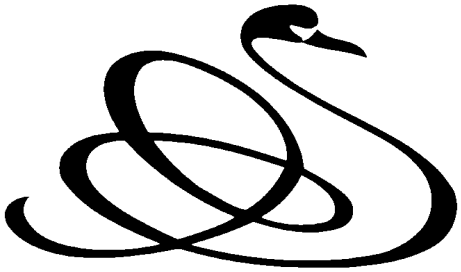
York Aviation

LONDON ASSEMBLY TRANSPORT COMMITTEE

TECHNICAL ADVICE AND SUPPORT FOR INVESTIGATION INTO AIRPORT CAPACITY

Report

April 2013



York Aviation

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LONDON ASSEMBLY TRANSPORT COMMITTEE

TECHNICAL ADVICE AND SUPPORT FOR INVESTIGATION INTO AIRPORT CAPACITY

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EXECUTIVE SUMMARY

1. York Aviation was appointed in late December 2012 to provide technical advice in relation to airport capacity to support the work of the Committee. The scope of our engagement is to analyse relevant data on the use of airport capacity and current and future demand for air travel to identify scope for different ways to use airport capacity and to undertake a literature review of the different options for addressing the issue of airport capacity in the short, medium and long-term.

2. This report will focus principally on the 5 main London airports and will cover:

   - Current Patterns of Usage and Demand at the London Airports;
   - The Patterns of Air Services at the London Airports;
   - Airport Capacity – how it is measured and used;
   - Capacity Development Options, including projections of demand.

Patterns of Airport Usage and Demand

3. Our main finding is that the pattern of air services from each of the airports is reflective of its local catchment area market, in particular for outbound travel by UK residents. Although significant demand for air travel is concentrated in Central London, Westminster and the City in particular, this is largely related to foreign or UK regional trips to Central London. There is also a substantial inbound tourist market to Central London. These inbound markets are spread across the airports to a greater extent reflective of the services offered by the airlines.

4. Heathrow and London City are the airports most reliant on business travel and on inbound passengers, not surprisingly given their greater proximity to Central London. The other airports have more of a focus on leisure and outbound passengers, although Gatwick under its new ownership is seeking to attract more business travel.

5. Surface access to the airports is also critical. Road access is as important as public transport access, with high proportions of passengers still using road to access most airports, other than from Central London. Heathrow has 31% of passengers accessing it by road, with 42% at Gatwick, 48% at Luton and 40% at Stansted. London City has the highest public transport share at 53%. There is also high usage of taxis at Heathrow and London City.

6. Last year, the London airports handled nearly 135 million passengers. In 2010, the number was 127 million passengers, of which 22% were transferring between flights. 85% of all transfer passengers at the London airports are using Heathrow. Using Heathrow survey data, which counts each transfer passenger twice on each of their arriving and departing flights, some 36% of passengers using Heathrow in 2010 were transferring between flights. An alternative view is that each transfer passenger should really only be counted once, in which case the proportion of transfer passengers at Heathrow would fall to 22% of actual passengers using the Airport in 2010.

7. Most of the flights using the London airports are carried passengers on commercial scheduled and charter flights. Other than at Luton and Stansted, the proportion of pure freighter and business/general aviation flights at the airports is very low indicating that there is little scope for increasing available capacity by relocating such flights, particularly at Heathrow and Gatwick.

8. In the light of the existing pattern of demand across the London airports, a key issue is the extent to which a new airport in the Thames Estuary would meet the air travel demand from the West of London and how two hub airports might interact if Heathrow remains operational. Surface access to West London will be critical. A key issue for the Davies Commission to explore is the extent to which airlines and passengers would automatically relocate to a new hub given the existing pattern of demand and what steps would be necessary to change that pattern.

Patterns of Air Service

9. The route network at each airport is largely driven by the airlines and how they respond to demand. The local market will be a key factor determining which routes an airline will operate. As we have shown, this is not necessarily the same for each of the London airports and their different catchment area characteristics is reflected in the pattern of air services operated.

10. For short haul services, each of the airports has a geographically distinct local market for UK outbound travel both business and leisure.

11. Our analysis demonstrates that long haul services, except to leisure destinations, are heavily concentrated at Heathrow both because of its accessibility to the core catchment area to the west of London and because BA is able to use its network strength to augment point to point passengers with transfer connectors.

12. These connecting passengers can make the difference to some flights operating at all but the numbers and proportions will be variable throughout the year dependent on the nature of local point to point demand.

13. Analysis of the pattern of use across a sample of routes highlights that virtually all routes at Heathrow feed the hub to a greater or lesser extent but reliance on the Heathrow hub varies significantly between airlines. The hub is clearly important to BA and to the development of routes to more marginal destinations, such as Hyderabad and Bangalore, with 80% and 69% of passengers transferring. However, transfer traffic also sustains high frequencies on large routes such as New York, with 32% of passengers transferring, and add value to the business offer. Transfer proportions are generally lower on European flights, although it is typically high on UK domestic services, reaching 79% on the Manchester route.

14. Generally, the number of UK and European destinations served from Heathrow has been declining but, overall, London remains well connected as new services have developed from the other airports, albeit mostly by low fares airlines.

Airport Capacity

15. In summary, the capacity of an airport is not independent of the nature of passengers and airlines using that airport and this needs to be understood in order to assess what the maximum capacity of an airport might be. Achievable capacity may vary over time as the nature of airline and passenger demand changes.

16. Although airport capacity is typically reported in terms of the number of annual passengers (mppa[1]) or annual movements which can be accommodated, it is actually calculated from a series of assessments of how many passengers or movements can be handled over an hour. In practice there is no simple definition of airport capacity in aggregate as it is built up from the individual capacity of each of the sub-systems. In general terms, the capacity of each subsystem might be defined as the number of passengers or aircraft movements which can be handled at an acceptable level of service over a defined period of time. The subsystems which need to be considered are:
    - Runway;
    - Apron;
    - Passenger Terminal;
    - Surface access;
    - Any environmental limits.

17. The annual capacity of an airport depends on how many hours in the year are operated at full capacity and, in turn, this depends on the nature of passenger and airline demand for any particular airport. Aircraft size is also critical to converting runway capacity to overall airport passenger capacity.

[1] Million passengers per annum

18. Heathrow and London City Airports exhibit less seasonality of demand than the other London airports, principally because they serve a higher business component of demand. Whereas Heathrow and, to a lesser extent, Gatwick exhibit fairly constant profiles of use during the day, the other airports are subject to much more marked peaks and troughs of demand. This is a function of both their scale and the nature of the airlines and passengers using them. Airports with a mix of business and leisure traffic and long and short haul routes will tend to have a more even profile of demand and attain a higher level of utilisation than airports with a less diverse mix of traffic.

19. Significantly, Heathrow attains a much higher utilisation of available capacity, as measured by runway slots, than its competitor hubs, achieving around 99% utilisation whereas its competitors operate below 75% utilisation. This high utilisation rates impacts on delays and resilience at Heathrow. There were only 39 spare slots each week at Heathrow Airport in Summer 2012.

20. Gatwick also attains a high level of utilisation of 80% or more year round. Overall, in Summer 2012, there were 717 spare runway slots, or 12% of the total, mostly at the beginning and, to a greater extent, towards the end of the day. Meaning that Gatwick was operating at around an 88% utilisation rate in summer.

21. Overall, examination of these profiles of utilisation shows that there is little spare capacity across the London airports as a whole in the morning peak period and, to a lesser extent, in the early evening peak. Stansted and, to a lesser extent, Luton have spare capacity for most of the day after the morning peak. London City has spare capacity during the middle part of the day. However, the extent to which this capacity is likely to be taken up depends on airlines finding markets which can be viably served outside of peak demand periods.

Airport Development Options

22. The Department for Transport has recently reviewed its air traffic demand forecasts. Although these have been reduced substantially from those published in 2011 to reflect the slower than expected economic recovery, they still show all the London airports as full by 2030 in the central case, although the timings vary with the low and high cases. However, these new lower forecasts do have some implications for the scale and timing of new capacity overall.

23. Our review of the evidence regarding the capacity of the existing London airports shows that Heathrow is to all intents and purposes full in terms of aircraft movements, although there is scope to grow passenger numbers through the use of larger aircraft. Mixed mode operations could enable more movements and hence passengers to use the Airport.

24. Gatwick is close to maximum acceptable utilisation, at over 80% year round, without the risk of delays increasing dramatically. However, whilst the airport is virtually full in summer with 88% utilisation, there is spare capacity in the winter.

25. The other airports appear to have reasonable amounts of spare capacity, with Stansted operating at 45% of consented annual movements and London City at around 60%, but the extent to which this can be used depends on the airlines willingness to develop different types and patterns of service. In turn, this is dependent on the nature and strength of the market which each airport serves.

26. We have reviewed information in the public domain regarding alternative sites for expansion, including those in the Thames Estuary as well as options for expansion at the existing sites. Key issues which are highlighted relate to the need for high quality surface access to link potential new sites to the current centres of air travel demand and the cost of development. Another critical issue is the future of Heathrow and whether a new hub would be viable if Heathrow remains open.

1 BACKGROUND

1.1 The London Assembly's Transport Committee is conducting an investigation into Airport Capacity in London. The terms of reference for this Inquiry are:

- to examine the arguments for and against changing existing airport capacity in London including analysing current capacity and current and future estimates of demand for air travel;
- to explore the different options for addressing airport capacity in the short, medium and long-term including the scope for more rational use of existing airport capacity; and
- to set out findings in a written submission to the Government's independent Airports Commission by May 2013.

1.2 York Aviation was appointed in late December 2012 to provide technical advice in relation to airport capacity to support the work of the Committee. The scope of our engagement is to analyse relevant data on the use of airport capacity and current and future demand for air travel to identify scope for different ways to use airport capacity and to undertake a literature review of the different options for addressing the issue of airport capacity in the short, medium and long-term.

1.3 Within the scope of our engagement, we have focussed principally on factual evidence regarding the capacity at, use of, and options for development at the London airports in this report. We believe that we have assembled and presented data and information in a manner which adds value to the debate.

1.4 This report will cover:

- Current Patterns of Usage and Demand at the London Airports;
- The Patterns of Air Services at the London Airports;
- Airport Capacity – how it is measured and used;
- Capacity Development Options, including projections of demand.

2 CURRENT PATTERNS OF USAGE AND DEMAND AT THE LONDON AIRPORTS

Key Findings

2.1 Our main finding is that the pattern of air services from each of the airports is reflective of its local catchment area market, in particular for outbound travel by UK residents. Although significant demand for air travel is concentrated in Central London, Westminster and the City in particular, this is largely related to foreign or UK regional trips to Central London. There is also a substantial inbound tourist market to Central London. These inbound markets are spread across the airports to a greater extent reflective of the services offered by the airlines.

2.2 Heathrow and London City are the airports most reliant on business travel and on inbound passengers, not surprisingly given their greater proximity to Central London. The other airports have more of a focus on leisure and outbound passengers, although Gatwick under its new ownership is seeking to attract more business travel.

2.3 Surface access to the airports is also critical. Road access is as important as public transport access, with high proportions of passengers still using road to access most airports, other than from Central London.

2.4 Last year, the London airports handled nearly 135 million passengers. In 2010, the number was 127 million passengers, of which 22% were transferring between flights. 85% of these were using Heathrow according to CAA survey data. This data, which counts each transfer passenger twice on each of their arriving and departing flights, shows some 36% of passengers using Heathrow in 2010 were transferring between flights. An alternative view is that each transfer passenger should really only be counted once, in which case the proportion of transfer passengers at Heathrow would fall to 22% of actual passengers using the Airport in 2010.

2.5 Most of the flights using the London airports are commercial scheduled and charter flights. Other than at Luton and Stansted, the proportion of pure freighter and business/general aviation flights at the airports is very low indicating that there is little scope for increasing available capacity by relocating such flights, particularly at Heathrow and Gatwick.

2.6 In the light of the existing pattern of demand across the London airports, a key issue is the extent to which a new airport in the Thames Estuary would meet the air travel demand from the West of London and how two hub airports might interact if Heathrow remains operational. Surface access to West London will be critical. A key issue for the Davies Commission to explore is the extent to which airlines and passengers would automatically relocate to a new hub given the existing pattern of demand and what steps would be necessary to change that pattern.

Airport Capacity and Demand

2.7 In this section, we concentrate on the nature of the current demand at each of the main London airports.[2] Understanding the nature of the market for each airport and how airlines are likely to respond to that market is an essential component of understanding the effective capacity of an airport. Whilst it is possible to define the theoretical maximum capacity of an airport by reference to its physical infrastructure, the ability of that airport to realise its maximum capacity is not independent of the nature of the demand to use it.

2.8 Hence, in this section, we first examine the different origins and destinations of different types of passengers, the geographic origins of passengers using each of the main London airports and the nature of their passenger demand as the differences between the catchment areas of each of the airports and their potential for growth shape the potential to increase the utilisation of the capacity available and the options for future development.

The Pattern of Air Travel Demand

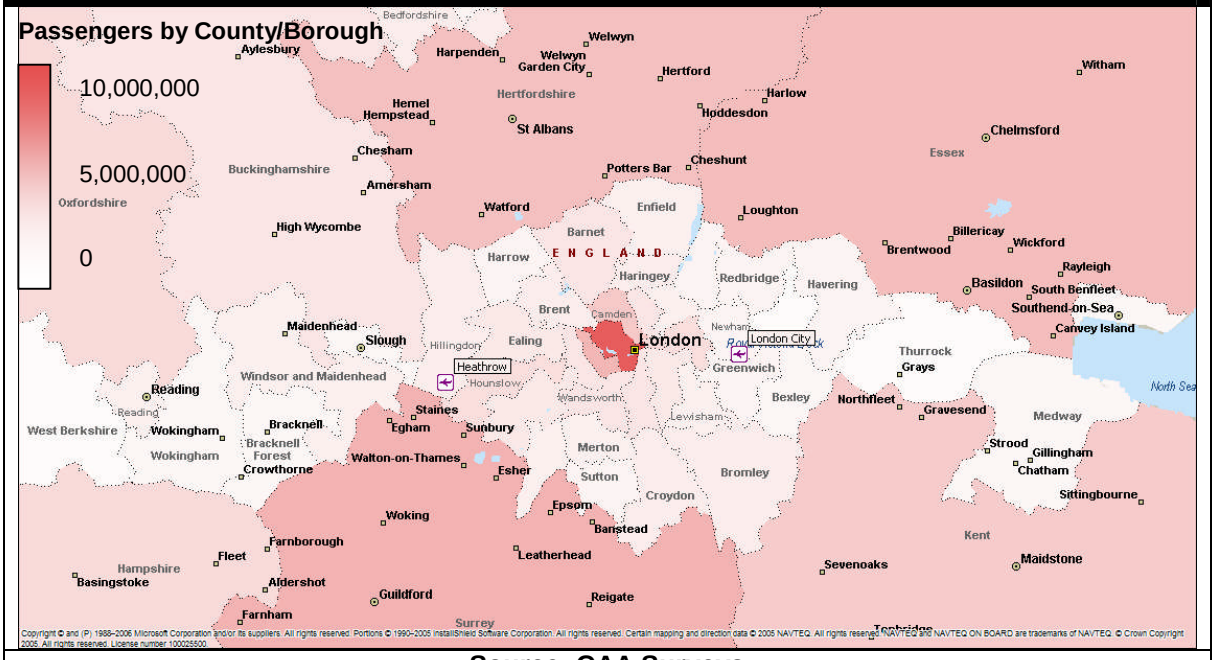
2.9 We have used Civil Aviation Authority (CAA) passenger survey data to examine the surface origins/destinations of air travel demand in Greater London and the immediately surrounding area. The CAA surveys passengers at the main London airports on a continuous basis but London City Airport is only surveyed on alternate years. Hence, the most recent comprehensive and validated set of data covering all five of the main London airports is the 2010 survey. We have used this data for our analysis of the catchment areas of the airports.

[2] London Southend Airport is excluded from the majority of analysis due to lack of detailed data since the development of substantive scheduled flying from Spring 2012.

2.10 Our analysis confirms the same patterns of airport use as the GLA Economics Paper 35 on Airport Choice which used CAA survey data from 2006. There has been little discernible change in the principal features of each airport's geographic catchment area since that time.

2.11 In **Figure 2.1**, we illustrate the local surface origins or destinations of air passengers by London Borough and surrounding County/Unitary Authorities[3], excluding transfer passengers using the London airports in 2010.

Figure 2.1: Overall Surface Origins of London Airport Passengers 2010



Source: CAA Surveys

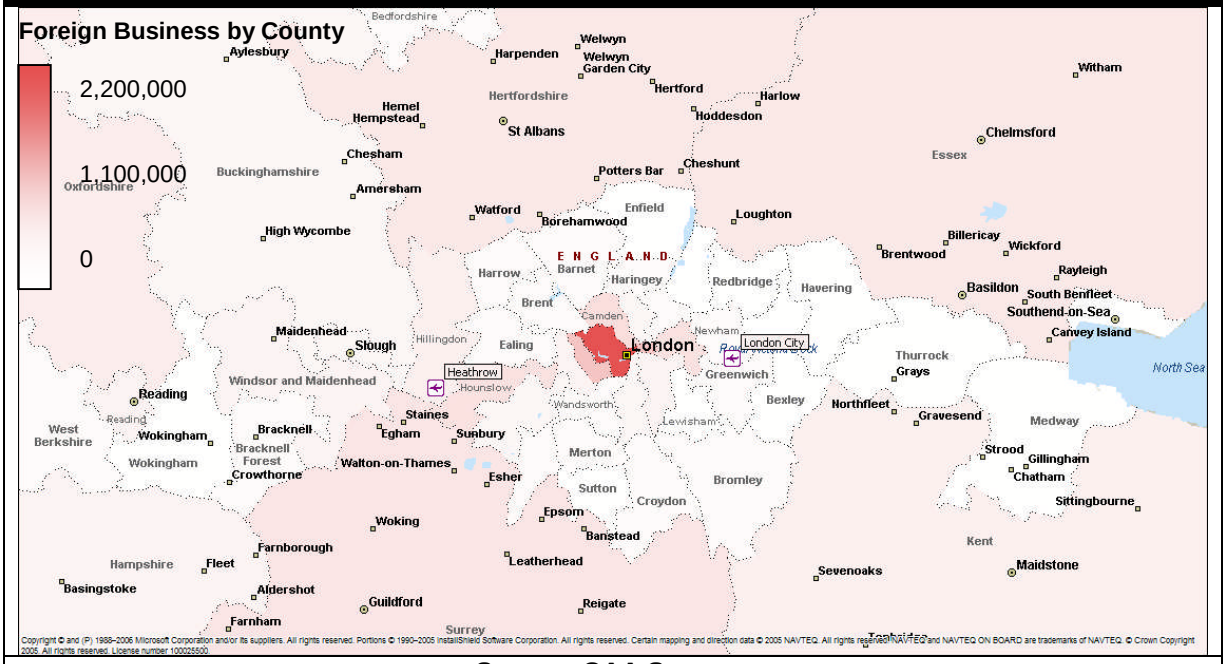
2.12 Westminster is the dominant point of demand origins/destinations overall, accounting for over 10% of the demand from the wider South East and East of England using the London airports at 9.27 million passengers in 2010. Overall, 55% of demand, nearly 47 million passengers, had origins or destinations in the London Boroughs, with the remainder coming from the wider area. However, demand is also strong from the commuter belt around London.

2.13 The pattern of demand does vary between the different types of air passengers. Foreign business passenger demand is highly concentrated in Westminster and the City as shown in **Figure 2.2**, accounting for over 2 million passengers and 67% of the total foreign business demand.

[3] In interpreting this map, cognisance needs to be taken of the relative size of the geographic areas used.

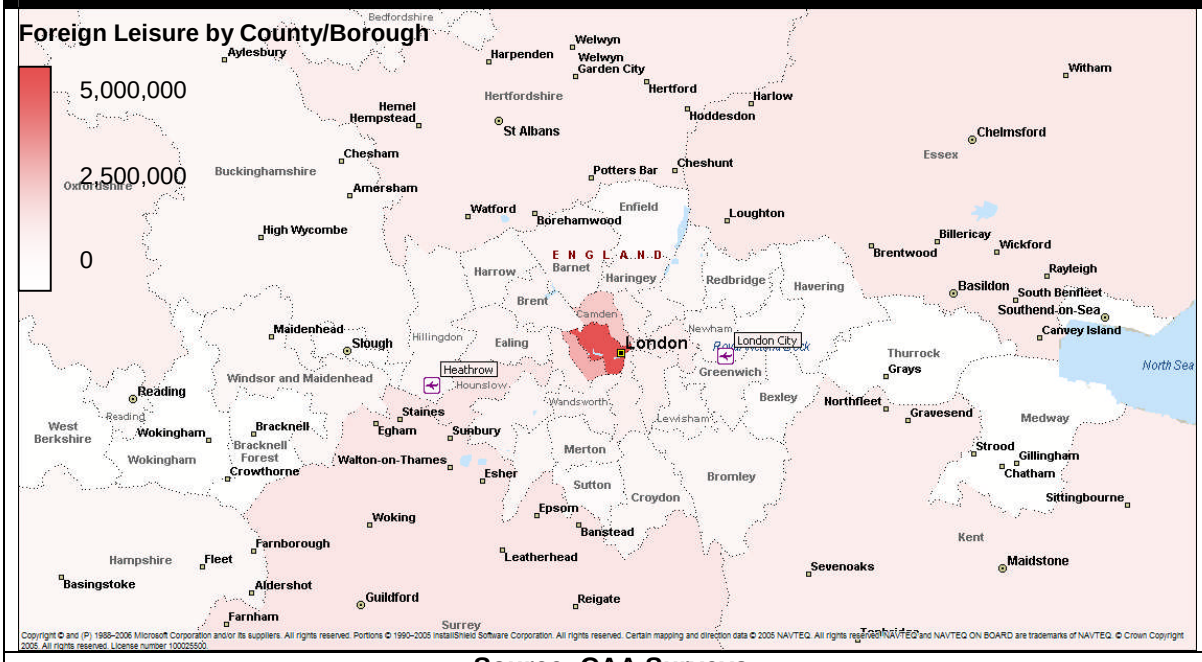
2.14 A similar but slightly more dispersed pattern is evident for Foreign Leisure Passengers as shown in **Figure 2.3**, although 71%, almost 5 million, of these passengers had destinations in Westminster.

Figure 2.2: Surface Origins of Foreign Business Passengers 2010



Source: CAA Surveys

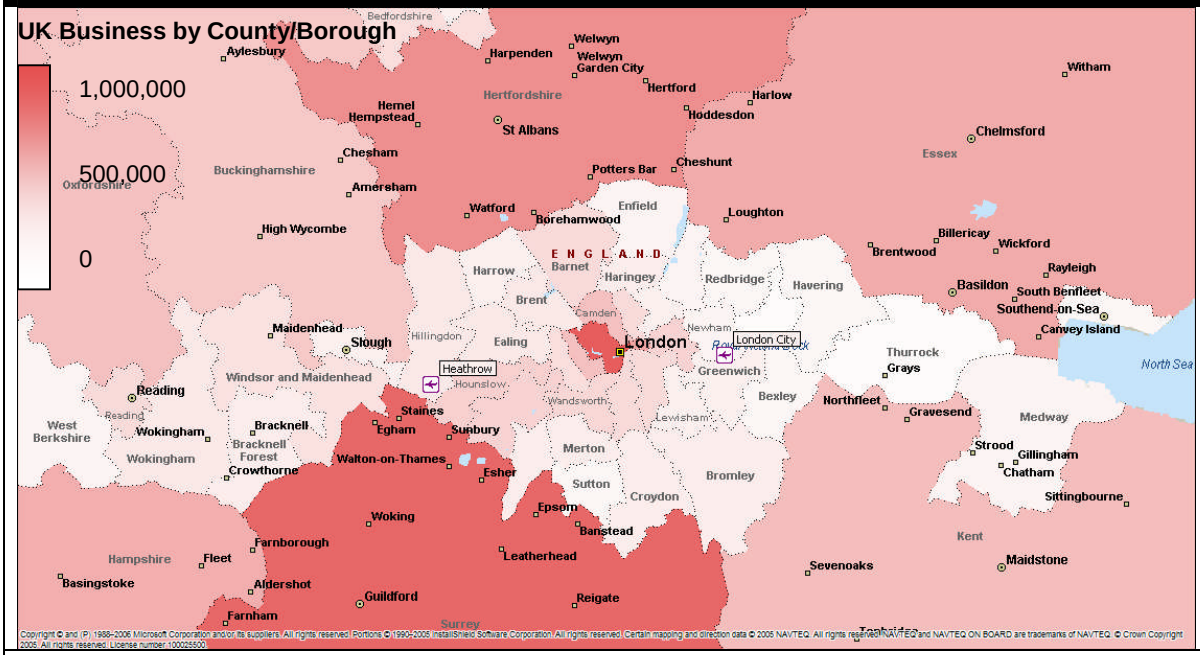
Figure 2.3: Surface Origins of Foreign Leisure Passengers 2010



Source: CAA Surveys

2.15 The pattern for UK Resident Business Demand is different, although there remains a high concentration in Westminster and the City. This derives to a large extent from inbound business trips from Scotland, Northern Ireland and northern regions of England to the capital. The predominant location of outbound business trips lies in the commuter belt around London, particularly to the south and west. This has implications for where airlines will be willing to initiate business oriented services to key global destinations. This pattern is illustrated in **Figure 2.4**. Overall 47% of these trips had origins or destinations within London, but Westminster only accounted for 7.5% or just under 1 million passengers.

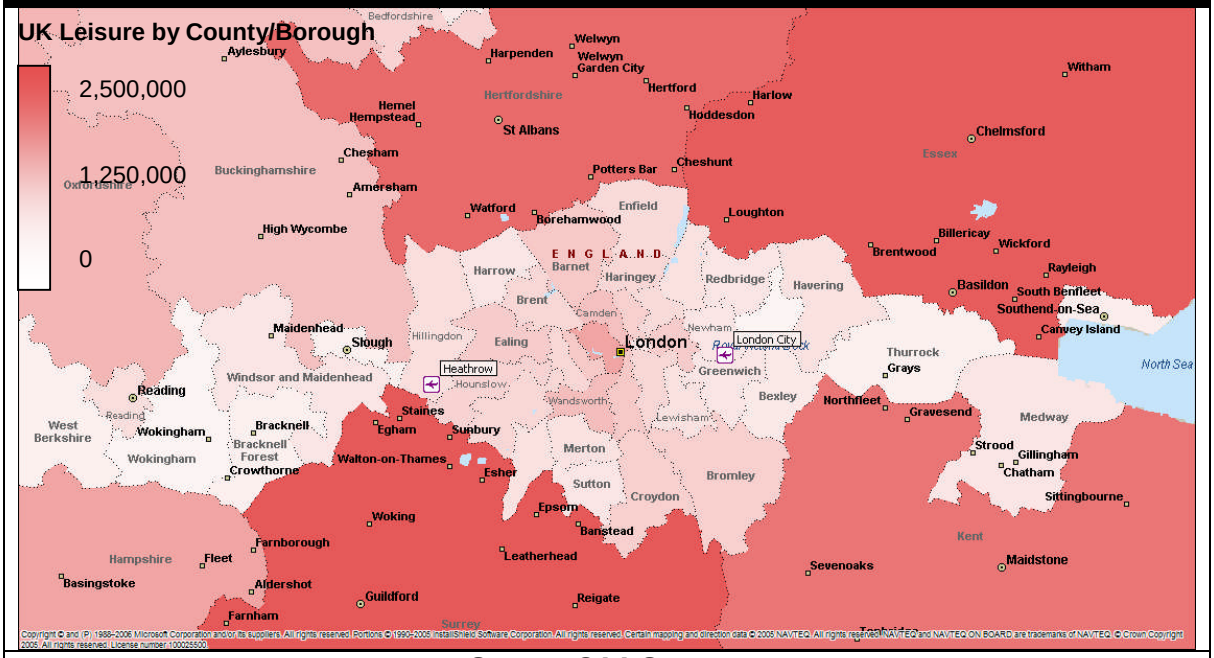
Figure 2.4: Surface Origins of UK Resident Business Passengers 2010



Source: CAA Surveys

2.16 UK Resident Leisure Demand is much more widely distributed around London and the surrounding areas as illustrated in **Figure 2.5**. Overall, this accounts for some 40 million passengers out of the total. Hence, airlines are better able to sustain a range of leisure oriented services from a variety of airports. The concentration of UK Resident inbound Leisure trips in Central London is less discernible, although London still accounts for 45% of this demand but Westminster itself only accounts for 3% of these trips at 1.27 million passengers.

Figure 2.5: Surface Origins of UK Resident Leisure Passengers 2010



Source: CAA Surveys

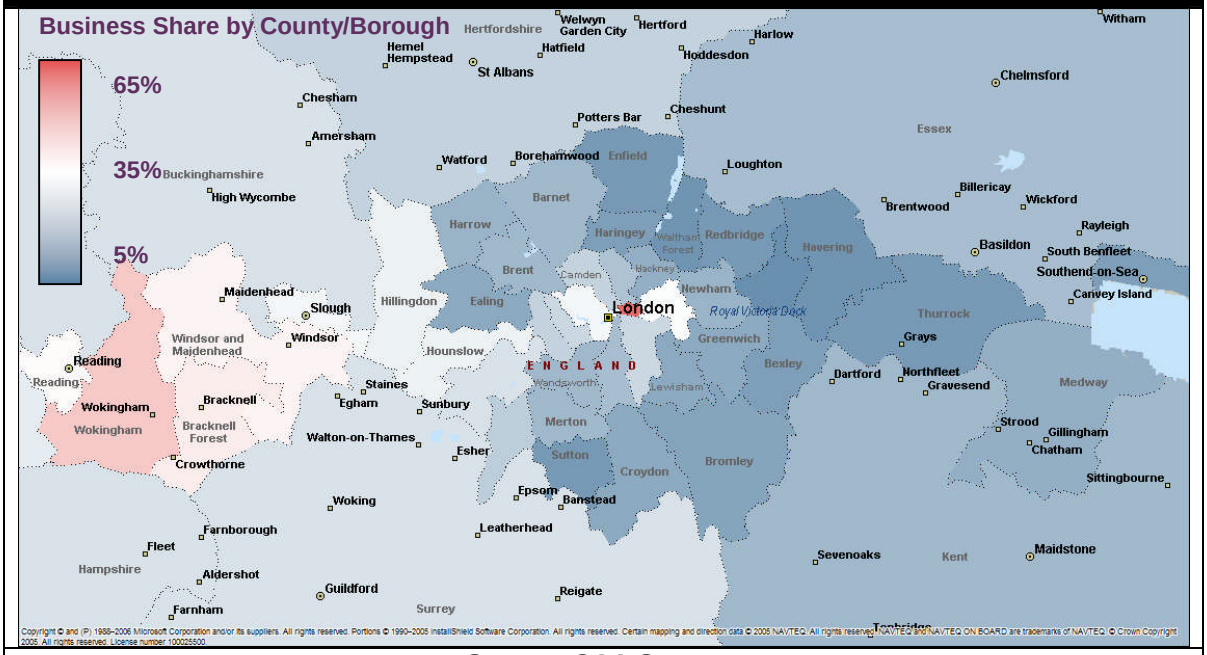
2.17 Overall, the Central London catchment is dominated by inbound visitors to London, who are more likely to use public transport, whilst those outbound trips are associated with home residences and the underlying pattern of disposable income.

2.18 These patterns of demand are material to how airlines determine which airports to operate services from according to which markets they are seeking to serve and are a factor in the extent to which airlines will be willing to relocate services between different airports serving London overall.

2.19 A further factor to be considered is that, whereas inbound passengers to London will have a reasonably high propensity to use public transport to access an airport, UK Resident outbound passengers from the surrounding areas will be far more likely to travel by car, either parking at the airport or being dropped off. Hence, road as well as rail access is an important consideration in the willingness of passengers to use each airport and, hence, a factor in airline decisions as to where to offer services.

2.20 Business travel is an important driver of where airlines are able to develop services viably, particularly for the full service scheduled airlines. The concentration of business travel demand is notable from Central London out along the M4 corridor as shown in **Figure 2.6**. This may indicate the extent to which Heathrow has been a factor in business location decisions but also highlights the challenges in ensuring accessibility from these areas to any new hub airport capacity. Business travel is a much lower component of total demand to/from areas to the East of London.

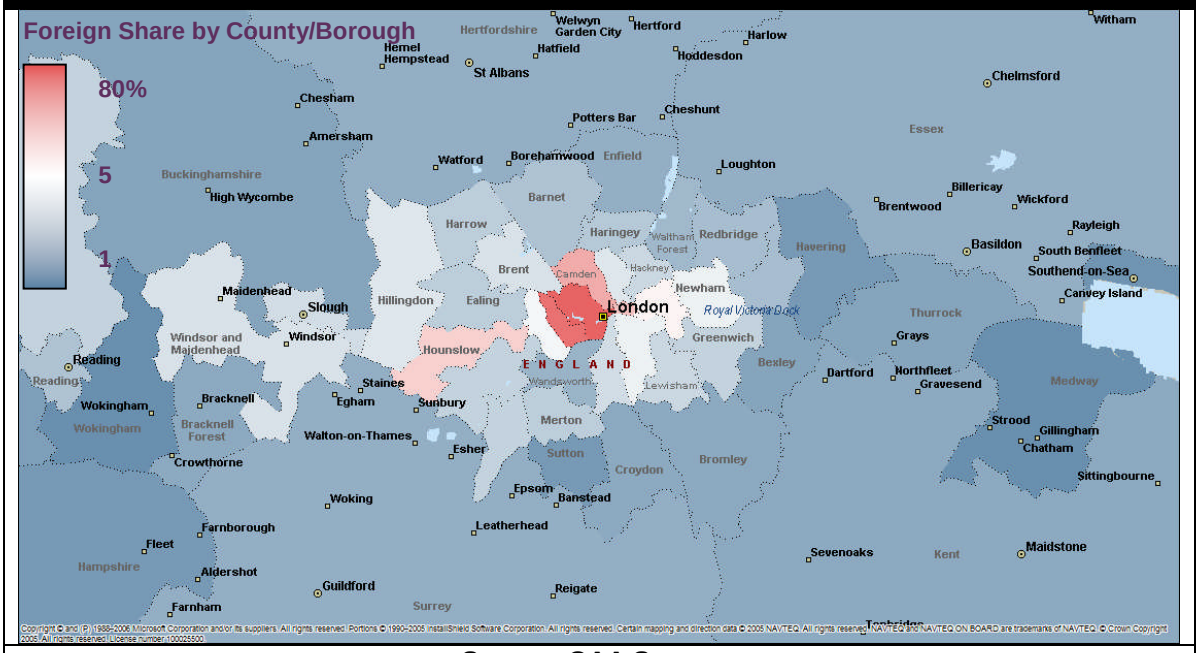
Figure 2.6: Business Travel – Market Share of Total Passengers



Source: CAA Surveys

2.21 Foreign resident demand is that which is most concentrated in Central London, as shown in **Figure 2.7**. This is particularly pertinent to the role and importance of public transport access to the airports as inbound visitors are more likely to use public transport than UK outbound resident travellers beginning their journey from home.

Figure 2.7: Foreign Inbound Passengers – Market Share of Total Passengers



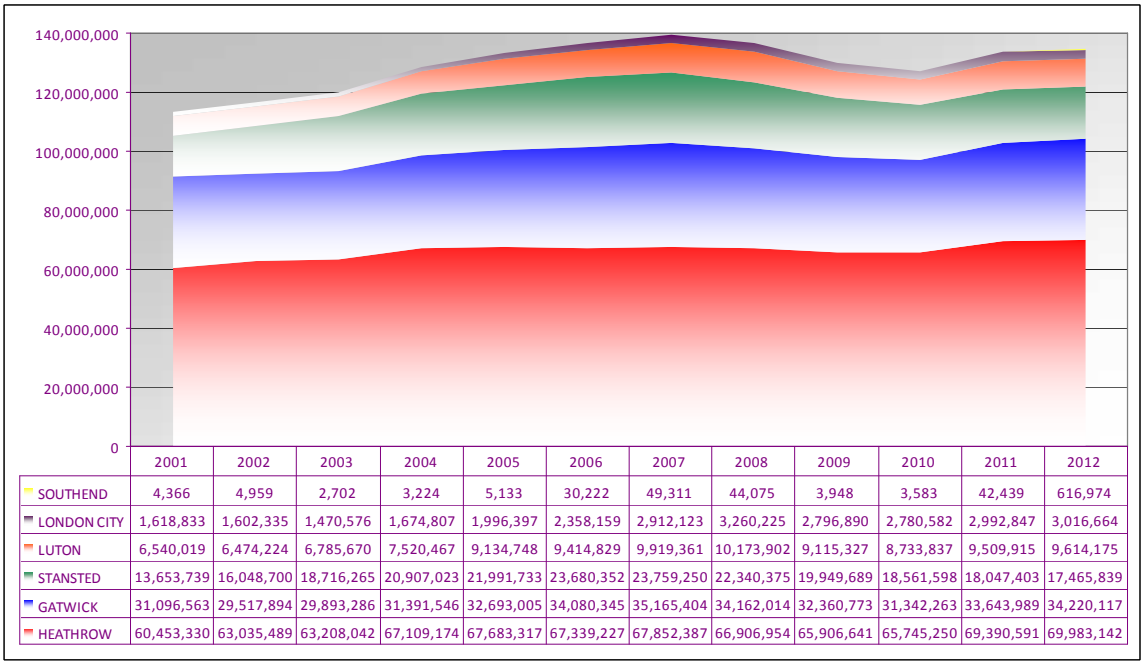
Source: CAA Surveys

2.22 Understanding these markets and how they might change in future, related to broader economic developments, is important to understanding how airlines may choose to serve different airports as, fundamentally, airlines respond to the base of demand. Only low fares airlines have demonstrated a substantive ability to stimulate new air travel markets and this has largely been confined to short haul markets.

Characteristics of Current Use of the London Airports

2.23 In **Figure 2.8**, we illustrate the use of the six London airports over the period since 2001. It is evident that across London as a whole, demand has almost returned to pre-recessionary levels. In particular, there has been strong growth at Heathrow and Gatwick, with declines still evident at Stansted, which has lost 26% of its passenger volume since 2007, albeit Stansted has recently reported growth in the market for the first time since 2007. This is mainly due to overall reductions in low fare airline discretionary travel due to increases in Air Passenger Duty (APD) and fuel prices, although Stansted also suffered as its airport charges were increased as airlines switched some capacity to Gatwick where the market is stronger.

Figure 2.8: Passenger Use of the London Airports 2001- 2012



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SOUTHEND	4,366	4,959	2,702	3,224	5,133	30,222	49,311	44,075	3,948	3,583	42,439	616,974
LONDON CITY	1,618,833	1,602,335	1,470,576	1,674,807	1,996,397	2,358,159	2,912,123	3,260,225	2,796,890	2,780,582	2,992,847	3,016,664
LUTON	6,540,019	6,474,224	6,785,670	7,520,467	9,134,748	9,414,829	9,919,361	10,173,902	9,115,327	8,733,837	9,509,915	9,614,175
STANSTED	13,653,739	16,048,700	18,716,265	20,907,023	21,991,733	23,680,352	23,759,250	22,340,375	19,949,689	18,561,598	18,047,403	17,465,839
GATWICK	31,096,563	29,517,894	29,893,286	31,391,546	32,693,005	34,080,345	35,165,404	34,162,014	32,360,773	31,342,263	33,643,989	34,220,117
HEATHROW	60,453,330	63,035,489	63,208,042	67,109,174	67,683,317	67,339,227	67,852,387	66,906,954	65,906,641	65,745,250	69,390,591	69,983,142

Source: CAA Statistics

2.24 Overall London airports are now running at only 3.4% below their 2007 peak passenger numbers, whilst the main impact of the ongoing slow economic recovery is being felt at regional airports where overall passenger numbers are 15.2% below the peak 2007 levels. The resilience of the London airport market is indicative both of the higher concentration of inbound visitors and of economic resilience overall. This is a consideration in the likelihood of airlines developing substantial services at the regional airports even if the London airports are full.

2.25 The characteristics of passengers using each of the airports varies. This is set out in **Table 2.1**. As can be seen London City Airport handles the highest proportion of passengers travelling on business at 63%, with Heathrow next at 30%. Both airports have high proportions of foreign resident passengers. The lowest proportion of business travellers in 2010 was at Gatwick.

Table 2.1: Characteristics of Passengers at the London Airports

	Foreign		UK	
	Business	Leisure	Business	Leisure
London City	32%	19%	31%	18%
Gatwick	5%	20%	9%	65%
Heathrow	17%	41%	13%	29%
Luton	5%	24%	14%	57%
Stansted	7%	35%	9%	48%

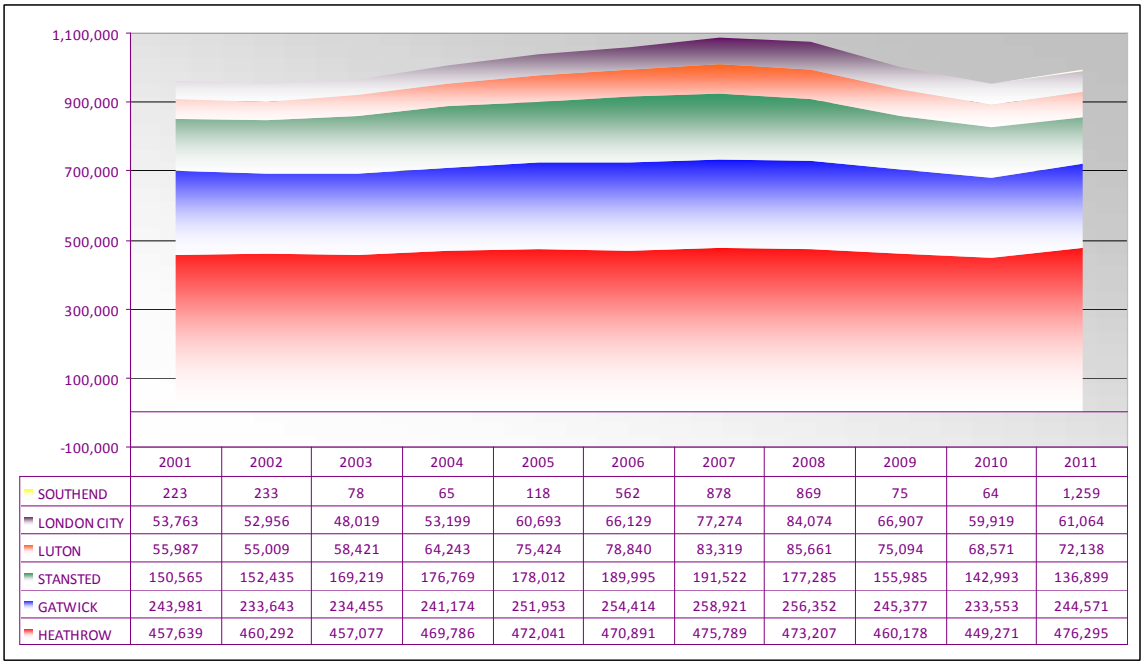
2.26 The mix of passengers using any airport is one of the key factors which will shape how airlines will put on services at an airport, although clearly the pattern of services will itself be a factor in the business/leisure mix. The passenger mix will be reflective of the catchment area which an airport serves.

2.27 The mix of passengers and the pattern of services also impacts on the utilisation of capacity at an airport, as we go onto explain in **Section 4**. For example, flights with high proportions of business travellers on fully flexible tickets will usually have lower load factors as the airlines need to leave seats available for such passengers to turn up at the last minute. On the other hand, flights with a high proportion of leisure passengers will usually operate with much higher load factors. The mix of passengers and the pattern of services will also impact on utilisation over the day and over the year as we also explain in Section 4.

2.28 In **Figure 2.9**, we set out the trend in terms of air transport movements[4]. This shows that generally the number of air transport movements has not recovered as quickly as airlines have increased the size of aircraft operated and the number of passengers carried on each movement to reduce operating costs. Whilst this trend is likely to continue, the extent to which airlines can increase the size of aircraft operated depends on the level of demand on any route and the extent to which operating at a high frequency of service is necessary to meet the needs of any particular market. This will vary from airport to airport dependent on the strength of its local catchment area and may be limited by the physical characteristics of each airport's runway.

[4] Air transport movements exclude private and general aviation flights not available for use by the public.

Figure 2.9: Air Transport Movement Use of the London Airports 2001- 2012



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
SOUTHEND	223	233	78	65	118	562	878	869	75	64	1,259
LONDON CITY	53,763	52,956	48,019	53,199	60,693	66,129	77,274	84,074	66,907	59,919	61,064
LUTON	55,987	55,009	58,421	64,243	75,424	78,840	83,319	85,661	75,094	68,571	72,138
STANSTED	150,565	152,435	169,219	176,769	178,012	189,995	191,522	177,285	155,985	142,993	136,899
GATWICK	243,981	233,643	234,455	241,174	251,953	254,414	258,921	256,352	245,377	233,553	244,571
HEATHROW	457,639	460,292	457,077	469,786	472,041	470,891	475,789	473,207	460,178	449,271	476,295

Source: CAA Statistics

2.29 In **Table 2.2**, we set out the number of freight movements and other, principally general/business aviation movements movements at each of the airports in 2011[5]. Both Heathrow and Gatwick have a very low proportion of such movements highlighting that exclusion of pure freighter activity and business aviation activity would have little impact on the utilisation of capacity overall. Most of the freight at these airports is carried in the bellyholds of passenger aircraft. We set out the freight carried by each airport in **Table 2.3**.

Table 2.2: Aircraft Movements by Category at the London Airports.

	Commercial Passenger[6]	Freight	Other	Total	% Freight	% Other
Gatwick	244,313	258	6,496	251,067	0.1%	2.6%
Heathrow	473,839	2,456	4,611	480,906	0.5%	1.0%
London City	61,064	0	7,728	68,792	0.0%	11.2%
Luton	70,421	1,717	25,436	97,574	1.8%	26.1%
Stansted	127,140	9,759	11,418	148,317	6.6%	7.7%

Source: CAA Statistics

[5] The last year for which a full annual breakdown in available
[6] Includes airline positioning flights.

Table 2.3: Freight Tonnage by Airport 2011	
Gatwick	88,085
Heathrow	1,484,351
Luton	27,905
Southend	6
Stansted	202,593
Source: CAA Statistics	

2.30 Only Luton and Stansted handle substantial numbers of business aviation (other) movements. However, business aviation is an important sector of the aviation industry serving London. In 2011, airports such as Farnborough and Biggin Hill were major operators in this sector handling 25,000 and 11,300 such movements respectively. Several other smaller airports also handle some business aviation and other general aviation movements.

2.31 In **Table 2.4**, we set out in broad terms the characteristics of the catchment areas of each of the airports in terms of the surface origin of passengers and the proportion of transfer passengers. This is derived from CAA survey data. This data demonstrates that for Heathrow, Gatwick and London City, the surface catchment areas are dominated by London and the South East. However, both Stansted and Luton draw a substantial proportion of passengers from the Eastern Region unsurprisingly. Luton also draws a large number of passengers from outside the Greater South East, principally from the East Midlands using the M1 corridor.

Table 2.4: Origins/Destinations of Passengers at the London Airports 2010					
	Transfers	**Greater London**	**Rest of SE**	**East of England**	**Other Regions**
London City	2%	83%	6%	8%	1%
Gatwick	8%	38%	40%	9%	6%
Heathrow	36%	32%	22%	6%	7%
Luton	2%	36%	30%	30%	15%
Stansted	6%	46%	16%	29%	8%
Source: CAA Surveys					

Transfer Passengers

2.32 Of the 127 million passengers which used the London airports in 2010, CAA survey data shows that 22% of all passengers were transferring between flights. Specifically, in 2010, 36% of passengers using Heathrow were transferring between flights, whilst the numbers of passengers transferring at the other airports were significantly lower. These transfer passengers include passengers with origins or destinations in other regions of the UK which are using Heathrow and, to a lesser extent, the other airports to connect to international services. Overall, 85% of all transfer passengers used Heathrow Airport.

2.33 There are some important definitional issues in interpreting the proportion of passengers at each airport which are transferring; a point which was highlighted before the Committee in the submission from Gatwick Airport. Most commentators use CAA survey data, as above, to categorise passengers terminating their journey at an airport and those transferring or using an airport to hub. This would include the figures produced by Heathrow Airport itself and by TfL on behalf of the Mayor. This data is collected by direct sample survey of departing passengers which asks whether the passenger is using an airport solely to transfer between flights within 24 hours or, if not their surface origin[7]. The survey data is then weighted up to total passenger volumes using the airport. As such, there is some tolerance for error in any estimate although this is not usually significant at the aggregate level, although discrepancies might arise with smaller samples at the individual route level.

2.34 The CAA survey data records, for each flight, passengers who were using that flight solely to transfer to another flight at Heathrow (or other airport). Hence, this data counts each actual passenger using Heathrow to transfer twice; once on the arriving flight and once on the departing flight. This is correct in so far as it records the dependence of each flight, route or airline on transfer passengers to sustain viable operations. This is the critical issue in terms of the extent to which the hub sustains operations to a wider range of global destinations. We will explore this further in the next section.

[7] It is assumed that the pattern of arriving passenger use mirrors that of departing passengers.

2.35 Gatwick Airport has argued that this approach overstates the dependence of Heathrow Airport on transfer passengers and that the vast majority of demand to use the London airports is point to point demand. In principle, this is correct. Adjusting for the 'double counting' of transfer passengers in CAA survey data, transfer passengers would make up only around 22% of all Heathrow passengers in 2010, meaning that 78% of individual passengers using the Airport were local originating passengers[8]. However, the data submitted by Gatwick Airport regarding transfer passengers, taken from the the IATA PAXIS data, is also not fully accurate as it does not show all transfers, only those which are identified as on a through ticket.

2.36 So, Gatwick reports that it only had 1 million passengers which were transferring through the Airport in 2011 (or 2 million airport passengers as recorded by the CAA) but this does not take into account passengers who were transferring between low fares flights or onto charter flights without a through ticket. CAA data shows over 500,000 passengers transferring to or from easyJet flights at Gatwick in 2011 and another 300,000 or so transferring to/from charter flights. All of these will be missed in the IATA data and therefore assumed to be London terminating passengers in Gatwick's approach. Making these adjustments, the Gatwick data can be reconciled to CAA survey data for that Airport. This similar pattern will also apply at Stansted and Luton and to a greater or lesser extent to the Heathrow transfer market dependent on the extent to which passengers are all on through tickets if they are using airlines which are part of different alliances[9]. There remains some discrepancy between the 8 million transfer passengers at Heathrow recorded in the data used by Gatwick Airport and the CAA data which records 24 million transfer passengers or 12 million once the double counting is stripped out. This is likely to be a combination of sampling error and passengers which were transferring at Heathrow but using separate tickets. This may be an area for the Davies Commission to investigate further.

[8] Local originating traffic is 64%. Transfer passengers absent the double counting are 18% and represent 22% of the total individual passenger count.
[9] Alliances are groups of airlines which cooperate and sell through tickets on each others' flights.

Airport Surface Catchment Areas

Heathrow

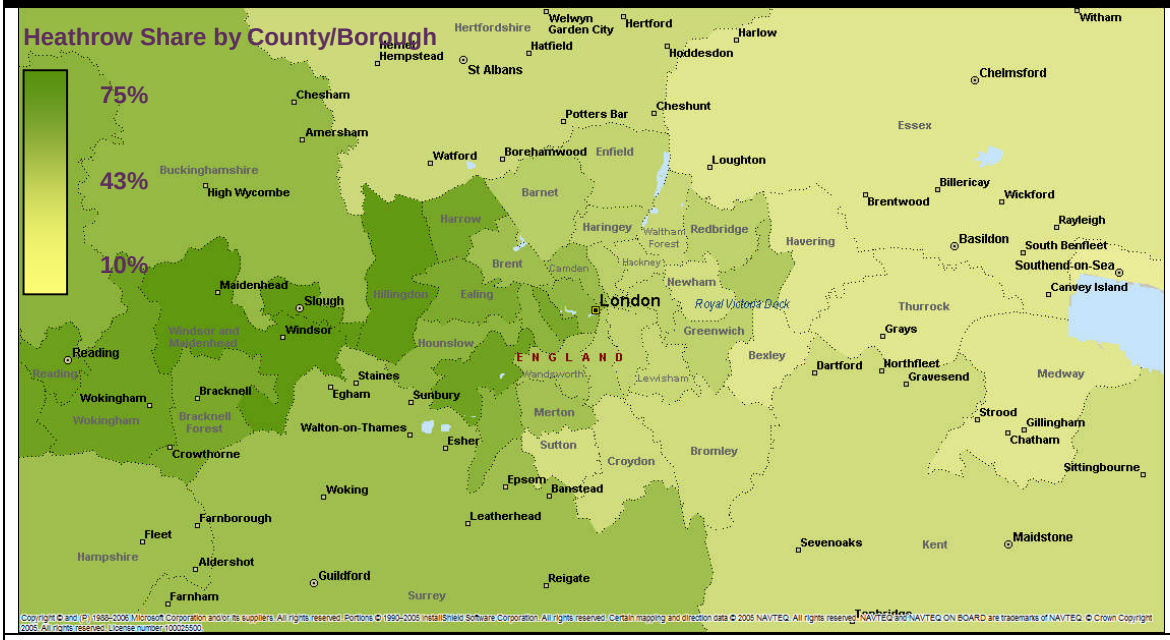
2.37 In **Figure 2.10**, we show the surface catchment area for Heathrow in more detail by London Borough, County or Unitary Authority[10]. This highlights the strength of Heathrow's catchment area to the West of London and its relatively lower market penetration to the East. The pattern is more striking when the market share of all air trips from each area which uses Heathrow is shown in **Figure 2.11**. Heathrow commands very high market shares to the west of London and much lower shares to the east. To some extent, this may reflect the extent to which high users of Heathrow have gravitated to locate in the areas closest to Heathrow. It should also be noted that these maps show both short haul routes which may be operated from a number of London airports and those long haul routes which are only served from Heathrow.

Figure 2.10: Surface Access Catchment of Heathrow 2010

Source: CAA Surveys

[10] It should be noted that account needs to be taken of the geographic scale of each area in interpreting the overall density of demand in these maps.

Figure 2.11: Heathrow Airport Market Share in Catchment Area 2010

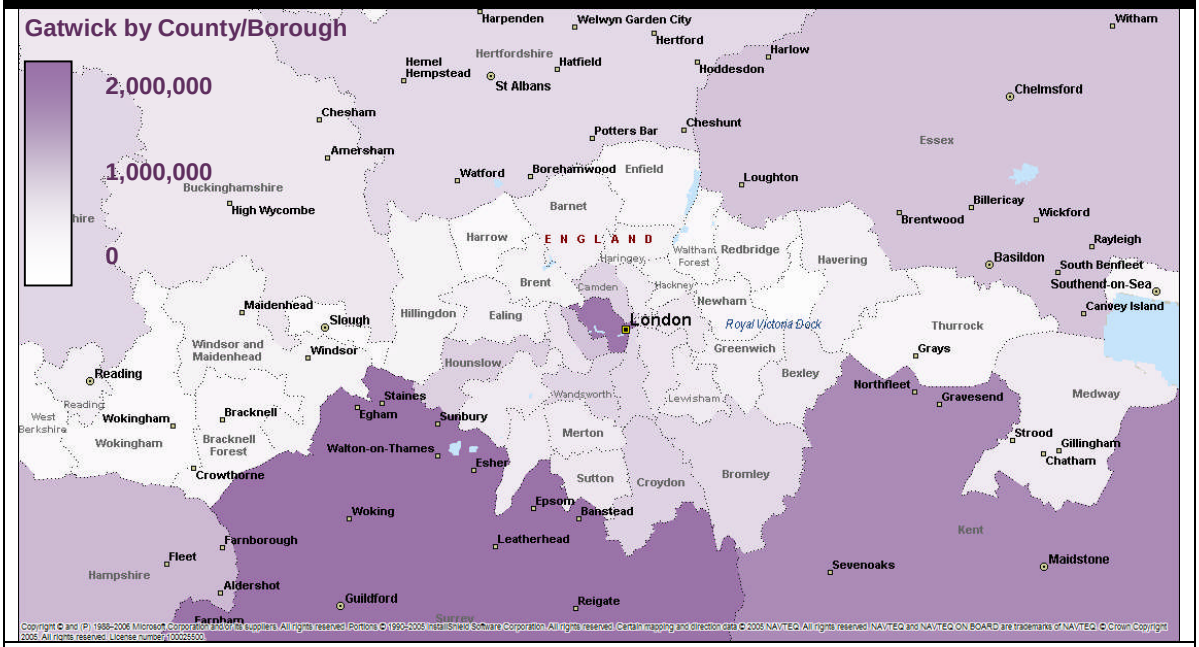


Source: CAA Surveys

Gatwick

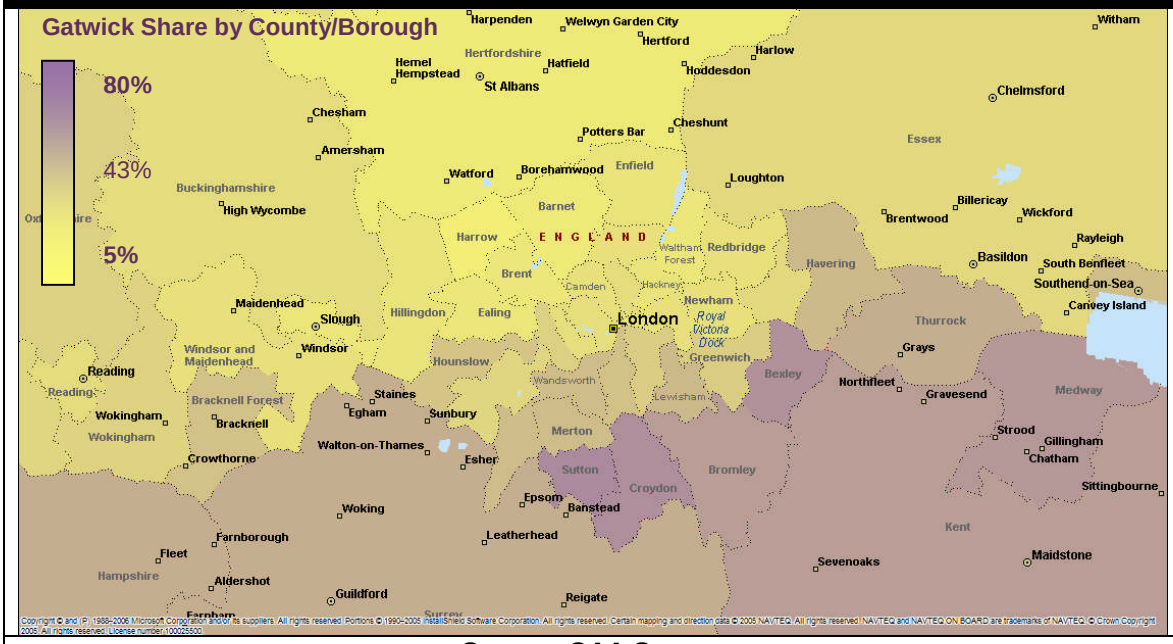
2.38 Gatwick's catchment area is illustrated in **Figures 2.12** and **2.13**. This highlights the strength of Gatwick's catchment area to the south of London and, to a lesser extent, Essex. The Airport's market share is highest in these areas, particularly in Kent.

Figure 2.12: Surface Access Catchment of Gatwick 2010



Source: CAA Surveys

Figure 2.13: Gatwick Airport Market Share in Catchment Area 2010

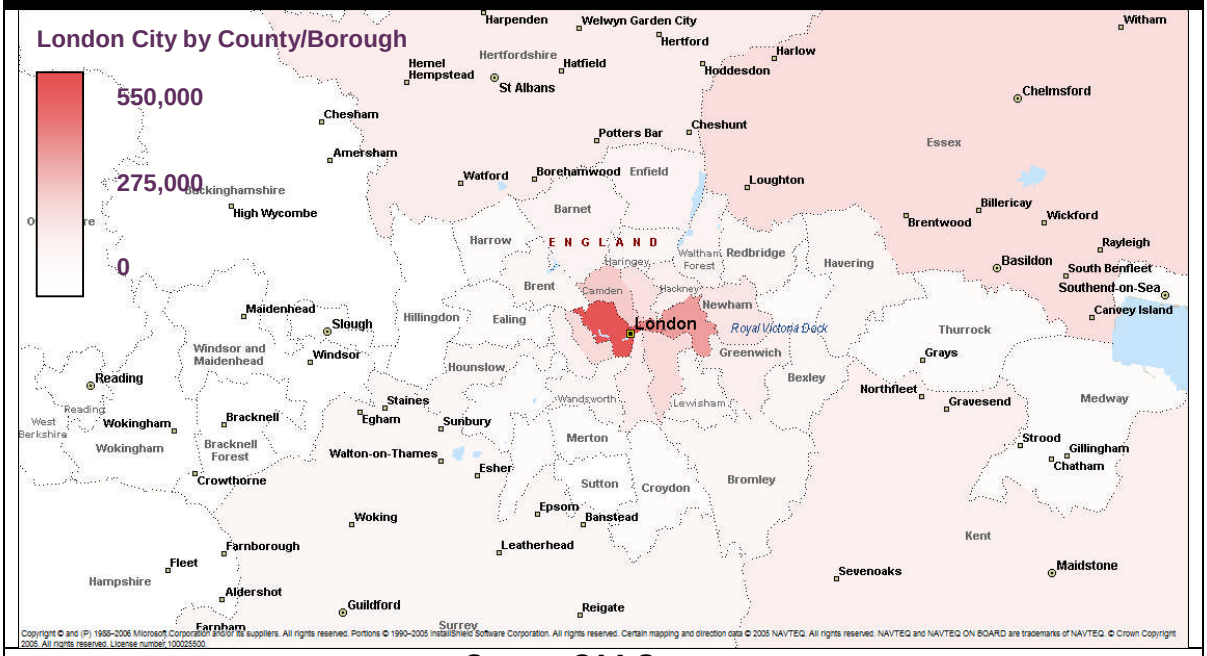


Source: CAA Surveys

London City

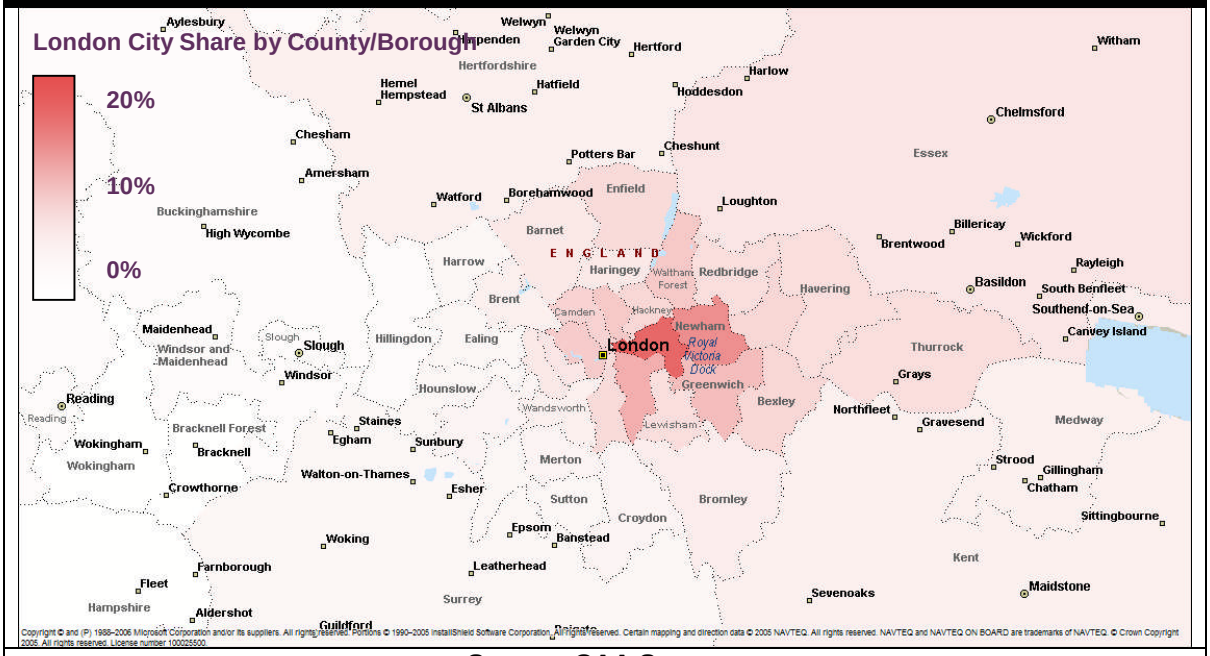
2.39 London City Airport's catchment area is illustrated in **Figures 2.14** and **2.15**. The catchment area is heavily focused in Westminster, the City and Tower Hamlets. In market share terms, the Airport commands its highest market share in Tower Hamlets and Newham. Whilst the share of the overall air travel market is relatively low, this has to be considered in the context of the relatively small number of mainly short haul routes served by airlines at the Airport. The Airport commands a very high market share from these districts on the routes which are actually operated.

Figure 2.14: Surface Access Catchment of London City 2010



Source: CAA Surveys

Figure 2.15: London City Airport Market Share in Catchment Area 2010

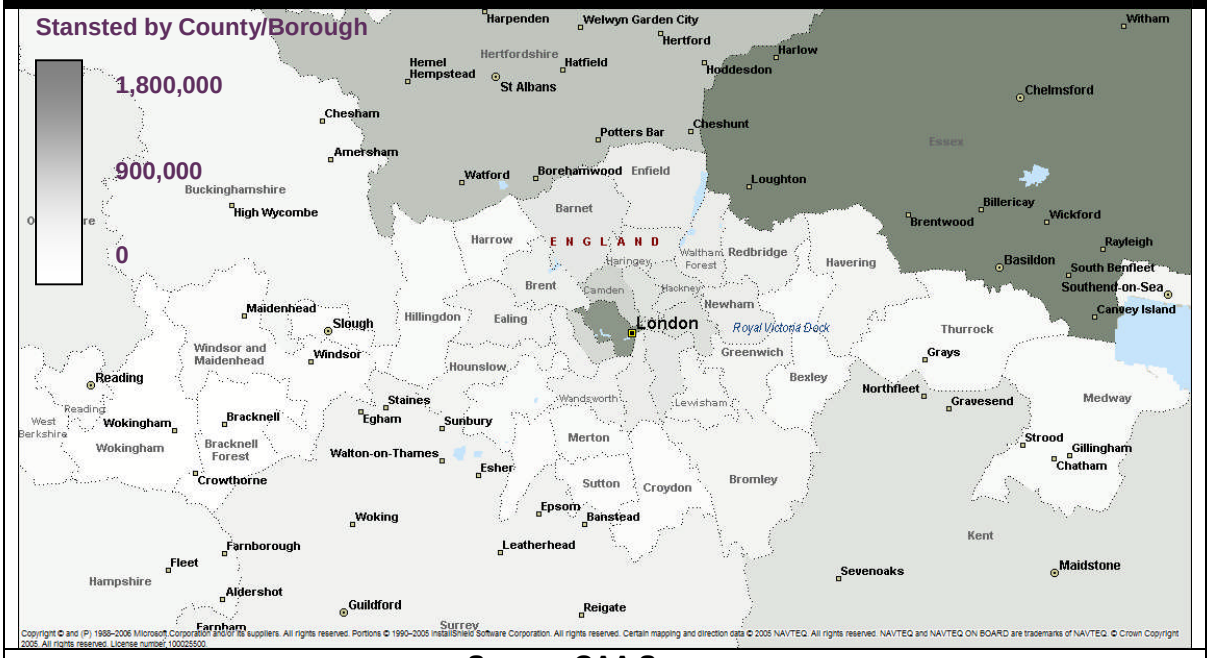


Source: CAA Surveys

Stansted

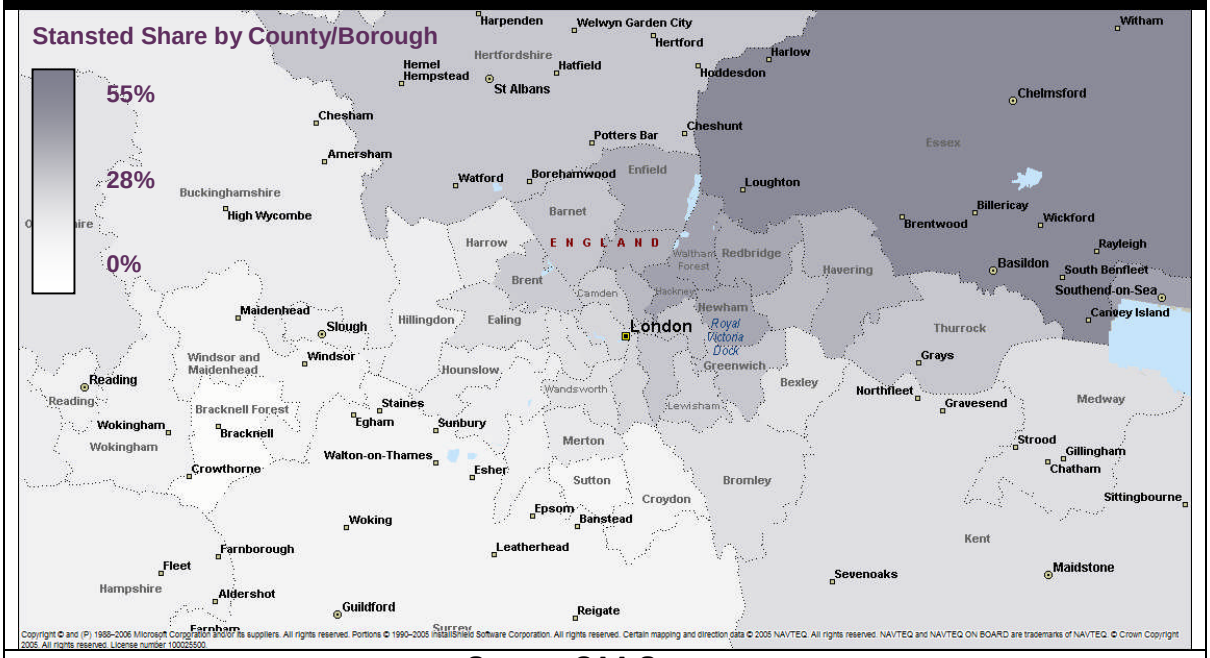
2.40 As shown in **Figure 2.16**, the catchment area for Stansted is dominated by Westminster and East Anglia. The former is largely a low cost inbound leisure market, including student visitors, whilst the latter is the core of the UK outbound market. In market share terms, Stansted's catchment area extends north eastwards from Central London, with low market shares to the south and west as shown in **Figure 2.17**.

Figure 2.16: Surface Access Catchment of Stansted 2010



Source: CAA Surveys

Figure 2.17: Stansted Airport Market Share in Catchment Area 2010



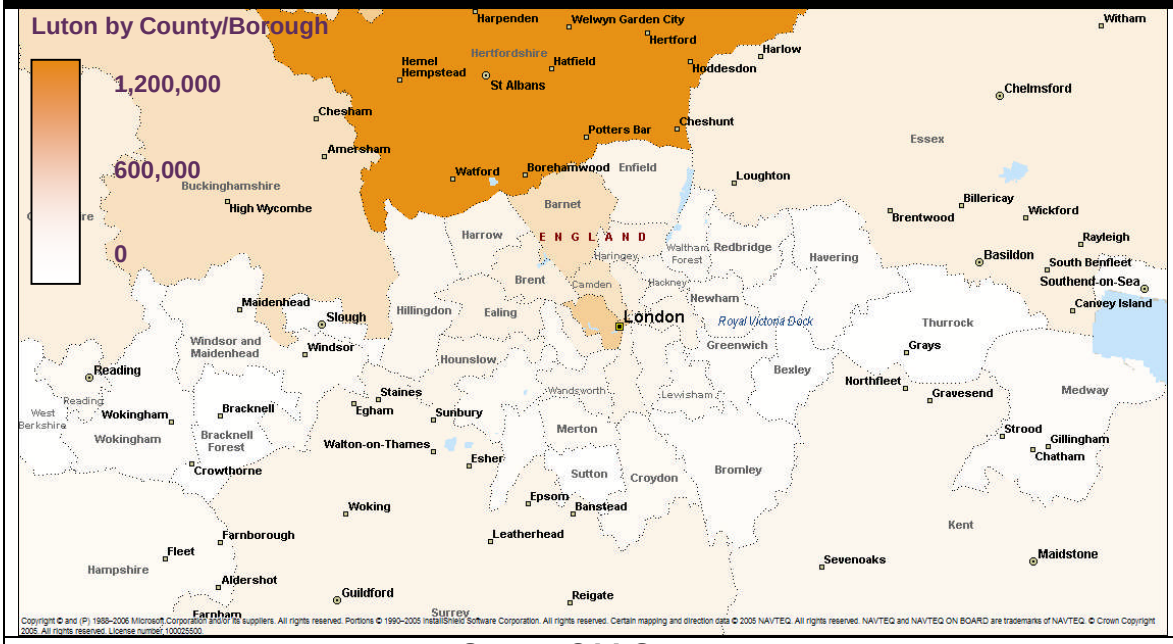
Source: CAA Surveys

Luton

2.41 Luton Airport's catchment area is dominantly to the north of London up the M1 corridor as illustrated in **Figure 2.18**. It draws a significant number of passengers from the East Midlands Region. Its penetration of the Central London market, even for inbound leisure travel, is relatively limited as shown in **Figure 2.19**.

2.42 Overall consideration of these catchment area maps highlights the extent to which each of the London airports serves its own local catchment area market, even Heathrow. This has implications for the extent to which one airport can substitute for another or the likelihood of airlines switching services away from their local demand base to an alternative airport site. This will need to be considered further by the Davies Commission. We highlight some route specific examples of this in the next section.

Figure 2.18: Surface Access Catchment of Luton 2010



Source: CAA Surveys

Figure 2.19: Luton Airport Market Share in Catchment Area 2010

Source: CAA Surveys

2.43 In the light of the existing pattern of demand across the London airports, a key issue is the extent to which a new airport in the Thames Estuary would meet the air travel demand from the West of London and how two hub airports might interact if Heathrow remains operational. Surface access to West London will be critical. A key issue for the Davies Commission to explore is the extent to which airlines and passengers would automatically relocate to a new hub given the existing pattern of demand and what steps would be necessary to change that pattern.

Surface Access

2.44 In **Table 2.5**, we show the surface mode of access to each of the main London airports taken from CAA Survey data from 2010, which is the last year when all five London airports were surveyed. Transfer passengers are excluded.

Table 2.5: Mode of Access to the London Airports

	Heathrow	Gatwick	London City	Luton	Stansted
Bus	3%	0%	1%	1%	1%
Coach	9%	6%	0%	15%	21%
Courtesy Bus	2%	3%	0%	0%	1%
DLR	-	-	52%	-	-
Hire Car	3%	2%	1%	3%	3%
Private Car Parked	13%	23%	3%	22%	20%
Private Car Dropped Off	18%	19%	10%	26%	20%
Rail	10%	34%	-	17%	25%
Taxi	26%	13%	34%	16%	9%
Tube	16%	-	-	-	-
Grand Total	100%	100%	100%	100%	100%

Source: CAA Survey Data 2010

2.45 All the airports, apart from London City, have substantial numbers of passengers travelling to them by private car. These are largely UK resident outbound passengers travelling from home. In particular, a high proportion of passengers are dropped off at each of the airports. The need for high quality road as well as rail access to airports is an important consideration in terms of any new airport site. Access by taxi is also significant to Heathrow and London City. London City has the highest public transport share at 53%, principally using the DLR.

Employment

2.46 The approach to estimating employment impact at airports is based on a framework of four categories of effect, as set out in the **Table 2.6**.

Table 2.6: Categories of Economic Impact		
Impact Category	**Definition**	**Examples**
Direct On-Site	Employment and income and wholly or largely related to the operation of an airport and generated within the Airport Operational Area.	Airport operator, airlines, handling agents, control authorities, concessions, freight agents, flight caterers, hotels, car parking, aircraft servicing, fuel storage.
Direct Off-Site	Employment and income wholly or largely related to the operation of an airport and generated within an approximate 20-minute drive-time.	Airlines, freight agents, flight caterers, hotels, car parking.
Indirect	Employment and income generated in the chain of suppliers of goods and services to the direct activities.	Utilities, retailing, advertising, cleaning, food, construction.
Induced	Employment and income generated by the spending of incomes earned in the direct and indirect activities.	Retailing, restaurants and entertainment.
Source: York Aviation		

2.47 The employment estimates in **Table 2.7** combine the direct on-site and direct off-site figures for the five London airports, as a split between on site and off site estimates is not available for all of the airports. In the case of London City Airport, a combined indirect and induced multiplier was used to estimate a single figure for these categories. The latest available data is shown for each airport, but the reference years to which the estimates apply are not the same in each case. The most recent publicly available figures for London Stansted were prepared for the Stansted G2 Public Inquiry and are now some years old (2006). We have, therefore, adjusted these figures pro rata to the fall in passengers over the period from 2006 to 2012 (23.7mppa in 2006 to 17.5mppa in 2012). There is no detailed information available consistently about the residence location of employees or the indirect and induced impacts.

Table 2.7: Estimated Employment Impacts of the London Airports					
	Direct	**Indirect**	**Induced**	**Total**	**Source**
Heathrow	84,300	20,800	31,500	136,600	Heathrow Airport & Optimal Economics (2010)
Gatwick	23,200	2,900	15,600	41,700	Gatwick Airport Master Plan 2012 & Optimal Economics
Stansted	8,713	960	2,289	11,962	Tribal (2006) adjusted to 2012 pro rata
Luton	7,610	1,440	1,490	10,540	Source: York Aviation (2011)
London City	1,983	595		2,577	Source: York Aviation (2011)

3 THE PATTERN OF AIR SERVICES AT THE LONDON AIRPORTS

Key Findings

3.1 The route network at each airport is largely driven by the airlines and how they respond to demand. The local market will be a key factor determining which routes an airline will operate. As we have shown, this is not necessarily the same for each of the London airports and their different catchment area characteristics are reflected in the pattern of air services operated.

3.2 For short haul services, each of the airports has a geographically distinct local market for UK outbound travel both business and leisure.

3.3 Our analysis demonstrates that long haul services, except to leisure destinations, are heavily concentrated at Heathrow both because of its accessibility to the core catchment area to the west of London and because BA is able to use its network strength to augment point to point passengers with transfer connectors.

3.4 These connecting passengers can make the difference to some flights operating at all but the numbers and proportions will be variable throughout the year dependent on the nature of local point to point demand.

3.5 Analysis of the pattern of use across a sample of routes highlights that all routes at Heathrow feed the hub to a greater or lesser extent but reliance on the Heathrow hub varies significantly between airlines. The hub is clearly important to BA and to the development of routes to more marginal destinations, such as Hyderabad and Bangalore, with 80% and 69% of passengers transferring. However, transfer traffic also sustains high frequencies on large routes such as New York, with 32% of passengers transferring, and add value to the business offer. Transfer proportions are generally lower on European flights, although it is typically high on UK domestic services, reaching 79% on the Manchester route.

3.6 Generally, the number of UK and European destinations served from Heathrow has been declining but, overall, London remains well connected as new services have developed from the other airports, albeit mostly by low fares airlines.

Pattern of Air Services

3.7 The route network at each airport is largely driven by the airlines and how they respond to demand. The local market will be a key factor determining which routes an airline will operate. As we have shown, this is not necessarily the same for each of the London airports and their different catchment area characteristics is reflected in the pattern of air services operated.

3.8 In **Table 3.1**, we set out the route structure at each of the London airports in July 2012. This table includes scheduled movements, although some charter flights are included where seats are sold directly to the public. There is no systematic database covering all charter flights. This table highlights that there are limited operations outside of Europe at all the airports other than Heathrow. Apart from leisure oriented services to North Africa and Israel, only Gatwick has any substantive number of long haul services. These are principally to leisure destinations in North America and the Caribbean, although the new owners of the Airport are seeking to develop a broader portfolio of services to the Far East with services being initiated recently to Beijing, Hanoi and services to Jakarta will commence in Summer 2013. However, services to Seoul started in Summer 2012 have now switched back to Heathrow. London City does operate a niche business route to New York.

3.9 This table does highlight the significant number of short haul and domestic services still operated to Heathrow. However, the number of such services has been declining over time as shown in **Table 3.2**. Within this pattern, new routes have been added and some services have ceased. This is also evident since British Airways (BA) took over bmi, whereby new short haul leisure routes are being operated in the short term to preserve slots at Heathrow. It is anticipated that these will be converted to long haul services over time, particularly once BA receives its new aircraft on order for such services, the A380 and B787. What is noticeable is that the increases in destinations served have largely been to North America, which arose as liberalisation of air service relations between the EU and USA allowed US carriers which had previously been limited to serving Gatwick on some or all routes to relocate services to Heathrow.

Table 3.1: Weekly Departures by World Region July 2012							
Scheduled Movements only	**London City**	**Gatwick**	**Heathrow**	**Luton**	**Southend**	**Stansted**	**Total**
Africa : Central/Western		11	43				54
Africa : Eastern		5	27				32
Africa : North		73	48	9		12	142
Africa : Southern			51				51
Asia : Central			9				9
Asia : North East		7	138				145
Asia : South		4	121				125
Asia : South East		4	84				88
Europe : Eastern/Central		133	235	65	4	189	626
Europe : Western	698	2229	2777	479	107	858	7148
Of which, United Kingdom	153	424	466	85	21	82	1231
Latin America : Caribbean		55	5				60
Latin America : Central		11	8				19
Latin America : Lower South			31				31
Middle East		24	276	20			320
North America		68	813				881
Total	698	2624	4666	573	111	1059	9731
Source: OAG							

Table 3.2: Change in Destinations served at Heathrow 2005-2012					
	2005	2008	2011	2012	Net Change 2005-12
Domestic	9	11	7	7	-2
Africa : Central/Western Africa	4	4	4	4	0
Africa : Eastern Africa	6	7	6	5	-1
Africa : North Africa	11	8	10	11	0
Africa : Southern Africa	5	4	4	4	-1
Asia : Central Asia	4	4	4	4	0
Asia : North East Asia	7	7	7	8	1
Asia : South Asia	12	14	16	12	0
Asia : South East Asia	6	4	4	4	-2
Europe : Eastern/Central Europe	19	17	16	16	-3
Europe : Western Europe	56	49	52	48	-8
Latin America : Caribbean	10	3	3	3	-7
Latin America : Central America	1	1	1	1	0
Latin America : Lower South America	3	3	3	3	0
Latin America : Upper South America	0	0	0	0	0
Middle East	17	17	14	14	-3
North America	26	31	36	36	10
Southwest Pacific	4	3	3	3	-1
Total	196	184	187	180	-16
Source: OAG					

3.10 When all the London airports are considered (**Table 3.3**), the pattern is different. The overall loss of UK domestic connections is evident, as well as a growth in European destinations.

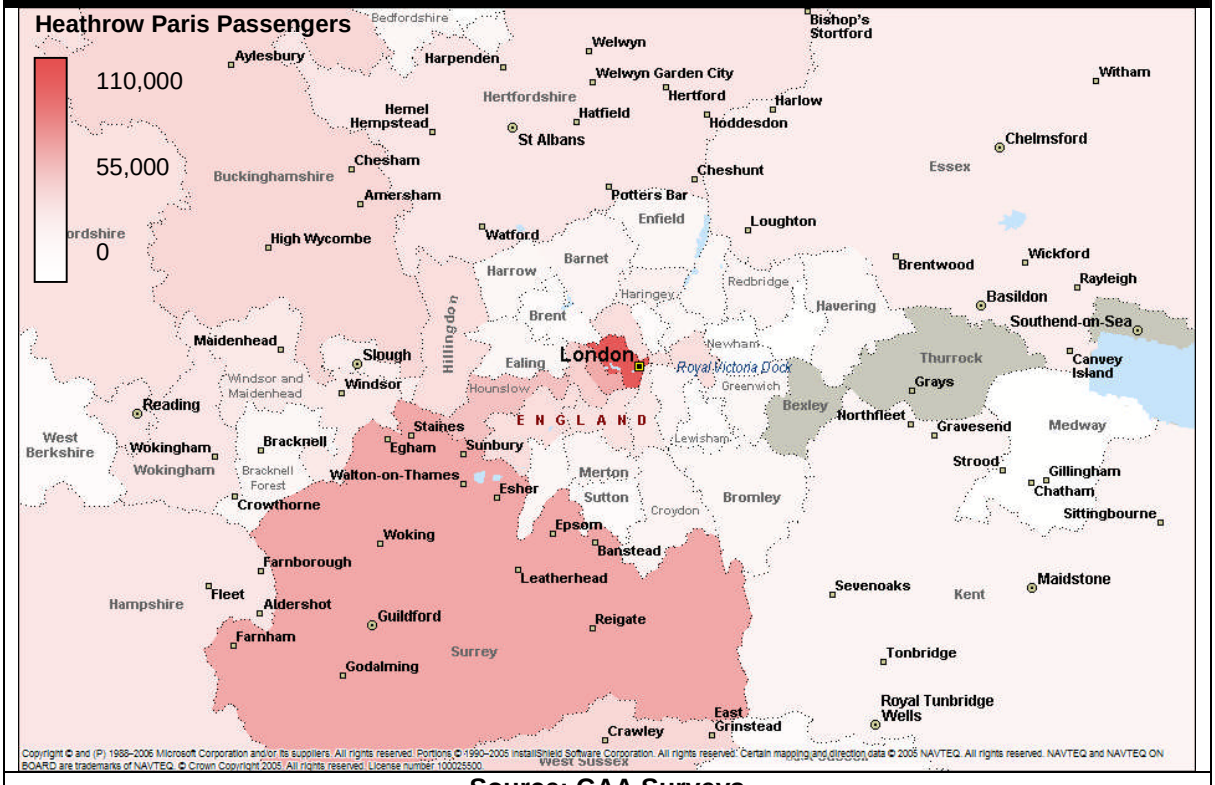
Table 3.3: Change in Destinations served across the London Airports 2005-2012					
	2005	2008	2011	2012	Net Change 2005-12
Domestic	22	21	15	14	-8
Africa : Central/Western Africa	8	4	6	6	-2
Africa : Eastern Africa	7	8	7	6	-1
Africa : North Africa	14	14	18	17	3
Africa : Southern Africa	6	7	5	4	-2
Asia : Central Asia	4	4	4	4	0
Asia : North East Asia	7	7	7	8	1
Asia : South Asia	12	14	16	13	1
Asia : South East Asia	6	4	4	6	0
Europe : Eastern/Central Europe	33	51	50	52	19
Europe : Western Europe	163	183	185	186	23
Latin America : Caribbean	16	17	21	19	3
Latin America : Central America	2	4	2	2	0
Latin America : Lower South America	3	4	3	3	0
Latin America : Upper South America	0	0	0	0	0
Middle East	17	17	14	14	-3
North America	40	42	41	40	0
Southwest Pacific	4	3	3	3	-1
Total	364	404	401	397	33
Source: OAG					

3.11 In **Annex A**, we set out the individual Western European and Domestic Cities served by each of the London airports. From this detailed table, it is evident that services from Heathrow are largely to major or capital cities, whilst the other airports serve a broader portfolio of cities.

3.12 In considering the reason why so many short haul routes still operate from Heathrow, whilst this is partly a function of the need for connections to feed the hub as we discuss later in this section, it also relates to Heathrow's role serving its own local demand. To illustrate, this we have examined the way in which demand to a short haul business destination, Paris, and a short haul leisure destination, Malaga, uses the different London airport using CAA survey data for 2010.

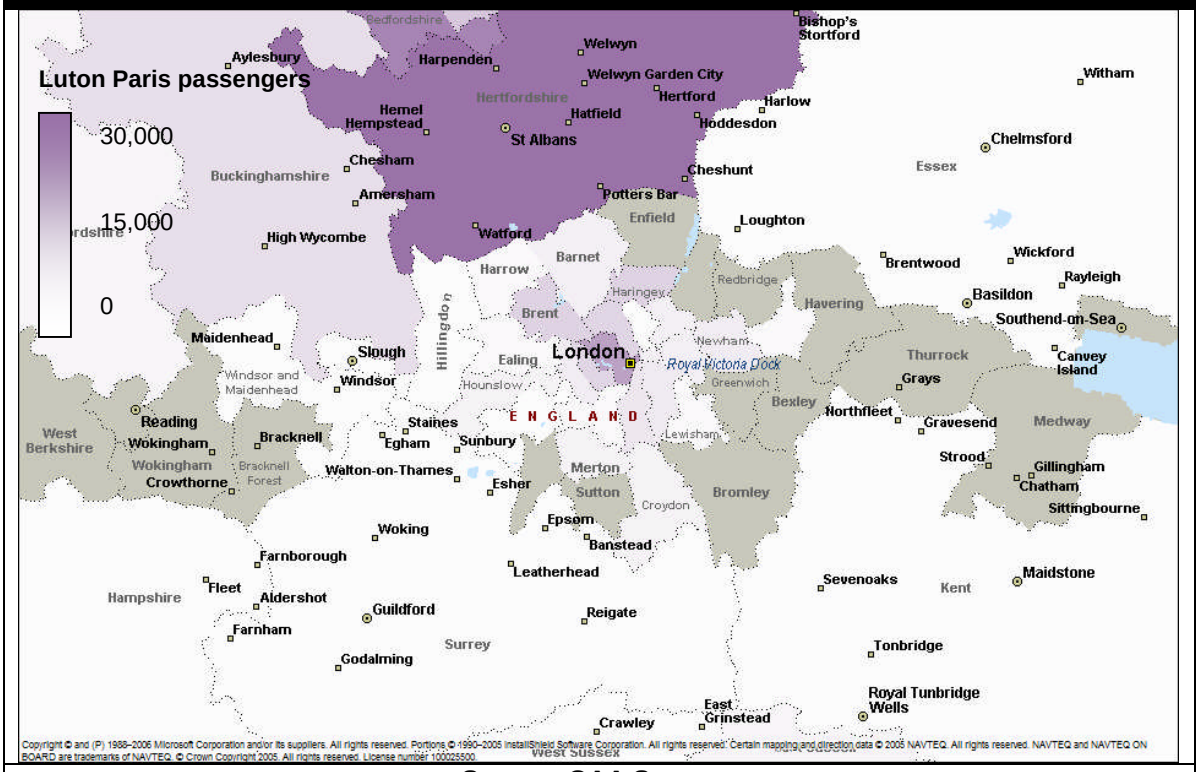
3.13 In **Figure 3.1**, we illustrate Heathrow's surface catchment area for passengers flying to Paris CDG. This is similar to the overall Heathrow catchment area shown in Figure 2.10. The catchment area for services from Luton to Paris CDG is shown in **Figure 3.2**. Services also operate from London City to Orly but large numbers of passengers use Eurostar from Central London. 84% of those passengers from Westminster using Heathrow were foreign residents, mostly travelling for leisure purposes.

Figure 3.1: Passenger Surface Origins of the Heathrow – Paris Route



Source: CAA Surveys

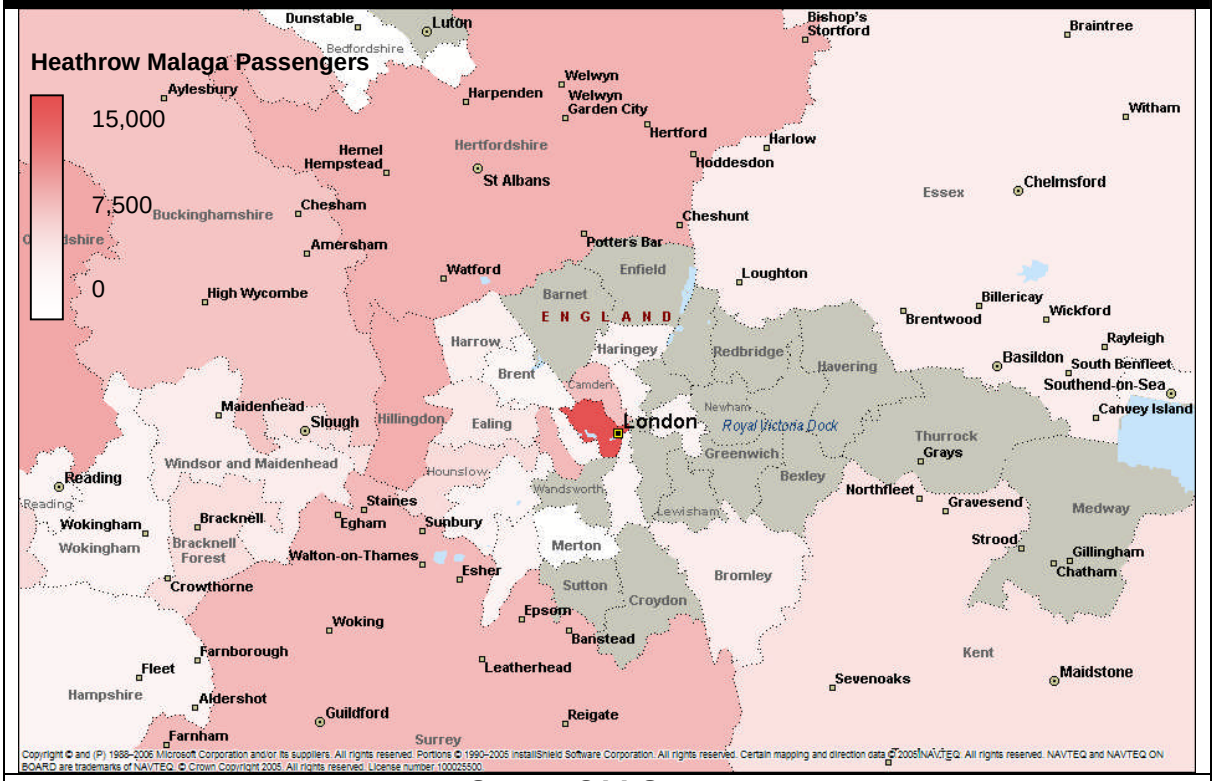
Figure 3.2: Passenger Surface Origins of the Luton – Paris Route



Source: CAA Surveys

3.14 The geographic distinction in the catchment areas of the airports on short haul routes is even more pronounced on leisure routes where services are offered from most of the airports. We have used Malaga as a example of such a route. In **Figures 3.3-3.6**, we illustrate the catchment area for flights to Malaga from each of Heathrow, Gatwick, Luton and Stansted in turn. The distinct surface catchment area of each of the airports is obvious. This highlights the extent to which surface access is a key consideration in determining passengers' choice of airport. It also highlights that it is not obvious that passengers would switch to a new hub airport on a route by route basis if services are still operated from Heathrow and/or one of the other airports if services are available from another more accessible airport. This could impact on the viability of airlines operating a full range of services from a new hub.

Figure 3.3: Passenger Surface Origins of the Heathrow – Malaga Route

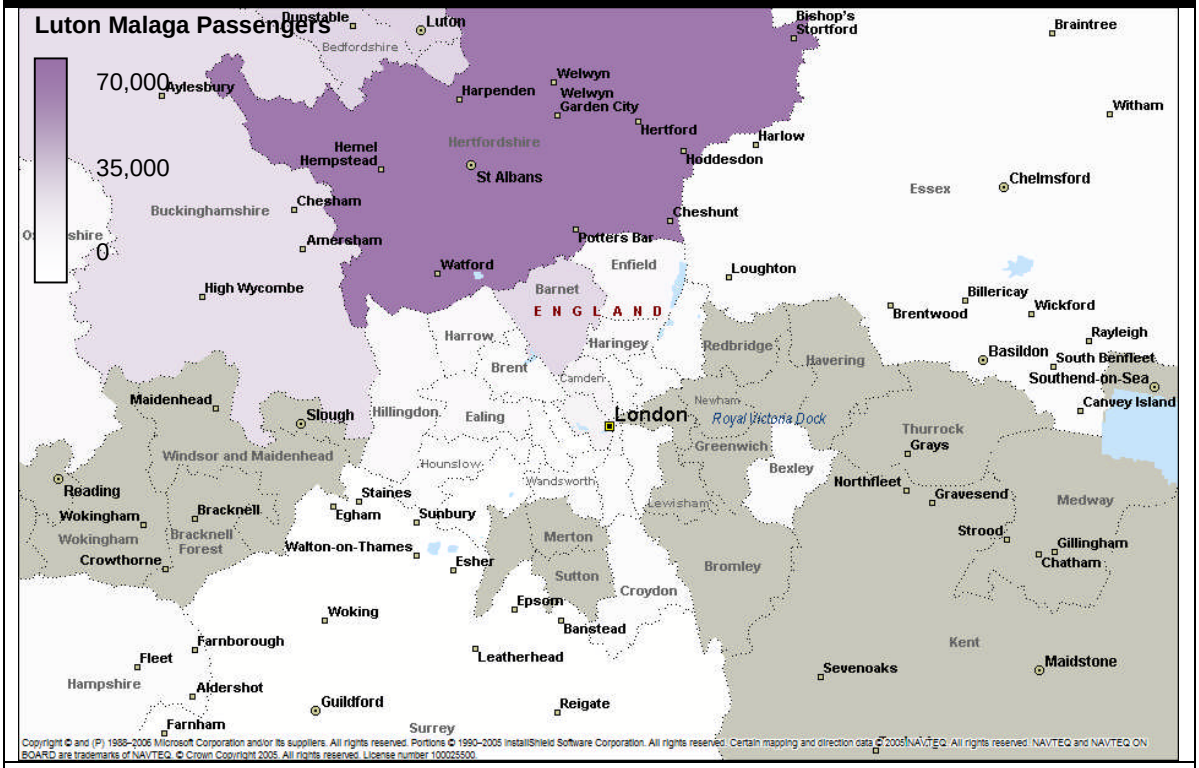


Source: CAA Surveys

Figure 3.4: Passenger Surface Origins of the Gatwick - Malaga Route

Source: CAA Surveys

Figure 3.5: Passenger Surface Origins of the Luton – Malaga Route



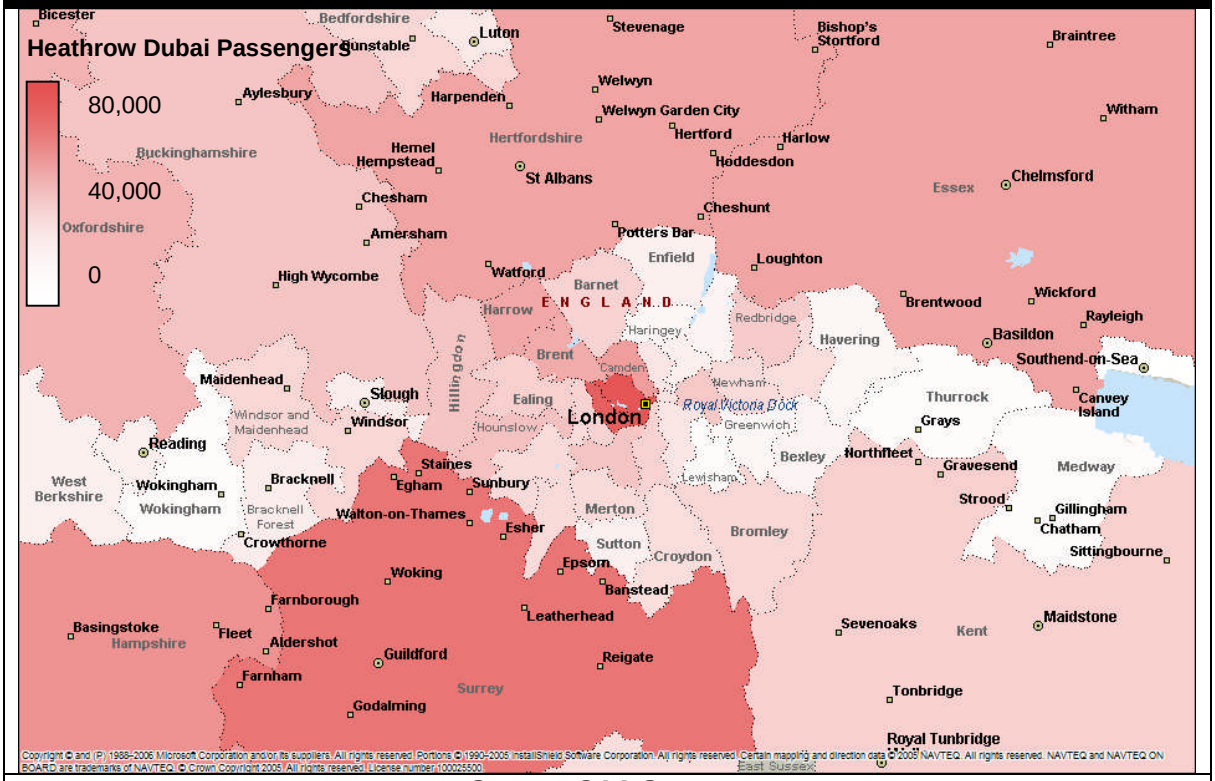
Source: CAA Surveys

Figure 3.6: Passenger Surface Origins of the Stansted – Malaga Route

Source: CAA Surveys

3.15 A distinction in the pattern of surface origins is also evident on the route to Dubai, which is operated from Heathrow and Gatwick. Whilst there is clear catchment area overlap in areas of southwest London as shown in **Figures 3.7** and **3.8**, much of the catchment area is quite distinct. We consider other characteristics of the Dubai route later in this section.

Figure 3.7: Passenger Surface Origins of the Heathrow – Dubai Route



Source: CAA Surveys

Figure 3.8: Passenger Surface Origins of the Gatwick - Dubai Route

Source: CAA Surveys

Connectivity

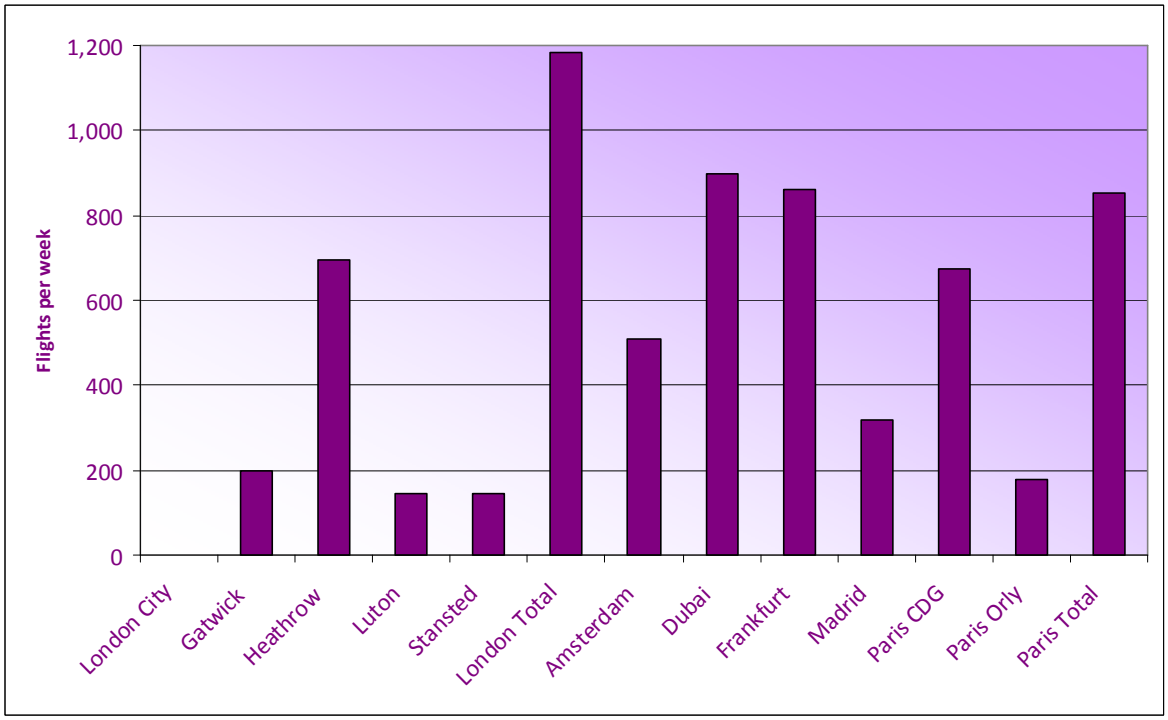
3.16 A key issue is the level of London's air service connectivity compared to other competitor cities. We have investigated this in our work for the City of London Corporation[11] but highlight and expand on some of the key features here.

[11] http://www.cityoflondon.gov.uk/business/economic-research-and-information/research-publications/Pages/london-air-connectivity.aspx

3.17 In **Figure 3.9**, we show how well London is connected to a basket of 23 fast growing economies identified by the FTSE in terms of weekly air service frequencies in Summer 2012. These economies are:

Advanced Emerging	Secondary Emerging
Brazil	Chile
Czech Republic	China
Hungary	Columbia
Malaysia	Egypt
Mexico	India
Poland	Indonesia
South Africa	Morocco
Taiwan	Pakistan
Thailand	Peru
Turkey	Philippines
	Russia
	UAE

Figure 3.9: London's Air Connectivity to Fast Growing Economies

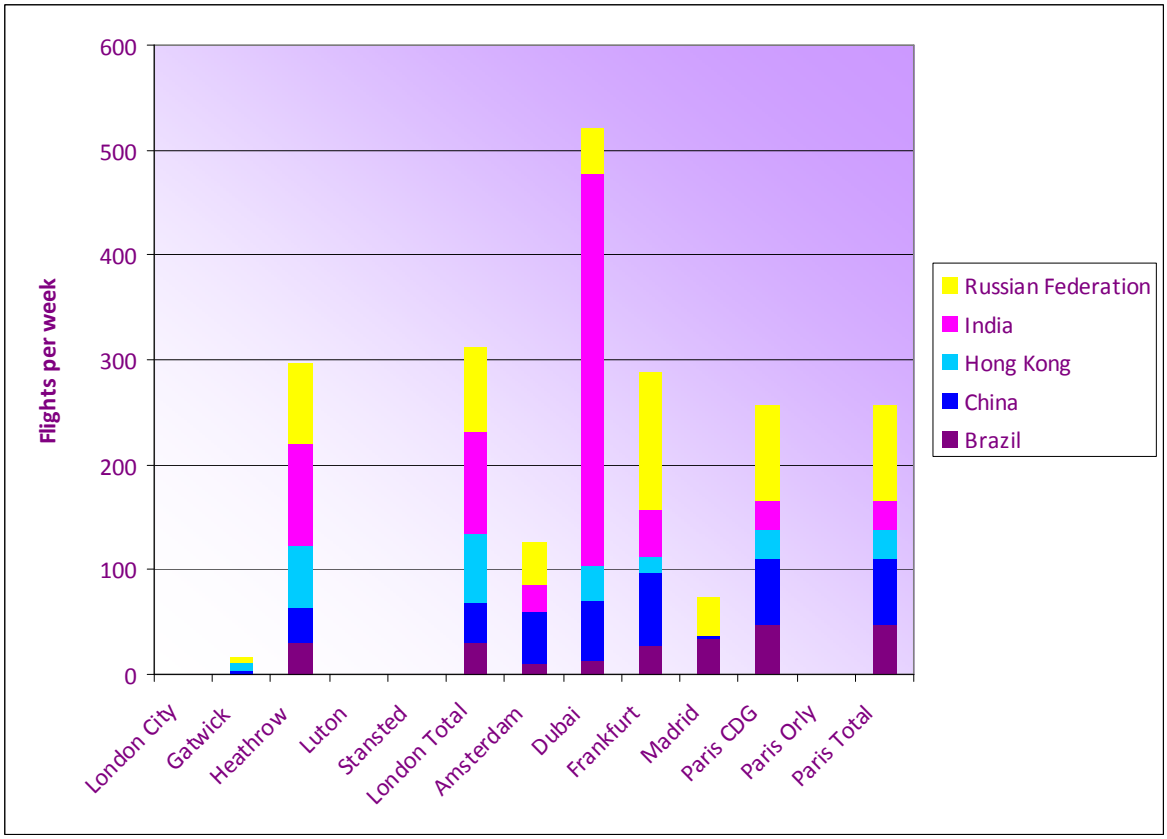


Source: OAG

3.18 Figure 3.9 shows that London remains the best connected city across this basket of fast growing countries, albeit Heathrow has fallen behind Dubai and Frankfurt as the best connected hub. It is significant that Dubai is now the best connected hub in terms of connections to the growth economies.

3.19 In terms of connections to the BRICS economies, however, London lies behind Dubai overall, as shown in **Figure 3.10**, although this is largely a consequence of Dubai's high level of connections to the Indian sub-continent. London is better connected than its European rivals to the BRICs economies overall, although it falls behind Paris and Frankfurt in terms of connections to Brazil, Russia and China, although London's position is better in terms of links to China if Hong Kong is included. Hence, London is well placed in terms of links to the financial centre in Hong Kong but less well connected to the manufacturing heartland of China and in terms of cities served.

Figure 3.10: London's Air Connectivity to the BRICs Countries



Source: OAG

3.20 In **Annex B**, we list the cities served and weekly frequencies of service from each of the principal hub airports shown in Figures 3.9 and 3.10.

3.21 Clearly, Heathrow is dominant in terms of providing long haul services. Hence, the key concern as to whether London will be able to keep pace with the other cities in terms of providing connectivity to emerging economies if capacity at Heathrow is constrained. The extent to which other airports can play a major role in developing services to unserved or underserved destinations in the emerging economies depends in part on the role of transfer passengers in supporting such services. Hence, the key question posed regarding the importance of and need for hub capacity.

The Role of the Hub

Alliances

3.22 Hubs are driven by airlines and their alliance partners. There are three main airline alliances:

- *oneworld* – led by British Airways with its principal European hub at Heathrow and a secondary hub in Madrid (Iberia);
- *Star* – led by Lufthansa within its principal European hubs in Frankfurt and Munich;
- *Skyteam* – led by Air France/KLM with hubs at Paris and Amsterdam.

Each of the alliances has a range of airlines around the world. The aim is ultimately to offer passengers through ticketed travel to any point on the globe within the alliance. Hence, the main focus of transfer traffic is within each alliance and using the hub of the home based carrier. Just as the European carriers drive hubbing at their home based airport, the same is true of other global partners with, for example American Airlines and United Airlines having strong hubs in Chicago and being members of *oneworld* and *Star* respectively. Similar patterns exist in other major global countries.

3.23 The Middle East carriers have also developed strong hubs in Dubai and, to a lesser extent, Abu Dhabi and Qatar. In the main, these are single carrier hubs although some of these carriers are not aligning to the alliances.

3.24 The alliances compete with each other, so BA will try to 'steal' passengers from the other alliances by offering lower fares to passengers willing to transfer at Heathrow, for example between Paris and New York, than is available on a direct Air France service. Air France/KLM will do the same in the UK and offer cheaper tickets for UK passengers transferring through their hubs. Much transfer traffic is, thus, leisure passengers taking advantage of lower fares. However, passengers also use connecting services where direct services do not exist, for example between the US and secondary cities in India, which are served from Heathrow.

3.25 60% of all transfer passengers using Heathrow use BA for one leg of their journey in 2011 according to CAA survey data. 77% of all transfer passengers involved BA and its one world alliance partners. Much of the remaining transfer traffic was between bmi and members of the Star Alliance, of which it was a member. It is likely that the transfer traffic is now even more dominated by the oneworld airlines.

3.26 In contrast, as explained earlier, much of the transfer traffic at Gatwick is between non-aligned carriers, particularly Flybe and easyJet for at least one leg of each passenger's journey. Such passengers are often not travelling on through tickets and so not recorded in some transfer/hub passenger statistics.

Dependence on Hubbing

3.27 Whilst, around 36% of passengers using Heathrow are transferring, using CAA survey data and definitions, the dependence of individual routes on transfer traffic varies considerably. Hubbing is not simply about connecting 'thin'[12] markets to each other but is often about connecting major global cities through alliance competition or providing links from major to more minor cities.

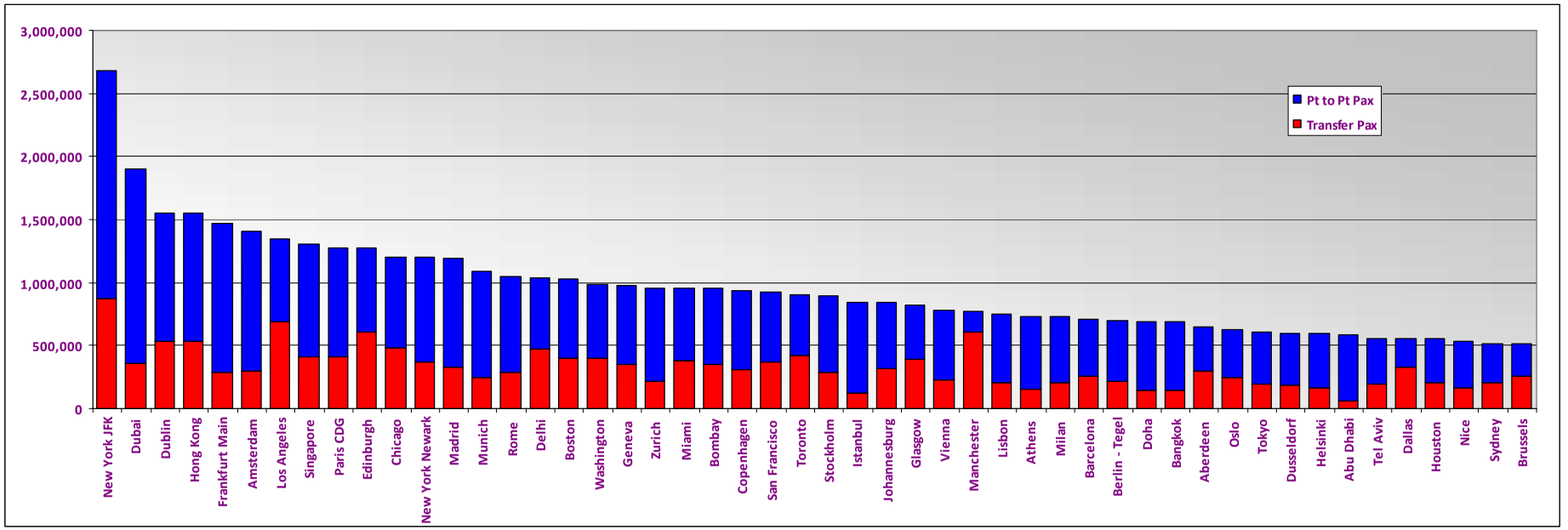
3.28 In **Figure 3.11**, we show the extent to which the top 50 routes at Heathrow in terms of overall volumes of passengers were dependent on transfer passengers in 2011. To an extent, then, transfer passengers help to underpin high frequencies of service valued by business travellers on routes such as New York or Dubai, as well as underpinning the operation of services to more marginal, but economically important, destinations. The high dependence of UK domestic routes on transfer passengers is evident, particularly in the case of Manchester at 79% of passengers transferring, where the air service exists now almost solely to feed the hub and to provide global connections for the north of England market which cannot support a full range of direct services itself.

[12] A 'thin' market is one which does not have enough demand on its own to sustain high frequency services.

3.29 In **Figure 3.12**, we show which routes are most reliant on hub traffic as an overall share of passengers on the route. This chart highlights the extent to which services to some key cities in emerging markets are dependent on transfer traffic. For example, 80% of passengers travelling to Hyderabad were transferring at Heathrow and 69% of passengers travelling to Bangalore. Both these services are operated by British Airways and this highlights the extent to which such cities are unlikely to be served directly without the support of a hub. We consider some other examples of the dependence on hubbing below. Generally, where a route is operated by a British airline, it is more likely that it will be supported by transfer traffic at the Heathrow end of the route but if a route is operated by a foreign airline, they are more likely to use their own home hub to collect the transfer traffic necessary to sustain service viability. So, on routes to China such as Shanghai and Beijing, BA will hub at Heathrow in the main but the Chinese airline on the route will generally have few passengers connecting onwards at Heathrow. A full list of transfer passengers by route at Heathrow in 2011 is given in **Annex C**.

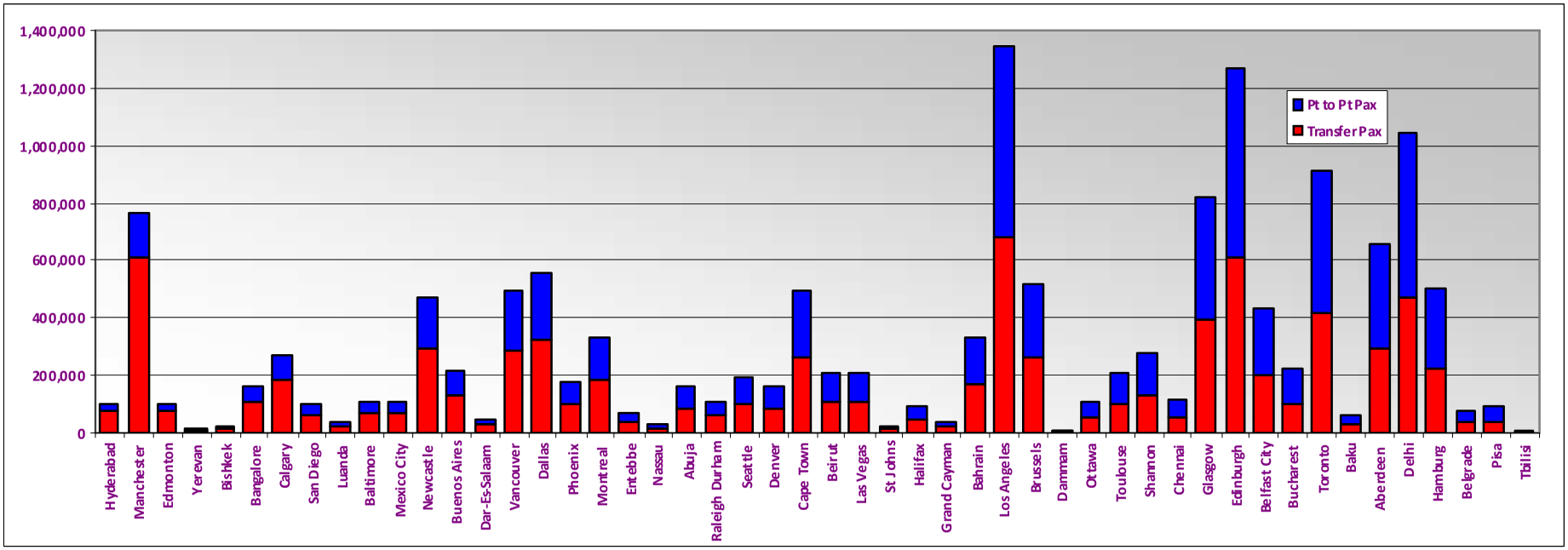
3.30 In **Figures 3.13** – **3.18**, we illustrate the mix of traffic to selected global destinations in more detail.

Figure 3.11: Transfer Share of Heathrow's Top 50 Routes



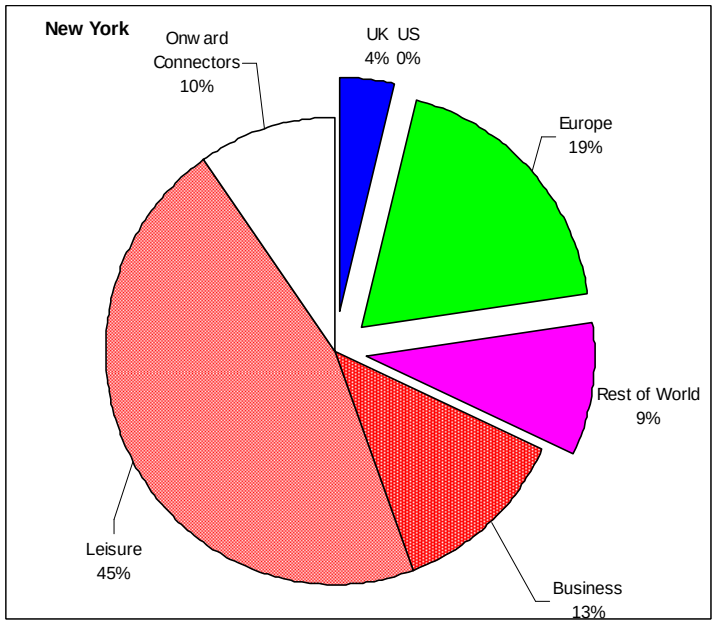
Source: CAA Surveys

Figure 3.12: Heathrow Routes Most Reliant on Hubbing



Source: CAA Surveys

Figure 3.13: Mix of Passengers using the Heathrow – New York Route



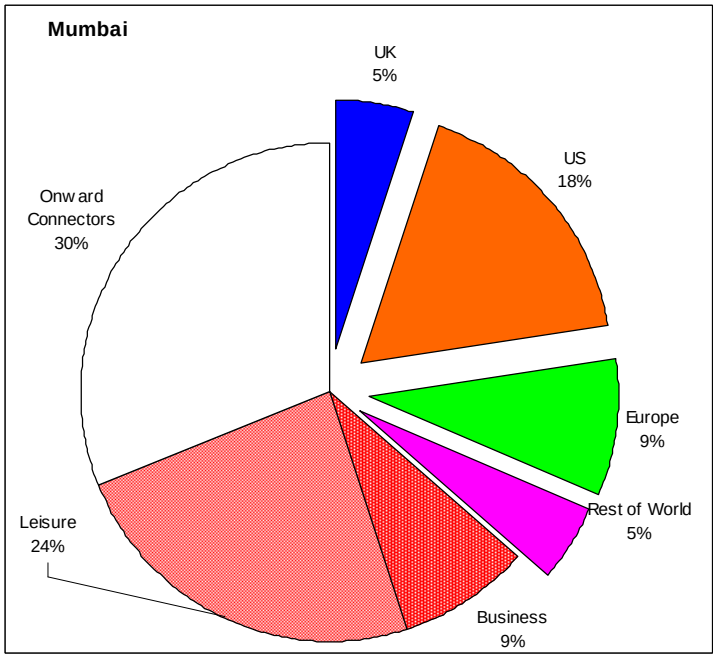
Source: CAA Surveys

3.31 As shown in Figure 3.13, 58% of passengers on the Heathrow-New York route were travelling point to point between the two cities (45% leisure and 13% business of the total passengers on the route), with leisure passengers making up ¾ of the total. Of the 32% of passengers who were transferring at Heathrow, the majority were connecting to European services (19% of the total passengers on the route) and around a third to the rest of the world (9% of total passengers). 10% of passengers using the route were connecting onwards at New York and these were more likely to be flying with US airlines for the whole of their journey.

3.32 Figure 3.14 illustrates the pattern for the Mumbai route. This shows that only 33% of passengers were travelling point to point between London and Mumbai, mostly for leisure purposes. 37% of passengers were connecting at Heathrow, principally to/from the BA service and to a lesser extent Virgin Atlantic. The largest proportion of these passengers were connecting onwards to the USA. However, 30% of passengers were also connecting to elsewhere in India, mostly using the Indian airlines operating on the route.

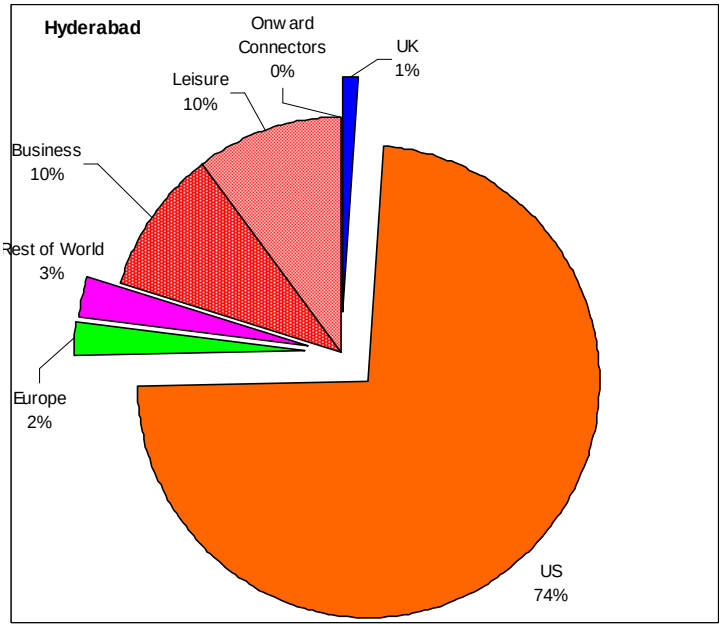
3.33 Figure 3.15 shows the pattern on the Hyderabad route. This shows that of the 20% of passengers who were flying point to point on the route, these were split evenly between those travelling for business or leisure reasons. Some 74% of passengers using the service were connecting to/from the USA.

Figure 3.14: Mix of Passengers using the Heathrow – Mumbai Route



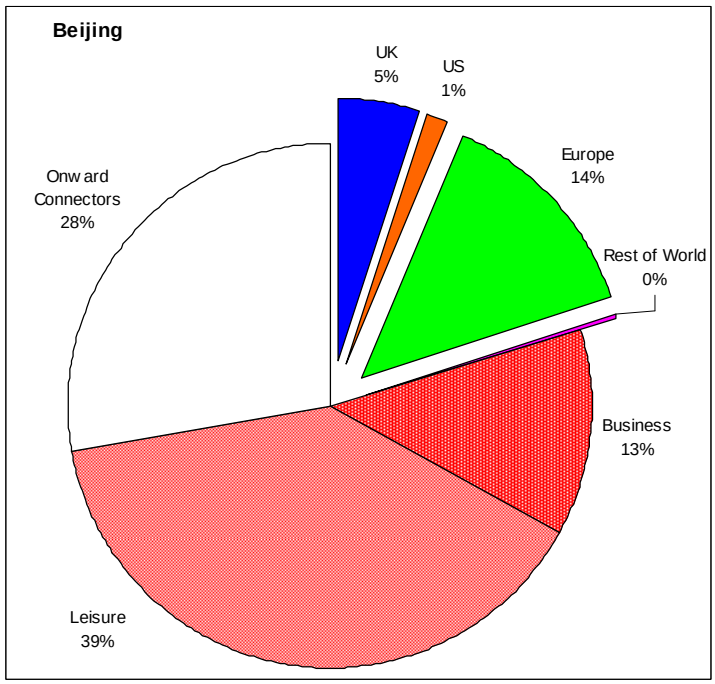
Source: CAA Surveys

Figure 3.15: Mix of Passengers using the Heathrow – Hyderabad Route



Source: CAA Surveys

Figure 3.16: Mix of Passengers using the Heathrow – Beijing Route



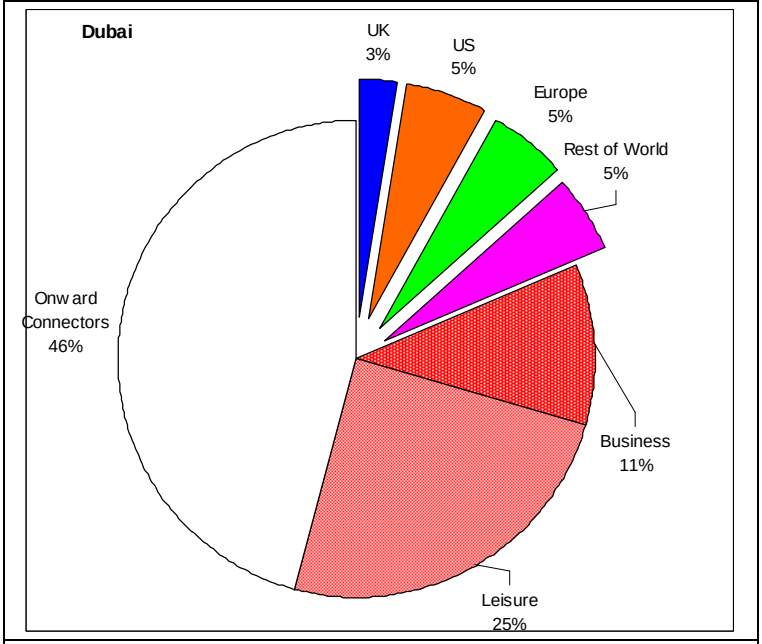
Source: CAA Surveys

3.34 As shown in Figure 3.16, over half of the passengers on the Heathrow-Beijing route were flying point to point. In this case, more passengers were connecting in Beijing than in London. Again, most of the passengers connecting in London were flying with BA, whilst Chinese airlines tend to focus on hubbing at their home airport.

3.35 Figure 3.17 shows that the pattern is similar on the Shanghai route, although in this case point to point demand was a slightly higher proportion of all passengers on the route and the proportions of transfer passengers at each end of the route were similar.

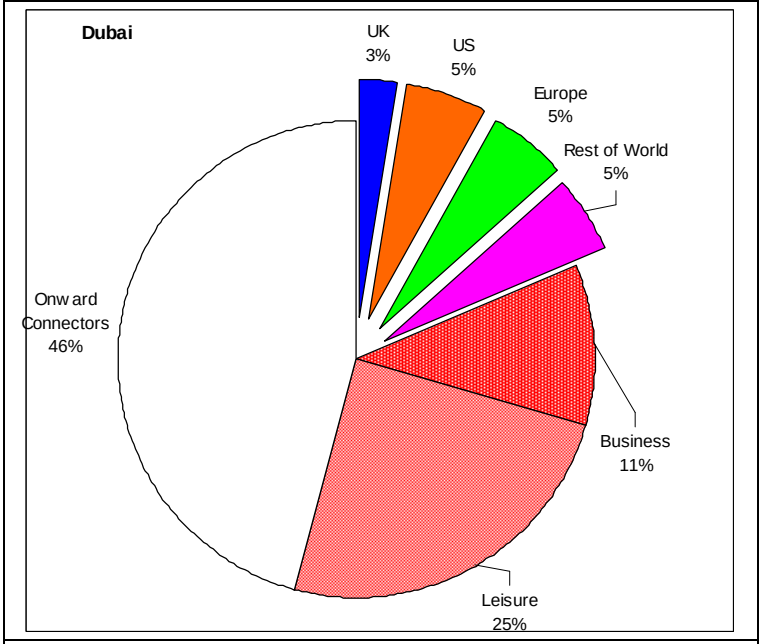
3.36 In Figure 3.18, we illustrate the pattern on the Dubai route. 36% of passengers were point to point passengers, about two thirds of which were leisure passengers. 18% of passengers were hubbing at Heathrow but 46% were connecting onwards in Dubai. In common with other routes, there were marked differences between the airlines, with 54% of BA's passengers connecting at Heathrow and only 9% at Dubai, Virgin Atlantic's passengers being virtually all point to point passengers with 8% connecting in London and Emirates having 74% of passengers connecting in Dubai but only 11% connecting in London.

Figure 3.17: Mix of Passengers using the Heathrow – Shanghai Route



Source: CAA Surveys

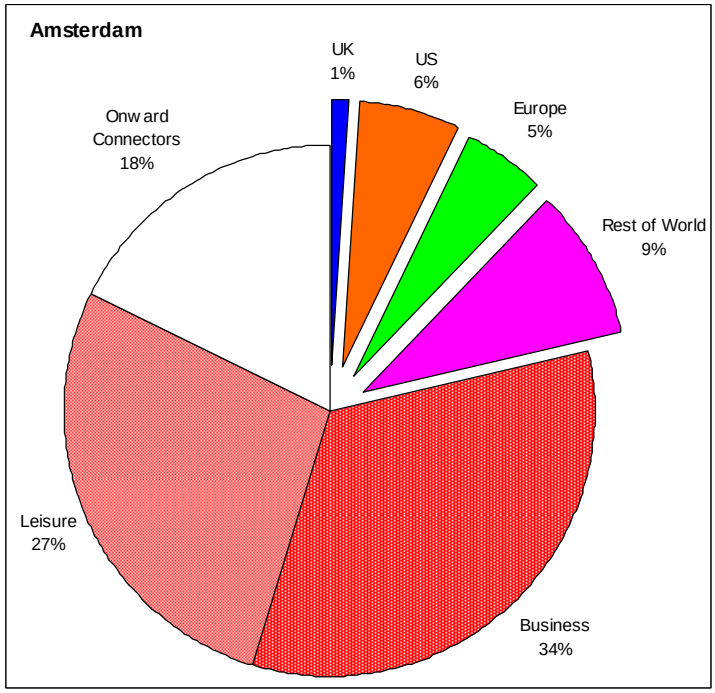
Figure 3.18: Mix of Passengers using the Heathrow – Dubai Route



Source: CAA Surveys

3.37 Similar patterns are evident on European hub routes from Heathrow, with relatively balanced numbers of passengers connecting at both Heathrow and the other hub. Connections are principally to the USA and the rest of the world. This is illustrated in Figures **3.19** – **3.22**.

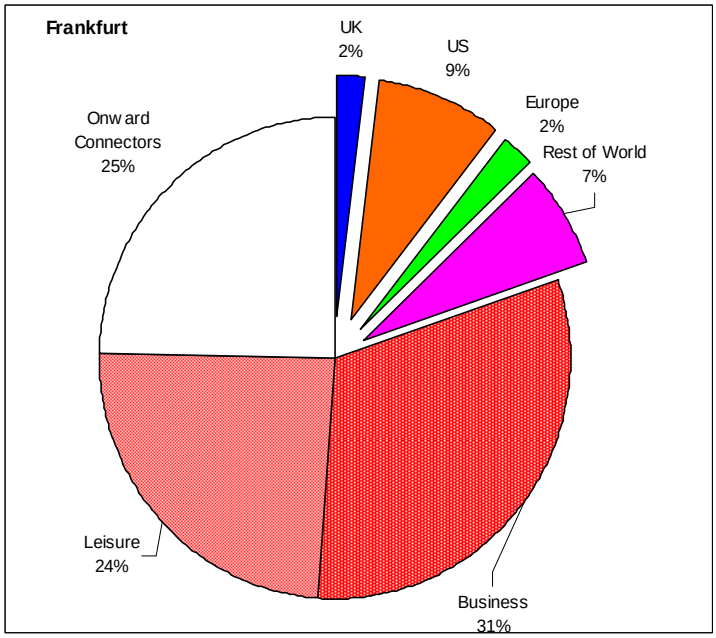
Figure 3.19: Mix of Passengers using the Heathrow – Amsterdam Route



Source: CAA Surveys

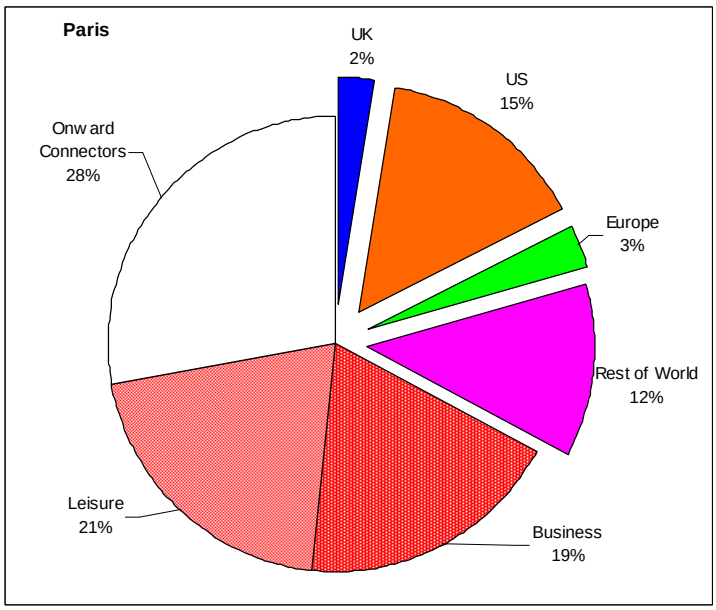
3.38 These example routes highlight that all routes at Heathrow feed the hub to a greater or lesser extent but reliance on the Heathrow hub varies significantly between airlines. The hub is clearly important to BA and to the development of routes to more marginal destinations, such as Hyderabad and Bangalore. However, transfer traffic also sustains high frequencies on large routes such as New York and adds value to the business offer.

Figure 3.20: Mix of Passengers using the Heathrow – Frankfurt Route



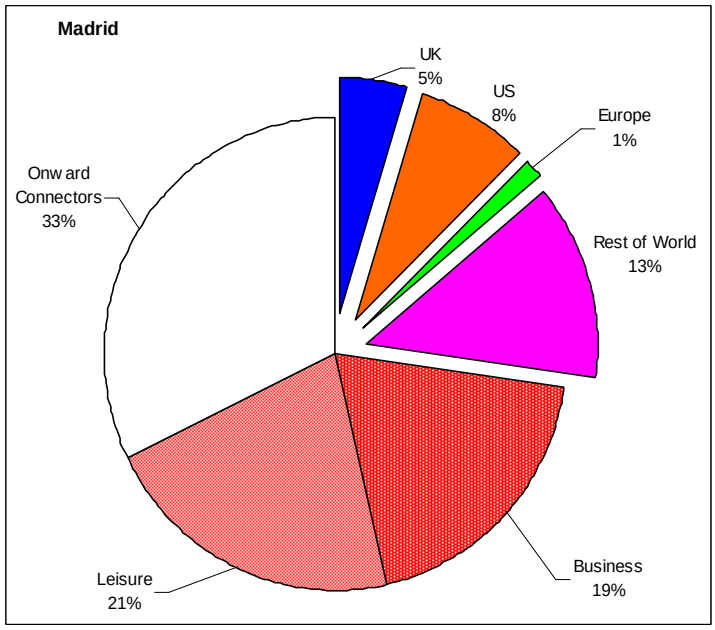
Source: CAA Surveys

Figure 3.21: Mix of Passengers using the Heathrow – Paris Route



Source: CAA Surveys

Figure 3.22: Mix of Passengers using the Heathrow – Madrid Route



Source: CAA Surveys

4 AIRPORT CAPACITY

Key Findings

4.1 In summary, the capacity of an airport is not independent of the nature of passengers and airlines using that airport and this needs to be understood in order to assess what the maximum capacity of an airport might be. Achievable capacity may vary over time as the nature of airline and passenger demand changes.

4.2 Although airport capacity is typically reported in terms of the number of annual passengers (mppa[13]) or annual movements which can be accommodated, it is actually calculated from a series of assessments of how many passengers or movements can be handled over an hour. In practice there is no simple definition of airport capacity in aggregate as it is built up from the individual capacity of each of the sub-systems. In general terms, the capacity of each subsystem might be defined as the number of passengers or aircraft movements which can be handled at an acceptable level of service over a defined period of time. The subsystems which need to be considered are:

- Runway;
- Apron;
- Passenger Terminal;
- Surface access;
- Any environmental limits.

4.3 The annual capacity of an airport depends on how many hours in the year are operated at full capacity and, in turn, this depends on the nature of passenger and airline demand for any particular airport. Aircraft size is also critical to converting runway capacity to overall airport passenger capacity.

4.4 Heathrow and London City Airports exhibit less seasonality of demand than the other London airports, principally because they serve a higher business component of demand. Whereas Heathrow and, to a lesser extent, Gatwick exhibit fairly constant profiles of use during the day, the other airports are subject to much more marked peaks and troughs of demand. This is a function of both their scale and the nature of the airlines and passengers using them. Airports with a mix of business and leisure traffic and long and short haul routes will tend to have a more even profile of demand and attain a higher level of utilisation than airports with a less diverse mix of traffic.

[13] Million passengers per annum

4.5 Significantly, Heathrow attains a much higher utilisation of available capacity, as measured by runway slots, than its competitor hubs, achieving around 99% utilisation whereas its competitors operate below 75% utilisation. This high utilisation rates impacts on delays and resilience at Heathrow. There were only 39 spare slots each week at Heathrow Airport in Summer 2012.

4.6 Gatwick also attains a high level of utilisation of 80% or more year round. Overall, in Summer 2012, there were 717 spare runway slots, or 12% of the total, mostly at the beginning and, to a greater extent, towards the end of the day. Meaning that Gatwick was operating at around an 88% utilisation rate in summer.

4.7 Overall, examination of these profiles of utilisation shows that there is little spare capacity across the London airports as a whole in the morning peak period and, to a lesser extent, in the early evening peak. Stansted and, to a lesser extent, Luton have spare capacity for most of the day after the morning peak. London City has spare capacity during the middle part of the day. However, the extent to which this capacity is likely to be taken up depends on airlines finding markets which can be viably served outside of peak demand periods.

Defining the Capacity of an Airport

4.8 Although airport capacity is typically reported in terms of the number of annual passengers (mppa[14]) or annual movements which can be accommodated, it is actually calculated from a series of assessments of how many passengers or movements can be handled over an hour, for example on a runway or through check-in desks, or accommodated at the same, for example on aircraft parking stands or within a departure lounge.

4.9 This assessment is not independent of the type of traffic using an airport as, for example, a large widebodied aircraft operating a long haul service is likely to be on the ground for a longer time requiring a parking stand compared to a small aircraft operating a short haul service. Passengers for a long haul leisure flight may well be at the terminal for longer than a business passenger using a domestic air service, giving rise to different space requirements.

[14] Million passengers per annum

4.10 Different types of passenger will also generate a requirement for different levels of service. For example, a business or first class passenger will expect to queue for less time than a passenger flying on a cheap air ticket. Leisure passengers may have more baggage than business passengers. Equally changing security or immigration requirements can adversely impact on the number of passengers who can be handled through an airport facility.

4.11 All of these factors will affect how the infrastructure of an airport is used and how many passengers or aircraft an airport can handle on an hourly basis or simultaneously. Capacity of some elements might even be defined in terms of capacity which can be handled through some facilities per 15 or 5 minutes. In practice, there is no simple definition of airport capacity in aggregate as it is built up from the individual capacity of each of the sub-systems. In general terms, the capacity of each subsystem might be defined as the number of passengers of aircraft movements which can be handled at an acceptable level of service over a defined period of time.

4.12 In theory, the annual capacity of an airport could be the hourly capacity multiplied by the number of hours which the airport is open, after allowing for any environmental curfews or restrictions. However, in practice, demand to use an airport is seldom constant over the day and the year as there are peaks of demand relating to the nature of traffic using an airport. For example, short haul business passengers place a premium on flights which allow them to undertake a day return business trip, leading to a preference for early morning and early evening flights. Low cost and charter airlines seek to maximise the use of their aircraft each day which requires them to depart their home base airport early each morning. Long haul operations are determined according to world time zones and flying distances. Airlines will also be seeking to maximise the connections at their home hubs.

4.13 Airports will seek to accommodate these demand peaks so long as it is cost effective to do so. Airlines may accept greater delays in peak periods in order to maximise the number of flights which can be operated at the most profitable times but the hourly capacity may need to be reduced in the following hours to allow recovery from delays and to secure resilience in the operation. This is known as ‘profiling’ of capacity to give a better match to demand.

4.14 In summary, the capacity of an airport is not independent of the nature of passengers and airlines using that airport and this needs to be understood in order to assess what the maximum capacity of an airport might be. Achievable capacity may vary over time as the nature of airline and passenger demand changes.

4.15 It needs also to be remembered that, in some cases, such as Heathrow, capacity is ultimately limited by environmental agreements which limit the total number of movements over a year, in Heathrow's case to 480,000 movements a year. Similarly, London City Airport is currently restricted to 120,000 noise factored movements a year and Stansted to 264,000 annual movements.

Factors Affecting Airport Capacity

Runway Capacity

4.16 This is typically declared as the number of movements which can be handled by the runway system in any given hour, although sub-limits per 5 or 15 minutes may also be declared in order to smooth the flow over an hour and minimise the build up of delays caused by a bunching of movements.

4.17 Runway capacity also takes into account the capacity of the surrounding airspace, such as the spacing of aircraft on approach and the extent of dispersion of departure tracks. Smaller aircraft following larger require greater separations than a succession of smaller aircraft. The sooner departure routes in the air (known as standard instrument departure routes or preferential noise routes) diverge after the end of the runway, the shorter the time which needs to be allowed between successive departures.

4.18 Within the overall runway capacity, separate limits for arrivals and departures are usually declared. The overall capacity of a runway is maximised when there is an even mix of arrivals and departures in mixed mode as a departure can be fitted into the gap between arriving aircraft. Runways operating with arrivals or departures only are operating in segregated mode. For example, a runway might have capacity for 50 movements per hour in mixed mode but a maximum of 30 movements per hour for either arrivals or departures on their own, with the overall capacity being less than 50 in an hour to the extent that there is not an even mix of departures and arrivals.

4.19 An airport's taxiway configuration will also impact on achievable capacity – the more runway holding/entry and exit points there are, the sooner aircraft can get on to the runway in the optimum sequence for departure or off the runway after landing so increasing capacity. Where an airport does not have a taxiway along the whole length of the runway, aircraft may have to back track so reducing effective runway capacity.

4.20 Runway length will limit the types of aircraft which can use an airport.

Apron Capacity

4.21 Apron capacity is a function of the number and size of aircraft stands available. Stands can sometimes be sized to take two small aircraft or one larger aircraft increasing flexibility.

4.22 An assessment of capacity also needs to take account of how long aircraft are parked on the ground. Stand utilisation depends on aircraft turn around times, with larger aircraft taking longer to turn around than small aircraft and the fastest turn around times being achieved by the low fares airlines at airports such as Stansted and Luton.

4.23 Apron capacity is often defined by the number of based aircraft which can be parked at the airport over night or the number of aircraft which can park in the peak period.

4.24 Sometimes, parts of the apron area may be restricted to particular uses, e.g. domestic flights, associated with a particular terminal, for a particular airline or for freight activity, although generally there is flexibility to use stands remotely by bussing passengers to and from them.

Passenger Terminal Capacity

4.25 Terminal capacity is measured by the capacity of key processing activities, e.g. check-in, the baggage handling system, immigration, etc., and the storage capability of key spaces such as the departure lounge, gate-rooms or the arrivals concourse. This can be impacted upon by such matters as changes in security or immigration rules and procedures. Terminal capacity is typically stated in terms of passengers per hour departing or arriving at an airport or a terminal.

4.26 The mix of flights and passengers using an airport will be a factor in how a terminal is used so long haul passengers tend to be at an airport for longer than those on short haul flights. Equally, day return business passengers and passengers using low fares airlines may carry much less baggage. In the former case, fewer passengers can be handled through a terminal of any given size. In the latter case, more passengers can be handled. Similarly, business and first class passengers require a different level of service than leisure passengers and usually require additional space, faster processing and access to airline lounges.

Surface Access

4.27 Surface access infrastructure, including car parking, is also a factor in airport capacity, although it is seldom declared as a constraint. However, surface access is a major influence on the attractiveness of an airport.

Airport Utilisation

4.28 An airport's capacity can be expressed as the proportion of annually available runway slots which are used. The number of annual slots is counted after the effect of any curfews or environmental limits, such as night movement quotas, are applied.

4.29 Heathrow has routinely operated at around 99% of available slots for many years, although this dipped a little during the recession, and within its environmental limit of 480,000 movements a year. In such circumstances, the effect of any delays from one hour to the next simply accumulates as there are no gaps in the schedule to allow recovery.

4.30 Generally, an airport will be subject to increasing congestion and delays once utilisation exceeds 75% of usable slots. Gatwick has operated at around 80% utilisation. The other London airports have lower utilisation rates.

4.31 The ability to achieve high utilisation rates is dependent on the mix of traffic at an airport as we demonstrate later by reference to how the London airports are currently used.

4.32 In **Table 4.1** below we set out utilisation data for Heathrow and other European hubs for 2010. Utilisation rates of 70-75% would be more typical of a well functioning hub with a good level of resilience and tolerable delays.

Table 4.1: Utilisation of Capacity at Main European Hubs 2010

Airport	Passengers (mppa)	No. of Runways	ATMs	Movement Capacity	Utilisation Rate
Heathrow	65.9	2	173,466	480,000	97.2%
Madrid	49.6	4	193,433	740,000	58.5%
Frankfurt	50.9	3	304,463	660,000	70.2%
Paris CDG	57.9	4	286,524	710,000	73.7%
Amsterdam	43.6	5	246,407	600,000	67.9%
Source: The Air League					

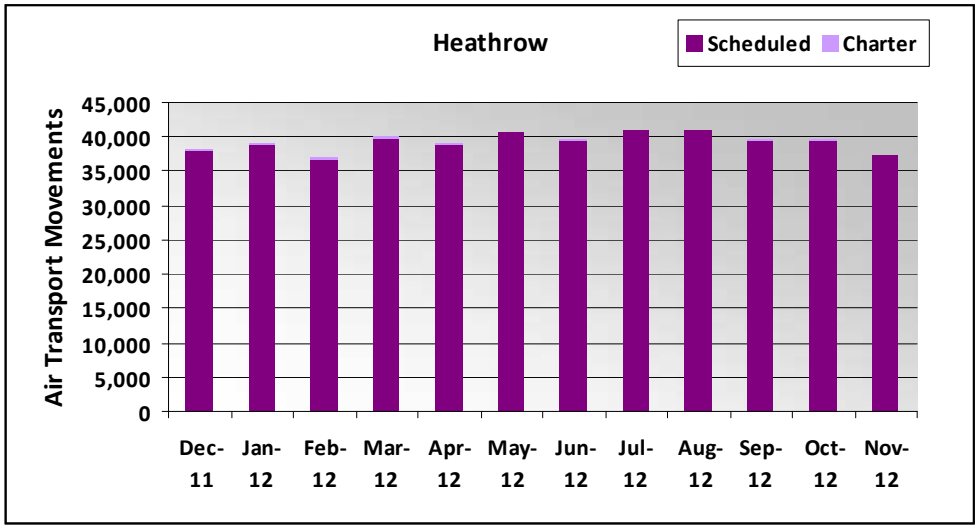
4.33 Conversion of movement capacity to passenger capacity is a function of the expected size of aircraft using an airport as there is generally more scope to increase the passenger handling capacity of an airport through adaptations to the terminal buildings than to increase the aircraft movement capability. Hence, whilst there may be more limited scope to increase the utilisation of runway capacity, changes in aircraft size can contribute to increasing the passenger capacity of an airport. Hence, it is expected that the achievable capacity of Heathrow will increase over time as aircraft size grows even though there is no realistic scope to increase runway utilisation.

Current Utilisation of the London Airports

Seasonal Profile of Demand

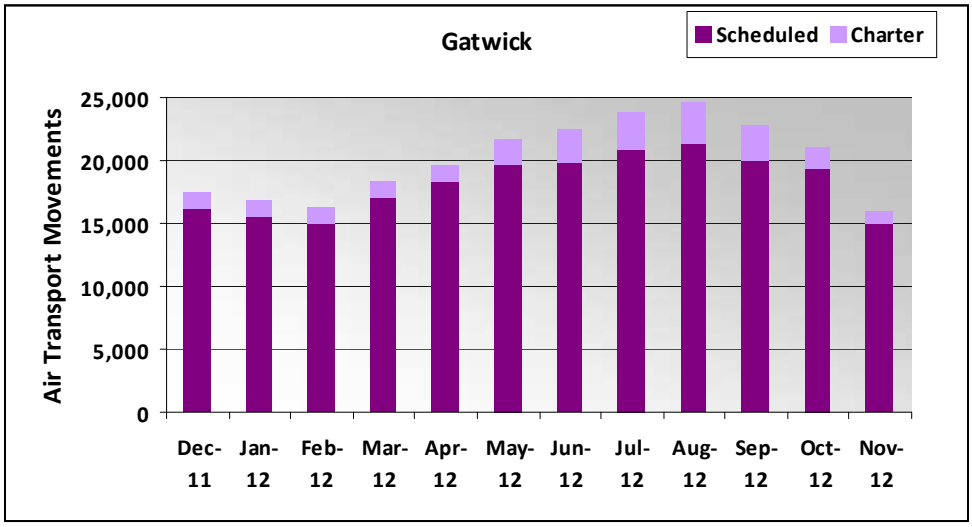
4.34 In **Figures 4.1** to **4.5**, we illustrate the seasonal profile of movement demand at the London Airports. It is evident from these that Heathrow and London City Airports have much flatter seasonal profiles of demand, which mean that, all other things being equal, they will make better use of available capacity over the year. This is because the other airports have much higher levels of use by leisure passengers, particularly to European destinations, which are much more concentrated in the summer periods.

Figure 4.1: Seasonal Profile of Movements at Heathrow Airport



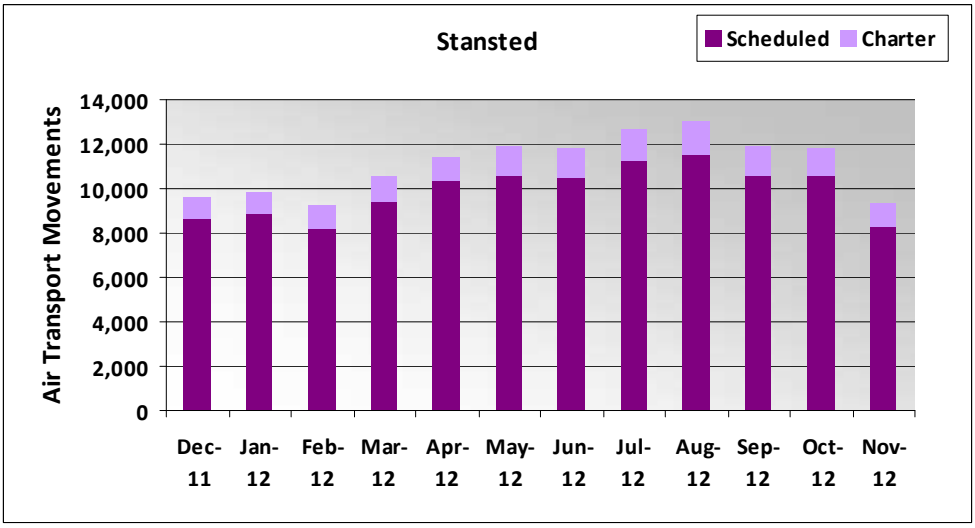
Source: CAA Statistics

Figure 4.2: Seasonal Profile of Movements at Gatwick Airport



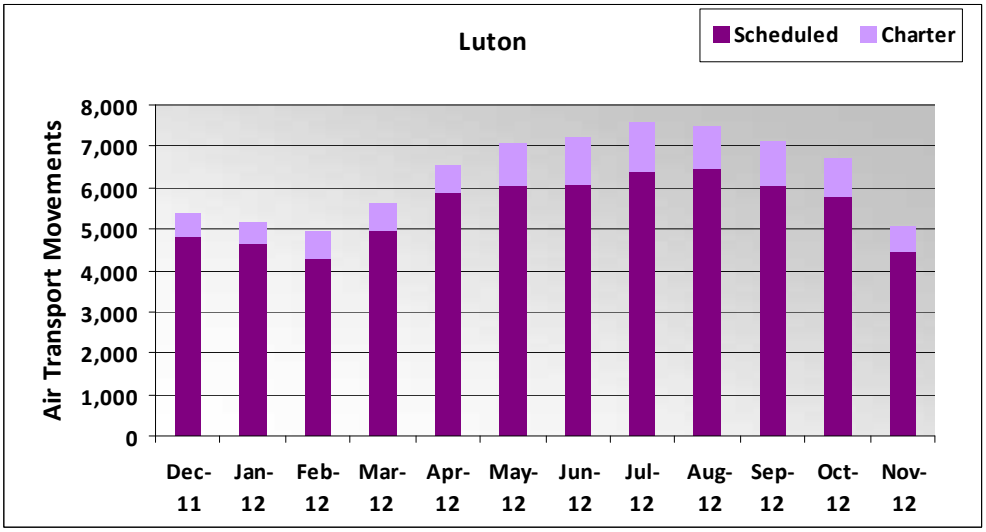
Source: CAA Statistics

Figure 4.3: Seasonal Profile of Movements at Stansted Airport



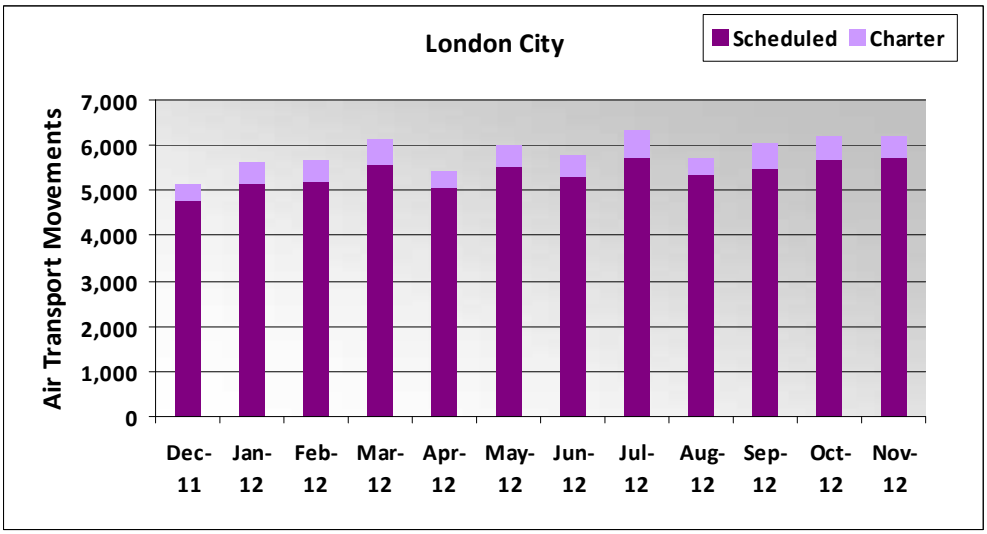
Source: CAA Statistics

Figure 4.4: Seasonal Profile of Movements at Luton Airport



Source: CAA Statistics

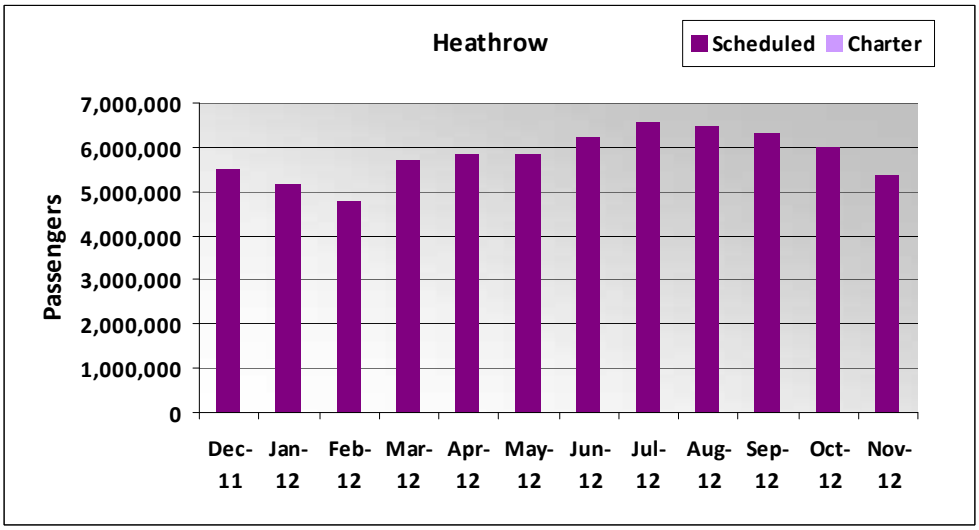
Figure 4.5: Seasonal Profile of Movements at London City Airport



Source: CAA Statistics

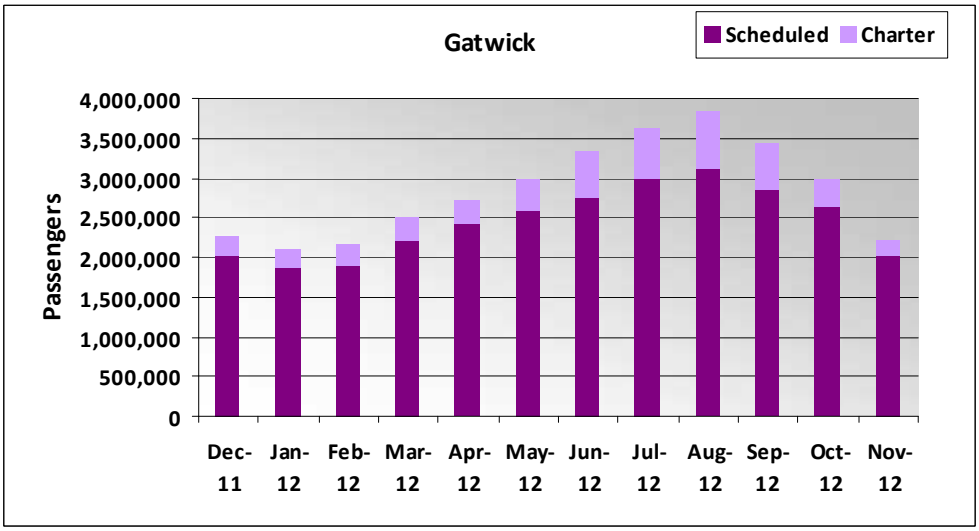
4.35 In **Figures 4.6** to **4.10**, we show the equivalent passenger demand profiles. These show greater variability as airline load factors can also vary over the seasons of the year even where the movement schedules do not vary. This will impact on the utilisation of available terminal capacity.

Figure 4.6: Seasonal Profile of Passengers at Heathrow Airport



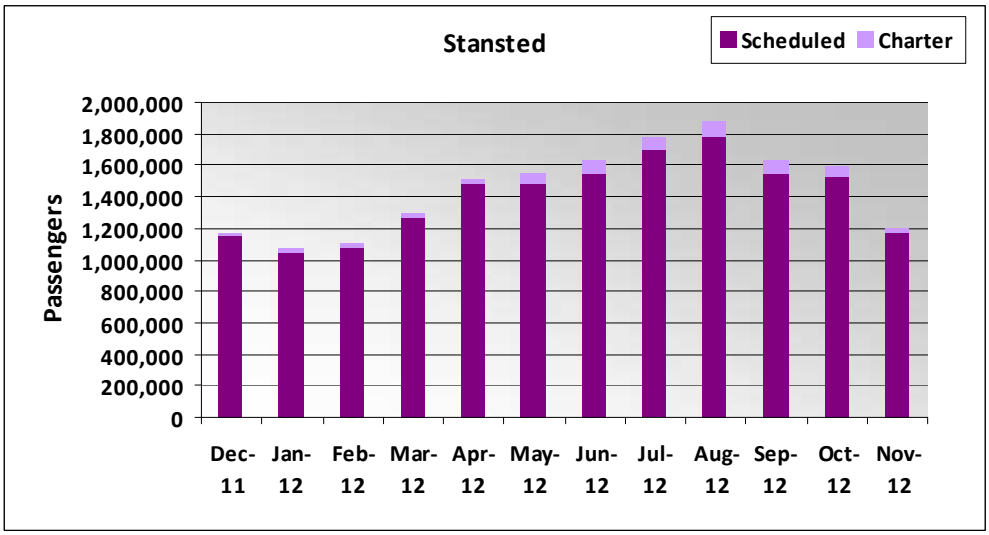
Source: CAA Statistics

Figure 4.7: Seasonal Profile of Passengers at Gatwick Airport



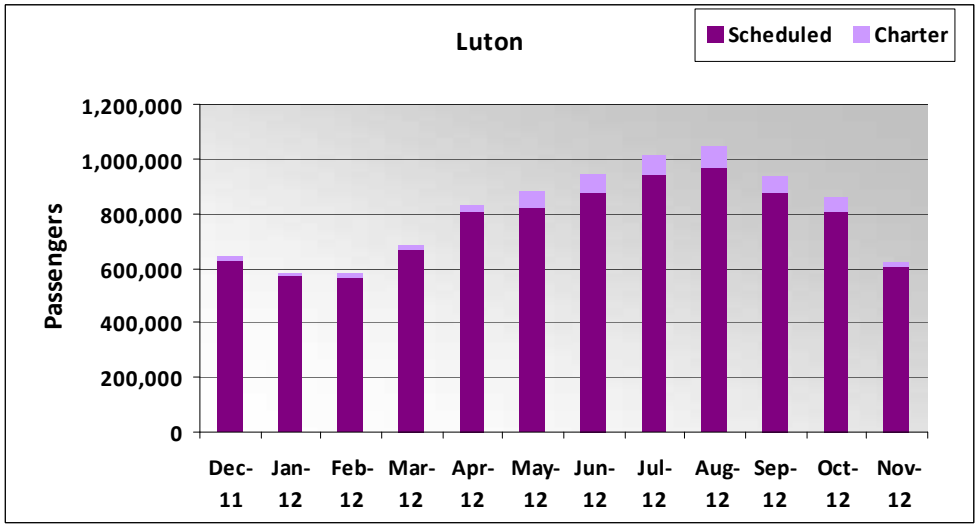
Source: CAA Statistics

Figure 4.8: Seasonal Profile of Passengers at Stansted Airport



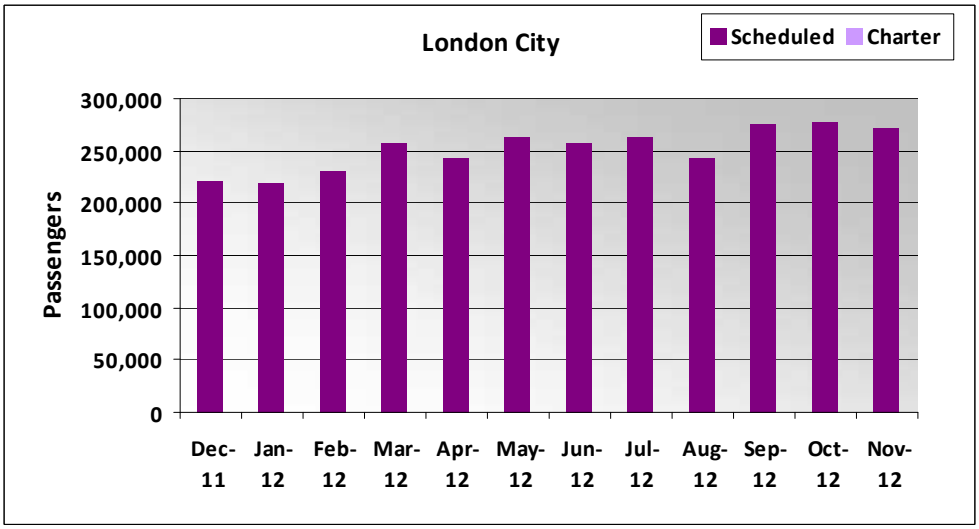
Source: CAA Statistics

Figure 4.9: Seasonal Profile of Passengers at Luton Airport



Source: CAA Statistics

Figure 4.10: Seasonal Profile of Passengers at London City Airport



Source: CAA Statistics

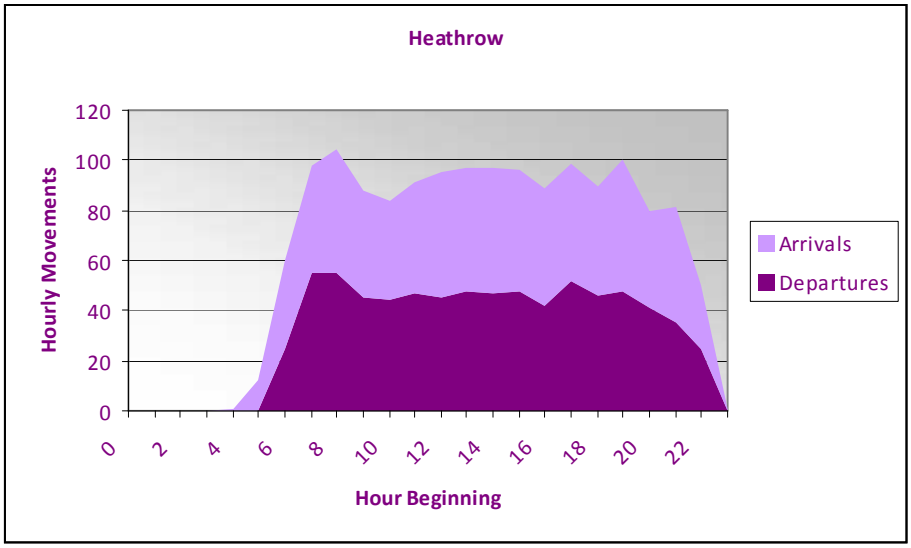
Daily Profiles of Demand

4.36 The profile of demand over the day is also vitally important to the ability to achieve high utilisation of airport capacity.

4.37 As shown in **Figures 4.11** to **4.16**[15], Heathrow and Gatwick have relatively flat profiles over the day whilst the other airports show much stronger peaks of demand. In the case of Stansted and Luton this is related to the largely low fares nature of their traffic, with much of the activity by airlines with based aircraft operating short haul sectors within Europe starting with the first departure early in the morning (after any night movement restriction period) and returning at regular intervals over the day. London City also has a strongly peaked profile associated with its principal role serving the needs of business travellers to the City and Canary Wharf. We have included Southend Airport, which only commenced significant scheduled services from summer 2012, to show the profile at a very immature airport.

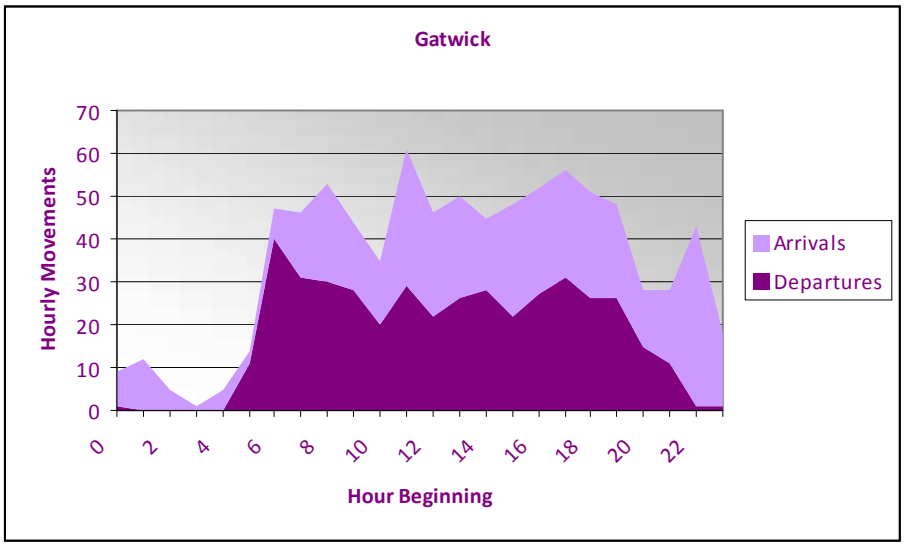
[15] The charts show scheduled movements and some services by charter airlines which are available for direct sale to the public. Other pure charter services are excluded as there is no consistent data source to show the timing of these.

Figure 4.11: Daily Profile of Scheduled Movements at Heathrow Airport



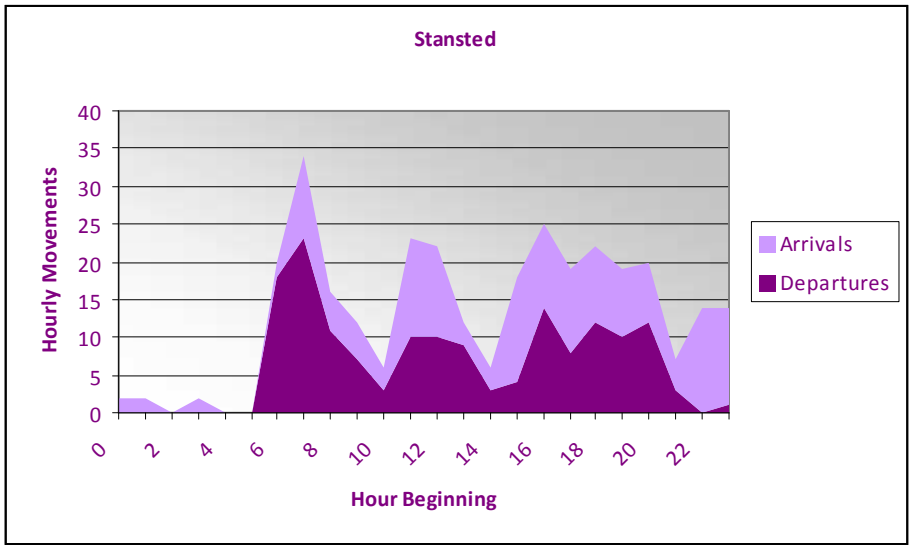
Source: OAG

Figure 4.12: Daily Profile of Scheduled Movements at Gatwick Airport



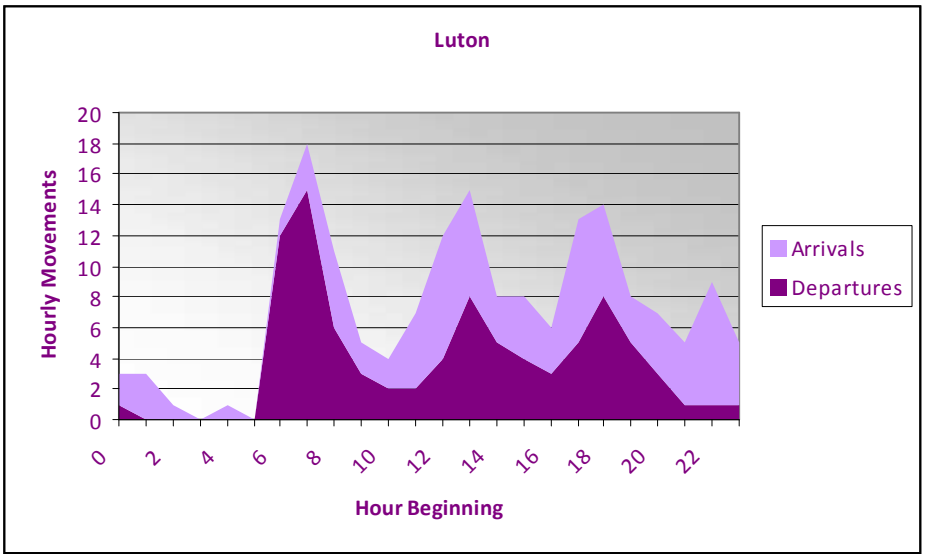
Source: OAG

Figure 4.13: Daily Profile of Scheduled Movements at Stansted Airport



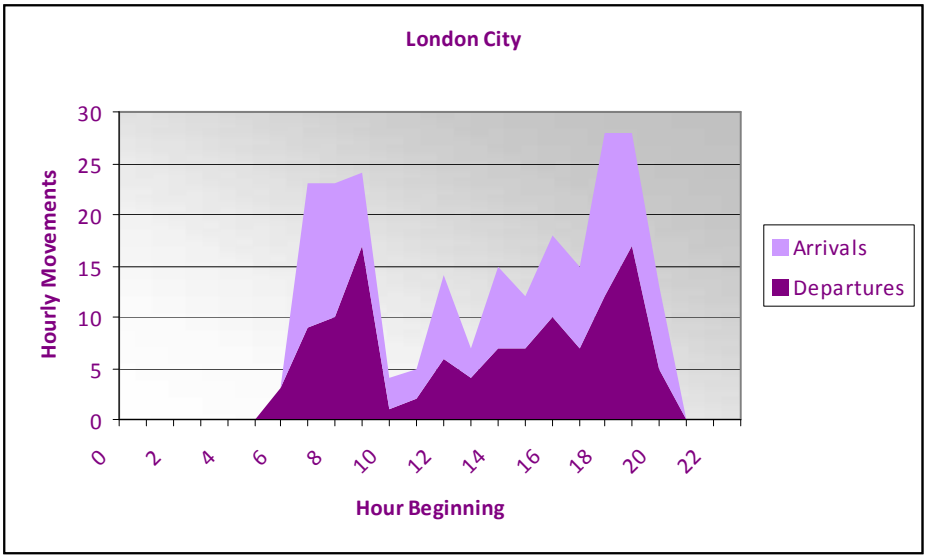
Source: OAG

Figure 4.14: Daily Profile of Scheduled Movements at Luton Airport



Source: OAG

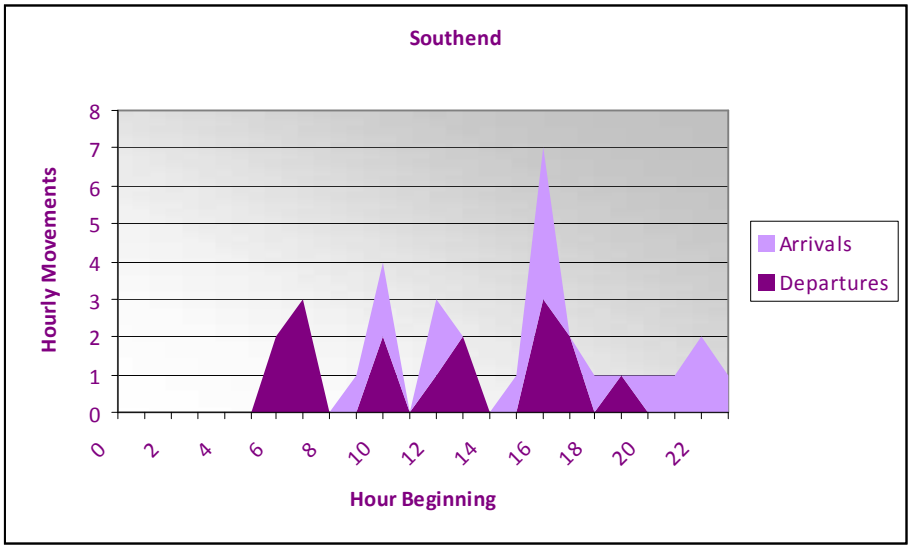
Figure 4.15: Daily Profile of Scheduled Movements at London City Airport



Source: OAG

4.38 It should also be noted that London City only operates 6 days a week and closes from Saturday to Sunday lunchtimes for noise abatement reasons.

Figure 4.16: Daily Profile of Scheduled Movements at Southend Airport



Source: OAG

4.39 The ability to fill troughs in demand is dependent on attracting airlines to put on additional services. This is related to the catchment area which the airport serves and the nature of demand within it to determine which services might be operated viably, also taking into account competitive interactions with neighbouring airports. It is important to remember that the key determinant of when flights will operate is viability to the airlines. This can be influenced to some extent by airport pricing policies but ultimately a flight which is operated at the wrong time of day for the market which it is seeking to serve will fail as passengers will use another service direct from another airport if there is a nearby alternative or choose to route through another hub.

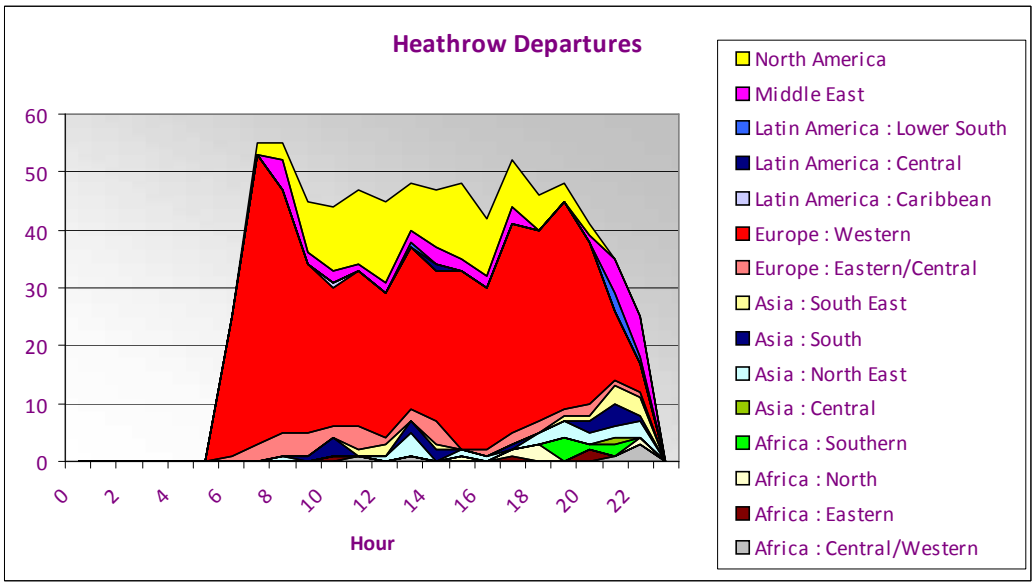
4.40 The ability to fill these troughs is also dependent on the airport being able to attract a mix of different types of air services. So attracting more leisure services by based aircraft will tend to worsen the peakiness of an airport but attracting services by inbound aircraft may fill some of the troughs. A good mix of scheduled and charter services may also help to smooth the peaks, particularly if some of the services operate longer sectors. This is the case at Gatwick. Busier airports, serving larger catchment areas, which are able to sustain higher frequencies of service on many routes will have flatter profiles of demand than those with only 1 or 2 flights a day which are more likely to need to operate at already congested peak times. Having peak period slots at ideal times available is often more important to the introduction of new routes than growth in frequency on existing routes. This may in part explain why services to the USA have seen expansion at Heathrow whereas there has been relatively less introduction of new destinations.

4.41 A consequence of night flying restrictions in the UK and Europe is that there is a large concentration of flights early in the morning, at the end of the night period more generally.

Traffic Mix

4.42 In Figures **4.17** to **4.20**, we illustrate how the broader mix of service types and global destinations served contribute to flatter demand profiles at Heathrow and Gatwick.

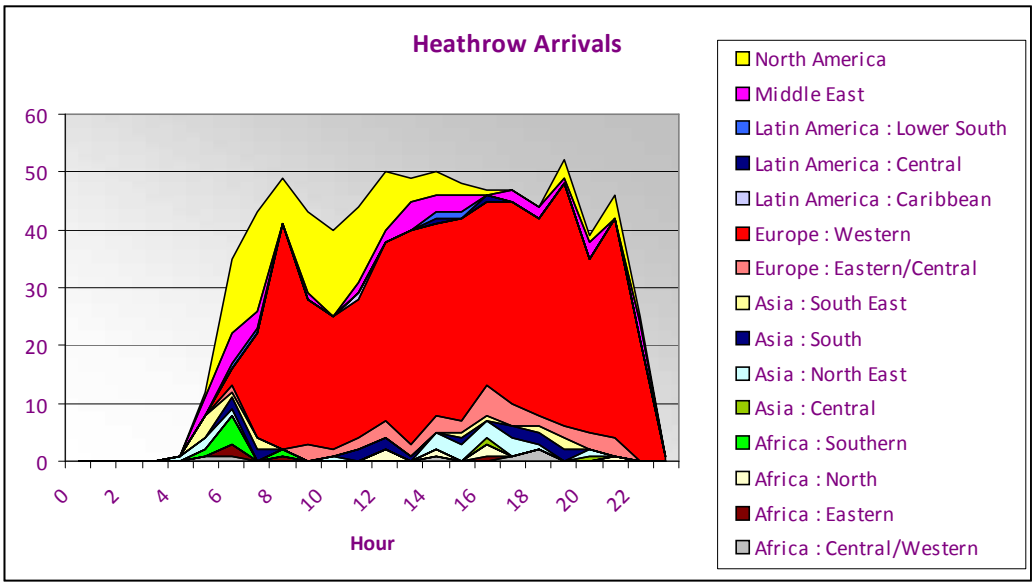
Figure 4.17: Pattern of Departing Movements at Heathrow July 2012



Source: OAG

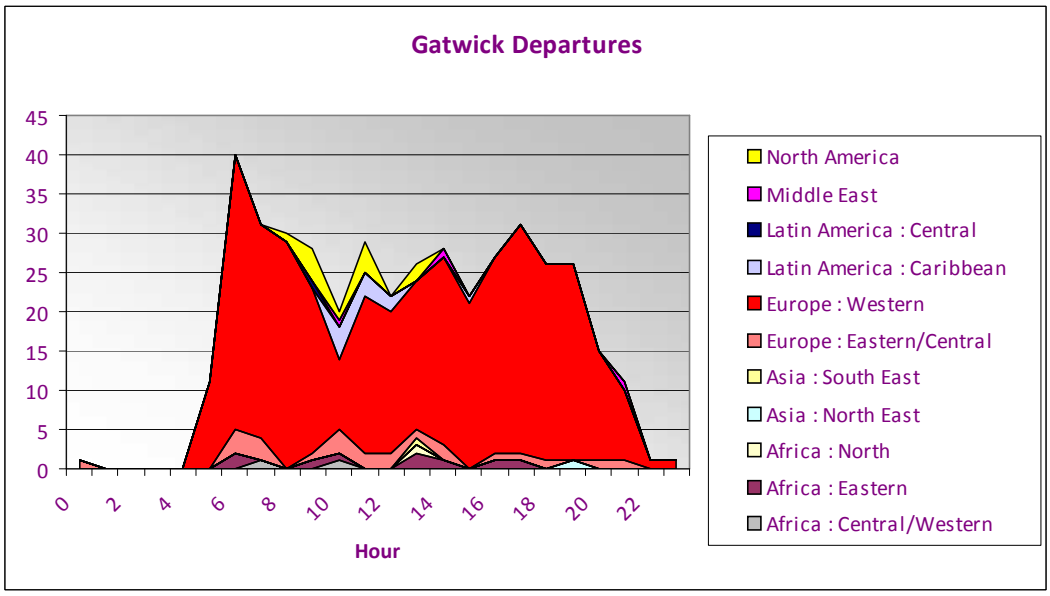
4.43 For example, as seen in Figure 4.17, the strong peak of Western European departing flights is evident at Heathrow in the early morning with another more dispersed peak in the early evening. However, Heathrow is able to fill other times of the day with services to other global destinations. The West European arrivals peak is less strong in the early morning, as shown in Figure 4.18 but there is a strong peak of arrivals from North America, which in turn allow passengers to connect to later departure flights to Europe and the rest of the world.

Figure 4.18: Pattern of Arriving Movements at Heathrow July 2012



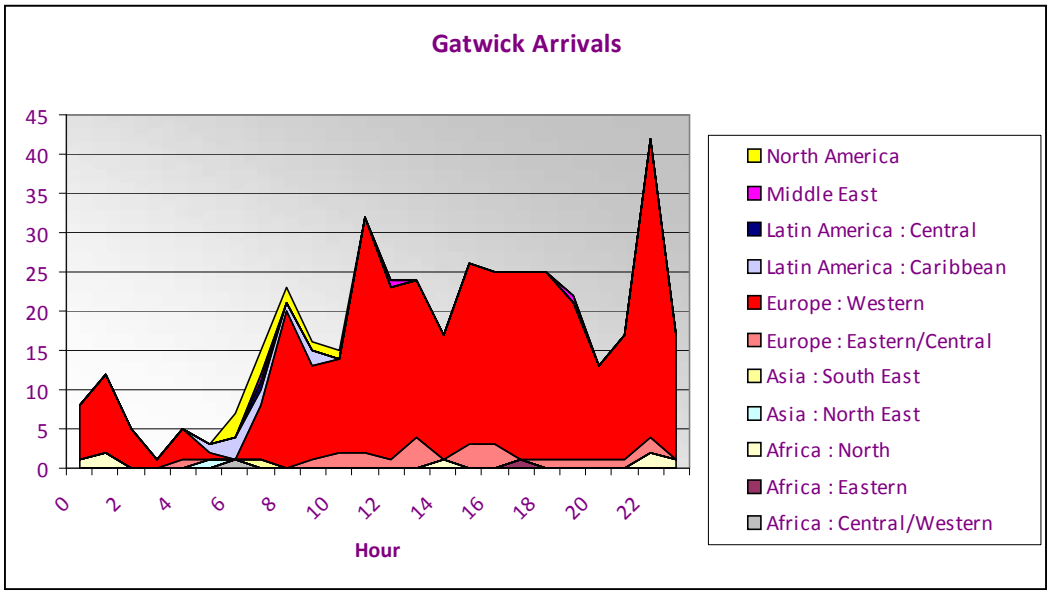
Source: OAG

Figure 4.19: Pattern of Departing Movements at Gatwick July 2012



Source: OAG

Figure 4.20: Pattern of Arriving Movements at Gatwick July 2012



Source: OAG

4.44 As shown in Figures 4.19 and 4.20, Gatwick does exhibit a peakier profile of demand than Heathrow, more dominated by a typical pattern of European short haul and leisure services but the contribution of movements from other world zones to achieving higher overall runway utilisation is evident.

Capacity Constraints at the London Airports

4.45 All of the London airports are schedule coordinated under the EU Slot Allocation Regulations. This means that each of them, with the exception of Southend, operates with some form of restriction on at least peak period usage due to shortage of infrastructure.

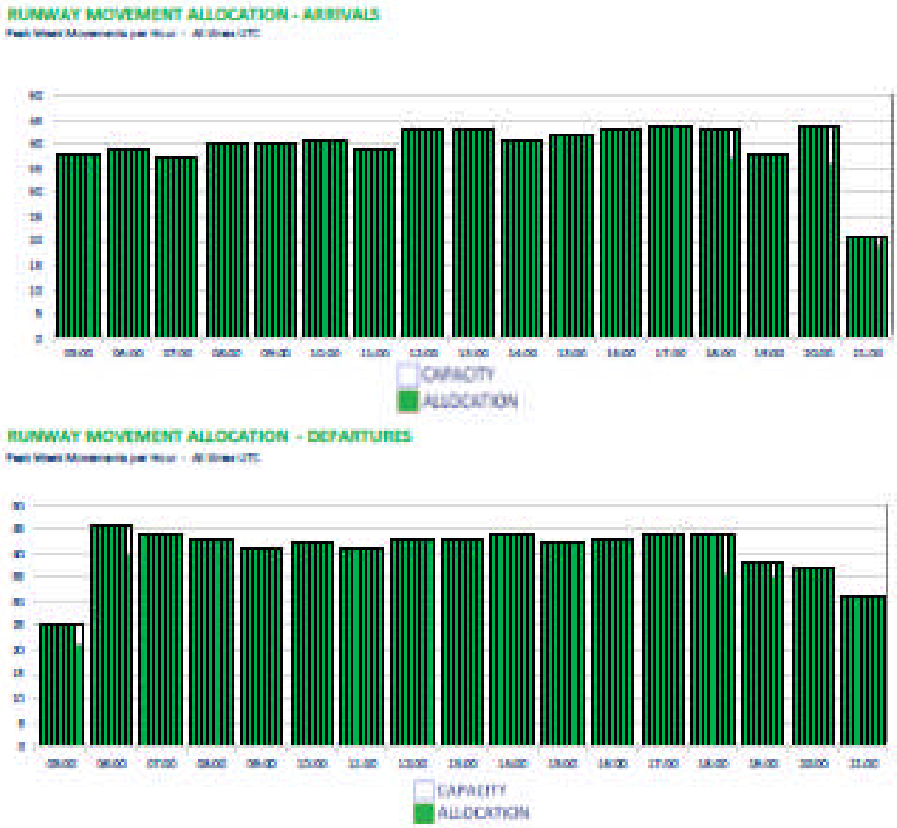
4.46 Details of available (declared) airport capacity and usage are provided in reports produced by Airport Coordination Ltd[16].

4.47 In Figure **4.21**, we show the utilisation of available runway capacity at Heathrow in Summer 2012. This is shown separately for arrivals and departures as capacity is declared separately due to the operation of the runways in segregated mode. As discussed earlier, the available capacity is not the same in every hour as it is increased in the most popular hours then reduced for the adjacent hours to allow delays which have built up to dissipate to an acceptable level (typically 10 minutes average over the peak hours taken together).

4.48 It is evident how little spare capacity there is. This is shown by small white bars on some days of the week in some hours. Some 18 arrival slots are available on Saturdays only after 18.00. For departures, 10 departure slots are available on Sunday mornings before 08.00 and another 11 slots in the evening on Sunday after 18.00. There are no regular spare slots which would allow an airline to operate a new regular daily scheduled service without acquiring the slots from another carrier.[17]

[16] http://www.acl-uk.org/reportsStatistics.aspx?id=98
[17] Further detail is available in the seasonal reports for each airport at http://www.acl-uk.org/reportsStatistics.aspx

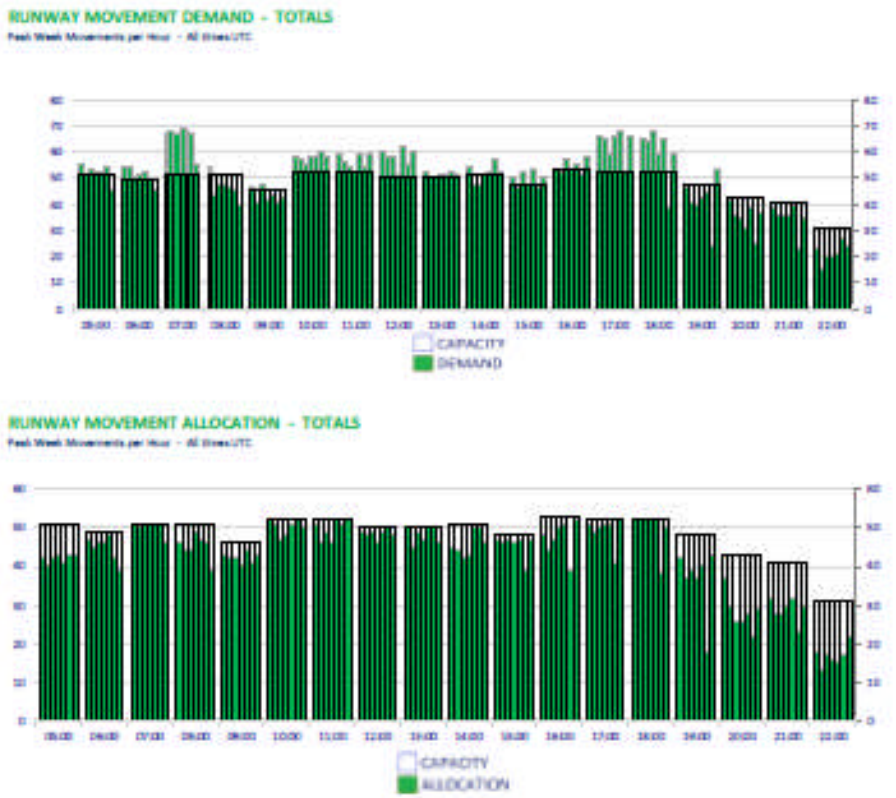
Figure 4.21: Heathrow Airport Runway Capacity Utilisation Summer 2012



Source: Airport Coordination Ltd

4.49 In Figures **4.22** to **4.25**, we illustrate the utilisation of available runway capacity at the other main London airports.

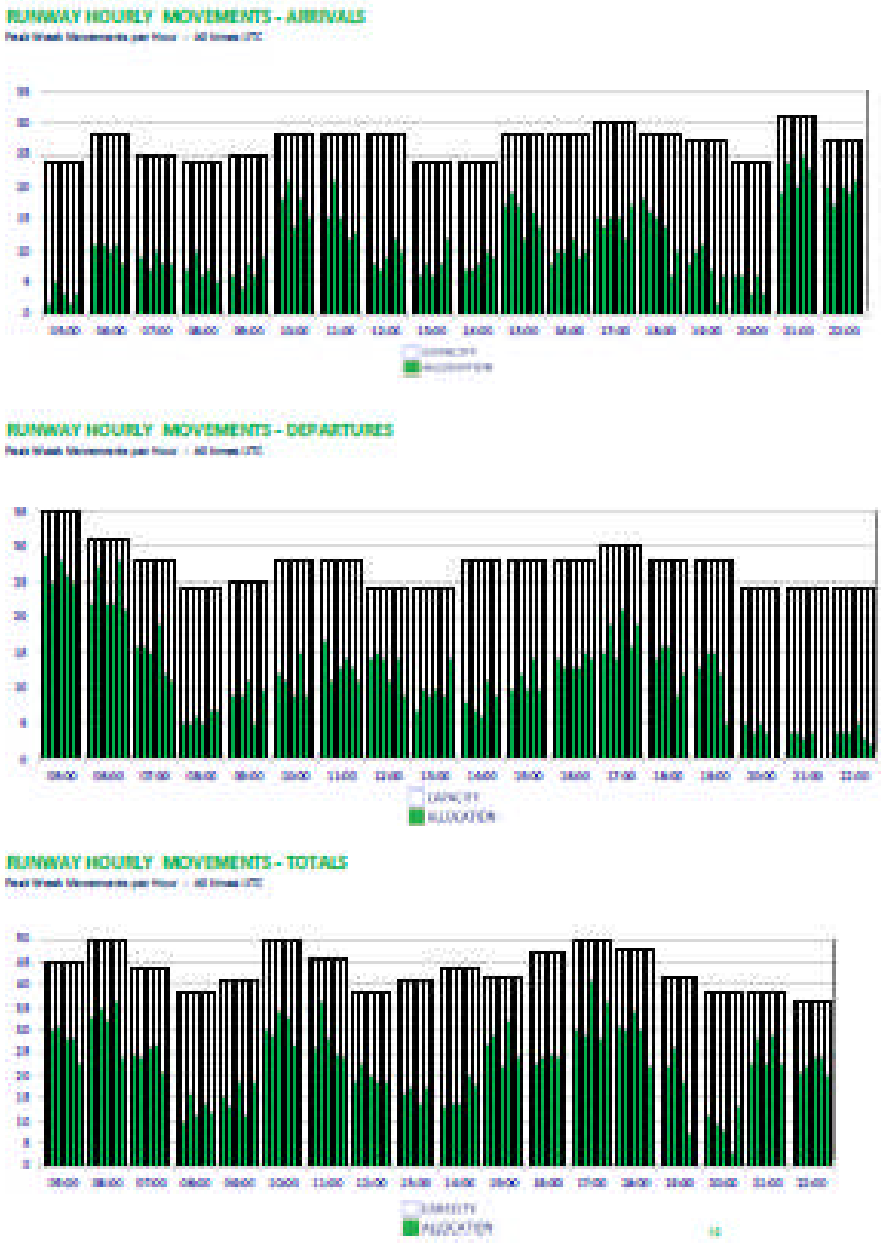
Figure 4.22: Gatwick Airport Runway Capacity Utilisation Summer 2012



Source: Airport Coordination Ltd

4.50 In Gatwick's case, Figure 4.22 shows both demand and allocated slots. This demonstrates the excess demand by airlines for slots in peak periods at Gatwick. It is evident, nonetheless, that there is some spare capacity remaining once slots have been allocated as airlines which could not obtain their optimum slot timings may simply choose not to operate. There are between 8 and 11 runway slots available each day for flights before 07.00, but the runway is fairly heavily used for the remainder of the day until 20.00. However, there are only 2 departure slots, one on Tuesday and one on a Thursday, available in the peak time before 08.00 which effectively means the airport cannot accommodate any more based aircraft operations. Any spare capacity is particularly at the beginning and end of the day. As with Heathrow, capacity is profiled as far as possible to match demand. Overall, in Summer 2012, there were 717 spare runway slots each week, or 12% of the total.

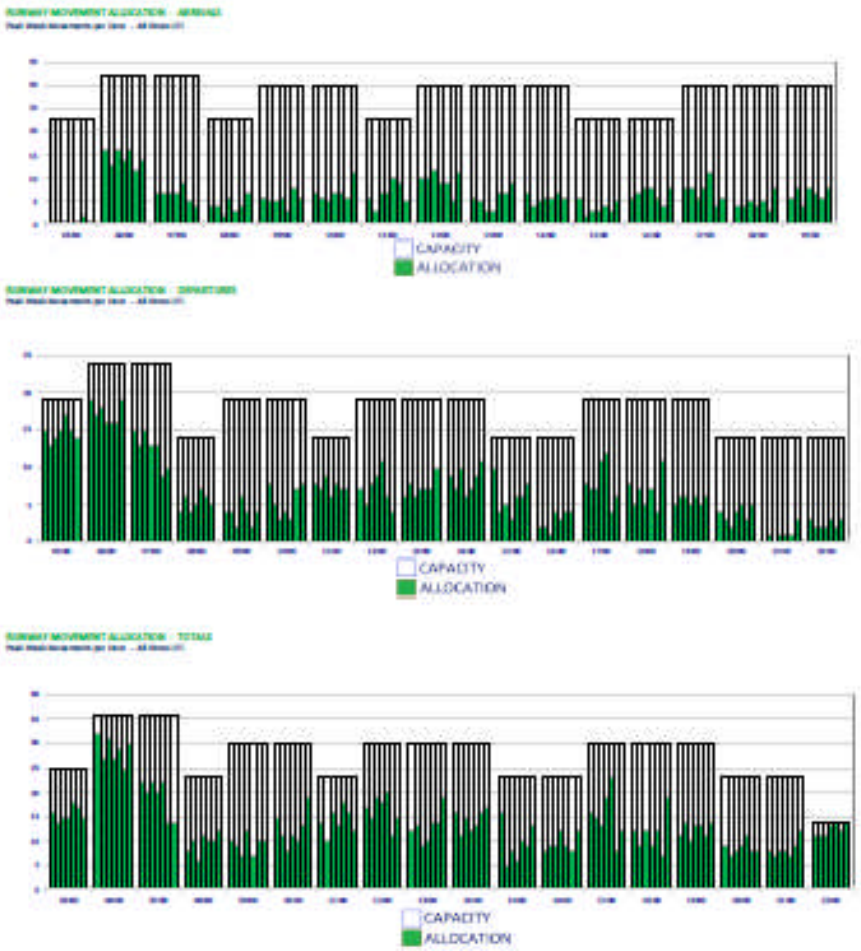
Figure 4.23: Stansted Airport Runway Capacity Utilisation Summer 2012



Source: Airport Coordination Ltd

4.51 Figure 4.23 shows how Stansted still exhibits a strong peak of departure demand on the runway early in the morning and arrival demand late in the evening, consistent with the based low fares airlines seeking to maximise aircraft usage during the day. Overall, however, there is substantial spare runway capacity, with around 47% of runway slots still available in Summer 2012.

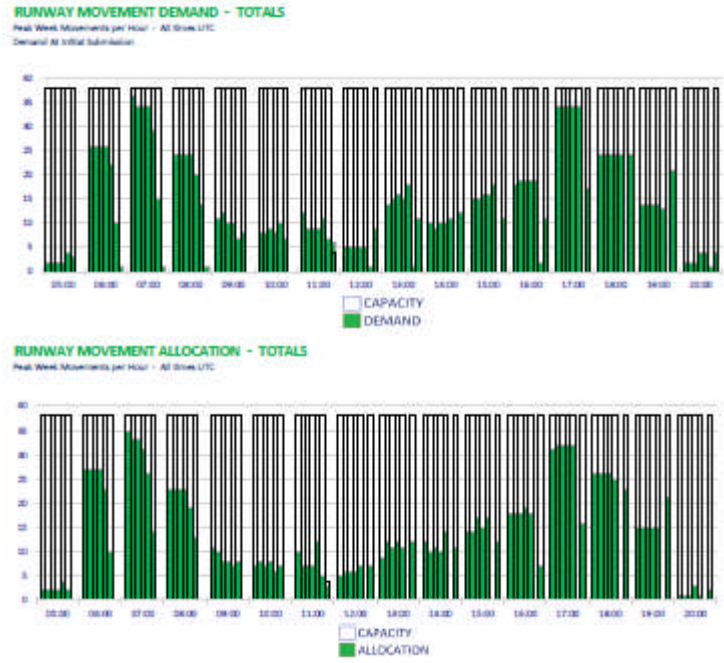
Figure 4.24: Luton Airport Runway Capacity Utilisation Summer 2012



Source: Airport Coordination Ltd

4.52 Figure 4.24 shows that Luton exhibits the similar pattern of morning peaking of demand for runway slots, dominated by departures. Because it does have some non-based aircraft operations, these also peak in terms of morning arrivals, resulting in high utilisation of the runway overall in the morning peak. Overall, in Summer 2012, Luton had 51% of runway slots available.

Figure 4.25: London City Airport Runway Capacity Utilisation Summer 2012



Source: Airport Coordination Ltd

4.53 Figure 4.25 shows that runway capacity at London City is almost fully used in the morning and afternoon peak periods. In practice, the main constraint at the Airport currently is stand capacity so analysis of available runway slots does not demonstrate the constraint, which driven by arriving aircraft in the peak period and the number of aircraft requiring stands simultaneously.

4.54 Overall, examination of these profiles of utilisation shows that there is little spare capacity across the London airports as a whole in the morning peak period and, to a lesser extent, in the early evening peak. At Gatwick, in summer spare capacity is largely limited to the evening period. Stansted and, to a lesser extent, Luton have spare capacity for most of the day after the morning peak. London City has spare capacity during the middle part of the day. However, the extent to which this capacity is likely to be taken up depends on airlines finding markets which can be viably served outside of peak demand periods.

5 CAPACITY DEVELOPMENT OPTIONS

5.1 In this section, we set out our understanding of the principal development options being proposed to expand the capacity of the London airports. This list is not necessarily comprehensive as it is understood that over 40 proposals may be being promoted to the Davies Commission. However, not all of these are worked up in any level of detail and we have concentrated here on those where some detail is available.

Key Findings

5.2 The Department for Transport has recently reviewed its air traffic demand forecasts. Although these have been reduced substantially from those published in 2011 to reflect the slower than expected economic recovery, they still show all the London airports as full by 2030 in the central case, although the timings vary with the low and high cases. However, these new lower forecasts do have some implications for the scale and timing of new capacity overall.

5.3 Our review of the evidence regarding the capacity of the existing London airports shows that Heathrow is to all intents and purposes full in terms of aircraft movements, although there is scope to grow passenger numbers through the use of larger aircraft. Mixed mode operations could enable more movements and hence passengers to use the Airport.

5.4 Gatwick is close to maximum acceptable utilisation, at over 80% year round, without the risk of delays increasing dramatically. However, whilst the airport is virtually full in summer with 88% utilisation, there is spare capacity in the winter.

5.5 The other airports appear to have reasonable amounts of spare capacity, with Stansted operating at 45% of consented annual movements and London City at around 60%, but the extent to which this can be used depends on the airlines willingness to develop different types and patterns of service. In turn, this is dependent on the nature and strength of the market which each airport serves.

5.6 We have reviewed information in the public domain regarding alternative sites for expansion, including those in the Thames Estuary as well as options for expansion at the existing sites. Key issues which are highlighted relate to the need for high quality surface access to link potential new sites to the current centres of air travel demand and the cost of development. Another critical issue is the future of Heathrow and whether a new hub would be viable if Heathrow remains open.

Demand Forecasts

5.7 The Department for Transport has recently published UK Aviation Forecasts 2013. These have revised downwards the overall demand projections to reflect the slower economic recovery. Although the forecasts are based on a wide range of variables including changes in the airlines' cost base and market maturity, the key driver is GDP growth. The changes in the demand projections generally reflect changes in the assumed rate of economic recovery in the UK and other changes in global GDP forecasts.

5.8 The new national unconstrained forecast is shown in **Table 5.1**. These projections take no account of any constraints arising from limitations in airport capacity, which are factored in at a later stage. In the Central Case, the projected demand is reduced from 345 million passengers to 320 million passengers in 2030 and from 520 to 480 million passengers in 2050. This has implications for the scale and timing of new airport development required. In 2012, based on provisional figures, UK airports handled around 223 million passengers.

Table 5.1: DfT unconstrained demand forecasts 2013 (mppa)

	Low	Central	High
2010	211	211	211
2015	220	230	240
2020	240	260	280
2025	260	290	315
2030	280	320	360
2035	295	355	415
2040	315	390	485
2045	335	435	565
2050	350	480	660
Source: DfT			

5.9 The Department for Transport also produce airport level forecasts constrained by existing airport capacity. Those for the London Airports and the National Total are shown in **Table 5.2**.

Table 5.2: DfT constrained Airport forecasts 2013 (mppa)					
	2010	2020	2030	2040	2050
Heathrow	66	75	82	87	93
Gatwick	31	37	41	43	44
Stansted	19	25	36	36	35
Luton	9	14	18	19	18
London City	3	5	6	6	7
Southend	0	2	3	2	2
London Total	128	156	186	193	199
National Total	209	255	313	372	447
Source: DfT					

5.10 The volume of demand which it assumed could be met within existing airport capacity has reduced since the 2011 forecasts: from 335 mppa to 313 mppa in 2030 and from 470 to 447 mppa in 2050. However, the London airports are now assumed to handle a higher proportion of demand, largely as a result of higher airport capacities being assumed at each of the main airports, with utilisation rates at Heathrow, Gatwick and London City assumed to have reached 100% by 2030. The amount of demand assumed to be handled at the London airports has increased from 180 to 186 mppa at 2030 and from 185 to 199 mppa in 2050.

5.11 The use of the regional airports is lower due to less traffic having to spill from London to the regions. We had severe doubts about the validity of the DfT's 2011 spill modelling in any event as detailed analysis showed significant flaws in the allocation of passengers by airport and by route, for example Stansted gains long haul services by 2030 only to lose them again by 2050. Further analysis is required of the latest Department for Transport forecasts to ascertain whether the allocation by airports is infected with the same flaws as in 2011.

5.12 The lower demand projections overall appear broadly realistic but may understate demand in the Central case as happened in previous forecasts undertaken at the bottom of a recession.

Existing Airports

5.13 The assumed capacities of the existing London airports as used by the DfT in their demand projections are set out in **Table 5.3**.

Table 5.3: DfT Airport Capacity Assumptions 2013 (mppa)						
	ATMs (000s)			Terminal Passengers (mppa)		
	2008	2030	2050	2008	2030	2050
Heathrow	480	480	480	90	90	90
Gatwick	270	280	280	40	45	45
Stansted	241	259	259	30	35	35
Luton	130	160	160	12	18	18
London City	73	120	120	5	8	8
Southend	0	53	53	0	2	2
Source: DfT						

5.14 We now go onto describe the capacity limitations of the existing London airports.

Heathrow

5.15 Heathrow is currently limited by planning condition to 480,000 air transport movements a year and is operating very close to this level.

5.16 In the 2008 Consultation Document *"Adding Capacity at Heathrow"*, it was estimated that with both runways at Heathrow operated in mixed, as opposed to segregated mode, capacity could reach 540,000 annual movements. Currently, there is a limited trial of mixed mode operations solely following periods of disruption in order to mitigate delays. It has been suggested that mixed mode operations could be permitted more generally to improve resilience and reduce delays but without any consequent increase in the number of permitted movements. However, there are concerns that this would remove the respite from noise which residents receive when the runways are alternated.

5.17 Displacement of all domestic flights from Heathrow would free up only 10% of slots but would damage hub connectivity from the regions. In general, short haul flights are being replaced by long haul flights at Heathrow; a process which is likely to accelerate following BA's acquisition of bmi, albeit short haul feeder connections remain important in sustaining long haul services particularly to emerging markets.

5.18 There is some scope to increase the number of passengers using Heathrow as larger aircraft are introduced. It is estimated that the ceiling on passenger capacity will be around 90 mppa.

5.19 A short third runway as previously proposed was estimated to increase capacity to 702,000 air transport movements and around 135 mppa.

Gatwick

5.20 A planning agreement prevents the construction of a new runway at Gatwick before 2019.

5.21 The current capacity is estimated at 280,000 air transport movements and 45 mppa, albeit this will require further expansion of terminal and apron facilities. There is limited scope to increase hourly runway capacity at Gatwick, although it is understood that the Airport is working with NATS to achieve a small increase in hourly runway movements. There is also little scope to increase utilisation of the Airport in summer, as the runway is close to fully used.

5.22 The principal opportunities to increase utilisation are in the winter, when movement rates are lower. However, this would require Gatwick to attract airlines to operate more business oriented services than currently operated. Such changes are likely to be required, along with further growth in aircraft size consistent with the airport's policy to increase peak period charges to operators of smaller aircraft, in order to achieve the anticipated passenger and movement capacities of the single runway.

5.23 Options for a second runway at Gatwick were considered by RUCATSE[18] in the 1990s and in the preparation of the 2003 White Paper. Options exist to the north and south of the existing runway, although the southern option was preferred in 2003. Gatwick Airport has declared that it is now reviewing options for a second runway with a view to making a definitive proposal.

Stansted

5.24 Stansted is limited by planning controls to 264,000 air transport movements and 35 mppa. The runway infrastructure is likely to support around 40 mppa. Stansted is currently operating well below capacity and has a peaky profile of demand.

5.25 In 2008, when passenger traffic was approaching 23 mppa, Stansted was close to being full at peak periods. A return to these traffic levels will bring forward an extension of the terminal and apron to meet demand growth beyond 25 mppa, including the construction of a 4th satellite building, all of which currently have planning approval.

[18] The Government's Runway Capacity to serve the South East Working Party which reported in July 1993.

5.26 In order to reach maximum utilisation, Stansted would need to attract more off-peak traffic, both during the day and during the year. This would require a change to the traffic mix and for overall levels of traffic on individual routes using the Airport to grow to the level that would support multiple daily frequencies in off-peak hours.

5.27 In the 2003 White Paper, Stansted was proposed as the site for the early construction of a new runway. This would have been widely spaced from the existing runway and would have allowed expansion of the capacity of the Airport up to 550,000 air transport movements a year and over 76 mppa.

Luton

5.28 Luton Airport is close to full at peak periods currently, with the limitations being terminal capacity, apron capacity and runway capacity, due to the limited length of taxiway serving the runway which constrains runway capacity.

5.29 The Airport has recently applied for planning permission to enhance the infrastructure up to the maximum possible within the existing Airport boundary, estimated at 18 mppa and currently handles around 9.6 mppa.

5.30 Following the 2003 White Paper, the Airport operator had proposed construction of a new runway and terminal to the south of the existing runway. However, this would have involved a major expansion of the Airport into green belt, with substantial topographical difficulties impacting construction. The proposal was not supported by the Airport's owner Luton Borough Council (through London Luton Airport Ltd).

5.31 There are possibilities to extend the Airport beyond the current site to the east for terminal and apron development but this will be subject to modifications to the existing operating concession, which now runs until 2031.

5.32 As with Stansted, the profile of traffic at Luton is subject to large peaks of traffic, particularly in the early morning. Attaining better utilisation of existing capacity would require a change to the profile of traffic using the Airport, which is more difficult to achieve than at Stansted due to the shorter runway limiting the prospects for the introduction of long haul traffic into the less busy periods.

London City

5.33 London City Airport is limited by planning condition to 120,000 noise factored movements a year.

5.34 Increases in the size of aircraft using the Airport have resulted in even greater concentration of activity into peak periods and mean that the existing apron infrastructure is a constraint both in terms of the number of movements which can be handled and the types of aircraft.

5.35 The Airport is currently undertaking pre-application consultation towards the submission of a planning application to provide the appropriate infrastructure, including apron, taxi-lane and terminal infrastructure to enable it to reach its current planning limit of 120,000 noise factored movements.

5.36 The strong business profile of traffic at the Airport limits the potential to develop substantial off-peak operations and increase utilisation. Growth of traffic at the Airport is closely aligned to growth in employment in Tower Hamlets and Newham.

5.37 In 2006, the Airport published a Master Plan indicating that the ultimate potential of the Airport site might be of the order of 170,000 annual movements and 8 mppa. Presently, this is not supported by the Mayor.

Southend

5.38 Southend Airport is limited by planning agreement to 53,000 movements per year, approximately equivalent to 2 mppa when the general aviation and aircraft maintenance related movements are taken into account. This limit was agreed as a consequence of permission being granted to extend the length of the runway. The physical capacity of the runway and apron exceeds these limits as more movements, albeit by small aircraft, were handled historically.

5.39 Southend Airport is currently constructing a second phase of its new terminal building, linked directly to a rail station, in order to provide capacity for up to 2 mppa.

5.40 Southend only has limited aircraft operations so its traffic profile is subject to large peaks in demand.

Summary Conclusions on Current Airport Capacity

5.41 Heathrow is to all intents and purposes full in terms of aircraft movements, although there is scope to grow passenger numbers through the use of larger aircraft. Mixed mode operations could enable more movements and hence passengers to use the Airport, albeit with potentially adverse noise implications.

5.42 Gatwick is close to maximum acceptable utilisation without the risk of delays increasing dramatically in summer, with utilisation reaching 88%. Whilst more use could be made of the airport in winter, this is less attractive to the airlines particularly on leisure oriented routes.

5.43 The other airports appear to have reasonable amounts of spare capacity but the extent to which this can be used depends on the airlines willingness to develop different types and patterns of service. In turn, this is dependent on the nature and strength of the market which each airport serves. In theory, these airports may have 50% spare capacity but the extent to which this will be taken up depends on market growth in each airport's catchment area and airline decisions as to the viability of developing new services. It is unlikely that these airports will attract a broad enough mix of services to attain the levels of utilisation seen at Heathrow and Gatwick for the foreseeable future.

Options to Expand Existing Airports

5.44 There are a number of options to expand capacity at the existing airports which have been proposed. These are tabulated below.

Heathrow Third Runway	BAA is believed to be working up a Third Runway proposal in more detail based on the previous options.
Heathrow Hub	Heathrow Hub Ltd. is a privately owned UK company proposing to link HS1 and HS2 with a Heathrow transport interchange 3.5km north of T5. Relocation of existing transport facilities would create more space for aircraft. Also incorporates suggestion of extending the Heathrow runways to double length with aircraft landing and departing on different portions of the same runways.
Western Extension of Heathrow	Proposed by Tim Leunig, chief economist at the liberal think-tank CentreForum and published by Policy Exchange. Four new runways to the west of the current site are proposed to be constructed over the M25, the Poyle industrial estate, the Wraysbury reservoir and part of Stanwell Moor. The existing runways would be decommissioned, but Terminals 1-3 and 5 would remain operational, and a new terminal would open at the western end of the airport. No cost assessment at this stage.

Gatwick	Gatwick (owned by GIP) is promoting a second runway to allow it to develop as a secondary hub after its planning restriction expires in 2019.
Luton	Weston Williamson Architects have proposed a 4 runway airport south of the existing site, but this is not supported by the current owners of Luton, who deem the land unsuitable.
Stansted	Make Architects (Ken Shuttleworth) has proposed building three new 4000m runways at Stansted and creating a new Crossrail link from the airport to Stratford, reducing train journey times from the capital to 25 minutes. However, full architectural details, construction cost and timescales have yet to be revealed and it is not known what the new owners of Stansted (MAG) think of the proposal.

New Sites

5.45 There are rumoured to be up to 42 sites or development proposals on the table. Not all of these have been identified in the public domain. We set out in this section some of the key features of known proposals.

5.46 It should be noted that most industry commentators are clear that new hub options would only be viable if Heathrow were to close. The level of compensation required, in the event of closure or downsizing, to Heathrow Airport Ltd and to other business located there is unclear and would depend on the alternative uses for the site in the context of the economy of West London, which in turn would be impacted more generally by the closure of the Airport. This is covered further in work by Oxera for the Transport Select Committee[19].

5.47 Experience from abroad would suggest that new airports are more likely to be successful when they replace existing airports. For example new airports in cities such as Denver, Hong Kong and Munich all replace existing airports, with the sites, often closer to the city centre, redeveloped for other users. However, an attempt in 1975 to develop a new airport at Mirabel to serve Montreal, 24 miles from the city, to replace the existing airport at Dorval failed as passenger and airlines were reluctant to use it, resulting in the focus of international air service development for eastern Canada switching to Toronto. Ultimately, in 1997, international flights were switched back to Dorval and Mirabel is now used principally as a cargo airport. There are no examples of the successful development of major airports operating alongside existing airports in recent years.

[19] http://www.parliament.uk/documents/commons-committees/transport/Would_a_new_hub_airport_be_commercially_viable.pdf

5.48 We illustrate in **Figure 5.1**, the approximate locations of the proposed estuarial sites. We tabulate the key features of each of the known proposals on the following pages.

Figure 5.1: Locations of Estuarial Options

Source: York Aviation

London Thames Hub/Thames Gateway Airport (Isle of Grain)

Proposed by	Foster & Partners, Halcrow, and Volterra
Location	Hoo Peninsula on the Isle of Grain, with half of the site being on reclaimed land.
Runways	4 runways - 150 mppa.
Cost	£20bn airport, £20bn orbital rail, £6bn barrier crossing, £4bn other infrastructure. Total £40bn. 15 year timescale suggested.
Surface Access	A rail connection of around 6km to a river crossing by East Tilbury connected into a four-track, high-speed passenger and freight Orbital Rail route around London, which links London's radial lines with HS1 and HS2 as well as the Thames Estuary ports and European networks. By road, it would be approx 10km to the M2/A2 near Rochester. No details are given of other road improvements which would be required. The new Orbital Route would approximately trace the line of the M25 north around London and much of it is proposed to be in tunnels. Over 100 km of new track is likely to be required. The Airport would be 55 kilometres from London and the estimated travel time is 30 minutes by high speed rail. The Airport would be around 10km from the HS1 line.

London Gateway Airport (Cliffe)

Proposed by	Independent Aviation Advisory Group (IAAG) led by John Olsen (former director of Cathay Pacific and of Dan-Air).
Location	Cliffe, North Kent.
Runways	3 runways
Cost	£15bn – no estimated timeframe. Cost estimates believed to be based on previous DfT estimates at the time of the 2003 White Paper
Surface Access	The mode of surface connections are not specified but it is assumed that there would be a rail spur to HS1 (approx 10km away), as was proposed before. The South East and East of England Air Services (SERAS) study estimated a rail travel time to central London of 26 minutes, and that a new Lower Thames river crossing would be required to improve road access. The eastern sections of the M25 would also be likely to require upgrading.
Comment	Cliffe has been proposed as a location repeatedly ever since WWII, but was most recently proposed as part of SERAS (South East of England Regional Air Services Study) of February 2003, but later rejected in the December 2003 White Paper on the grounds of high cost, financial viability, and potential bird strike risk. John Olsen has, however, claimed the bird population is now "meagre".

London Medway Airport (Cliffe)

Proposed by	London Medway Airport Group (founded by two young academics, Luke Douglas and Thomas Aldred)
Location	Cliffe, North Kent (i.e. the same location as IAAG's proposal)
Runways	4 runways - 150mppa
Cost	Estimated £30bn for airport and surface access infrastructure, but no detailed breakdown. Estimated less than 7 years to construct.
Surface Access	As with the IAAG proposal, there would be a new branch line to HS1 (approx 10km away) which the proposers claim would link the Airport to Stratford in 20 mins and St Pancras in 25 mins. A new Lower Thames Crossing is also proposed and (although it is not mentioned in the proposal) some upgrades to the eastern sections of the M25 are likely to be required.
Comment	The proposal plays down the risk of bird strike (one of the reasons the Cliffe site was previously dismissed) referring to an unnamed 'recent report' which concludes that the risk is low. Retains Heathrow as small 1 runway, possibly low cost airport.

London Jubilee International Airport (offshore)

Proposed by	Testrad (Thames Estuary Research & Development) - a company formed by Doug Oakervee (former Chair of Crossrail) and Bridget Rosewell (former Chief Economic Adviser to the GLA/Owner of Volterra).
Location	An offshore airport platform, 6 to 7 kilometres north of Herne Bay, with onshore terminals at Ebbsfleet linked by High Speed Rail to the offshore airport.
Runways	Up to 6 runways.
Cost	£39.5bn to £49bn, depending on whether the link from the mainland is through tunnels or over water. Estimated 7 years construction time.
Surface Access	High speed links from onshore terminals to offshore airport. The link to HS1 would be around 30km from Herne Bay, after the new track reached the shore. Herne Bay to the A2/M2 would be approximately 10km. Direct rail connections from central London largely through existing HS1 infrastructure but possible extension of Crossrail, or the regeneration of the former Channel Tunnel link from Waterloo Station. There would also be a requirement to upgrade the eastern portion of the M25 as well as the river crossings in the vicinity of Dartford.

London Britannia Airport (offshore)

Proposed by	Gensler (Architecture, Design & Planning firm)
Location	Floating island airport located centrally in the Thames Estuary, with onshore terminals. The precise location of the Airport is unclear. Terminals are proposed to be located both north and south of the Estuary
Runways	Up to 6 runways.
Cost	No estimates seem to be available.
Surface Access	Passengers would access the Airport via high-speed underground rail. Vehicular access would be dispersed to three new land-based departure/arrival terminals, two located north and south of the estuary, and a third proposed for Central London between Canary Wharf and the Olympic Park. Depending on the precise location, the distance between the Airport and the HS1 line could be 15 to 20km.
Comment	Heathrow would be closed and transformed into an 'Eco City' with housing.

Marinair (offshore)

Proposed by	Thames Estuary Airport Company Ltd
Location	Offshore – around 7 kilometres to the north-east of Whitstable
Runways	4 x 4,500 metre runways
Cost	No estimates available
Surface Access	The HS1 line is around 16 kilometres south of the Isle of Sheppey and it is proposed that HS1 be connected to MARINAIR by way of a new line which, when it reaches The Swale, would pass into a tunnel under the Isle of Sheppey and the Thames Estuary. Travel time to Central London is estimated at 32 minutes. Sharing the tunnel with the HS1 spur, the M2 and M20 motorways would be connected to MARINAIR by way of an upgraded A249. Motorway access from north of the River Thames would be by the eastern section of the M25, the Dartford Crossing and the A2/M2 motorway and the M20 motorway and then, as described above, by way of a future upgrade of the A249.
Comment	Originally proposed to the RUCATSE (Runway Capacity to Serve the South East) Group in the early 1990s.

Goodwin Sands (offshore)

Proposed by	Beckett Rankine (Marine Consulting Engineers)
Location	3km offshore of Deal at Goodwin Sands on the east coast of Kent.
Runways	Phase 1 would comprise 3 runways and 150 mppa capacity, with potential for expansion.
Cost	Construction of Island £3.5bn, Link To Mainland £1.2bn, The Harbour £1.2bn, Roads, Rail and Runways £11.4bn, Improvements to Existing Infrastructure £3bn, Buildings & Structures £8.7bn, Equipment and Systems £10.2bn - Total £39.2 billion (Phase 1 costs)
Surface Access	Road tunnel to the mainland. High speed rail to London via existing HS1 in (estimated) 40 minutes. However, Deal is at least 12km from the HS1 line and possibly more depending on where exactly it joins. Road links via A2 & M20, although the road journey time from Deal to Canary Wharf using these existing routes is 122km and 100 mins.
Comment	Envisages Heathrow downgraded to a smaller airport.

Other Sites

Sites West of London	The Progressive Aviation Group has looked at sites that could accommodate 4 runways and two potential sites west of London have been identified: • RAF Croughton (37km north of Oxford, 5km east of the M40, and currently around 90 mins by road from Central London); • the Steventon area (20km south of Oxford and just west of Didcot; currently around 80 mins by road from Central London). The target would be for a 30 minute journey time to London by high speed rail. Various other proposals are believed to be under development, including RAF Lyneham (west of Swindon) and a site between Maidenhead and Twyford.
Northolt	Rothwell Aviation have developed a proposal to re-align the Northolt runway and extend it to 2,400 metres, construct a new passenger terminal, build a high speed rail line to Heathrow 'South', and allow passengers to transfer between both sites in 15 minutes.
Birmingham	Proposal from the Airport to develop Birmingham as a reliever hub with a new terminal integrated with the HS2 station to bring Birmingham into a similar journey time zone from central London as Stansted is today.

ANNEX A

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
Austria	Innsbruck		4					4
	Klagenfurt						4	4
	Linz						3	3
	Salzburg		5				6	11
	Vienna		11	49				60
Austria Total			20	49			13	82
Belgium	Antwerp	26						26
	Brussels			66				66
Belgium Total		26		66				92
Cyprus	Larnaca		22	21	5			48
	Paphos		26		5		5	36
Cyprus Total			48	21	10		5	84
Denmark	Aalborg		3					3
	Aarhus						4	4
	Billund	11					16	27
	Copenhagen		39	75			13	127
Denmark Total		11	42	75			33	161
Faroe Islands	Faroe Islands		2					2
Faroe Islands Total			2					2
Finland	Helsinki		12	42				54
	Tampere						3	3
Finland Total			12	42			3	57
France	Ajaccio		1					1
	Angers	2						2
	Avignon	1						1
	Bastia		2					2
	Bergerac		1				3	4
	Beziers				2			2

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
	Biarritz		3				2	5
	Bordeaux		22		8			30
	Brest	2						2
	Brive	2						2
	Carcassonne						2	2
	Deauville	2						2
	Dinard/St-Malo						3	3
	Dole						2	2
	La Rochelle		3				3	6
	Limoges						3	3
	Lourdes/Tarbes						2	2
	Lyon		13	26			9	48
	Marseille		12	21			7	40
	Montpellier		10		4			14
	Nantes	7	3					10
	Nice	7	55	49	15		7	133
	Nimes				3			3
	Paris	33		123	16			172
	Pau	3						3
	Poitiers						2	2
	Quimper	2						2
	Strasbourg						3	3
	Toulon/Hyeres	2						2
	Toulouse		22	21				43
	Tours						2	2
France Total		63	147	240	48		50	548
Germany	Berlin		24	74	13	6	7	124
	Bremen						14	14
	Cologne/Bonn		13	18			15	46

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
	Dortmund				12			12
	Dresden	6						6
	Duesseldorf		12	68			27	107
	Frankfurt	41	7	126			16	190
	Hamburg		11	55	6			72
	Hannover			21			12	33
	Karlsruhe/Baden						7	7
	Leipzig/Halle						4	4
	Memmingen						6	6
	Muenster	7						7
	Munich		17	95	3		7	122
	Nuremberg	11					7	18
	Paderborn	6						6
	Stuttgart			32			6	38
Germany Total		71	84	489	34	6	128	812
Gibraltar	Gibraltar		11	9	5			25
Gibraltar Total			11	9	5			25
Greece	Athens		7	47				54
	Chania		6					6
	Irakleion		20		3		2	25
	Kalamata		2					2
	Kavala		1					1
	Kefallinia		8		1		3	12
	Kerkyra		18		7		2	27
	Kos		10					10
	Mykonos		6		2			8
	Preveza/Lefkada		1					1
	Rhodes		10		1		2	13
	Samos		1					1

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	**City**	**London City**	**Gatwick**	**Heathrow**	**Luton**	**Southend**	**Stansted**	**Grand Total**
	Skiathos		2					2
	Thessaloniki		10		1		3	14
	Thira		7					7
	Zakinthos Island		9		1		1	11
Greece Total			118	47	16		13	194
Iceland	Reykjavik		16	14	4			34
Iceland Total			16	14	4			34
Ireland Republic of	Cork		7	28			14	49
	Dublin	31	73	135	18	21	46	324
	Kerry				7		7	14
	Knock		7		7		7	21
	Shannon	11	7	21			12	51
Ireland Republic of Total		42	94	184	32	21	86	459
Italy	Alghero		1				3	4
	Ancona						4	4
	Bari		6				4	10
	Bologna		7	21			7	35
	Brindisi						2	2
	Cagliari						7	7
	Catania		12					12
	Florence	6		7				13
	Genoa		7				2	9
	Lamezia Terme						3	3
	Milan	11	45	90	7		24	177
	Naples		24				14	38
	Olbia		10		2			12
	Palermo		5				3	8
	Perugia						3	3
	Pescara						4	4
	Pisa		26	8	7		11	52

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
	Rome		38	77	3		21	139
	Trieste						4	4
	Turin		6				11	17
	Venice	6	47	11		4	12	80
	Verona		22					22
Italy Total		23	256	214	19	4	139	655
Luxembourg	Luxembourg	37	6	14				57
Luxembourg Total		37	6	14				57
Malta	Malta		18	15	3		2	38
Malta Total			18	15	3		2	38
Netherlands	Amsterdam	68	57	132	25	12	20	314
	Eindhoven						14	14
	Maastricht						6	6
	Rotterdam	46		19				65
Netherlands Total		114	57	151	25	12	40	399
Norway	Alesund		2					2
	Bergen		11	14				25
	Haugesund						3	3
	Kristiansand	3						3
	Oslo		30	61			28	119
	Stavanger		5	27				32
	Tromso		2					2
	Trondheim		5					5
Norway Total		3	55	102			31	191
Portugal	Faro		57		20	8	4	89
	Funchal		16		1			17
	Lisbon		12	65	10			87
	Ponta Delgada		1					1
	Porto		21				12	33

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
	Porto Santo		1					1
Portugal Total			108	65	31	8	16	228
Spain	A Coruna			7				7
	Alicante		67	2	20	10	7	106
	Almeria		6					6
	Asturias						8	8
	Barcelona	7	90	61	14	10	14	196
	Bilbao			7			14	21
	Fuerteventura		7		1		3	11
	Girona		2		3			5
	Gran Canaria		12		2		2	16
	Ibiza	11	36	2	7	3	14	73
	Jerez		1					1
	Lanzarote		18		4		5	27
	Madrid	11	43	91	7		13	165
	Malaga	4	89		21	7	16	137
	Menorca	3	21		10		2	36
	Murcia		10				3	13
	Palma	7	69	9	31	5	16	137
	Reus		3		1		2	6
	Santa Cruz		1					1
	Santander						4	4
	Santiago de C		3				3	6
	Sevilla		4				4	8
	Tenerife		30		8		9	47
	Valencia		14				4	18
	Valladolid						2	2
	Zaragoza						4	4
Spain Total		43	526	179	129	35	149	1061

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	**City**	**London City**	**Gatwick**	**Heathrow**	**Luton**	**Southend**	**Stansted**	**Grand Total**
Sweden	Goteborg		6	20			14	40
	Malmo						4	4
	Stockholm	8	30	60			18	116
Sweden Total		8	36	80			36	160
Switzerland	Basel/Mulhouse	12	14	21				47
	Berne	12						12
	Geneva	24	36	92	14			166
	Zurich	56	13	90	7			166
Switzerland Total		104	63	203	21			391
Turkey	Antalya		19		1		4	24
	Bodrum		14		4		4	22
	Dalaman		28		8		7	43
	Istanbul		21	52	4		14	91
	Izmir		4				3	7
Turkey Total			86	52	17		32	187
United Kingdom	Aberdeen	15	13	76	7			111
	Belfast		84	62	20	11	21	198
	Derry						9	9
	Dundee	13						13
	Edinburgh	61	53	120	21		22	277
	Glasgow	30	40	60	21		22	173
	Guernsey	5	73				4	82
	Inverness		28		7			35
	Isle of Man	18	33		5			56
	Jersey	11	62		4	7	4	88
	Leeds Bradford			20				20
	Manchester			89				89
	Newcastle		19	39				58
	Newquay		19			3		22

Weekly Frequency of Service to UK and European Cities from the London Airports July 2012								
Country	City	London City	Gatwick	Heathrow	Luton	Southend	Stansted	Grand Total
United Kingdom Total		153	424	466	85	21	82	1231
Total		698	2229	2777	479	107	858	7148

ANNEX B

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Afghanistan	Bagram		4				
	Camp Bastion		2				
	Kabul		79	2			
	Kandahar		3				
Afghanistan Total			88	2			
Algeria	Algiers		3	14	**5**	9	36
	Annaba						2
	Constantine						1
	Hassi Messaoud						3
	Oran			1		3	4
Algeria Total			3	15	**5**	12	46
Angola	Luanda	2	5	2	**2**	2	2
Angola Total		2	5	2	**2**	2	2
Argentina	Buenos Aires	3		7	**7**	27	7
Argentina Total		3		7	**7**	27	7
Armenia	Yerevan	1	5		**7**		6
Armenia Total		1	5		**7**		6
Aruba	Aruba	6					
Aruba Total		6					
Australia	Brisbane		7				
	Melbourne		7				
	Perth		14				
	Sydney		14				
Australia Total			42				
Austria	Graz			28			
	Innsbruck	2		28			
	Linz			28			
	Salzburg			28			

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Vienna	56	21	88	**63**	16	59
Austria Total		58	21	200	**63**	16	59
Azerbaijan	Baku		10	4	**10**		4
Azerbaijan Total			10	4	**10**		4
Bahamas	Nassau				**5**		
	San Salvador						1
Bahamas Total					**5**		1
Bahrain	Bahrain	3	102	11	**21**		9
Bahrain Total		3	102	11	**21**		9
Bangladesh	Chittagong		14				
	Dhaka		25		**1**		
	Sylhet		2				
Bangladesh Total			41		**1**		
Belarus	Minsk	5		13			4
Belarus Total		5		13			4
Belgium	Brussels	35		58	**73**	58	15
Belgium Total		35		58	**73**	58	15
Benin	Cotonou						5
Benin Total							5
Bolivia	Santa Cruz					3	
Bolivia Total						3	
Bonaire, Saint Eustatius and Saba	Bonaire	2					
Bonaire, Saint Eustatius and Saba Total		2					
Brazil	Recife			1			
	Rio de Janeiro	3	7	10	**9**	6	19

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Salvador			2		3	
	Sao Paulo	7	7	14	**14**	21	21
Brazil Total		10	14	27	**23**	30	40
Brunei Darussalam	Bandar Seri Begawan		7				
Brunei Darussalam Total			7				
Bulgaria	Burgas	3		2			
	Sofia	7		14	**14**	10	21
Bulgaria Total		10		16	**14**	10	21
Burkina Faso	Ouagadougou						6
Burkina Faso Total							6
Cameroon	Douala						10
	Yaounde						5
Cameroon Total							15
Canada	Calgary	8		11	**14**		1
	Edmonton				**7**		
	Halifax			3	**7**		
	Montreal	7		7	**14**	1	42
	Ottawa			7	**7**		
	Quebec						3
	St Johns				**7**		
	Toronto	20	3	27	**49**	8	18
	Vancouver	10		13	**23**		2
	Whitehorse			1			
Canada Total		45	3	69	**128**	9	66
Cape Verde	Boa Vista Island			1			1
	Praia	1					1
	Sal Island					1	

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Sao Vicente Island	2					2
Cape Verde Total		3		1		1	4
Central African Republic	Bangui						1
Central African Republic Total							1
Chad	N'djamena						3
Chad Total							3
Chile	Santiago					14	7
Chile Total						14	7
China	Beijing	14	22	21	**14**	4	21
	Chengdu	4					
	Guangzhou	7	14		**3**		12
	Hangzhou	4					
	Kunming		2				
	Nanjing			3			
	Shanghai	12	14	28	**17**		32
	Shenyang			3			
	Wuhan						3
	Xiamen	3					
China Total		44	52	55	**34**	4	68
Chinese Taipei	Taipei	7		10			4
Chinese Taipei Total		7		10			4
Colombia	Bogota			5		20	7
	Cali					5	
	Medellin					2	
Colombia Total				5		27	7
Congo	Brazzaville						4
	Pointe-Noire						5

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Congo Total							9
Congo Democratic Republic of	Kinshasa						4
Congo Democratic Republic of Total							4
Costa Rica	San Jose					7	
Costa Rica Total						7	
Cote D'Ivoire	Abidjan						7
Cote D'Ivoire Total							7
Croatia	Dubrovnik			9		8	4
	Pula	1					
	Rijeka			1	**1**		
	Split	4		12	**1**	2	9
	Zadar			2			1
	Zagreb	8		28	**7**	2	21
Croatia Total		13		52	**9**	12	35
Cuba	Havana	3		2		15	6
	Holguin	1		2			
	Santiago					1	
	Varadero	3		2			
Cuba Total		7		6		16	6
Curacao	Curacao	9					
Curacao Total		9					
Cyprus	Larnaca	4	7	11	**28**		7
	Paphos	5					
Cyprus Total		9	7	11	**28**		7
Czech Republic	Ostrava						2
	Prague	44	8	49	**35**	15	71

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Czech Republic Total		44	8	49	**35**	15	73
Denmark	Aalborg	21					
	Billund	35		28			19
	Copenhagen	62	7	56	**74**	15	60
Denmark Total		118	7	84	**74**	15	79
Djibouti	Djibouti		13				
Djibouti Total			13				
Dominican Republic	Puerto Plata	1		2		1	1
	Punta Cana	2		5		14	7
	Santo Domingo			3		13	
Dominican Republic Total		3		10		28	8
Ecuador	Guayaquil					7	
	Quito	4				7	
Ecuador Total		4				14	
Egypt	Alexandria		18				
	Cairo	10	32	23	**25**	12	20
	Hurghada	4		9			
	Luxor	1			**1**		
	Marsa Alam	2		2			
	Sharm El-Sheikh	1		1	**3**		
Egypt Total		18	50	35	**29**	12	20
Equatorial Guinea	Malabo					8	
Equatorial Guinea Total						8	
Eritrea	Asmara		10	3			
Eritrea Total			10	3			
Estonia	Tallinn	14		7			6

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Estonia Total		14		7			6
Ethiopia	Addis Ababa		24	7	**6**		6
Ethiopia Total			24	7	**6**		6
Finland	Helsinki	34		42	**42**	7	35
Finland Total		34		42	**42**	7	35
France	Ajaccio	2					19
	Bastia			1			12
	Biarritz						7
	Bordeaux	21				18	42
	Brest						28
	Brive-La-Gaillarde	1					
	Calvi						1
	Clermont-Ferrand					4	27
	Figari						7
	Lille						1
	Lyon	21		28	**21**	25	41
	Marseille	28		21		24	50
	Montpellier						28
	Nantes	19				13	28
	Nice	40	7	28	**64**	21	62
	Paris	87	25	110	**119**	188	
	Pau	2					21
	Rennes						21
	Strasbourg	19				5	28
	Toulouse	28		29	**21**	37	56
France Total		268	32	217	**225**	335	479
Gabon	Libreville			5			5
Gabon Total				5			5
Gambia	Banjul					1	
Gambia Total						1	

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Georgia	Tbilisi	2	3				
Georgia Total		2	3				
Germany	Berlin	49		112	**57**	26	53
	Bremen	28		39			24
	Cologne/Bonn	21			**21**		18
	Dresden			44			
	Duesseldorf	35	14	43	**69**	31	53
	Frankfurt	91	28		**127**	67	104
	Friedrichshafen			21			
	Hamburg	52	14	89	**55**	7	39
	Hannover	28		52	**19**		32
	Heringsdorf			1			
	Leipzig/Halle			28			
	Memmingen			1			
	Muenster/Osnabrueck			21			
	Munich	88	21	88	**95**	49	88
	Nuremberg	26		36			31
	Rostock			2			
	Stuttgart	35		35	**35**		21
	Westerland			3			
Germany Total		453	77	615	**478**	180	463
Ghana	Accra	7	7	7	**12**	2	
Ghana Total		7	7	7	**12**	2	
Gibraltar	Gibraltar				**7**		
Gibraltar Total					**7**		
Greece	Athens	14	7	28	**57**	14	59
	Chania	1		1			
	Chios	2					
	Irakleion	9		9		3	10
	Kavala			1			

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Kefallinia	1					
	Kerkyra	2		5		1	
	Kos	2		5			1
	Mykonos	1		1		3	
	Mytilini	1					
	Patrai			1			
	Preveza/Lefkada	3		1			
	Rhodes	3		6			1
	Samos	2		1			
	Thessaloniki			10			7
	Volos	1					
	Zakinthos Island	1		1			
Greece Total		43	7	70	**57**	21	78
Guadeloupe	Pointe-a-Pitre						1
Guadeloupe Total							1
Guatemala	Guatemala City					4	
Guatemala Total						4	
Guinea	Conakry						4
Guinea Total							4
Hong Kong (sar) China	Hong Kong	14	27	14	**59**		22
Hong Kong (sar) China Total		14	27	14	**59**		22
Hungary	Budapest	25		47	**21**	12	25
Hungary Total		25		47	**21**	12	25
Iceland	Reykjavik	12		10	**14**	1	20
Iceland Total		12		10	**14**	1	20
India	Ahmedabad		12				
	Amritsar		7				

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Bengaluru		21	7	**7**		6
	Chennai		28	7	**5**		
	Delhi	7	49	14	**35**		20
	Goa		4				
	Hyderabad		39		**5**		
	Jaipur		3				
	Kochi		21				
	Kolkata		12				
	Kozhikode		25				
	Lucknow		7				
	Mangalore		10				
	Mumbai	7	84	7	**35**		6
	Pune		4	4			
	Thiruvananthapuram		19				
	Tiruchirapally		6				
India Total		14	351	39	**87**		32
Indonesia	Jakarta		20				
Indonesia Total			20				
Iran Islamic Republic of							
	Abadan		2				
	Bandar Abbas		10				
	Bushehr		2				
	Chah Bahar		1				
	Esfahan		4				
	Kermanshah		2				
	Kish Island		27				
	Lamerd		1				
	Lar		7				
	Mashhad		4				
	Shiraz		13				

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Tabriz		2				
	Tehran	6	33	11	**3**		
	Zahedan		1				
Iran Islamic Republic of Total		6	109	11	**3**		
Iraq	Al Najaf		4				
	Baghdad		17	2			
	Basrah		6				
	Erbil	2	5	4			
	Sulaymaniyah		4				
Iraq Total		2	36	6			
Ireland Republic of							
	Cork	14			**28**		7
	Dublin	35	7	35	**126**	26	62
	Shannon				**21**		
Ireland Republic of Total		49	7	35	**175**	26	69
Israel	Tel Aviv-yafo	19		25	**25**	25	49
Israel Total		19		25	**25**	25	49
Italy	Alghero					3	
	Ancona					2	
	Bari					2	
	Bologna	21		28	**7**	23	34
	Cagliari					4	
	Catania	2		4		4	9
	Florence	14		42		3	42
	Genoa			2		2	21
	Milan	62	21	95	**90**	83	79
	Naples	6		14		11	14
	Olbia			2		6	2
	Palermo	1		2		5	3

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Pisa	8			**8**	5	21
	Rimini	2					2
	Rome	65	14	56	**71**	90	95
	Turin	12		25		20	26
	Venice	35	14	35	**11**	27	51
	Verona	4		21		3	23
Italy Total		232	49	326	**187**	293	422
Jamaica	Montego Bay			1			
Jamaica Total				1			
Japan	Nagoya			7			
	Osaka	7	7	7			7
	Tokyo	10	7	28	**33**		35
Japan Total		17	14	42	**33**		42
Jordan	Amman	5	51	12	**17**	5	14
Jordan Total		5	51	12	**17**	5	14
Kazakhstan	Almaty	4	2	4	**5**		
	Astana		2	10			
	Atyrau	6					
Kazakhstan Total		10	4	14	**5**		
Kenya	Mombasa		3	1			
	Nairobi	14	24	2	**22**		6
Kenya Total		14	27	3	**22**		6
Korea Republic of	Seoul	10	12	21	**14**	3	18
Korea Republic of Total		10	12	21	**14**	3	18
Kuwait	Kuwait	4	124	10	**15**		
Kuwait Total		4	124	10	**15**		
Kyrgyzstan	Bishkek		4				

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Kyrgyzstan Total			4				
Latvia	Riga	12		21		2	7
Latvia Total		12		21		2	7
Lebanon	Beirut		70	26	**24**		43
Lebanon Total			70	26	**24**		43
Libya	Tripoli			7	**3**		
Libya Total				7	**3**		
Lithuania	Vilnius			14			
Lithuania Total				14			
Luxembourg	Luxembourg	21		28	**12**	11	21
Luxembourg Total		21		28	**12**	11	21
Macedonia Former Yugoslav Republic of	Ohrid	3					
Macedonia Former Yugoslav Republic of Total		3					
Madagascar	Antananarivo						7
Madagascar Total							7
Malaysia	Kuala Lumpur	14	22	5	**14**		7
Malaysia Total		14	22	5	**14**		7
Maldives	Male		14	2			
Maldives Total			14	2			
Mali	Bamako					2	7
Mali Total						2	7
Malta	Malta	7		15	**15**	8	6
Malta Total		7		15	**15**	8	6
Martinique	Fort de France						1

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Martinique Total							1
Mauritania	Nouakchott						3
Mauritania Total							3
Mauritius	Mauritius		11	2	**4**		14
Mauritius Total			11	2	**4**		14
Mexico	Cancun			4		13	3
	Mexico City	7		7	**4**	22	21
Mexico Total		7		11	**4**	35	24
Moldova Republic of	Chisinau			6			
Moldova Republic of Total				6			
Montenegro	Podgorica			7			6
	Tivat						1
Montenegro Total				7			7
Morocco	Agadir			1	**2**		4
	Al Hoceima	3					
	Casablanca	12	7	11	**11**	14	35
	Fes						3
	Marrakech	5			**5**	15	8
	Nador	9		3		2	
	Oujda	2				1	2
	Rabat					3	14
	Tangier	13			**2**	14	4
Morocco Total		44	7	15	**20**	49	70
Namibia	Windhoek			7			
Namibia Total				7			
Nepal	Kathmandu		7				
Nepal Total			7				

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Netherlands	Amsterdam		18	91	**134**	76	87
	Rotterdam					3	
Netherlands Total			18	91	**134**	79	87
Niger	Niamey						4
Niger Total							4
Nigeria	Abuja		1	7	**7**		7
	Lagos	7	14	7	**21**	4	7
Nigeria Total		7	15	14	**28**	4	14
Norway	Bergen	28		21	**7**		
	Kristiansand	21					
	Oslo	79		40	**48**	7	39
	Stavanger	35		19	**19**		
	Trondheim	21		2			
Norway Total		184		82	**74**	7	39
Oman	Muscat		87	6	**7**		4
	Salalah		2				
Oman Total			89	6	**7**		4
Pakistan	Faisalabad		1				
	Islamabad	1	22		**4**		1
	Karachi		64		**2**		
	Lahore		31	1	**4**		1
	Multan		1				
	Peshawar		18				
	Quetta		2				
Pakistan Total		1	139	1	**10**		2
Panama	Panama City	7				5	
Panama Total		7				5	
Peru	Lima	7				24	5
Peru Total		7				24	5

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Philippines	Manila		14				
Philippines Total			14				
Poland	Gdansk	3		21			
	Katowice			18		2	
	Krakow	4		27		3	14
	Nowy Dwor Mazowiecki					2	
	Poznan			14		2	
	Rzeszow			7			
	Warsaw	40		49	**34**	7	46
	Wroclaw			21			
Poland Total		47		157	**34**	16	60
Portugal	Faro	9		6		4	
	Funchal	2		2		3	
	Lisbon	46	7	42	**65**	102	49
	Ponta Delgada	1		2			
	Porto	7		21		60	19
Portugal Total		65	7	73	**65**	169	68
Puerto Rico	San Juan			2		3	
Puerto Rico Total				2		3	
Qatar	Doha	5	183	21	**35**	7	16
Qatar Total		5	183	21	**35**	7	16
Reunion	St-denis						8
Reunion Total							8
Romania	Bucharest	28	3	32	**28**	21	34
	Cluj-Napoca					4	
	Timisoara					2	
	Tirgu Mures					3	
Romania Total		28	3	32	**28**	30	34

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Russian Federation	Kazan		2	3			
	Krasnodar		1				
	Mineralnye Vody		2				
	Moscow	28	23	78	**70**	34	70
	Nizhny Novgorod			3			
	Novosibirsk			2			
	Rostov		2	4			
	Samara		2	4			
	Saratov			1			
	St Petersburg	12	7	28	**7**	2	21
	Ufa		2				
	Yekaterinburg		3	4			
Russian Federation Total		40	44	127	**77**	36	91
Rwanda	Kigali	6	3				
Rwanda Total		6	3				
Saudi Arabia	Abha		6				
	Dammam	3	32	4			
	Gassim		7				
	Jeddah		84	10	**12**		7
	Madinah		10				
	Riyadh		87	10	**19**		7
	Taif		5				
	Yanbu al Bahr		3				
Saudi Arabia Total		3	234	24	**31**		14
Senegal	Dakar		4			7	7
Senegal Total			4			7	7
Serbia	Belgrade	7	5	21	**9**		18
	Pristina			7			

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Serbia Total		7	5	28	**9**		18
Seychelles	Mahe Island		11	1			
Seychelles Total			11	1			
Sierra Leone	Freetown				**3**		
Sierra Leone Total					**3**		
Singapore	Singapore	14	31	28	**49**		14
Singapore Total		14	31	28	**49**		14
Slovenia	Ljubljana	7		24			13
Slovenia Total		7		24			13
Somalia	Berbera		4				
Somalia Total			4				
South Africa	Cape Town	5	14		**14**		
	Durban		7				
	Johannesburg	7	21	14	**38**		7
South Africa Total		12	42	14	**52**		7
Spain	Alicante	19		4		35	
	Almeria	1				35	
	Asturias					58	
	Badajoz					7	
	Barcelona	87	7	42	**63**	271	74
	Bilbao	4		19	**11**	86	34
	Fuerteventura	2		8		19	
	Girona	7				14	
	Gran Canaria	6		6		85	
	Granada					25	
	Ibiza	16		8		85	5
	Jerez			5		33	
	La Coruna	3			**7**	45	

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
	Lanzarote	2		4		36	
	Logrono					5	
	Madrid	76	14	63	**91**		76
	Malaga	21		9		42	29
	Melilla					22	
	Menorca			2		34	3
	Murcia					22	
	Palma de Mallorca	14		61		111	8
	Pamplona					39	
	San Sebastian					37	
	Santa Cruz de la Palma	2		1		9	
	Santander					51	
	Santiago de Compostela					56	3
	Sevilla	3				31	
	Tenerife	4		7		102	1
	Valencia	11				32	21
	Vigo				**3**	50	13
Spain Total		278	21	239	**175**	1477	267
Sri Lanka	Colombo		33	5	**12**		4
Sri Lanka Total			33	5	**12**		4
St Maarten (dutch Part)	St Maarten	3					6
St Maarten (dutch Part) Total		3					6
Sudan	Khartoum	3	20	6			
	Port Sudan		1				
Sudan Total		3	21	6			
Suriname	Paramaribo	8					

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Suriname Total		8					
Sweden	Goteborg	35		28	**23**		20
	Linkoping	14					
	Stockholm	48		41	**56**	10	35
Sweden Total		97		69	**79**	10	55
Switzerland	Basel/Mulhouse	21		25	**40**	7	27
	Berne	7				4	
	Geneva	49	7	54	**99**	64	55
	Zurich	70	21	84	**90**	38	83
Switzerland Total		147	28	163	**229**	113	165
Syrian Arab Republic	Aleppo		4	1			
	Damascus		23		**2**		
	Kamishly	1					
Syrian Arab Republic Total		1	27	1	**2**		
Tajikistan	Dushanbe		1	2			
Tajikistan Total			1	2			
Tanzania United Republic of	Dar Es Salaam		7		**3**		
	Kilimanjaro	7		1			
Tanzania United Republic of Total		7	7	1	**3**		
Thailand	Bangkok	24	35	21	**27**	3	13
Thailand Total		24	35	21	**27**	3	13
Togo	Lome						5
Togo Total							5
Trinidad and Tobago	Tobago			1			
Trinidad and				1			

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Tobago Total							
Tunisia	Djerba	1		2			4
	Enfidha	1		1			
	Monastir						1
	Sfax						5
	Tunis	3	11	15	**5**	5	38
Tunisia Total		5	11	18	**5**	5	48
Turkey	Adana			4			
	Ankara	3		11			
	Antalya	16		36			
	Bodrum	6		1			
	Carsamba			1			
	Dalaman	5		4			
	Elazig			1			
	Gaziantep			2			
	Istanbul	56	30	58	**52**	24	49
	Izmir	8		9			
	Kayseri	1		3			
	Konya	1					
	Trabzon			1			
Turkey Total		96	30	131	**52**	24	49
Turkmenistan	Ashgabat		4	1	**2**		
Turkmenistan Total			4	1	**2**		
Uganda	Entebbe		7		**5**		
Uganda Total			7		**5**		
Ukraine	Donetsk		2				
	Kharkiv		2				
	Kiev	26	8	20	**12**	5	21
	Simferopol			2			

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
Ukraine Total		26	12	22	**12**	5	21
United Arab Emirates	Abu Dhabi	2	1	21	**28**		14
	Dubai	18		28	**63**	14	25
	Sharjah			2			
United Arab Emirates Total		20	1	51	**91**	14	39
United Kingdom	Aberdeen	41		21	**84**		20
	Belfast	9			**63**		6
	Birmingham	35	14	28			39
	Bristol	37				4	25
	Cardiff	21					7
	Durham	20					
	Edinburgh	52		14	**109**	12	35
	Exeter	7					7
	Glasgow	40	14		**60**	2	6
	Guernsey			1			
	Humberside	21					
	Inverness	7					
	Leeds Bradford	34					6
	Liverpool	18				7	7
	London	302	84	184		172	107
	Manchester	55	21	28	**107**	15	49
	Newcastle	35	7		**32**		23
	Norwich	21					
	Nottingham			16			
	Southampton	19		6			
United Kingdom Total		774	140	298	**455**	212	337
Uruguay	Montevideo					5	
Uruguay Total						5	

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
USA	Anchorage			4			
	Atlanta	28	7	14	**25**	7	21
	Baltimore			2	**7**		
	Boston	14		14	**56**	6	21
	Charlotte			14		7	7
	Chicago	14		35	**70**	7	21
	Cincinnati						7
	Dallas/Fort Worth	5	7	14	**34**	7	7
	Denver			7	**7**		
	Detroit	28		14	**10**		14
	Fort Lauderdale			3			
	Houston	14	7	14	**28**		14
	Las Vegas	2		4	**7**		1
	Los Angeles	10	14	14	**56**	3	22
	Memphis	4					
	Miami			7	**35**	18	14
	Minneapolis/St Paul	21			**7**		7
	New York	35	14	49	**206**	45	82
	Oakland	1					
	Orlando	3		7			3
	Philadelphia	7		19	**21**	7	14
	Phoenix				**6**		
	Pittsburgh						5
	Portland (US) OR	7					
	Raleigh/Durham				**7**		
	Salt Lake City						7
	San Diego				**7**		
	San Francisco	7	7	21	**38**		16
	Seattle	13	7	10	**7**		7
	Washington	17	7	35	**49**	7	21

Weekly Frequencies to Destinations served from Hub Airports							
		Amsterdam Schiphol	Dubai	Frankfurt	London Heathrow	Madrid	Paris CDG
USA Total		230	70	301	**683**	114	311
Uzbekistan	Tashkent		2	3	**2**	1	2
Uzbekistan Total			2	3	**2**	1	2
Venezuela	Caracas			7		20	7
Venezuela Total				7		20	7
Viet Nam	Hanoi			5			7
	Ho Chi Minh City		7	3			6
Viet Nam Total			7	8			13
Yemen	Aden		1				
	Mukalla		2				
	Sanaa		13				
	Sayun		1				
Yemen Total			17				
Zambia	Lusaka	3	5		**3**		
Zambia Total		3	5		**3**		
(blank)	(blank)						
Grand Total		3,983	2,929	4,570	**4,641**	3,752	4,508

ANNEX C

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
New York JFK	33%	2,678,989	874,673	1,804,316
Los Angeles	51%	1,343,689	683,493	660,196
Manchester	79%	766,718	607,308	159,410
Edinburgh	48%	1,271,299	604,622	666,677
Dublin	34%	1,555,456	535,053	1,020,403
Hong Kong	34%	1,549,422	531,584	1,017,837
Chicago	40%	1,206,805	478,703	728,102
Delhi	45%	1,041,099	471,589	569,510
Toronto	46%	908,534	416,606	491,928
Singapore	32%	1,305,154	411,490	893,664
Paris CDG	32%	1,272,204	409,301	862,903
Boston	39%	1,030,867	398,144	632,723
Washington	40%	989,211	397,827	591,384
Glasgow	48%	820,949	393,853	427,096
Miami	40%	953,878	377,022	576,856
San Francisco	40%	925,722	366,823	558,899
New York Newark	30%	1,197,837	365,088	832,749
Dubai	19%	1,902,219	356,027	1,546,192
Geneva	36%	977,928	354,361	623,567
Bombay	36%	950,819	346,503	604,316
Dallas	59%	557,230	326,857	230,373
Madrid	27%	1,191,047	324,600	866,447
Johannesburg	38%	840,184	320,444	519,740
Copenhagen	33%	939,197	312,801	626,396
Amsterdam	21%	1,407,083	300,286	1,106,797
Aberdeen	45%	652,261	296,117	356,144
Newcastle	62%	473,614	295,384	178,230
Vancouver	59%	493,292	289,614	203,678
Frankfurt Main	20%	1,469,904	289,422	1,180,482

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Rome	27%	1,052,936	288,841	764,095
Stockholm	32%	889,622	285,893	603,729
Cape Town	54%	492,521	265,444	227,077
Brussels	50%	516,582	260,617	255,965
Barcelona	36%	706,853	254,060	452,793
Oslo	40%	627,039	251,282	375,757
Munich	22%	1,090,279	242,326	847,953
Hamburg	45%	504,563	225,050	279,513
Vienna	29%	778,612	223,760	554,852
Berlin - Tegel	32%	694,503	219,561	474,942
Zurich	23%	957,726	217,150	740,576
Lisbon	28%	745,611	208,556	537,055
Houston	37%	555,763	208,276	347,487
Sydney	40%	518,508	204,836	313,672
Milan	28%	733,761	203,393	530,368
Belfast City	47%	428,611	200,360	228,251
Tel Aviv	35%	557,766	196,598	361,168
Tokyo	32%	603,523	190,487	413,037
Dusseldorf	31%	600,317	187,312	413,005
Calgary	69%	271,512	186,311	85,201
Montreal	56%	329,133	183,776	145,357
Bahrain	51%	332,241	170,992	161,249
Cork	42%	396,660	165,272	231,388
Nice	30%	537,326	162,640	374,686
Helsinki	27%	591,919	161,185	430,734
Nairobi	33%	493,743	160,590	333,153
Athens	21%	734,436	154,722	579,714
Doha	22%	690,311	148,780	541,531
Philadelphia	40%	372,936	148,651	224,285

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Bangkok	22%	683,675	147,076	536,599
Prague	43%	337,457	143,699	193,758
Lagos	29%	475,724	136,448	339,276
Buenos Aires	62%	218,241	135,943	82,298
Cairo	30%	445,723	132,777	312,946
Shannon	48%	274,671	132,125	142,546
Istanbul	15%	847,188	128,084	719,104
Bangalore	69%	165,440	113,701	51,739
Las Vegas	53%	209,465	111,603	97,862
Beirut	53%	204,398	109,142	95,256
Sao Paulo	40%	271,535	108,169	163,366
Milan	25%	438,038	107,813	330,225
Kuwait	43%	245,507	105,247	140,260
Warsaw	25%	423,228	104,295	318,933
Phoenix	58%	179,016	103,959	75,057
Bucharest	46%	223,600	103,079	120,521
Seattle	54%	189,419	102,207	87,212
Toulouse	49%	208,911	102,141	106,770
Belfast International	35%	289,359	101,700	187,659
Moscow Domodedovo	20%	511,288	101,583	409,705
Atlanta	27%	351,845	93,867	257,978
Kuala Lumpur	22%	433,198	93,761	339,437
Lyon	42%	216,368	90,751	125,617
Denver	54%	165,600	89,344	76,256
Gothenburg	35%	255,438	88,847	166,591
Jeddah	42%	210,897	88,110	122,786
Melbourne	43%	202,206	87,058	115,148
Budapest	35%	245,358	85,503	159,855
Abuja	55%	156,432	85,485	70,947

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Auckland	40%	206,991	82,150	124,840
Accra	41%	192,929	79,832	113,097
Riyadh	34%	233,024	78,539	154,485
Shanghai	22%	351,933	77,828	274,105
Edmonton	78%	99,564	77,644	21,920
Hyderabad	80%	95,966	76,506	19,460
Colombo	35%	216,140	75,225	140,915
Mexico City	65%	111,575	72,023	39,552
Basle	24%	297,464	70,781	226,683
Baltimore	65%	108,552	70,380	38,172
San Diego	66%	100,982	66,409	34,573
Larnaca	15%	446,820	66,077	380,743
Abu Dhabi	11%	582,596	65,015	517,580
Keflavik	31%	207,192	64,437	142,755
Beijing	20%	310,758	63,031	247,727
Stuttgart	25%	247,718	62,748	184,970
Raleigh Durham	55%	110,658	60,443	50,215
Rio De Janeiro	39%	154,384	59,746	94,638
Paris-Orly	37%	162,170	59,632	102,538
Amman	28%	200,992	57,205	143,787
Chennai	48%	115,118	55,233	59,885
Ottawa	49%	111,004	54,322	56,682
Tehran	39%	127,857	50,324	77,533
Halifax	52%	92,645	48,597	44,048
Seoul	14%	311,093	42,812	268,281
Sofia	26%	156,365	40,010	116,355
Pisa	44%	91,809	39,979	51,830
Entebbe	56%	70,973	39,532	31,441
Mauritius	20%	191,398	38,598	152,800

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Belgrade	44%	80,087	35,553	44,534
Kiev	37%	93,312	34,733	58,579
Gibralta	34%	87,164	30,068	57,096
Addis Ababa	29%	101,918	29,405	72,513
Baku	46%	63,961	29,194	34,767
Luxembourg	34%	81,151	27,840	53,311
Algiers	24%	116,151	27,822	88,329
Dar-Es-Salaam	61%	44,734	27,227	17,507
Stavanger	20%	129,702	26,537	103,165
Zagreb	30%	83,323	24,748	58,575
Venice	31%	80,132	24,441	55,691
Luanda	65%	36,738	23,844	12,894
Cologne	16%	147,005	22,904	124,101
Grand Cayman	52%	43,481	22,394	21,087
Malta	11%	203,141	22,085	181,056
Bishkek	73%	25,389	18,619	6,770
Nassau	55%	32,544	17,889	14,655
Damascus	36%	48,572	17,516	31,056
Freetown	38%	45,664	17,451	28,213
Lusaka	36%	45,817	16,705	29,112
Musca	11%	153,918	16,309	137,610
Casablanca	14%	105,085	14,797	90,288
Minneapolis-St Paul	10%	140,001	14,107	125,894
St Petersburg	16%	77,057	12,095	64,962
St Johns	53%	22,441	11,881	10,560
Yerevan	78%	14,886	11,602	3,284
Detroit	6%	183,467	11,351	172,116
Marrakesh	28%	37,996	10,728	27,268
Hannover	16%	67,217	10,454	56,763

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Tokyo	20%	49,429	9,715	39,714
La Coruna	11%	84,956	8,924	76,032
Bergen	28%	30,251	8,328	21,923
Bandar Seri Begawan	7%	110,900	8,243	102,657
Dacca	10%	82,021	8,101	73,920
Moscow Sheremetyevo	3%	245,128	7,788	237,340
Malaga	20%	34,017	6,803	27,214
Taipei	10%	69,030	6,644	62,386
Male	13%	49,079	6,149	42,930
Almaty	17%	32,456	5,550	26,906
Lahore	5%	98,496	4,529	93,967
Bilbao	4%	100,878	4,065	96,813
Dammam	50%	7,269	3,635	3,635
Providenciales	39%	9,113	3,587	5,526
Dresden	8%	41,291	3,451	37,840
Ashkhabad	12%	26,642	3,299	23,343
Islamabad	2%	136,336	2,543	133,793
Split	25%	7,627	1,944	5,683
Tbilisi	44%	4,135	1,799	2,336
Luxor	15%	9,776	1,479	8,297
Tunis	3%	44,790	1,267	43,523
Amritsar	6%	20,739	1,226	19,513
Karachi	2%	60,439	1,148	59,291
Seville	2%	57,052	1,046	56,006
Mahe	4%	13,680	545	13,135
Tashkent	2%	23,244	501	22,743
Tangier	3%	16,632	501	16,131
Cagliari	4%	10,250	436	9,814
Bastia	5%	5,742	310	5,432

Total and Transfer Passengers by Destination at Heathrow 2011				
	Hub %	Total Passengers	Transfer Passengers	London Passengers
Khartoum	3%	7,250	233	7,017
Agadir	7%	2,662	190	2,472
Vigo	0%	17,627	0	17,627
Porto	0%	10,986	0	10,986
Dalaman	0%	10,972	0	10,972
Sharm El Sheikh	0%	10,555	0	10,555
Bodrum	0%	7,293	0	7,293
Tripoli	0%	6,338	0	6,338
Lulea	0%	4,922	0	4,922
Olbia	0%	3,805	0	3,805
Faro	0%	1,829	0	1,829
Source: CAA Surveys				