

Question 1

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

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?

Background

The World Health Organisation (WHO) has long-standing guidelines on maximum community noise levels that should not be exceeded. The WHO guideline values are below the current noise levels at Heathrow in the day and night periods, but the size of the gap between the two has never been evaluated. Question 1 aims to arrive at an evaluation. Question 1 also asks how Heathrow noise compares with other airports. Until recently such comparisons were difficult, because different methods of noise assessment were used at different airports. But the Environmental Noise Directive provides common minimum assessment methods at major EU airports, which should facilitate comparisons of the number of residents exposed to specified noise contours. We are not aware that any such comparison has been undertaken but we consider that it is relevant to consider Heathrow's noise impact against that of other major airports.

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2M, Hillingdon Council and Kensington and Chelsea Council

The issue of achieving the World Health Organisation (WHO) guidelines appears to be ignored when it comes to aspects such as aviation noise. This is in direct contrast with air quality legislation where the WHO guidelines for pollutants are transposed into legislation as set limits which must be met within set time scales. The thrust behind the air quality legislation is the protection of vulnerable people.

Communities do not appear to be given the same level of protection when it comes to noise. Instead the Government have simply chosen to set a benchmark labelled as onset of community annoyance. This benchmark was set based upon a social survey carried out in 1982. More discussion of its relevance is given in Question 2. It is unclear why there is this discrepancy. Given the substantial numbers of people adversely impacted by noise around Heathrow Airport this issue deserves immediate attention.

The substantial detrimental impact of Heathrow airport becomes clear when comparisons are made with other airports. This was demonstrated in the Airports Commission Discussion Paper 05, Aviation Noise. Using the metric 55Lden contour for comparison with European airports, Heathrow impacts on the most population, i.e. 725,500 people whereas Frankfurt is second highest at 238,000. In the UK using the metric 57Laeq 16h contour Heathrow impacts on a population of 258,550 with Manchester second highest at 35,200. By any measure, it is clear Heathrow has the largest adverse noise impact on people. Given the associated links between noise annoyance and sleep disturbance, hypertension and cardiovascular risks, cognitive impairment in children etc, it is considered that more attention should be paid to ensuring the metric used to evaluate the impacts is based upon clear established evidence.

The WHO has guidelines which include a low limit for night noise to reduce health impacts. By contrast, the controls of night noise in the UK, is by a limit on the number of aircraft movements in the night period and a noise quota based on the noise of the individual aircraft. Although such controls in this sensitive time period are welcome, given the associated detrimental health impacts of sleep disturbance, a move towards a ban on night flights is a measure that would gain community support.

CAA

Data to directly compare UK and European airports with the World Health Organisation's (WHO) guideline values does not exist. World Health Organisation guideline values are typically set at a level that protects the majority of people from serious noise annoyance during the day, and that allows completely undisturbed sleep even with windows open at night. Daytime (0700-2300) and night-time (2300-0700) the guideline values are 55 dB $L_{Aeq,16hr}$ and 45 dB L_{night} respectively, those guideline values apply to all sources of noise¹, except those which an individual is exposed to whilst in their workplace.

The UK does not measure aircraft noise against the WHO guideline values. While the CAA would be able to do so, in the UK, Government policy since 1990 has been to report the populations exposed to 16 hour aircraft noise (0700-2300) above 57 dB $L_{Aeq,16hr}$. The 2013 Aviation Policy Framework also introduced a policy that the designated airports should map night-time aircraft noise between 2300-0700 above 48 dB L_{night} . As such, the CAA is commissioned by airports to produce noise contours on this basis, which also provides historic continuity.

In 2002, the Environmental Noise Directive (END) was published, creating a legal requirement for EU member states to assess and report the number of people exposed to 24-hour noise exposure through a weighted noise indicator, L_{DEN} , and the night-time (2300-0700) 8-hour noise exposure. Data are to be reported from 55 to 75 dB for L_{DEN} and from 50 to 70 dB for the night period. This applies to aviation noise as well as road, rail and industrial noise sources in large urban areas.

In seeking to compare information produced in the UK with WHO guideline values, the population exposed to more than 57 dB $L_{Aeq,16hr}$ for daytime and 50 dB L_{night} for night are the closest indicators.

At Heathrow airport, the populations in 2011 exposed to more than 57 dB $L_{Aeq,16hr}$ and 50 dB L_{night} were 243,350 and 211,300 respectively.

Whilst the CAA maps daytime noise every year for a number of airports, night-time noise has so far only been mapped in 2006 and 2011. Many airports have yet to publish data for 2011, thus the CAA currently only holds data for a range of airports from 2006, as given in Table 1.

¹ Sources of community noise include road, rail and air traffic, industries, construction *and* public work, and neighbourhood noise. The main indoor sources of noise are ventilation systems, office machine's, home appliances and neighbours.

Table 1: Size of population affected by 2006 57 dB LAeq,16hr daytime and 50 dB Lnight,8hr night-time contours for largest UK airports

(source: UK CAA & European Environment Agency)

Airport	Population within the 57dB LAeq,16hr contour	Population within the 50 dB Lnight,8hr
London Heathrow	258500	203000
Manchester	35,200	41800
Birmingham	18900	21300
Glasgow	14650	63800
London City	6,700	<100
Aberdeen	6,150	15500
Southampton	4,000	3000
London Gatwick	3,700	4800
Edinburgh	3,100	12400
Liverpool	2,400	3100
London Luton	2,400	2900
Leeds Bradford	2,000	800
London Stansted	1,900	4,100
Newcastle	1,800	2,100
East Midlands	1,200	5,900
Bristol	1,100	1,100
Bournemouth	900	100
Blackpool	400	<100

The $L_{Aeq,16hr}$ the indicator defined in the WHO community guidelines is not widely used within Europe, outside of the UK. Thus, any European comparison has to be made in terms of the common END indicator, L_{DEN} . Table 2 gives populations exposed to more than 55 dB L_{DEN} at the largest EU airports (source: EEA).

Table 2: Size of population affected by the 2006 55 dB_{LDE,N}, 24hr contour and for the largest European airports (source: EEA)

Aiurport	Population within the 55 dB _{LDE,N} contour
London Heathrow	725,500
Frankfurt	238,700
Brussels	173,300
Paris Charles de Gaulle	170,000
Paris orly	110,000
Amsterdam Schipol	43,700
Madrid Barajas	43,300
Rome Fiumicino	34,400
Munich	7,800

* Data updated from that reported by the Airports Commission due to incorporation of population exposed within the Brussels agglomeration.

In 2011, the population exposed to more than 55 dB_{LDE,N} at London Heathrow was 766,100 (source: CAA ERCD Report 1204).

EANAG

When Heathrow is on easterly operation, some 30% of the time, west London including Ealing is subjected to noise around 70 decibels at a rate of some 20 flights per hour for at least the 17.5 hours of scheduled departures. In practice the noise continues most nights beyond 23.30, and quite often to 1.00am (see late departure schedule published by HAL). Implementation of runway alternation on easterly operation following the abolition of the Cranford agreement will not substantially change this, as the flight paths from the two runways converge over the east of the borough of Ealing, so that most residents suffer the noise of departures from both runways. The only difference will be that residents further north in Ealing will be affected for the first time. EANAG is unable to make a full estimate of the number of people affected: the population of Ealing is over 300 000, but some residents of the north of the borough (Northolt, Greenford and Perivale) are not at present affected, while clearly residents of Hounslow, Brent and Hammersmith are affected, and the total must be over 500 000.

Some airports close at night (Frankfurt, Paris Orly) so that residents are not affected by noise at night.

Hacan

The World Health Organisation (WHO) says that “during daytime, few people are highly annoyed at LAeq levels below 55dB(A) and few are moderately annoyed at levels below 50dB(A)”: <http://whqlibdoc.who.int/hq/1999/a68672.pdf> . The WHO Europe guidance sets an interim maximum target for noise levels of 55Lnight, and a long-term maximum target of 40L: http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf .

To our knowledge, neither the Department for Transport nor Heathrow Airport has carried out measurements around Heathrow based on the WHO recommended levels. Measurements, though, have

Airport	Designated by the DfT for noise purposes	Population Impact	Population as a percentage of the total number of people affected across the European Union
Heathrow	*	725,500	28.5%
Manchester		43,000	1.7%
Glasgow		53,500	2.1%
Birmingham		47,300	1.8%
Aberdeen		15,400	0.6%
Edinburgh		15,000	0.6%
London City		12,200	0.5%
Gouthampton		12,100	0.5%
Cardiff	*	11,000	0.5%
East Midlands		10,500	0.4%
Stansted	*	9,400	0.4%
Luton		8,500	0.3%
Leeds Bradford		8,400	0.3%
Newcastle		5,900	0.2%
Liverpool John Lennon		5,700	0.2%
	Totals	1,044,300	41.0%

Source: European Commission, CAA. Figures based on the populations affected by noise using the standard measure of 55Lden-2006 figures

Airport	Population within the 55L _{den} contour
London Heathrow	725,500
Frankfurt	238,700
Paris Charles de Gaulle	170,000
Paris Orly	110,000
Brussels	49,700
Amsterdam	43,700
Madrid	43,300

HAL

It is not clear which WHO guideline value the question relates and perhaps worth noting that some of their guideline values relate to internal noise levels which have the potential to be mitigated against through effective noise insulation schemes.

The WHO guideline value for outdoor noise in the day is 55dB (16 hour) and at night it is 40dB (8 hour). However the WHO recognises that its night-time limit is not feasible in the short-term and has therefore set an interim target of 55dB (8 hour night from 2300 to 0700). The daytime value is not one that is routinely measured in the UK but we do have 2012 measurements for the summer day 16 hour contours which show round 586,000 people are within the 54dB contour and about 237,000 in the 57dB contour.

While this is more than other European hubs, it is comparable to big US airports like New York JFK, Los Angeles and Chicago.

been carried out using the 55Lden metric. Lden is a little different and, we would argue, more accurate than the LAeq metric. Whilst LAeq averages out noise over a 16 hour day, Lden measures it over a 12 hour day, then separately over a 4 hour evening period and an 8 hour night period, adding 5 decibels to the evening total and 10 decibels to the night total so as to allow for the quieter background levels during these times. This is the method required by the European Commission when member states draw up noise maps.

Heathrow in a league of its own

Using the Lden measurement, 725,000 people are impacted by the Heathrow flight paths; that is, 28% of all people across Europe impacted by aircraft noise. These figures exclude many people who are moderately annoyed by the aircraft noise. The numbers which live within a 50LAeq contour would be well in excess of 1 million. It is also worth making the point that, using either the Lden and LAeq methods, if the noise was averaged out only during the periods there were planes overhead (i.e. excluding the quiet periods) the number of people impacted would also be higher.

It is important to put the WHO community noise guidelines into context. They do not apply specifically to aircraft noise and the population affected at these levels from other sources such as road and rail will be very much higher. Indeed the WHO itself recognises that around 40% of the European Union's population is exposed to road noise in excess of the guideline values. It also recognises that its night-time limit is not feasible in the short-term. Consequently it should be noted that many areas in London experience noise levels in excess of the WHO guidelines when there is no overflight of aircraft as a result of general suburban noise sources including road and rail.

For example, based on the 2011 round of strategic noise mapping for London published by DEFRA showed that around 2.3 million Londoners are exposed to road noise above 55dB Lden (the EU and Mayor's preferred measure and not the same as the WHO 55dB (16 hour) measure) and 1.6 million to levels above 50dB at night. For Heathrow (including people affected by aircraft noise living outside London) the figures are around 765,000 for the 55dB Lden and 200,000 for 50dB Lnight.

Consequently, if Heathrow shut tomorrow, around 50% of people in the airport's noise footprint would still be exposed to noise levels above "55dB Lden" as a result of traffic noise (based on a review of noise maps from defra.gov.uk).

Hammersmith & Fulham Council

We do not hold such data but we do know that Heathrow affects a far greater number of people in terms of noise impacts than any other airport in the UK or EU. The population within the 55dB Lden noise contour at Heathrow is calculated to be 725,500. This compares to 238,700 for Frankfurt, 170,000 for Paris Charles de Gaulle and 43,700 for Amsterdam.

A recent CAA report shows that Heathrow's 3rd Runway proposal will expose more than 1.1 million people to noise in excess of 55dB Lden, when fully utilised.

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 have undertaken some desktop research on the question posed and we hope the following information is of assistance.

It is not easy to determine from official publications the margin of the exceedance of WHO guidelines in terms of noise. Neither the DfT, Defra or the Airports Commission refer to the guidelines in any meaningful sense and Heathrow Airport in its 2013 Quieter Heathrow document (which sets out the airports road map for noise management in future) fails to make a single mention of the WHO guidelines.

Overall we believe the whole issue of achieving World Health Organisation guidelines has, to date, been ignored both by government and the airport operator in the current aviation debate. In our view it is illogical that noise pollution does not appear to be afforded the same degree of concern as for example air quality, where the WHO guidelines for pollutants have been transposed into UK legislation as limit values which must be complied with within set timescales.

The original WHO Guidelines for Community Noise were published in 1995, these set out recommended maximum noise exposure levels for all forms of Transport related noise.

Separate recommended target levels for day and night noise exposure are given by WHO. The target levels although often referred to by government as a “gold standard”, are but they are nevertheless health based targets derived by an expert peer reviewed organisation. The guidelines are designed to protect not only the “average” population but also vulnerable groups.

Although the UK Government adopted the WHO guidelines in 2002 there have been a number of “policy qualifications” since this time which have resulted in the guidelines being set as long term goals.

Current UK government policy on WHO standards is contained within the 2004 London Airports Night Noise Restrictions Consultation 2004 (Stage 1). In July 2004 by the Department for Transport gave a commitment to achieve the WHO guideline values for night flights by 2030².

There has been no recent confirmation of this policy in the latest Heathrow Night flights consultation or decision. There is therefore some concern that even this partial commitment to achieving WHO guideline levels by 2030 has been dropped. We therefore urge the APPG to seek answers from ministers on this point.

Daytime Noise

The World Health Organisation (WHO) says that “during daytime, few people are highly annoyed at LAeq levels below 55dB(A) and few are moderately annoyed at levels below 50dB(A).”

The WHO in setting out its guideline values states that it is important to realise that the above values relate to “steady continuous” noise (such as motorways). Lower noise levels are required for intermittent noise, such as from aircraft events. WHO makes clear that if the noise is intermittent, number of events and the single event noise level (LAmax) are important and should be considered by policy makers.

By inference, the WHO guidelines mean that moderate annoyance starts where air noise (averaged over a 16 hour day) is computed to be 50dB(A). High levels of annoyance are reported where air noise, similarly computed, is found to be 55dB(A) or more.

The UK government by contrast relies on the results of a 35 year old social survey undertaken around Heathrow to claim that the onset of significant community annoyance is 57dB(A). A more recent study undertaken by the UK government and published in 2007 – The ANASE Study, however confirmed that the onset of community annoyance from air noise in the UK is now probably quite well aligned with the WHO target of 50dB(A). Regrettably the UK government decided to reject the findings of the ANASE study.

² The guideline values are very low. It would be very difficult, if not impossible, to achieve them in the short to medium term without draconian measures - but that is not what the WHO proposed. The recommendation was that the Guidelines for Community Noise should be adapted as long term targets for improving human health. This is also consistent with the advice above. The UK Government is committed to take account of this. In respect of aircraft noise at night, the 30 year time horizon of the White Paper, provides a suitable parameter for ‘longer term’. Night Flying Restrictions at Heathrow, Gatwick and Stansted Stage 1 of Consultation on Restrictions to apply from 30 October 2005 (July 2004), paragraph 3.12. The 30 year time horizon of the White paper ran to 2030.

We are not aware of any studies that have been commissioned either by the DfT or the airports commission to establish the margin of exceedance in terms of populations exposed or contour area enclosed at the WHO standard of 50dB(A) 16 hr, however by reference to the latest WHO Night Noise Guidelines for Europe (2009) we believe at least a million people would fall into this contour band.

In terms of the 55dB(A) standard, the level of exceedance can be approximately determined from a CAA publication “ERCD 1204” which sets out a number of data sets required to be provided to the EU under Noise Mapping Directive 2002/49/EC.

The CAA report sets out year 2011 strategic noise maps using its own ANCON noise prediction model in conformance with the requirements of the *Environmental Noise (England) Regulations 2006*. The report sets out noise contours and population data around Heathrow for a number of indicators including Lday (16 hr day average noise levels from aircraft noise). Table A5 shows that around **449,000 persons** are exposed to 55dB(A) or more around Heathrow.

Night time Noise

WHO guidance sets an interim maximum target for noise levels of 55dB(A)Lnight outside (8 hour 23:00 – 07:00) and a long-term maximum target of 40dB(A) Lnight outside.

WHO advise that its 40 dB(A) Lnight, outside, should be considered a health-based limit value necessary to protect the public, including most of the vulnerable groups such as children, the chronically ill and the elderly, from the adverse health effects of night noise.

The interim target (IT) of 55 dB Lnight, outside is only recommended in the situations where the achievement of the 40 dB standard is not feasible in the short run for various reasons. It should be emphasized that it is not a health-based limit value by itself. Vulnerable groups cannot be protected at this level. Therefore, it should be considered only as a feasibility-based intermediate target which can be temporarily considered by policy-makers for exceptional local situations.

So far as we are aware the neither the DfT, Defra or the airports commission has published any evaluation of the numbers of persons affected at 40dB(A)L night around Heathrow. The WHO 2009 night noise guidelines give some information however of the number of persons around Heathrow exposed to noise levels of 45dB(A) for 2006.

An extract of this table is given below from which it can be seen that over 477,000 inhabitants were exposed tonight time noise levels of 45dB(A).

Although the 2011 contours have shown improvement since 2006 in terms of the size of the night time contour around Heathrow (typically 12%), it can be expected that around 400.000 people are still

Notwithstanding the obvious differences between these two countries, the data show a remarkable similarity.

A first result of the END (see Table 1.6) comes from a study into night regulations for (large) airports (Wubben and Busink, 2004).

Airport	Number of inhabitants	Number of night operations per year	Night operations as percentage of daytime operations
Amsterdam	21 863	23 462	5.8%
Frankfurt	134 651	46 662	10.1%
London	477 289	26 465	5.7%
Paris	180 184	51 683	10.3%

Table 1.6
Number of inhabitants within 45 Lnight contour

exposed to noise levels of 45dB(A)L night.

It is also important to note that the “improvement” in noise contours between 2006 and 2011 was nearly all related to a reduction in contour area to the west of the airport, reflecting the improved take off noise performance of more modern aircraft types . There was virtually no improvement for all intents and purpose for communities in south west London under the arrival flight paths.

In terms of the margin of exceedance for the WHO 55dB(A) Lnight interim standard, reference to ERCD report 1204 shows that in 2011 around 295,000 people around Heathrow were exposed to night noise levels at or above 55dB(A).

The UK government currently ignores in terms of policy, the fact that the WHO guidelines set out recommended levels for “single events” at night (the standard is 45dB(LAmax within bedrooms) single event levels night noise (measured in terms of single event levels e levels) of 45dB(LAmax within bedrooms - to preserve sleep and the ill health effects of noise). The single event level guidelines are designed to preserve sleep and the ill health effects of noise. WHO also recommends that citizens should be able to sleep with bedroom windows opens for ventilation if they wish. Allowing 15 dB(A) attenuation for a part open window this effectively means that single event noise levels should not exceed 60dB(LAmax) externally. The 2009 WHO Night Noise Guidelines for Europe do however assume an inside to out attenuation for part open window 21dB(A). This has the effect of slightly raising the “acceptable” outside noise levels to around 65dB(A). However some caution needs to be afforded with this substitution as in England it has been government policy to take the attenuation afforded by a part open window to be around 15dB(A).

The last UK aircraft noise sleep disturbance study undertaken in 1992 (FS92) showed that aircraft landing at Heathrow exceed 60 / 65 dB(A) max by a significant margin even as far away as Richmond, Putney, Wandsworth and Clapham. To the east of the airport residents of Ealing are regularly subjected to single event levels in excess of 70dB(A)Lmax after 23:00 when flights scheduled to depart in the daytime are permitted depart late. Similarly under easterly operations residents of Windsor, Old Windsor and surrounding parishes all suffer from noise in excess of the 60/65dB(LAmax outside) WHO guideline level as a result of Heathrow early morning arrivals.

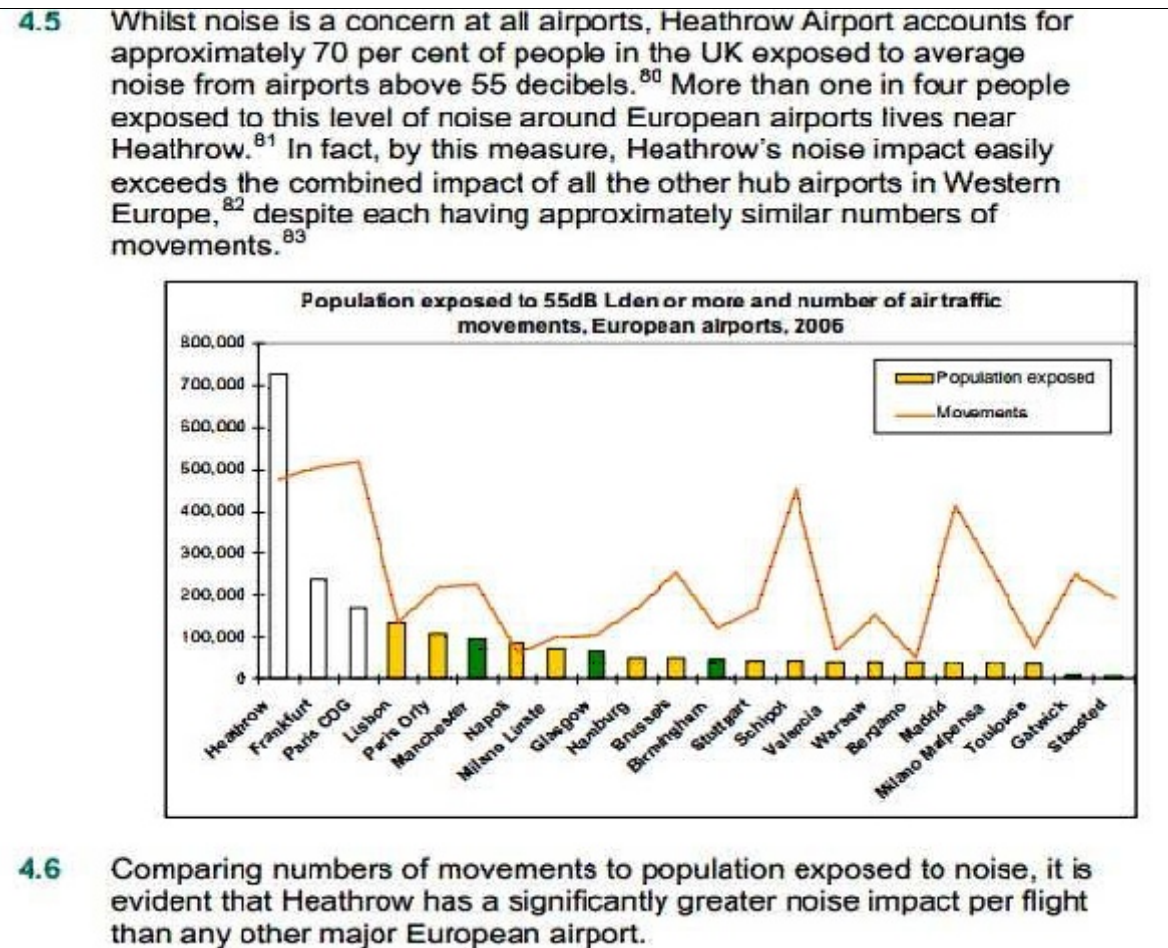
The UK government has not undertaken any official update to the 1983 sleep disturbance study but what we do know is that the Heathrow fleet operating between 04:30 and 06:00 has not markedly changed in terms of landing noise performance since then and very little has been achieved by way of noise reduction at Heathrow in 20 years of night restrictions.

It is also the case, even with the most optimistic of fleet renewal projections into 2030 and 2040, that landing noise is not expected to be cut significantly from that experienced today.

We would also like to advise the APPG that The UK Government's night time policy benchmark standard at Heathrow – the 48dB(A) contour (6.5hour) has no scientific health based evidence to underpin or support its use. It is based upon averaging noise emission over the 6.5 hours which covers what is known as the Night Quota Period (23:30 to 06:00hrs). **Even worse is that** Virtually all of the scheduled NQP movements at Heathrow occur in the 04:30 to 06:00 period. The effect of stretching the averaging period from 90 minutes to 6.5 hours is to significantly underestimate the size of the contour area as well as population numbers affected during the actual period of noise events from 04:30 to 06:00. **In LAANC's view, averaging noise over 6.5hrs when it only occurs in 1.5 hrs is an abuse of the scientific principals behind the calculation.**

Comparisons with Other Airports

By any measure, it is clear Heathrow has the largest adverse noise impact on people compared to any other EU hub airport. The DfT's own Draft Aviation Policy Framework document (2102) provided the evidence for this. This shows by reference to the preferred EU Lden noise metric how Heathrow's noise impact easily exceeds the combined impact of all other hub airports in Western Europe. For ease of reference section 4.5 of this document is reproduced below.



Richmond Heathrow Campaign

World Health Organisation

So far as we are aware, neither the Department for Transport nor HAL has published an assessment of the extent to which the noise from Heathrow's flight paths exceeds the World Health Organisation's guideline values for community noise. It is however possible to make a rough estimate of the level of exceedence by applying the guideline values to the published noise data for the flight paths.

The table below sets out the population numbers at Heathrow that were exposed in 2012 to the noise values which the Environmental Noise Directive (END) requires to be assessed (see our response to Question 2 for more details on the Directive). The populations for the END values have been multiplied against the WHO values in order to arrive at estimates of the number of people whose exposure exceeded

the WHO values. We accept that our figures are a somewhat crude estimate, but we consider that in broad terms - and in the absence of any official figures - they are relatively indicative of the scale of the WHO exposures for the purposes of the Inquiry. More details on the WHO values and our calculations are set out in the appendix on the final page of this submission.

It can readily be seen from the table that the differences between the two population figures are large. The explanation appears to be that the WHO values are set at a level to protect members of the population who are vulnerable to noise, such as children, people with hearing sensitivities, the

chronically ill and the elderly³. By contrast, the need to protect vulnerable groups is not recognised by the END values⁴ or by the UK's 57 decibel contour (see our response to Question 2 for more detail).

Over 24 hours	END noise values		WHO noise values	
	Decibels (leq)	Population	Decibels (leq)	Population
0700-1900	55	430 000	50	1 428 000
1900-2300	55	388 000	50	1 278 000
2300-0700	50	197 000	40	2 096 000

Air traffic noise at Heathrow and at other airports

The table below sets out the number of people who were affected in 2006 by air traffic noise - as measured by the LDEN noise indicator in the Environmental Noise Directive (see our response to Question 2 for more details on the Directive) - in the day and night periods at Heathrow and other major airports in: (a) London; (b) the United Kingdom; and (c) at other EU hub airports⁵.

The table shows that the number of people exposed to air traffic noise is far larger at Heathrow than at any other airport in London or in the United Kingdom; or at the other EU hub airports with which Heathrow is said to be in competition. The proponents of expansion at Heathrow readily invoke economic and operational comparisons between Heathrow and other airports. We consider that it is important to make noise comparisons between airports for a balanced view of the merits of the arguments for a third runway.

London Airports		UK Airports		EU Hub Airports	
Heathrow	725 500	Heathrow	725 500	Heathrow	725 500
London City	12 200	Manchester	94 000	Frankfurt	238 700
Gatwick	11 900	Glasgow	63 600	Paris (C de G.)	170 000
Stansted	9 400	Birmingham	47 900	Amsterdam	43 700
Luton	8 600	Aberdeen	16 300	-	-
-	-	Edinburgh	15 000	-	-
-	-	Southampton	12 100	-	-

³ See *Guidelines on Community Noise*, Executive Summary, Adverse Health Effects of Noise - Vulnerable Subgroups.

⁴ In fairness to the Directive, it stipulates only the minimum requirements for noise assessments. Member States could include protection of vulnerable groups as part of both the noise assessments and the noise action plans for airports. To set the position of vulnerable groups in a wider context, it should be noted that air quality values are set at levels that protect vulnerable groups. Recognising the vulnerability of certain groups therefore has a public health precedent.

⁵ We have not been able to obtain the data for 2012 for all the listed airports, hence the use of data for 2006.

APPENDIX to RHC Submission

WORLD HEALTH ORGANISATION COMMUNITY NOISE GUIDELINE VALUES

World Health Organisation Noise Guidelines

The World Health Organisation (WHO) published *Guidelines for Community Noise* in 1999, which includes a set of noise values that national Governments are recommended to achieve in the long term (i.e. taking 1999 as the base year). Noise values are recommended for 15 specific environments (including schools and hospitals). The values of application to the majority of the population - for the day and evening period (0700-2300) and the night period (2300-0700) - are summarised in the table below.

<i>Specific environment</i>	<i>Critical health effects</i>	<i>L_{Aeq} (dB)</i>	<i>Hours</i>	<i>L_{Amax} (dB)</i>
Outdoor living area	Serious annoyance	55	16	-
	Moderate annoyance	50	16	-
Outside bedrooms	Sleep disturbance (open window)	45	8	60

The WHO Regional Office for Europe subsequently published the *Night Noise Guidelines for Europe* in 2009 in order to provide scientific advice to EU Member States for the development of future legislation and policy action on the assessment and control of night noise exposure, following the adoption of the Environmental Noise Directive in 2002 (see our response to Question 2 for more details on the Directive). The *Night Noise Guidelines* take into account research since the *Guidelines for Community Noise* was published, and recommends 40 dB (L_{Aeq}) as the long term target for Member States (instead of 45 dB in the *Guidelines for Community Noise*), with 55 dB (L_{Aeq}) as an interim target where 40 dB cannot be achieved in the short term (i.e. taking 2009 as the base year).

Estimating Exposure to WHO Guideline Values

The table below sets out our estimates of the number of people affected by noise from Heathrow air traffic that exceeded the WHO guideline values in 2012. We arrived at the estimate on the basis that each interval of three decibels represents a doubling or halving of noise energy and applied the following multiplications to the END noise populations in 2012:

- For the day and evening periods (0700-2300), there is a difference of 5 decibels between the END values at 55 decibels and the WHO values at 50 decibels. The END population was therefore multiplied by 100 per cent (3 decibels) and the result by a further 66 per cent (2 decibels) in order to arrive at the WHO population.
- For the night period (2300-0700), there is a difference of 10 decibels between the END value at 50 decibels and the WHO value at 40 decibels. The END population was therefore multiplied by 100 per cent (3 decibels), the result by a further 100 per cent (3 decibels), the result by a further 100 per cent (3 decibels) and the result by 33 per cent (1 decibel) in order to arrive at the WHO population.

<i>Over 24 hours</i>	<i>END noise values</i>		<i>WHO noise values</i>	
	Decibels (leq)	Population	Decibels (leq)	Population
0700-1900	55	430 000	50	1 428 000
1900-2300	55	388 000	50	1 278 000
2300-0700	50	197 000	40	2 096 000

Richmond Upon Thames Council

We understand that aircraft using Heathrow affect more people than around any other airport in Europe. Clearly the WHO values apply to every airport, but the scale of Heathrow means that more people are affected. Whatever metric is used, the noise impacts are compounded by Heathrow's greater population density, the size of the area over flown and the greater frequency of flights. Although the 'Air and Ground Noise Assessment' from HAL indicates some options for reducing the number of people overflown, these are only possible by adopting new routes over new people. There is no certainty that these new routes are actually achievable or will pass the scrutiny of NATS. As the demand for extra capacity will not stop with a 3rd runway, it makes most sense to stop expansion now. We do not know the scale of the margin – but Heathrow has to get 'better not bigger'. Greater recognition of WHO values has to be a good start towards achieving compliance.

'Air and Ground Noise Assessment' in <http://your.heathrow.com/britainsheathrow/downloads/>

Royal Borough of Windsor & Maidenhead

RBWM support the assertions put forward by the London Borough of Hillingdon (LBH), such that the noise guidance put forward by the World Health Organisation (WHO) should be seen as an absolute target, rather than a rough benchmark, in order to protect the vast number of residents affected by the noise from aircraft both to the east and particularly to the west of the airport (where background noise can be significantly lower).

Mayor of London

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.

1.1. 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)	LAeq [dB(A)]	Time base [hours]	LAmx 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
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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}⁶ 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)⁷, the European Environment Agency⁸ 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 LA_{eq} 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 LA_{eq}, and,
- the level at which financial compensation is paid to homeowners, schools and businesses to mitigate impacts. At Heathrow currently, this starts at 69dB LA_{eq}. London City Airport is far more generous, with compensation starting at 57dB LA_{eq} and Nice in France starting at 55dB L_{den}.

⁶L_{night} 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.

⁷Night Noise Guidelines for Europe, WHO Europe, 2009

⁸Good practice guide on noise exposure and potential health effects, European Environment Agency, 2010

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 Lden). Based on aircraft movement data in 2011, this has since risen to 766,100⁹.

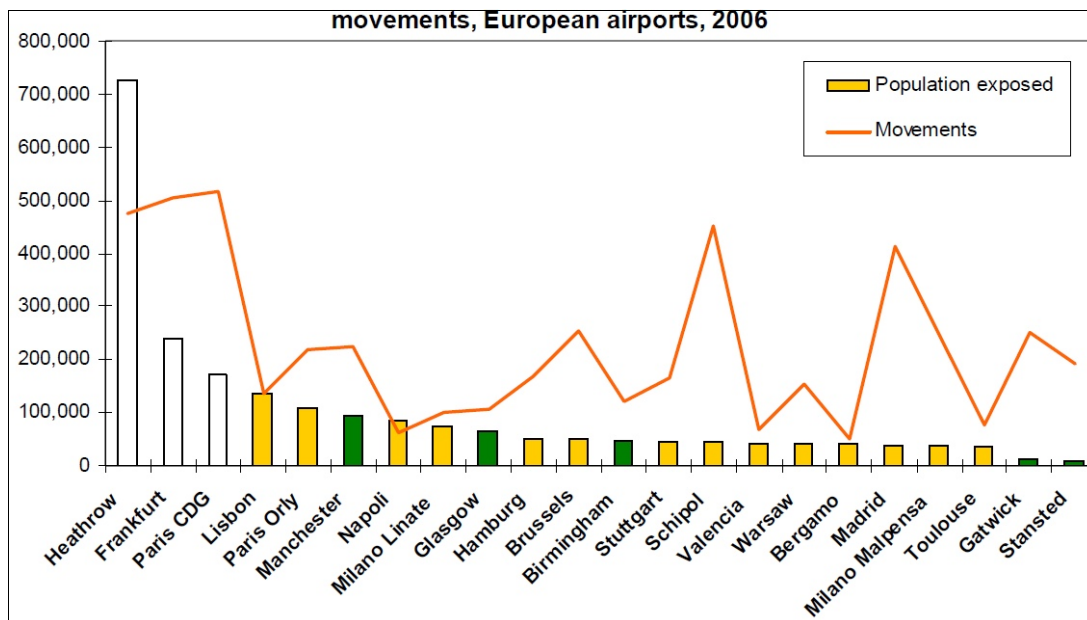
1.9. Furthermore, London’s population is forecast to grow by at least 20% over the next fifteen years. Given the Heathrow noise contour stretches into the heart of London, if the airport were to remain open, a substantial proportion of the new housing growth could be expected to fall within these contours – 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 Lden and number of ATMs, European airports, 2006 Source: DfT¹⁰



1.12. Heathrow alone accounts for around 28.5% of all the people in Europe exposed to aviation noise (above the 55dB Lden threshold)¹¹.

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

⁹Night Flying Restrictions at Heathrow, Gatwick and Stansted Stage 1 Consultation Annexes, Department for Transport, January 2013

¹⁰Draft Aviation Policy Framework, Department for Transport, July 2012

¹¹Insight Note 2: Aviation Policy for the Environment, CAA, December 2011

Table 2: Population exposed to 55dB Lden at top 15 UK airports, 2006 Source: CAA¹²

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

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 outlines¹³ 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 Lnight¹⁴. 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 exposed¹⁵. Studies have found that aircraft noise can increase the time taken to fall asleep¹⁶ 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 sleep¹⁷.

1.18. 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-

¹²Ibid

¹³Night Noise Guidelines for Europe, WHO Europe, 2009

¹⁴Report 1305 Noise Action Plan Contours for Heathrow Airport 2012, CAA ERCD, January 2014

¹⁵Report 1208 Aircraft Noise, Sleep Disturbance and Health Effects: A Review, CAA ERCD, January 2013

¹⁶Noise and Health, Health Council of the Netherlands, 1993

¹⁷Night Noise Guidelines for Europe, WHO Europe, 2009

age children to aircraft noise was seen to correspond to a two month delay in reading age among UK pupils¹⁸.

1.19. 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 sleep¹⁹.

1.20. 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.

1.21. 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 2013²⁰, 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.

1.22. 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.

1.23. 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.

¹⁸The effect of nocturnal aircraft noise on health: A review of recent evidence, Clark and Stansfeld, 2011

¹⁹The time use survey 2005, Office for National Statistics, 2006

²⁰“O’Hare noise complaints reach record heights in 2013”, Chicago Tribune, 13 January 2014

Gatwick

The ERCD Report 1305 – ‘Noise Action Plan Contours for Heathrow Airport (2012)’ - presents the 2012 year Lden, Lday, Levening, and Lnight noise contours and population exposure counts that have been calculated for Heathrow Airport’s Noise Action Plan.

Gatwick’s Noise Action Plan (2013–2018) also report the equivalent figures for Gatwick Airport in 2012 based on the equivalent ERCD modelling for Gatwick.

The following table provides a comparison of population exposed at Heathrow and Gatwick in 2012

Population Exposure to Noise 2012 at Gatwick and Heathrow (2012)

Noise Metric	Heathrow	Gatwick
24hr 55dB Lden	725,100	11,300
12hr 55dB Lday	430,000	8,700
4 hour 55dB Levening	238,200	6,400
8hr 50dBA Lnight	197,000	4,000 (2011 Figure)

The following table, albeit based on 2006 data, ranks some of the major UK airports in terms of the numbers of people affected by aircraft noise,

Airport Population Ranking Using 2006 LDEN Noise Mapping

	Airport	Movements in 2006	Population exposed to Lden level				
			<55	<60	<65	<70	<75
1	Heathrow	477,000	756,150	194,600	54,250	9,650	750
2	Manchester	230,000	92,950	30,650	3,950	700	50
3	Glasgow	110,000	56,750	11,650	400	<50	<50
4	Birmingham	119,000	48,400	15,300	2,200	<50	<50
5	London City	79,000	19,100	3,650	<50	<50	<50
6	Aberdeen	117,000	13,750	2,700	100	<50	<50
7	Gatwick	263,000	12,500	3,300	600	150	<50
8	Edinburgh	127,000	11,750	2,900	450	<50	<50
9	Southampton	56,000	11,550	1,850	100	<50	<50

Based on work undertaken for the European Commission²¹ Heathrow has the highest noise impact of any European Airport. Estimates of noise exposure across more than 50 major EU airports indicate

²¹ 1 European Commission Directorate General for Energy and transport; Study of Aircraft Noise exposure at and around Community Airports: Evaluation of the Effect of Measures to Reduce Noise, Final Report Tender N° TREN/F3/15-2006, October 2007.

approximately 2.2 million people were exposed to noise levels above Lden 55dB in 2006. On this basis Heathrow would be responsible for over 25% of all aircraft noise exposure above Lden 55 in the whole of Europe.