

# Heathrow Night Curfew

## Introduction

This study, carried out by AvGen Limited on behalf of HACAN, examines the practicality, if and when a third runway is built at Heathrow, of implementing a full or partial 8-hour night movement curfew from 23:00 (local time) to 07:00.

A full curfew would mean no arrivals or departures during that period; a partial curfew would restrict and arriving or departing flights to after 06:00, with all arrivals ideally on a single runway to provide predictable respite for communities under the approach flightpaths, and departures similarly using only one runway.

## Summary and Conclusions

The study concludes that:

- i) It is operationally feasible to operate a night curfew which extends to 06:00, by moving existing pre-06:00 arrivals to post-06:00
- ii) In order to achieve the aim of using only a single runway for 06:00-07:00 arrivals, some arriving flights would need to be moved out of that period and re-timed to arrive after 07:00.
- iii) In most cases, airlines would be able to accommodate the revised flight timings that would result from all flights being moved out of the 04:30-06:00 period and some flights out of the 06:00-07:00 period.
- iv) Almost all of the airports from which Heathrow's pre-07:00 arrivals originate are open for departures during the period that re-timed flights would take off.

## History

Heathrow has never had a ban on night flights. However for many years the numbers, types and timings of flights permitted to land or take off at night have been governed by a combination of legislation and voluntary agreements with the airlines.

## The Current Night Regime

Heathrow currently lands approximately 16 aircraft per day, on average, between 04:30 and 06:00 local time (around 14 in summer, 18 in winter). All movements use a single runway, with the runway used and the direction rotating on a weekly basis, subject to the wind.

During the following hour, between 06:00 and 07:00, there were an average of around 40 daily arrivals and 12 daily departures in 2016, with both runways in use simultaneously for landings and one runway for takeoffs.

With the last departure typically at around 23:15, the period during which there are no aircraft movements is nominally around 5¼ hours to 04:30, although this respite period is reduced on days where there are late-night (delayed) arrivals and/or departures. During 2016, nightly respite ranged from 1.82 hours to 5.80 hours with a mean of 4.57 hours and a median of 4.67 hours.

## The Proposition

This study investigates the implications of implementing either of two options:

- a) a fixed curfew on flights between 23:00 and 07:00, i.e. an 8-hour period without aircraft movements

or

- b) a 7-hour curfew between 23:00 and 06:00, followed by use of only a single runway in the hour from 06:00 to 07:00 to provide predictable respite

The following aspects of a full or partial curfew are examined:

- i) whether a third runway would provide enough additional capacity to shift all flights out of the 04:30-06:00 period and some or all flights out of the 06:00-07:00 period
- ii) the commercial implications to the airport and airlines of moving flights as in (i)
- iii) the effect on communities surrounding the airport of moving flights

## Heathrow Capacity with 3 Runways

The movement capacity of a 3-runway Heathrow is discussed at length in the various airport expansion proposals. For the purpose of this study, the following assumptions have been made:

- a) Annual capacity of approximately 720,000 Air Transport Movements (ATMs)
- b) Use, during the operating day from 07:00 onwards, of the three-runway rotation scheme described in Heathrow's expansion proposal: one of the two outer runways used in mixed mode (for both landings and takeoffs) and the other two runways used simultaneously in segregated mode (i.e. one for takeoffs only and one for landings only, as at present)
- c) No insurmountable ATM or airspace constraints that would reduce capacity significantly from the value quoted above
- d) Wake separation criteria similar to those in use today, including use of Time-Based Separation (T-BS)
- e) Mix of aircraft using the airport (short/longhaul, narrow/wide-body) similar to today's

At present, hourly runway capacity for scheduling purposes is defined in the Runway Scheduling Limits published for each season by Airport Coordination Ltd (ACL), the organisation responsible for slot allocation at Heathrow.

Current declared runway capacity averages just over 40 arrivals and 41 departures per hour across the operating day, with up to 45 during certain hours (the hourly capacity depends on the anticipated mix of aircraft types and the figures for Summer 2017 are shown in Appendix A).

## Options with a Third Runway

Clearly, the purpose of a third runway is to increase both capacity (hourly and in total) and the actual number of flights. However an increase in capacity also makes it possible to satisfy the dual aims of increasing the number of flights while reducing the length of the operating day. A shortening of the operating day, combined with a curfew on flights outside of that period, would have the effect of introducing predictable, guaranteed respite from aircraft noise for communities under the flightpaths.

For the purpose of this study, figures for the capacity of a 3-runway Heathrow have been derived from the declared hourly 2-runway capacity increased by 55% to an average of 62 arrivals and 64 departures per hour

(because a mixed-mode runway can handle more movements per hour than a segregated runway). With the operating pattern described above (one mixed-mode and two segregated-mode runways, one for arrivals and one for departures, during most of the day), an average hourly movement rate of around 40 each for the dedicated arrival and departure runways (up to 45 at certain times of the day) and slightly more for the mixed-mode runway can be assumed.

### **Moving flights out of the Night Quota Period (04:30-06:00)**

As discussed above, an average of 16 flights typically land during the Night Quota Period (04:30-06:00), departing from 12 different airports of origin. Winter totals tend to be higher than those in the Summer, mainly because the local time difference between the UK and originating points will change between Summer and Winter where the country in question does not use Daylight Saving Time (DST) in the Summer.

The following list details the flights that typically land between 04:30 and 06:00 and operate at least 4x per week, together with details of other later services that operate at least 4x per week on the same routes outside the Night Quota period (timings are not shown as they may vary between Summer and Winter seasons):

BA Boston (AA, AY, EI, IB):	3 additional BA, 1 DL, 1 VS
BA Dubai (AA, EI, IB):	2 additional BA, 2 QF, 6 EK, 1 VS
BA x2 Hong Kong:	3 additional CX
BA Johannesburg (AA, IB):	1 additional BA, 2 SA, 1 VS
BA Kuala Lumpur (IB):	1 additional MH
BA Lagos:	1 additional VS
BA Nairobi (AA, IB):	1 additional KQ
BA Riyadh (IB):	1 additional SV
BA Singapore (IB):	3 additional SQ
BA Sydney (via Singapore)(IB):	1 additional QF
CX Hong Kong:	3 additional CX
MH Kuala Lumpur (AA):	1 additional MH
SQ Singapore (NZ, SK, TP, VS):	3 additional SQ
SV Jeddah:	1 additional BA
UA Chicago (AC, LH, OS, SN):	4 additional AA, 2 BA, 2 UA
VS Hong Kong:	3 additional CX

Not all the above flights operate daily, and some are Summer only or Winter only. Airline codes in brackets, e.g. (AA) show the alliance carriers that codeshare on those routes. See Appendix B for a full list of airline codes involved.

In order for those flights to be moved to the 06:00-07:00 hour, either spare capacity must exist while accommodating the flights already scheduled in that hour and/or some of the latter flights must be displaced to post-07:00. Current declared capacity during that hour (Summer 2017) is 39 arrivals and 25 departures, based on the use of both runways

for landing and one for departures, with actual usage in 2016 (see above) of around 41 arrivals and 12 departures on average.

Of those 41 arrivals, on average 24 landed on the designated arrival runway and 17 on the designated departure runway interspersed with the 12 departures.

A 3-runway Heathrow would clearly have enough additional capacity (in effect one more runway dedicated to arrivals during that hour) to accommodate all of the arrivals displaced from the pre-06:00 period, although in order to avoid displacing existing flights in that hour, two of the three runways would need to be used for arrivals.

See below for discussion of the effect of operating with one runway only for arrivals during the 06:00-07:00 hour combined with displacing pre-0600 flights.

**Conclusion 1: It is operationally feasible to operate a night curfew which extends to 06:00 by moving existing pre-06:00 arrivals to post-06:00.**

### **Moving flights out of the Night Shoulder Period (06:00-07:00)**

As noted above, an average of 41 flights landed during the 06:00-07:00 hour during 2016, together with 12 departures during that hour. Maximum numbers recorded 06:00-07:00 during 2016 were 50 landings (split equally between the two runways) and 18 takeoffs.

Assuming that the 18 (Winter) 04:30-06:00 arrivals were also moved into the 06:00-07:00 hour, that would produce a total of around 60 arrivals in that hour. The number of departures would remain unchanged at 12 as there are no takeoffs prior to 06:00.

Clearly, dual use of two runways for landings (as at present) would be necessary if all the 06:00-07:00 arrivals were to be retained during that hour in addition to the 18 flights moved from the Night Quota Period. It is assumed that both runways could be used solely for landings during that hour as the relatively small number of departures could be accommodated on the third runway (there being no advantage to be gained from the use of mixed-mode during that hour).

The following list details the flights that typically land between 06:00 and 07:00 and operate at least 4x per week, together with details of later-arriving (post-0700) services that operate at least 4x per week on the same routes (timings are not shown as they may vary between Summer and Winter seasons):

9W Mumbai (AC, DL, VS):	1 additional 9W, 1 BA, 1 AI
AA Chicago (AY, BA, GF, IB):	3 additional AA, 2 BA, 2 UA
AA Dallas (AY, BA, GF, IB, LY):	2 additional AA, 1 BA, 1 DL

AA New York (AY, BA, EI, IB):	3 additional AA, 7 BA, 3 DL, 4 VS
AA Raleigh/Durham (BA, IB):	no other services
AC Toronto (LH, OS, TP, UA):	3 additional AC, 1 BA
BA Abu Dhabi (AA, EI, IB):	3 additional EY
BA Accra (AA, IB):	no other services
BA Bahrain (AA, IB):	1 additional GF
BA Boston (AA, AY, EI, IB):	2 additional BA, 1 DL, 1 VS
BA Buenos Aires (IB):	no other services
BA Cape Town (AA, AY, IB):	no other services
BA Delhi (AA):	1 additional BA, 1 9W, 2 AI, 1 VS
BA Dubai (AA, EI, IB):	2 additional BA, 1 QF, 5 EK, 1 VS
BA Miami (AA, AY, EI, IB):	1 additional BA, 2 AA, 1 VS
BA Mumbai (AA, IB):	1 additional BA, 1 9W, 1 AI
BA x2 New York (AA, AY, IB):	7 additional BA, 3 AA, 3 DL, 4 VS
BA Philadelphia (AA, AY, IB):	2 additional AA
BA Shanghai:	1 additional BA, 1 MU, 1 VS
BA Toronto (AA, AY, EI, IB):	1 additional BA, 3 AC
BA Washington (AA, AY, IB):	1 additional BA, 2 UA, 1 VS
BI Brunei (via Dubai):	no other services
CX Hong Kong:	2 additional CX
DL Detroit (9W, AF, KL, VS):	1 additional DL
DL Philadelphia (9W, VS):	2 additional AA
ET Addis Ababa (AC, TP, UA):	no other services
GF Bahrain:	1 additional GF
QF Sydney (via Dubai)(EK):	no other services
SA x2 Johannesburg (AC, UA):	1 additional BA
UA x2 New York (AC, LH, OS):	7 additional BA, 3 AA, 3 DL, 4 VS
UA Washington (AC, LH, OS):	2 additional UA, 1 BA, 1 VS
VS Johannesburg:	1 additional BA
VS New York (DL):	4 additional VS, 3 AA, 3 DL, 7 BA
WY Muscat:	1 additional WY, 1 BA

Not all of the above flights operate daily, and some are Summer only or Winter only.

Arrivals capacity 06:00-07:00 based on one runway only (with a separate runway used for departures) would be approximately 28, based on the current pre-07:00 mix of predominantly Heavy category aircraft. It follows that around 32 of the 60 arrivals would need to be accommodated on a second runway and/or moved to land post-07:00.

**Conclusion 2: In order to achieve the aim of using only a single runway for 06:00-07:00 arrivals, some arriving flights would need to be moved out of that period and re-timed to arrive after 07:00.**

The 32 flights for which capacity would not be available in the 06:00-07:00 hour with only one runway being used for landing would make use of the increased post-07:00 capacity that a third runway would provide. With the current segregated runway capacity of around 76 arrivals during the period 07:00-09:00 increasing to around 118, some 42 additional landing slots would be available to accommodate the displaced flights.

## Commercial Considerations

Airlines are constrained by the availability and timing of slots at the airports they serve. Moving all the currently arriving flights out of the 04:30-06:00 Night Quota Period and some or all out of the 06:00-07:00 shoulder period could have commercial implications for carriers.

The proposition outlined in this report does not imply reducing the overall number of flights or the frequency offered on any specific route. The listings above of flights that currently arrive during those two periods include details of later arrivals from each of the originating airports.

In the scenario that features two landing runways post-06:00, all of the displaced 04:30-06:00 flights can be accommodated during the 06:00-07:00 hour. The single landing runway (06:00-07:00) scenario will displace some of the current flights from that hour to post-07:00.

There may be a small number of displaced flights where the new timing is less than optimal. Detailed assessment of the impact on individual airline/route combinations is beyond the scope of this study, however it should be borne in mind that airlines already schedule some flights very close together: for example British Airways has two arrivals from Hong Kong within 45 minutes of each other and two flights arriving from New York 25 minutes apart. South African Airways similarly has two arrivals from Johannesburg within half an hour.

While delaying the start of the operating day from 04:30 to 06:00 (with or without also restricting 06:00-07:00 arrivals to a single runway) would undoubtedly meet with opposition from the airlines (and probably the airport operator), the trade-off would be predictable respite for communities under the flightpaths, with no aircraft noise before 06:00 and only a 1 in 3 chance on any given day of being under an arrival flightpath in the following 06:00-07:00 hour.

**Conclusion 3: In most cases, airlines would be able to accommodate the revised flight timings that would result from all flights being moved out of the 04:30-06:00 period and some flights out of the 06:00-07:00 period.**

## Operating Restrictions at Originating Airports

Arrivals at Heathrow prior to 07:00 are predominantly longhaul flights (see above listings). These will have taken off from the originating airport many hours previously.

The main regions from which pre-07:00 arrivals originate are the Far East/Australia, North America and Africa plus, to a lesser extent, the Middle East and South America.

Typical flight durations to Heathrow and time differences, in Winter and Summer respectively, between originating airport and the UK are as follows:

FE:	Hong Kong:	12h 50m	+8/+7 hours
	Kuala Lumpur:	13h 30m	+8/+7 hours
	Singapore:	13h 40m	+8/+7 hours
	Shanghai:	12h 20m	+8/+7 hours
IN:	Mumbai:	9h 35m	+5½/+4½ hours
AF:	Johannesburg:	11h 15m	+2/+1 hours
	Lagos:	6h 35m	+1/+0 hours
NA:	New York:	7h 5m	-5/-5 hours
	Chicago:	7h 55m	-6/-6 hours
	Toronto:	6h 55m	-5/-5 hours
ME:	Dubai:	7h 45m	+4/+3 hours
	Bahrain:	7h 10m	+3/+2 hours
SA:	Buenos Aires:	13h 15m	-3/-4 hours

For flights from any originating airport, such as those above, the local arrival time at Heathrow will correspond to local departure time at the origin plus the flight duration, adjusted for the time difference between origin and destination.

For example BA028 departs from Hong Kong at 23:45 local time in Summer. Flight duration is 12h 50m, so it arrives in the UK at 12:35 Hong Kong time the following day. Hong Kong is 7 hours ahead of the UK in Summer, so the local UK arrival time is 05:35.

In the Winter season the flight departs at the same local Hong Kong time, but although UK clocks go back by one hour, the arrival time is only 40 minutes earlier because the duration of the flight is 20 minutes longer.

For a flight's arrival time to be moved out of the 04:30-06:00 and 06:00-07:00 periods would require that it operate up to 90 minutes later than originally scheduled. That offset could be achieved by means of a later departure time at the originating airport plus, optionally, a slightly extended flight duration as in the above example.

The departure schedules for all flights arriving at Heathrow prior to 07:00 were examined and those flights that depart between 22:00 and 04:00 from their origin airport were identified:

Abu Dhabi	01:45	BA072
Abu Dhabi	02:35	EY011
Accra	22:35	BA078
Addis Ababa	00:35	ET700
Bahrain	01:00	BA124



Bahrain	01:15	GF007
Bangkok	01:10	TG910
Delhi	01:50	BA142
Dubai	01:30	BA106
Dubai	02:30	EK007
Dubai (from Brunei)	01:50	BI097
Dubai (from Sydney)	02:10	QF001
Ho Chi Minh City	00:15	VN051
Hong Kong	00:25	CX255
Hong Kong	23:10	BA032
Hong Kong	23:45	BA028
Hong Kong	23:55	CX251
Hong Kong	23:55	VS207
Kuala Lumpur	23:10	BA034
Kuala Lumpur	23:15	MH002
Lagos	22:55	BA074
Mumbai	01:45	9W120
Mumbai	01:45	BA138
Muscat	01:20	WY103
Nairobi	23:15	BA064
Riyadh	01:10	BA262
Shanghai	00:40	BA160
Singapore	23:15	BA012
Singapore	23:30	SQ322
Singapore (from Sydney)	22:35	BA016

The departure schedules for each of these airports were then examined to ascertain whether a departure time moved to 60-90 minutes later than that shown above would move a flight into a period where departures did not normally operate.

With the sole exception of Lagos, all the other listed airports operated departures during the times at which the flights in question would depart if a 60-90 minute offset was applied.

**Conclusion 4: Almost all of the airports from which Heathrow's pre-07:00 arrivals originate operate departures during the period that re-timed flights would depart.**

## Appendix A - Heathrow Declared Runway Capacity Summer 2017

From	To	Arrivals	Departures	Total
06:00	07:00	39	25	64
07:00	08:00	39	45	84
08:00	09:00	37	42	79
09:00	10:00	45	45	90
10:00	11:00	41	43	84
11:00	12:00	40	44	84
12:00	13:00	40	40	80
13:00	14:00	43	44	87
14:00	15:00	41	45	86
15:00	16:00	41	44	85
16:00	17:00	44	44	88
17:00	18:00	41	43	84
18:00	19:00	45	44	89
19:00	20:00	43	44	87
20:00	21:00	41	44	85
21:00	22:00	41	34	75
22:00	23:00	22	29	51
Total 06:00-23:00		644	674	1318
Total daily		683	699	1382
Average hourly		40.2	41.1	

(all times local)

## Appendix B - Airline Codes

IATA Code	Airline
9W	Jet Airways (India)
AA	American Airlines
AC	Air Canada
AF	Air France
AI	Air India
AY	Finnair
BA	British Airways
BI	Royal Brunei Airlines
CX	Cathay Pacific Airways
DL	Delta Air Lines
EI	Aer Lingus
EK	Emirates
ET	Ethiopian Airlines
EY	Etihad Airways
GF	Gulf Air
IB	Iberia
KL	KLM - Royal Dutch Airlines
KQ	Kenya Airways
LH	Lufthansa
LY	El Al
MH	Malaysia Airlines
NZ	Air New Zealand
OS	Austrian
QF	Qantas
SA	South African Airways
SK	SAS Scandinavian Airlines
SN	Brussels Airlines
SQ	Singapore Airlines
SV	Saudia
TP	TAP Portugal
UA	United Airlines
VS	Virgin Atlantic
WY	Oman Air