleet are phased out. Aircraft are very expensive to design and build, purchase, lease and operate; this means aircraft manufacturers and airlines will want each plane to have a long product life in order to recoup initial costs and make a profit. This encourages the continued use of noisier ‘ageing’ aircraft even though less noisy designs may be feasible or on the market, delaying benefits of technological advances.

3.7. Moreover, any improvements in aircraft noise should not inevitably be used to allow more flights; any decrease in noise should be ‘banked’ to help alleviate the already dire noise impacts faced by those living on the flight paths today.

3.8. The introduction of a third runway at Heathrow will not necessarily influence technological advancement; any airport can seek to influence this by incentivising the use of quieter planes and operational procedures.

Gatwick

The aviation sector, including manufacturers, are continuing to progress improvement in aircraft engine and airframe technologies and GAL would expect older and noisier aircraft to be replaced with quieter aircraft at all major airports over the coming years.

³ bid

GAL does not consider that the introduction of quieter aircraft should be influenced by or be dependent on the prospects of further runway development. All major airports should be taking action to minimise noise impacts through working with airlines to encourage the quietest fleet practicable. This should occur irrespective of the development of further runways.

There is a degree of conflict in aircraft technology between noise and carbon objectives but government policy⁴ is clear that below 4,000ft the environmental priority is singularly to minimise noise impact on populations. Between 4,000ft and 7,000ft the focus continues to be on minimising noise impact on densely populated areas but the CAA may also balance this requirement with the need for efficient flow of air traffic to minimise emissions. Above 7,000ft efficient use of airspace to reduce emissions become the environmental priority.

⁴ Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions – Department for Transport (January 2014)