

Mayoral Submission to the All Party Parliamentary Group on Heathrow

Heathrow's noise impact

September 2014

This paper forms the TfL submission in response to the questions posed by the All Party Parliamentary Group on Heathrow. The questions and responses are provided below.

1. APPG question 1

By what margin - in terms of the number of people affected - does the present noise from Heathrow's existing flight paths exceed the World Health Organisation's community noise guideline values in the day/evening period (0700-2300) and in the night period (2300-0700)? How does this compare with other airports within the UK and the EU?

1.1. In 1999 the World Health Organisation (WHO) published Guidelines for Community Noise that provides values for the onset of health effects from noise. The table below provides a summary of the WHO community noise guideline values (1999).

Table 1: Extract from WHO Guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	L _{Aeq} [dB(A)]	Time base [hours]	L _{Amax} fast[dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16 hrs 0700 -2300	-
	Moderate annoyance, daytime and evening	50	16 hrs 0700 -2300	-
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16 hrs 0700 -2300	-
Inside bedrooms	Sleep disturbance, night-time	30	8 hrs 2300 - 0800	45
Outside bedrooms at night	Sleep disturbance, window open (outdoor values)	45	8hrs 2300 - 0800	60

1.2. In addition to the guidelines in the table above, in 2009, in order to align with the metrics used in the EU Environmental Noise Directive, the WHO Regional Office for Europe published guidelines for noise at night that used the L_{night}¹ noise metric. These guidelines are as follows:

- An L_{night} value of 40 dB should be the target of the night noise guideline (NNG) to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly.

- An L_{night} value of 55 dB is recommended as an interim target for the countries where the NNG cannot be achieved in the short term for various reasons, and where policy-makers choose to adopt a stepwise approach. These guidelines are applicable to the member states of the European Region and may be considered as an extension to, as well as an update of, the previous WHO Guidelines for community noise (1999).

Day, evening and night period (L_{den})

- 1.3. Taking a steer from the World Health Organisation (WHO)², the European Environment Agency³ deemed that 55dB_{L_{den}} is a fair approximation to represent the onset of significant adverse health effects from exposure to noise. It is also the metric for which the European Commission ask member states to report the number of people exposed by their airports. The L_{den} measure averages noise during the day, evening and night period.
- 1.4. The UK currently puts most weight on a different level - those exposed in excess of 57dB_{L_{Aeq}} over a 16 hour average summer day. As a single measure, 55dB_{L_{den}} – over an annual average (24 hour) day – represents a better reflection of the intensity of noise. Moreover, because it includes the night period and assigns different weightings to evening and night noise, it acknowledges that sensitivity to noise is particularly acute during the evening and the night.
- 1.5. However, 55dB_{L_{den}} does not perfectly capture all those adversely affected by noise. The impacts of Heathrow's aviation noise are felt far beyond the boundaries of its 55dB_{L_{den}} contour. The Mayor regularly receives complaints from people outside of this area.
- 1.6. Indeed, there is evidence that, today, people are more sensitive to aircraft noise; this is a particular challenge when much of the research that underpins aviation noise policy today was carried out around thirty years ago.
- 1.7. Attitudes to noise exposure vary, but it is clear that there is a very large gap between:
 - the level of average noise exposure at which significant impacts start to be experienced. Some studies identify levels as low as 50dBA, and the current UK approach to planning decisions places most weight on 57dB_{L_{Aeq}}, and,
 - the level at which financial compensation is paid to homeowners, schools and businesses to mitigate impacts. At Heathrow currently, this starts at 69dB_{L_{Aeq}}. London City Airport is far more generous, with compensation starting at 57dB_{L_{Aeq}} and Nice in France starting at 55dB_{L_{den}}.

The noise impacts of Heathrow on local populations are severe

- 1.8. Heathrow's location, directly amidst one of the most densely populated areas in

Europe, makes it inevitable that it will always have a significant noise impact on local communities. Official figures show that noise from aircraft at Heathrow exposed around 725,000 people in 2006 to potentially harmful levels of noise (over 55dB L_{den}). Based on aircraft movement data in 2011, this has since risen to 766,100⁴.

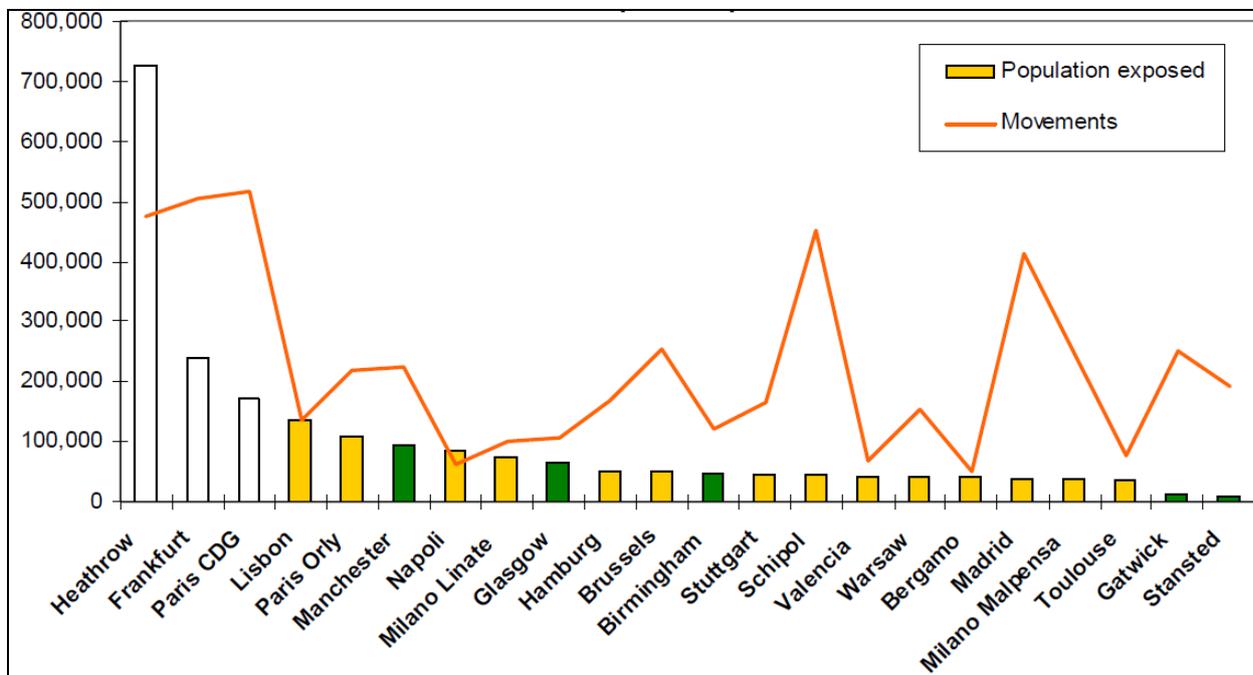
1.9. Furthermore, London’s population is forecast to grow by at least 20% over the next fifteen years. Given the Heathrow noise contour stretches into the heart of London, if the airport were to remain open, a substantial proportion of the new housing growth could be expected to fall within these contours – exposing yet more people to noise. As such, considering the progress the industry is actually making today in reducing noise, it will be challenging to avoid an increase in the population exposed to noise, even without expansion.

Heathrow has the worst noise impacts in Europe by a considerable margin

1.10. Heathrow exposes the highest number of people to excess aircraft noise in Europe by a considerable margin – more than three times more than the next noisiest airport, Frankfurt. Indeed, Heathrow exposes more people to noise than its five main rivals – Paris CDG, Frankfurt, Amsterdam, Madrid and Munich – combined.

1.11. The graph below shows how much more dire are the noise impacts of Heathrow, both in absolute terms and relative to the number of air traffic movements (ATMs).

Figure 1: Population exposed to 55dB L_{den} and number of ATMs, European airports, 2006



Source: DfT⁵

1.12. Heathrow alone accounts for around 28.5% of all the people in Europe exposed to aviation noise (above the 55dB L_{den} threshold)⁶.

- 1.13. Heathrow’s noise exposure in the UK context is no less unsettling, as set out in the table below.

Table 2: Population exposed to 55dB_{Lden} at top 15 UK airports, 2006

Airport	Population exposed
London Heathrow	725,500
Manchester	94,000
Glasgow	63,600
Birmingham	47,900
Aberdeen	16,300
Edinburgh	15,000
London City	12,200
Southampton	12,100
London Gatwick	11,900
East Midlands	10,500
London Stansted	9,400
London Luton	8,600
Leeds Bradford	8,400
Newcastle	5,900
Liverpool	5,700

Source: CAA⁷

- 1.14. In short, Heathrow accounts for just 20% of UK air traffic movements, around 30% of UK passengers – yet almost 70% of all those exposed to noise in the UK above 55db_{Lden}.

Night Period (2300-0700)

- 1.15. The WHO outlines⁸ that at 40 to 55dB_{Lnight} annoyance and/or adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night with vulnerable groups being the most severely affected. Above 55dB_{Lnight} the situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is seriously annoyed and sleep-disturbed. There is also an increased risk of cardiovascular disease above 55dB_{Lden}.
- 1.16. Heathrow currently exposes 197,000 people to over 55dB_{Lnight}⁹. Although the WHO report that annoyance begins at 40dB_{Lnight}, the population included within this contour is not reported at Heathrow.
- 1.17. Not only does night noise affect health it also impacts on quality of sleep and therefore productivity of populations exposed¹⁰. Studies have found that aircraft noise can increase the time taken to fall asleep¹¹ and that during the morning hours (after 04:00), the sleeper can be more easily awakened by ambient noise and has

more difficulty going back to sleep. This is because the noise threshold for awakening is less in shallow sleep than in deep sleep¹².

- I.18. The Mayor is particularly concerned about recent evidence which links noise to significantly reduced reading comprehension and memory recall in school children. A five decibel increase in exposure of school-age children to aircraft noise was seen to correspond to a two month delay in reading age among UK pupils¹³.
- I.19. The Airports Commission Interim Report supports the 'early morning smoothing of arrivals'. This would allow more flights between 05:00 to 05:59. The Mayor strongly opposes the encroachment of more movements earlier within the night period and would like to see night flying reduced further to reflect sleep patterns. Ninety per cent of people are sleeping at 06:00 and around two thirds are still asleep at 07:00; to encroach even more into this night period would further deny Londoners their right to a good night's sleep¹⁴.
- I.20. However, evidence also shows that whilst Lnight can be used to assess sleep disturbance, the number of noise events and a descriptor of the peak noise level – for example Lmax or SEL (sound exposure level) – are also important.
- I.21. It is inconceivable that any increase of flights during the night period at Heathrow should be allowed, risking significantly exacerbating the already burdensome impact on local communities and consequent adverse health impacts. It should be noted that complaints at Chicago O'Hare airport increased sharply following the opening of a new runway in October 2013¹⁵, with pressure growing for an expansion of voluntary 'fly quiet' times which call on pilots and air traffic controllers to use designated runways and flight tracks from the current 10pm to 7am period, to now start at 9pm. This highlights a general decreasing tolerance for noise disturbance during the night as a result of changes in night time movements following opening of a new runway.
- I.22. Delays are often experienced at Heathrow as a consequence of operating at capacity. Delayed flights frequently arrive and depart after 11pm. Further disincentives should be in place to avoid breaches to these limits and regulations and must be dealt with in a manner which deters further violation and minimises exposure to noise at night.
- I.23. It is noted that the standard eight hour night period applied for different types of transport noise (including road and rail traffic) is 23:00-07:00; this is in line with WHO guidelines and the EU Environmental Noise Directive and, as such, is used for most official purposes in the UK. The exception is for aviation, where, in response to strong lobbying by the aviation industry some decades ago, a compromise night quota count period of 23:30-06:00 was established by Government. The Mayor supports lengthening of the Heathrow night period to 23:00-07:00 to better reflect when the majority of the population are asleep.

- 1.24. In the long term there is no reasonable night noise solution at Heathrow. Demand for aviation will grow and increasing capacity and flights to meet demand at Heathrow will result in unacceptable noise impacts.

Noise exposure is not just about residential exposure

- 1.25. Noise impacts at Heathrow do not only affect the residential population. There are also a number of other sensitive developments located within noise contours of 55dB_{Lden} or above which are adversely affected by annoying and potentially harmful aviation noise. Today, there are approximately 568 'sensitive' developments within the prescribed Heathrow noise contours (55dB_{Lden} or above), comprising 521 education and 47 hospital facilities. When looking more closely at the type of education facilities affected by aircraft noise, it is of particular concern that at least 69% of all affected facilities are used for either nursery or primary education.

2. APPG question 2

Does the Environmental Noise Directive enable the UK to meet fully the criticisms that were made in the Heathrow Terminal Five Public Inquiry Report that the 57 decibel noise contour was by itself an inadequate measure for assessing the full impact of air traffic noise?

- 2.1. EU Directive 2002/49/EC - more commonly known as the Environmental Noise Directive (END) - concerns noise from road, rail and air traffic and from industry. It focuses on the impact of such noise on individuals, complementing existing EU legislation which sets standards for noise emissions from specific sources. The END requires:
- the determination of exposure to environmental noise, through noise mapping;
 - provision of information on environmental noise and its effects on the public;
 - adoption of action plans, based upon noise mapping results, which should be designed to manage noise issues and effects, including noise reduction if necessary;
 - preservation by the member states of environmental noise quality where it is good.
- 2.2. The END requires noise maps to represent the annual average cumulative noise levels over the 24 hour period, with 5 and 10 decibel corrections for the day and night periods respectively. In addition the EU directive requires the use of additional parameters, L_{day} (07.00 - 19.00), L_{evening} (19.00 - 23.00), L_{night} (23.00 - 07.00), and L_{den}, all based on an annual average day.

- 2.3. It is common practice in the UK to produce aircraft noise contours for an average summer's day based on the 16 hour period between 0700 and 2300 (i.e. LAeq).
- 2.4. By contrast, the END noise metrics Lden, Levening and Lnight allow the dose response to be updated to reflect the greater sensitivity found nowadays – for example in line with the EEA Good practice guide annoyance dose response.
- 2.5. Nonetheless, there is room for improvement; the ideal noise index for assessment of aviation noise would have at least the following attributes:
- The absolute or peak noise level of the over flight;
 - The duration the noise of the over flight is audible at a location;
 - The degree to which the over flight noise exceeds the ambient noise;
 - How often the over flight noise occurs;
 - Correlates well with the different impacts of the aviation noise for example annoyance, sleep and activity disturbance, speech interference;
 - Be easily measured;
 - Be capable of modelling/prediction;
 - Be readily understood by non-specialists.
- 2.6. No single noise index has yet been developed (and probably never will) that can meet all the above requirements. Consequently, an approach that uses a core primary noise index that covers as many of the above attributes as possible could be used, for example Lden and Lnight, coupled with supplementary indices, which address the remaining attributes; taken together the core and primary indices might meet all of the above requirements. This is explored in more detail below.

Core Primary Noise Index

Day-Evening-Night Level: Lden and Night Level: Lnight

- 2.7. Lden moves beyond LAeq,t by adding extra weightings, of 5 dB and 10 dB, to aircraft noise levels occurring in the evening and at night respectively. It has three component parts: Lday measured over a 12 hour day period from 0700 to 1900, Levening measured over a 4 hour evening period from 1900 to 2300 and Lnight measured over an 8 hour night period from 2300 to 0700. It is the index specified for the environmental noise maps produced under the European Noise Directive (Directive 2002/49/EC). The default day/evening/night time periods in the EU Directive are 0700 to 1900, 1900 to 2300 and 2300 to 0700, but it is possible to shorten the evening period by one or two hours if desired to and lengthen the day and/or the night period

accordingly. The L_{den} can be used to assess annoyance and the impacts of noise on physical health. Annoyance and impacts on physical health start to be detectable at approximately L_{den} 55 dBA, although they may not become significant until higher noise levels are exceeded. L_{night} can be used in the assessment of sleep disturbance. The WHO advise that the lowest observed adverse effects on sleep disturbance start around an external L_{night} of 40 dBA.

Supplementary noise indices

- 2.8. Other noise indices to be considered include SEL (Sound Exposure Level) and L_{Amax} .
- 2.9. SEL treats a noise event as uniformly compressed into a reference time of one second and can be used to assess sleep disturbance. Research has shown that sleep disturbance tends not to increase until external SEL values reach 80 to 90 dBA.
- 2.10. L_{Amax} is the maximum noise recorded. Indices based on L_{Amax} do not take into account the duration of the noise, and hence are possibly less representative of the disturbance due to the noise event. However, they are easier to measure and often much simpler for the public to understand. The L_{Amax} can be used to assess speech and activity interference, sleep disturbance and impacts on children's cognitive development. Depending on the baseline, noise level speech interference and effects on children's cognitive development starts to occur at L_{Amax} values of 60 dBA, and sleep disturbance at approximately L_{Amax} 45 within a bedroom.

Other indices

- 2.11. It is also useful to supplement these technical acoustic parameters with other indices perhaps more accessible to the public.
- 2.12. 'Time Above' is the amount of time that sound exceeds a given decibel level during a given period – for example the time in minutes that the aviation noise level is above noise in 5 dBA bands from 50 to 75 dB L_{dn} .
- 2.13. 'Number Above' is the number of times that sound exceeds a given maximum decibel level during a day, evening or night period e.g. noise in 5 dBA bands from 70 to 100 dB L_{max} .
- 2.14. For example, a substantial number of complaints about noise following opening of a second runway at Sydney airport led to use of 'Number Above' measures:
 - $N70$ – 70 dBA L_{max} based on an average summer's 16-hour day;
 - $N60$ – 60 dBA L_{max} based on an average summer's 8-hour night.
- 2.15. At Heathrow today, more than 340,000 people experience over 20 noise events exceeding 70dBA during the day ($N70$). More than 220,000 people experience over 25 noise events exceeding 60dBA during the night ($N60$). This would increase fourfold, to

almost a million people, with a third runway.

In summary

- 2.16. It is important that decisions should be based on a series of measures and metrics. Development of the right suite of metrics is essential and must fully represent sensitivity to and the impacts of aviation noise and how individual aircraft events are experienced during different times of day and night
- 2.17. The Heathrow Terminal Five Public Inquiry Inspector identified the need for policy makers to have more up-to-date insights into the attitudes and opinions of local residents¹⁶. It did not seem that the effects of increasing traffic had been sufficiently taken into account by the new LAeq based methods of indicating the extent of noise nuisance around major airports. These issues were discussed at length but there is little evidence of progress in the intervening years.

3. APPG question 3

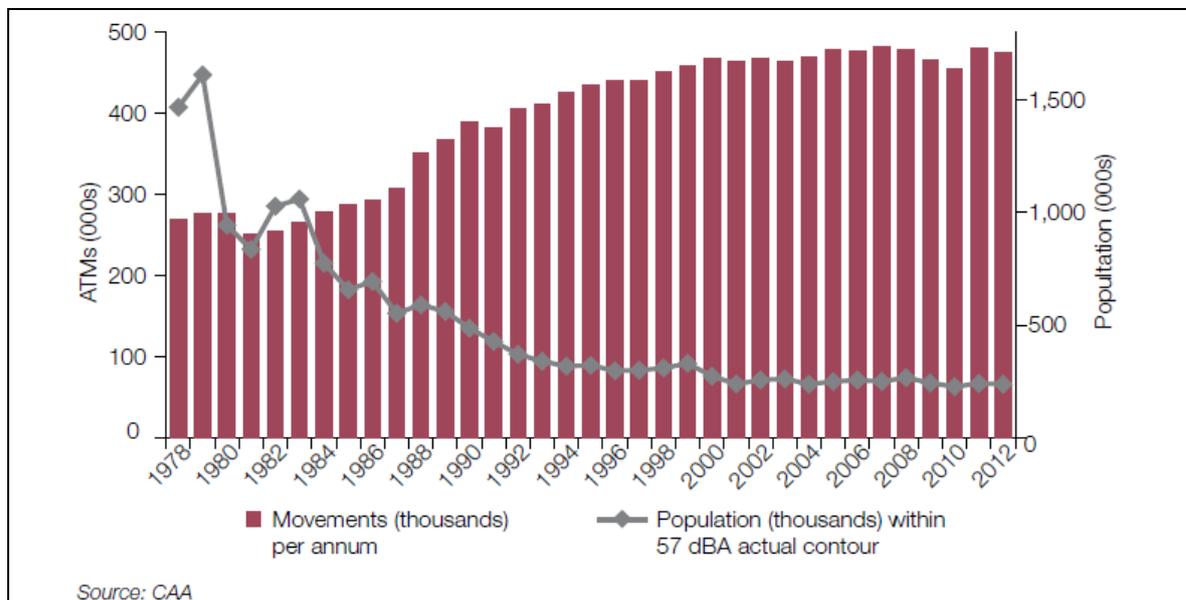
What are the prospects for significantly less noisy aircraft at Heathrow over the next ten years and are the prospects in any way dependent on the development of the proposed third runway? To what extent is there a conflict between the optimum reduction of aircraft noise and carbon emissions?

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 81.5dB¹⁷.
- 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 overstated¹⁸.

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 L_{Aeq} 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.

Figure 2: Number of people living within 57dB L_{Aeq} contour and number of ATMs



There is evidence which suggests that 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 turbofans²¹. 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.

4. APPG question 4

Are there additional operational procedures for noise reduction and respite at Heathrow that could be introduced within the next ten years; or are any such noise improvements being held back for the development of a third runway?

- 4.1. Some options are worthy of further investigation; however it should be recognised none is a panacea and will not fundamentally address the problem of severe noise exposure by Heathrow.
- 4.2. An example is increase the rate of aircraft climb and decent – noise at ground level is reduced because aircraft spend less time at lower altitudes. However, this also entails greater engine thrust and so increases emissions. Furthermore, this is less feasible for larger aircraft – and there are operational complexities if one tries to use different glide slopes for aircraft using the same runway.
- 4.3. Displaced thresholds – moving the point at which aircraft take-off or land to a point part-way along the runway – can help, but only is only a realistic option for smaller aircraft who do not require the full runway length (and which also tend to be the less noisy).
- 4.4. Time-based separation – to be introduced by NATS in Spring 2015 – could help in the margins by safely reducing the distance between aircraft in strong headwinds; this could slightly reduce the need for flights to encroach into the night period when Heathrow suffers delays.
- 4.5. Beyond such measures, more can be done to incentivise quieter aircraft and stricter rules that penalise noisier aircraft – or ban them altogether.

5. APPG question 5

Over what areas will the arrival and departure flight paths for the proposed third runway be routed, and which of those areas are not currently overflown by Heathrow air traffic, either at all or only occasionally?

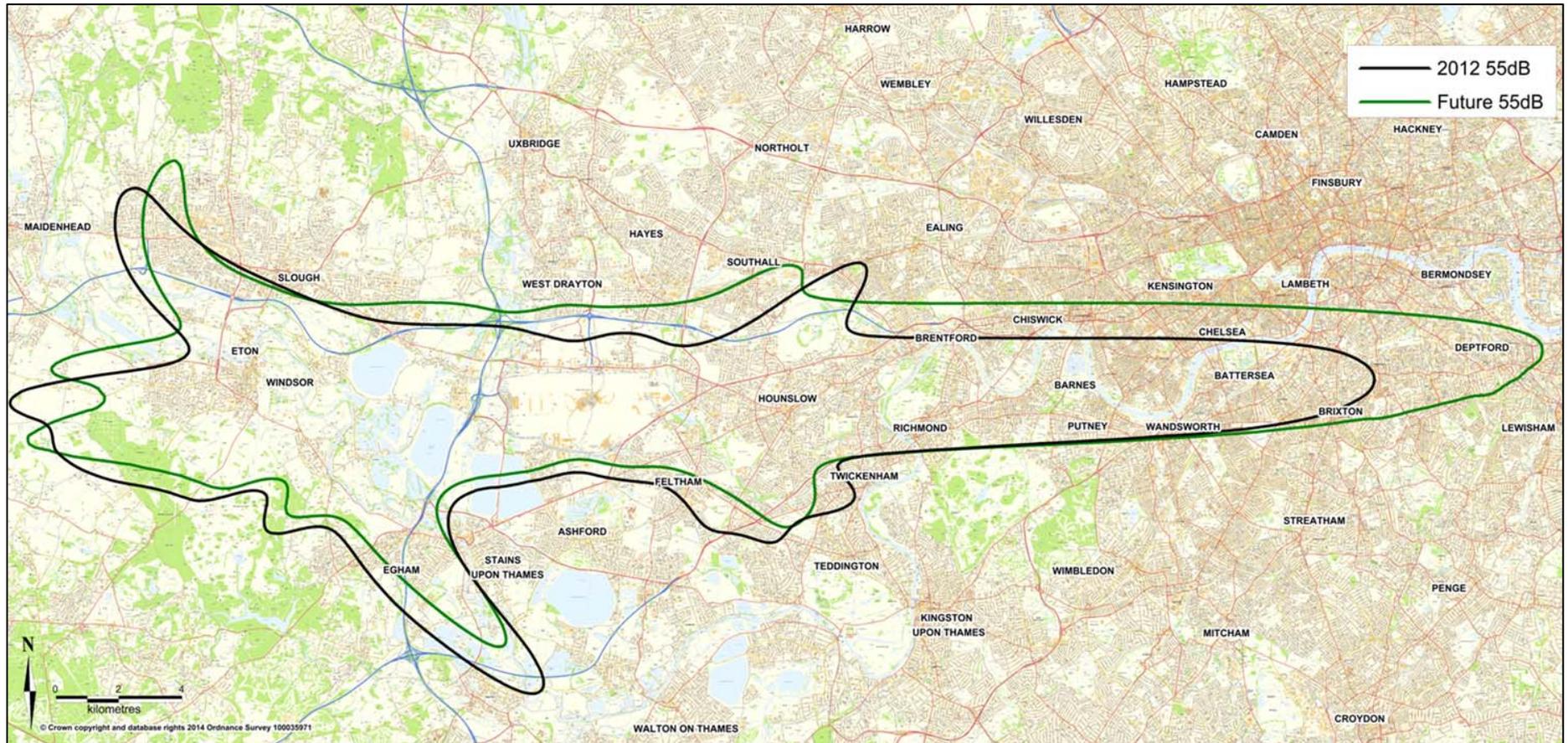
A third runway will require new arrival and departure paths, which will overfly new people. New areas falling within the 55dB L_{den} contour will likely include Chiswick, Hammersmith, Chelsea, Pimlico, Kennington, Camberwell, Peckham, New Cross and Deptford.

- 5.1. To ensure informed comparison, TfL commissioned detailed noise modelling from the CAA's ERCD consultancy on a third runway to the north west of Heathrow²². The following assumptions were used:
- 2050 demand and traffic mix;
 - new runway fully utilised (740,000 ATMs);
 - realistic fleet mix assumptions – in line with recent orders²³;
 - runway thresholds displaced 1000m west from current;
 - westerly preference retained;
 - 3 degree approach glide slope;
 - Operating hours as today (no additional movements in the night quota period 23:30 to 06:00).
- 5.2. These differ from Heathrow's own modelling, in part a result of very optimistic assumptions about new technology in their work: both in terms of the rate of technological progress (in the face of a slowing in noise improvements over the last decade) – and the rate of fleet replacement.
- 5.3. But perhaps most contentious, it would appear that Heathrow's modelling has assumed just 570,000 ATMs annually – effectively the third runway operating less than a third full. This is clearly not tenable if one is seeking to assess the full noise impacts of an additional runway. Based on these highly questionable assumptions, Heathrow concluded a third runway would lead to a reduction in noise exposure.
- 5.4. The modelling undertaken for TfL shows that with a third runway to the north west of the site, Heathrow would expose 1,097,200 people to aviation noise above 55dB L_{den} . This is an increase of 372,100²⁴ people on today. New areas which would fall within the 55dB L_{den} contour include Chiswick, Hammersmith, Chelsea, Pimlico, Kennington, Camberwell, Peckham, New Cross and Deptford.
- 5.5. It is worth noting that this figure does not account for the significant population

growth expected in these areas. It derives from placing the contour over a 2012 population base. Current Greater London Authority (GLA) population growth projections for London are for a 20% increase by 2030, and a 36% increase to 2050.

- 5.6. The map below sets out the noise contour profile for a 3-runway Heathrow and how it compares (at 55db L_{den}) to Heathrow today.

Figure 3: Comparison of 2012 (two-runway airport) and 20250 (third runway north west) noise contours for Heathrow



6. APPG question 6

Would the flight paths for the third runway cause any alteration to the present routing of the flight paths for the existing runways; and if so, to what extent?

- 6.1. Yes. There will need to be a significant re-design of airspace not just around Heathrow but across the wider London and southeast to accommodate the arrival and departure routings for a 3 runway Heathrow as well as the increased volume of flights. This is likely to result in residential areas that are not currently within noise preferential routes to fall within these routes in future.
- 6.2. There is a broader question as to the best approach for the design of noise routings and these are being considered by NATS as part of their future airspace strategy. But so long as the UK's main airport is located amidst sizeable concentrations of population, neither approach is palatable:
 - a greater concentration of flights on a smaller number of routings – exposing a smaller number of homes, schools and medical facilities to significantly more noise disturbance; or
 - a much greater dispersion of flights across several routings - exposing many, many more homes, schools and medical facilities to noise disturbance, albeit less frequently.

7. APPG question 7

How would the proposed segregated mode respite periods operate with three runways, compared with the existing runway alternation arrangements (between 0700-2300 and 2300-0700)?

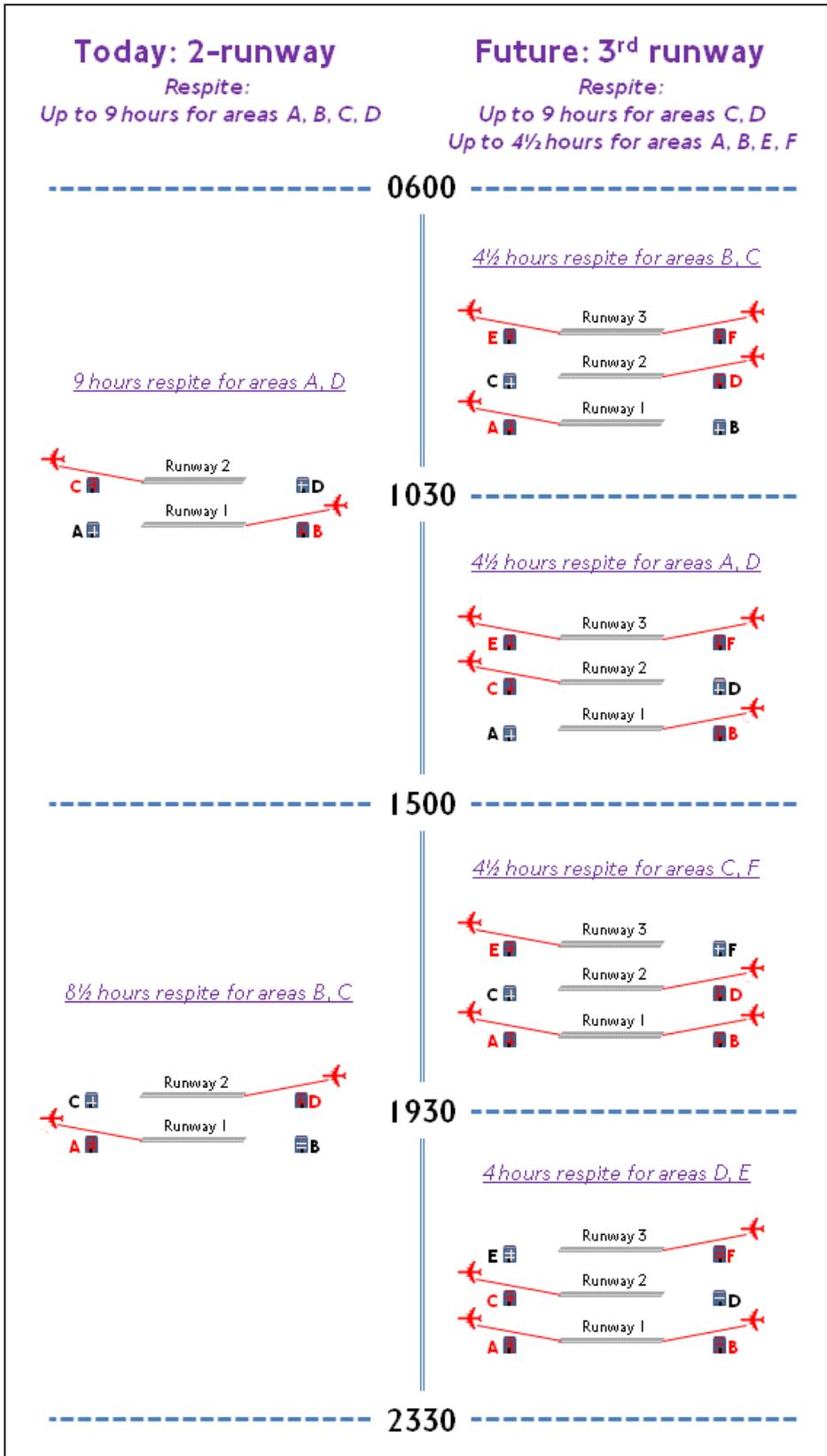
A 3rd runway would end much of the respite that local residents rely on, with most suffering from aircraft overhead for over 13 hours a day

- 7.1. One of the few aspects of the current noise regime at Heathrow that affords local residents any relief from aircraft noise are the periods of respite that are secured by operating the airport in 'segregated alternate mode'. With one runway used for departures and the other for arrivals before being switched round at 3pm, this gives many local people half a day without aircraft directly overhead.
- 7.2. However, Heathrow Airport have made clear that their third runway proposals would require at least one runway to operate in mixed mode at all times – and that, for reasons of proximity, this cannot be the middle runway. For the majority of affected residents, that will mean just 4½ hours of respite a day within operating hours – half

the respite offered to local communities today. For many that will mean facing over 13 hours of constant aircraft noise. The pattern of take-offs and landings proposed by Heathrow Airport are set out in the diagram below.

- 7.3. This arrangement means there will constantly be two streams of traffic landing (usually over London) and two streams departing at all times. It is highly likely that, given the proximity of the runways, even those nominally in a respite phase will be disturbed by one of the four streams of aircraft approaching or leaving Heathrow.

Figure 4: Illustration of current and future respite patterns at Heathrow



[Times of day are approximate]

8. APPG question 8

Would the third runway enable Heathrow to operate without flights in the night period (2300-0700)?

Flights operate at night because they provide key economic benefits to the London and UK economy – a third runway does not reduce that need

- 8.1. With a handful of exceptions, flights operate in the night period not because there are no slots at other times of day. There is a specific need for connectivity which can only be met within those hours – and without that connectivity, the UK economy would suffer. There are two key categories of flights which need to operate between 23:00 and 07:00: freight movements and early morning longhaul arrivals.
- 8.2. Air freight accounts for 0.5% of UK international goods movements by volume – but 25% by value²⁵. For UK trade with non-EU countries, that rises to 35%, while for UK manufactured exports outside the EU, air freight accounted for 55%²⁶. Several elements of the freight market rely on overnight deliveries, including the just-in-time delivery of high-value goods – invaluable for UK manufacturers. Many of these freighter flights are only viable from the hub and without being able to operate at night, UK companies will be at a competitive disadvantage, forced to ship by road to/from continental European hubs for onward flights from there.
- 8.3. Early every morning, several flights from destinations across Asia and the Americas arrive at European hub airports. Airline scheduling is shaped by passenger preference – and particularly the needs of time sensitive business travellers. Travelling on a ‘red eye’ overnight service minimises daytime wasted that could be used for business engagements. This can be seen below in the Hong Kong to Heathrow schedule.

Figure 5: Daily flights, Hong Kong-London Heathrow, September 2014

Airline	Flight Number	Depart HKG	Arrive LHR
British Airways	BA 026	2315	0455
Virgin Atlantic	VS 201	2325	0525
British Airways	BA 028	2345	0535
Cathay Pacific	CX 251	2355	0540
Cathay Pacific	CX 255	0035	0620
Cathay Pacific	CX 257	0915	1505
Cathay Pacific	CX 253	1435	2030

Source: Heathrow Airport

[excludes 7 weekly Cathay Pacific flights which arrive at different times depending on day]

- 8.4. It is striking that of the 7 daily flights from Hong Kong to Heathrow, five flights arrive between 0430 and 0630. The main carrier on the route, Cathay Pacific is the only airline with flights arriving at Heathrow outside this window; but it operates as many arrivals in those 2 hours as it does for the rest of the day. On a highly competitive route such as this, the evidence points to a very strong passenger preference to fly at this time. The airlines fly at this time because that is when business travellers want to

fly – and so when the flights are most profitable. If these arrival times were not available, the frequency would likely be lower – with more passengers and flights going to rival European hubs, to the detriment of UK competitiveness.

- 8.5. Aside from these scheduled longhaul and freighter movements, a small number of unscheduled movements take place late at night, following delays. If there was spare capacity, then such flights would less likely need to infringe on the night period. But, as has already been demonstrated, a third runway would be full soon after opening – so the situation would remain largely as today.
- 8.6. The night period is crucial for keeping the UK economy connected – both for passengers from key longhaul markets in the Americas and Asia and for overnight freight movements. The need for night flights can only realistically be met with a hub airport location away from populated areas.

9. **APPG question 9**

How quickly would Heathrow with the proposed third runway reach its stated capacity of 740 000 aircraft movements (ATMs) per year? In view of the resilience difficulties at Heathrow with 480 000 ATMs (a problem not identified at the Terminal Five Public Inquiry), how much resilience would there be with 740 000 ATMs?

Airports Commission capacity unconstrained demand forecasts suggest that a 3-runway airport would effectively be full by 2030

- 9.1. The Airports Commission Interim Report²⁷ indicates that a 3rd runway would leave Heathrow “operating at around 80-90% of capacity by 2030”. When average runway utilisation is above 70-75% averaged over the traffic day²⁸, airlines are unable to secure slots at peak times and it also undermines an airport’s ability to function as an attractive, effective hub, with waves of arriving then departing flights. It also has a major impact on resilience, as an airport’s ability to recover from periods of disruption is eroded.
- 9.2. Were a three-runway Heathrow be allowed to operate at the levels of utilisation of 99% on all three runways, then 740,000 ATMs would be reached by 2038, according to Airports Commission forecasts. This would represent an increase in 260,000 ATMs over the current cap and implies a substantial increase in aircraft sizes and a more intensive use of the runways than currently achieved. This implies a worsening of the delays at Heathrow – including more use of stacking over London – further degradation of resilience and a severe lack of slots to launch new routes and frequencies. In short, if a 3-runway Heathrow were operated in this way, it would leave the airport facing the same capacity and resilience challenges that plague it today, just a few years after opening.

10. APPG question 10

Would the proposed third runway hasten or delay the date by which the air traffic noise levels at Heathrow would not exceed the World Health Organization's guideline values on community noise?

- 10.1. Given that aircraft flying to or from Heathrow overfly significant swathes of densely populated London, it is extremely unlikely that they will ever be so quiet that the WHO Guideline levels would not be exceeded for a significant number of people.
- 10.2. Yet Heathrow Airport believe that a third runway could be accompanied by a reduction in the number of people exposed to aircraft noise. TfL refute this assertion in the strongest possible terms. Heathrow Airport's assertion is based on very optimistic assumptions about new technology: both in terms of the rate of technological progress (in the face of a slowing in noise improvements over the last decade) – and the rate of fleet replacement.
- 10.3. But the most fundamental flaw in Heathrow's modelling is that it has assumed just 570,000 ATMs annually – effectively the third runway operating less than a third full. This is clearly not tenable if one is seeking to assess the full noise impacts of an additional runway.
- 10.4. TfL's own noise modelling was conducted based on a series of relatively conservative assumptions identified and agreed by Atkins, set out in section 5.1 above. These were then modelled by the CAA ERCD. It found that an extra 372,100 would be exposed to noise above 55dB L_{den} . As such a third runway at Heathrow would make even more remote the possibility that WHO guideline values on noise might not be met by the airport.

Endnotes

- ¹ Lnight is a measure of noise levels over an 8 hour period some time between 2200 and 0800 hrs; the range is designed to reflect cultural differences in the definition of night between northern and southern Europe; in the UK the period is from 2300 to 0700 hrs.
- ² Night Noise Guidelines for Europe, WHO Europe, 2009
- ³ Good practice guide on noise exposure and potential health effects, European Environment Agency, 2010
- ⁴ Night Flying Restrictions at Heathrow, Gatwick and Stansted Stage I Consultation Annexes, Department for Transport, January 2013
- ⁵ Draft Aviation Policy Framework, Department for Transport, July 2012
- ⁶ Insight Note 2: Aviation Policy for the Environment, CAA, December 2011
- ⁷ Ibid
- ⁸ Night Noise Guidelines for Europe, WHO Europe, 2009
- ⁹ Report 1305 Noise Action Plan Contours for Heathrow Airport 2012, CAA ERCD, January 2014
- ¹⁰ Report 1208 Aircraft Noise, Sleep Disturbance and Health Effects: A Review, CAA ERCD, January 2013
- ¹¹ Noise and Health, Health Council of the Netherlands, 1993
- ¹² Night Noise Guidelines for Europe, WHO Europe, 2009
- ¹³ The effect of nocturnal aircraft noise on health: A review of recent evidence, Clark and Stansfeld, 2011
- ¹⁴ The time use survey 2005, Office for National Statistics, 2006
- ¹⁵ "O'Hare noise complaints reach record heights in 2013", Chicago Tribune, 13 January 2014
- ¹⁶ Understanding UK Community Annoyance with Aircraft Noise ANASE Update Study, 2013
- ¹⁷ London Airspace Consultation Appendix J Standard Tables of Aircraft Noise Impact, NATS, 2013
- ¹⁸ Airports Commission (2013) Interim Report
- ¹⁹ Ibid
- ²⁰ Report 1101 Noise Exposure Contours for Heathrow Airport 2010, ERCD, 2011
- ²¹ Rolls-Royce, 2013, http://www.rolls-royce.com/sustainability/casestudies/noise_technology.jsp
- ²² Aviation Noise Modelling: Heathrow Options, CAA ERCD, May 2014 [as part of The Mayor of London's Submission in response to Airports Commission Call for Evidence]
- ²³ We have assumed a fleet mix equivalent to LHR's 2030 assumptions will be applicable in 2050. IAG (BA and Iberia) are still placing orders for conventional A320s (the lifecycle of an aircraft is many decades, 30 years+) while the fleet mix forecasts on which Heathrow rely for their modelling anticipate the vast majority of A320s to be the quieter engine 'A320 neo' aircraft in the future.
- ²⁴ 1305 Noise Action Plan Contours for Heathrow Airport 2012, CAA ERCD, 2014
- ²⁵ Focus on Freight, Department for Transport, December 2006
- ²⁶ The Economic Contribution of the Aviation Industry in the UK, Oxford Economic Forecasting, October 2006.
- ²⁷ Interim Report, Airports Commission, December 2013 – section 6.88
- ²⁸ This is in line with international best practice; IATA guidance is for 70% runway utilisation; Paris CDG, Amsterdam and Frankfurt all operate at 70-75% runway utilisation