

**AIR CONNECTIVITY FOR WALES AND THE WEST**

**An exploratory paper prepared for the  
INSTITUTE FOR WELSH AFFAIRS**

**Executive Summary**

- The UK Government has established an Airports Commission, under the chairmanship of Sir Howard Davies, “to examine how the UK’s status as a leading global aviation hub can be maintained.” As part of its remit the commission has been asked “to maintain a UK perspective, taking appropriate account of the national, regional and local implications of any proposals.”
- The commission has also been asked to “provide materials, based on detailed analysis, which will support the Government in preparing a National Policy Statement to accelerate the resolution of any future planning applications for major airports infrastructure.”
- Decisions on the configuration of hub airport capacity in London and the south east of England could have major implications for the economies of Wales and the West of England. Accessible commercial air services are important for all economies. They are a convenience for leisure travellers. They contribute to the competitiveness of a country or region. They are an important factor in attracting inward investment.
- The last review of airports policy in 2003 adopted a regional approach that considered regions separately. By doing so it failed to take account of the *combined* needs of south Wales and the West of England. Separating consideration of these two markets led to a sub-optimal approach for the development of air travel for both south Wales and the West of England. Both regions need to ensure that this approach is not followed by the new Airports Commission.
- A re-balancing of the UK economy, both spatially and towards manufacturing, will not be best served by a further concentration of airport capacity in south east of England, without a parallel significant improvement in the connectivity of regions such as south Wales and the West of England.
- Cardiff Airport appears to be in a structural decline with little prospect of major improvement in the short term. At present there is not enough demand at economic prices from its catchment to make up adequate, commercial scheduled flight frequency, on efficient-sized jet aircraft on a daily basis throughout the year. It is not conveniently situated for road or rail access.

- On 18 December 2012 the Welsh Government announced that it was in the process of purchasing Cardiff Airport from the existing owners TBI and that once the transaction was completed, it would appoint a private company to manage the airport on its behalf.
- We fully understand the concerns of the Welsh Government at the decline in services at Cardiff Airport and its wish to protect jobs and services at the site, including the BA Heavy Maintenance base. It is right for the Welsh Government to wish to take greater control over the future short-term direction of the airport, even if Cardiff Airport does not offer the optimal solution for Wales and the South West of England in the long term. Such ownership will facilitate long term planning.
- As well as serving the West of England, Bristol Airport is the second most important airport (after Heathrow) for passengers travelling to or from Wales. It has the capacity to expand but in the medium term that will be constrained by its runway limitations, a confined site and difficult road access. Like Cardiff, Bristol is not conveniently situated for road or rail access. It, too, does not offer the optimal solution for Wales and the south west of England.
- North Wales is better served by Liverpool and Manchester airports.
- The current dominance of Heathrow for travellers to and from south Wales and the West of England is such that a decision to close Heathrow and create a new hub airport on the east side of London in the Thames Estuary would mean a serious worsening of air connectivity for Wales and the West. In these circumstances, unless a new level of air service provision can be created for south Wales and the West, it will entail a significant loss of economic competitiveness for both regions.
- Whichever option is chosen for the development of London airports, air connectivity for south West Britain needs to be enhanced. There is a *prima facie* case that this can be best achieved by creating a new passenger and cargo airport on the Severn estuary.
- A site on the Severn estuary between Newport and Chepstow would provide convenient access to the motorway system as well as, by then, to an electrified rail system. Its accessibility will be better than anything that could be achieved at either Cardiff or Bristol airports.
- Such a development, replacing Bristol and Cardiff airports, would serve 10-11 million passengers from its inception, assuming a reasonable planning and construction timetable of 8-10 years. It would also create the UK's first purpose-built 24-hour cargo airport, reversing the relative decline of air cargo in the UK. Its location on the edge of the estuary would mean minimal noise pollution for residential areas.
- The case for such a development can be made in its own right, but it would be further enhanced if it were decided to build the Severn Barrage, particularly if a Severn estuary airport were to be central to an integrated cargo hub, linking all four modes of transport: air, road, rail and marine.

- Authorities on both sides of the Severn should work together, as they did over rail electrification, to explore this option in detail and, if its viability is confirmed, to make the case to the UK Government and the Davies Commission.
- Since the preparation of this paper the UK Government Department for Transport has issued a new air traffic forecast. This traffic forecast shows a slower rate of growth compared to previous forecasts mainly as a result of lower estimates of future economic growth and the continued sluggishness in recovery of growth in air traffic over the last two years.
- We believe the new forecast is more realistic than earlier forecasts although we disagree with some of the key assumptions - mainly technical change and the changeover towards biofuels which we believe could be much more significant than the UK Government predicts.
- The new air traffic forecasts cast doubt on the future recovery of air traffic at Cardiff Airport except in the high growth constrained scenario and even then virtually all of this growth occurs in the later years between 2040 and 2050 when the all 5 SE Airports are completely saturated.
- Analysis of the new forecast strengthens the case for proceeding with a large international airport in the Severn Estuary to replace both Bristol and Cardiff airports.

## 1. Introduction

Accessible commercial air services are important for all economies. They are a convenience for leisure travellers. They contribute to the competitiveness of a country or region. They are an important factor in attracting inward investment. For these reasons there is concern in Wales over the apparent structural decline at Cardiff Airport and the implications of any radical change in airport provision in and around London now being considered by the Davies Commission.

Having studied in some detail the key issues relating to commercial air travel to and from Wales, and in the context of wider airport policy in the UK, we (MSP Solutions) have come to the following conclusions:

- According to the UK DfT published forecasts, the South West of England and Wales both show a relatively low propensity to travel by air (as measured by the number of return flights divided by the population) compared with other regions of the UK. (See Appendix 1) We do not believe this will change materially in the medium term assuming a continuation of current economic policies and travel patterns.
- Around 75% of Wales' air passengers currently travel via English airports while English travellers make up less than 8% of the traffic through Cardiff Airport.
- At the peak demand level in 2007, prior to the recession, more than five times as many Welsh passengers used Bristol Airport as English passengers used Cardiff Airport. In 2007 781,000 Welsh origin passengers used Bristol Airport while only 136,000 English origin passengers used Cardiff Airport in the same year. Since then, as traffic has declined very significantly at Cardiff, this ratio will have increased in favour of Bristol.
- We believe that the lack of air links to Wales has been a significant factor in holding back its economic development, limiting for the time being long term sustained inward investment.
- We also believe that the geography of Wales and its concentration of population in the South and the North, with little urban development in between, polarises the civil air travel into two sectors that cannot be properly served by a single airport.
- If we confine the effective travel population to Welsh people living in South Wales - from Chepstow to St David's - it is difficult to establish, build-up and sustain a strong network of scheduled flights to a large number of destinations at Cardiff Airport. Although charter operations and some limited scheduled services are possible, at present there is simply not enough demand at economic prices from this catchment to make up adequate, commercial,

scheduled flight frequency, on efficient-sized jet aircraft on a daily basis throughout the year.

- We believe that, ultimately, there is a better way for Wales to access more convenient international flights, which over time, would increase its economic prosperity through long term sustainable investment and also the propensity to fly. We present our initial conclusions at the end of this discussion paper.

## **2. Current Commercial Civil Air Travel to and from Wales**

The only significant commercial air passenger travel to and from a Welsh airport is from Cardiff Airport. However, the vast majority of passengers travelling to and from Wales actually travel through other airports in the UK. This situation arises for the following main reasons:

- Cardiff Airport has only a limited range of domestic (UK) and short haul international European destinations and no longhaul scheduled flights. It also offers low frequency which is less attractive to business passengers who need choice and flexibility. With the closure of Bmibaby following the sale of its parent company BMI Airlines to IAG, the service offering from Cardiff has been further reduced
- Cardiff Airport is not a convenient airport from the surface access viewpoint (road/rail) for people living in Central and North Wales, for whom Manchester, Liverpool and Birmingham airports offer a much greater choice of frequency and destinations.
- For South Wales, Bristol Airport offers a much bigger choice of low cost airline flights to Scotland and continental Europe.
- Of the airports of the south east of England, Heathrow and Gatwick offer the best choice of longhaul flights, with Gatwick offering flights mainly to leisure destinations especially the Caribbean and Southern USA.

There are no commercial scheduled or charter flights currently operated at Swansea Airport. The only other airports in Wales are existing or former military bases and there are no commercial flights operated or planned from these locations, other than the internal service from Cardiff to Valley in Anglesey.

In this paper we have analysed Welsh commercial air travel, relying on data published by the UK Department for Transport (DfT), publications and data on air travel available from the UK Civil Aviation Agency (CAA), and associated forecasts.

## **3. Cardiff Airport**

Cardiff Airport is located on the coast immediately west of Barry. It is connected by road to the M4 and to Cardiff City by a series of interconnecting single carriageway roads passing through villages and built up areas with restricted speed limits. The main railway line to London and

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Swansea is well to the north of the airport, but there is a regional line that connects Cardiff into the coastal areas to the west of the airport. The airport is connected by a bus service to the nearest station on the line. The frequency of trains is relatively low compared to services to Swansea, Bridgend and Port Talbot on the main line.

Access to Cardiff Airport from the Thames Valley, Bristol, the West Midlands and South West England via the motorway system requires traversal of the Severn toll bridges, a disincentive to travellers. Travel by train from these areas requires a change of trains at Cardiff, followed by change of mode on to a bus service, all of which increases uncertainty and inconvenience.

Passenger air travel at Cardiff airport peaked at 2.1 million in 2007. Since then traffic has been in steady decline with volume down to 1.2 million in 2011. There has been a further fall of nearly 19% in 2012 for the period up to the end of August (down 15.9% over 2012 to 1.03 million). In terms of cargo, volume peaked in 2004 at 2,600 tonnes declining to below 380 tonnes in 2011. Cardiff has never been an important air cargo market.

Cardiff Airport's major problem is that it has to compete with Bristol Airport which has been much more successful at developing scheduled flights. The table below shows the development of scheduled and chartered flights in 2011 compared to other major UK airports:

<b>Destinations (city pairs) by Key UK Airports in 2011</b>		
<b>Airport</b>	<b>Scheduled Actual</b>	<b>Charter Actual</b>
Heathrow	175	7
Gatwick	214	95
Stansted	148	26
Luton	89	24
London City	31	0
Manchester	142	82
Birmingham	79	55
Liverpool	65	0
<b>Bristol</b>	<b>70</b>	<b>36</b>
<b>Cardiff</b>	<b>12</b>	<b>26</b>
Glasgow	32	38
Edinburgh	76	13
Newcastle	36	38
East Midlands	59	38
Other UK Airports	187	109
<b>Total</b>	<b>1,415</b>	<b>587</b>

This shows that even before the recent decline in traffic at Cardiff Airport scheduled flights at Bristol served almost 6 times the number of destinations.

Cardiff Airport does have a 3-bay major maintenance facility for British Airways for the overhaul of its wide-body B777 and B747 fleets. While this facility brings in valuable income for the airport, no scheduled flights are operated by BA with these aircraft nor is this ever likely for technical and economic reasons. The runway is too short for full aircraft loading of wide-body jets, and there is no adequate commercial market to support such flights.

Although the banking crisis and recession has had a significant effect on the decline of both passenger and cargo traffic, the poor geographical position of the airport and the much better service provision at Bristol Airport have made Cardiff Airport uncompetitive even for shorthaul flights.

The airport's growth was predicated on the commercial success of BMI's daughter low cost airline BMIBaby, which was structurally and financially weak, compared to the low cost airline market leaders, easyJet and Ryanair. Despite valiant effort by the airline's management to make a success of expanding at Cardiff Airport, it incurred sustained heavy losses. Since the acquisition of the airline's parent company BMI by International Consolidated Airlines Group (BA/Iberia) the future of the daughter company was sealed when it was closed down in June 2012.

On 18 December the Welsh Government announced that it was in negotiations to buy Cardiff Airport from the previous owners TBI. The precipitous decline in air services at the airport must have been a major concern to the Welsh Government and the risk of job losses not only at the airport but also at the major BA Heavy Maintenance base on site, in the event of the risk of closure of the airport, must have been a major concern. So it is understandable that this action was taken.

This development also underlines the UK-wide problem of relying totally on private capital to fund and develop its airports. The current trend is to adopt a medium term structure usually in the form of a small level of private equity and a much higher amount of bank debt to finance the development of civil airports. The original private equity partners then sell-off packages of equity to financial institutions such as pension funds thereby diluting their interest and recovering their investment at an early stage.

There is much to be said for the private-public partnership structured approach adopted by major European airports such as Amsterdam and Frankfurt. Here the State directly or indirectly has a major (constant) equity stake thus stabilising the capital structure of its airports and making it cheaper to raise debt finance for expansion.

Reversal of Cardiff Airport's structural decline is a formidable challenge. It will not be easy to attract other airlines to establish and expand a wide range of shorthaul services at the airport, especially as Bristol Airport, relatively nearby, already serves much of the market. Cardiff Airport's commercial future looks uncertain and there would appear to be little prospect of major improvement in the short term. But Wales does have a vital strategic interest in sustaining its air connectivity.

## **4. Other Existing Welsh Airports**

There are two other potential airports in Wales that could be considered for commercial operations namely St Athan and Swansea. St Athan was a former RAF base and is less than 10 miles from Cardiff Airport along the coast towards Bridgend. It is currently a centre of aircraft maintenance. It is less conveniently located in terms of road and rail access than Cardiff Airport, and would not be a viable alternative site.

Swansea Airport did handle some commercial flights in 2004 with 18,000 passengers. Since then there have been no commercial passenger flights. The location of the airport - offering a substantially weaker catchment than Cardiff Airport - and the limitation of its facilities would make it an unattractive site for future commercial passenger and cargo flights.

## **5. Airports in England:**

The 5 SE Airports (London Heathrow (LHR), London Gatwick (LGW), Stansted (STN), Luton (LTN) and London City (LCY), especially Heathrow and Gatwick, account for the biggest number of passengers originating in and destined for Wales, collectively accounting for around 1.25 to 1.27 million passengers in 2010 and 2011. This is substantially bigger than the 1.03 million handled by Cardiff Airport in 2012.

The Midlands and north of England airports account for a further 1.1 million Welsh origin and destination passengers. Finally airports in the south west of England, principally Bristol and Exeter, account for about 800,000 Welsh origin and destination passengers per annum.

For a long time around 75% of Wales' passengers have been using English airports. With the decline of services at Cardiff Airport over the last few years this proportion is likely to have risen very significantly.

### **5.1 Heathrow**

Heathrow serves over 180 destinations in around 90 countries and has the biggest longhaul network in terms of passenger intensity in Europe. On the basis of current volume it will handle around 70 million passengers in 2012, an all-time record for the airport. In particular, it offers a



higher level of frequency to more destinations in North America than any other European airport. It also has a wide range of longhaul flights to India, Hong Kong, Australasia, South Africa and the Middle East. Heathrow's other strength is its extensive shorthaul network, with good frequency to most of the important European destinations - especially business centres.

With the acquisition of BMI, British Airways (BA) now operates around 50% of the flights at Heathrow. With the One World Alliance - BA, Iberia, American Airlines, Cathay Pacific, Qantas, Japan Airlines, Royal Jordanian, Qatar Airways - the traveller is offered the widest range of integrated services. The other major groupings - Star Alliance (led by Lufthansa) and Sky Team (led by Air France-KLM) - also offer a good package of destinations from Heathrow Airport.

For the business traveller Heathrow offers a good choice of destination coupled with high frequency. This means time-management can be more easily achieved together with easier accommodation of unexpected change of plans. For the longhaul leisure traveller, except the Caribbean and Southern USA (the Florida resorts), Heathrow also offers an excellent choice of destinations with good frequency and strong price competition for the traveller who is prepared to use this hub rather than other airports, whether these be in continental Europe or a Middle East airport such as Dubai.

Heathrow is operating at around 99% of maximum capacity. There is no possibility of additional flights unless the current trial of mixed mode operation simultaneous take-off and landings operated independently on both runways is extended or agreement and approval to build a third runway is given by the UK Government.

In 2011 according to the CAA Passenger survey 810,000 passengers from Wales chose to use Heathrow Airport (2010 figures were similar at 803,000). In spite of the inconvenience of travel from Wales, especially by public transport, Heathrow still represents a very important airport for originating and destination traffic from South Wales. If the existing airport infrastructure is maintained, with no change at existing regional airports, Heathrow will continue to remain an important departing and arriving airport for passengers travelling to and from Wales. Its attraction may even be enhanced by the new rail terminal envisaged as part of the electrification of the route between London and Wales and the West.

### **5.2 Gatwick**

Like Heathrow, Gatwick Airport serves over 190 destinations in around 90 countries with most of the network being short and medium haul especially leisure destinations. It has a big shorthaul network, but with generally a significantly lower frequency than that at Heathrow. The Gatwick shorthaul network is largely operated by easyJet that operates 37% of all Gatwick flights. BA also operates a much more limited range of destinations in Europe as well as a number of domestic UK points. There is also an extensive charter airline programme both to Europe and some longhaul destinations operated from Gatwick Airport by airlines such as Thomson, Thomas Cook and Monarch Airlines.

The longhaul network at Gatwick centres on: an extensive flight network to the Caribbean and Southern USA, principally Florida leisure destinations by BA and Virgin, Dubai with 3 daily flights by Emirates and other flights to Asia (Vietnam and China). Gatwick is actively seeking to obtain other longhaul flights and airlines, but is up against intense competition from Heathrow for which airlines and their passengers still have a clear preference.

In terms of passenger intensity, Gatwick is around half the size of Heathrow, but is still by far the busiest single runway airport in the world, handling around 33 million passengers per year. The airport is currently operating at about 90% of capacity, so it would still be possible to add more flights mainly in the off-peak periods. The Gatwick Airport management has already indicated that it will apply to the Davies Commission for a second runway to be built after the current moratorium expires in 2019.

For the business traveller Gatwick offers a good choice of destination but at a generally lower frequency than at Heathrow. It does offer a wide range of low costs flights to Europe including some destinations not served by Heathrow. So, for the cost sensitive passenger, Gatwick continues to attract some traffic from Wales, despite the distance and more difficult road access than Heathrow.

In 2011, according to the CAA Passenger survey, 302,000 passengers from Wales chose to use Gatwick Airport. This is around 1% of the total Gatwick passenger throughput. About 70% of these passengers were using scheduled flights. The 2011 volume represented a small fall over the 2010 figure of 315,000. These figures show that in spite of the inconvenience of travel from Wales, especially by road, Gatwick Airport still represents a relatively important airport for originating and destination traffic from south Wales. If the existing airport infrastructure is maintained, with no change at existing regional airports, and the pattern of traffic at Gatwick remains broadly similar to the current pattern, the airport will continue to remain a significant departing and arriving airport for passengers travelling to and from Wales.

### **5.3 Luton**

Luton Airport's operations are dominated by low cost carriers - principally easyJet, for which Luton was its original main operating base - and by the major charter airlines, Thomson, Thomas Cook and Monarch Airlines. Nearly all the flights are to continental European destinations and holiday flights to the Mediterranean and North Africa for inclusive tour groups.

South Wales' access to Luton Airport by road is broadly comparable with travelling to Gatwick with slightly less risk of delays due to congestion on the M25. Rail access is not ideal as it requires changing London terminal stations from Paddington to St Pancras.

These factors combine to ensure Luton Airport's attraction for passengers travelling to and from Wales is relatively modest. Over recent years the volume of Wales originating and destination passengers at Luton Airport has been around 50,000/annum or less than 1% of the total

passenger throughput. Unless there is a significant change in the pattern of flights, which seems unlikely, this volume is not expected to change materially over the next few years.

### **5.4 Stansted**

Stansted Airport's operations are also dominated by low cost carriers, principally Ryanair which has its largest European base there with over 100 destinations. EasyJet also has a significant operation at Stansted. There are also a number of international longhaul cargo flights at Stansted. Unlike Heathrow and Gatwick Airports there are very few longhaul scheduled passenger flights, so Stansted's only attraction for Welsh traffic is probably for special offer (heavily discounted) low cost flights. Nearly all the scheduled flights are to continental European destinations and some holiday flights to the Mediterranean and North Africa for inclusive tour groups.

By road Stansted is further from south Wales than Luton or Gatwick, requiring a long journey on the M25 followed by the M11. The risk of encountering congestion over this length of the M25 is relatively high. Rail access is not ideal as it requires changing London terminal stations from Paddington to Liverpool Street.

These factors combine to ensure that Stansted Airport's attraction for passengers travelling to and from Wales is much less than that of Heathrow and Gatwick. Over recent years the volume of Wales originating and destination passengers at Stansted Airport has been around 90,000/annum or around 0.5% of the total Stansted passenger throughput (89,000 in 2011 and 95,000 in 2010). This volume is not expected to change materially over the next few years, unless there is a significant change in the pattern of flights at Stansted due to the change of ownership to the Manchester Airport Group, or if Stansted becomes a 4-runway hub to replace Heathrow Airport as a result of the future outcome of the Davies Commission. Both are unlikely.

### **5.5 Bristol Airport**

Bristol Airport ranks as the second most important English airport for Wales' originating and destination passengers, with 785,000 travelling in 2008, equivalent to 13% of the total. Bristol Airport has a good range of low cost and medium cost domestic and European flights provided by easyJet and Ryanair as well as flyBe, but at relatively modest frequency. There are also some charters to holiday destinations. Passenger volume peaked in 2008 at around 6.2 million since when it eased to 5.7 million in 2011 before increasing slightly in 2012 to 5.9 million, an increase of 2.4per cent.

Bristol Airport is located on a hill to the south west of the city and is badly located in terms of convenient road and rail access. The airport site is restricted with little space to expand and only a 2,011 metre length runway. The airport could probably be expanded to reach around 10

million passengers per annum, but even at this utilisation, operations would be very congested in terms of runway movements, taxi way use, and lack of parking stands.

Access to the airport with passenger traffic doubling to 10 million per annum would create substantial nuisance for local residents and would be a significant congestion problem. While on paper the airport could be expanded, it would require a large number of additional remote stands requiring a large amount of additional bussing to and from the terminal which would have to be significantly expanded on a very confined site. Operations would not be easy at this level of throughput. Fog is also a significant issue at the airport at certain times of the year. This leads to significant flight diversions and cancellations.

What is needed in the long term is a much larger replacement airport on a better located site. The existing airport site would be excellent for building land especially for residential properties.

### **5.6 Exeter Airport**

Exeter Airport ranks as of low importance as an English airport for Wales' originating and destination passengers, with only 6,000 people travelling in 2008, equivalent to about 0.6% of the total. The airport has a good range of medium cost domestic and European flights provided by flyBe, Exeter being its home base airport. There are also some charters to holiday destinations. Passenger volume peaked in 2007 at around 1 million, since when it has eased to 700,000 in 2011.

Exeter Airport is located to the east of the city, and is well located in terms of convenient road access, being a relatively short distance off the M5 motorway. The airport site is restricted with little space to expand and only a 2,087 metre length runway. The airport could probably be expanded to reach around 2 million passengers per annum, but even at this utilisation, operations would be very congested in terms of terminal capacity, runway movements, taxiway use, and lack of parking stands.

Due to its distance from Wales and the low probability of major expansion of flights, Exeter is unlikely to increase in importance for the Welsh air passenger.

### **5.7 Newquay Airport**

Like Cardiff Airport, Newquay Airport has suffered from a precarious drop in traffic since 2008 from 431,000 to around an estimated 115,000 in 2012. The airport offers only a very limited range of flights at quite high fares and is too far from Wales to serve its passenger travel requirement.

## **5.8 Birmingham Airport**

In 2010 Birmingham Airport handled 153,000 Wales' originating and destination passengers, equivalent to 2.6% of the total of 8.6 million. The airport has a good range of medium cost domestic and European Flights provided by flyBe. It also has some longhaul flights to North America, the Middle East and Pakistan. Emirates operate a twice-daily service to Dubai with A330s and B777s, and Qatar Airways has announced that it will start services to Doha.

EasyJet operates to only 3 destinations, but Ryanair claim to fly to 27 points in Europe. Many of these are at very low frequency. There are also many charters to holiday destinations. Passenger volume peaked in 2008 at around 9.6 million, since when it has eased back to 8.6 million in 2011 and 93,000 Air Transport Movements (ATMs).

Birmingham Airport is very well located in terms road access to the M5, M6, M40 and also to the rail network. It is 6.3 miles south east of the city centre. Access from south and central Wales is therefore quite good. The airport has a single 3,003 metre runway that was recently extended to handle long haul flights. The airport terminal capacity has been expanded to reach around 15 million passengers per annum.

The main problem with the site is its close proximity to built-up urban areas including housing estates and its inability to operate night flights. The very slow growth and limited destination choice of longhaul flights, except to the Middle East, limits its attractiveness for the Welsh air passenger market.

## **5.9 East Midlands Airport**

The East Midlands Airport was the home base of BMI Airlines and is a significant cargo airport. Its web site claims that the airport handles 313,000 tonnes of cargo, although for what period this is applicable is not specified. Ryanair operates 37 European routes from the airport, almost all at very low frequency. There are no long haul flights. The airport is owned by the Manchester Airport Group. It has a single 2,893 metre long runway.

The airport is not very close to any part of Wales and there are better options for north Wales at Liverpool and Manchester Airports, for mid Wales at Birmingham Airport and for south east Wales at Heathrow and Gatwick Airports. Its attractiveness to the Welsh air passenger market is quite low and in 2010 only 21,000 people used the airport. This position is not expected to change over the next 5 years.

East Midlands Airport has developed significantly as a cargo airport with volume peaking at 275,000 tonnes in 2007. The airport's growth performance in the air cargo business (that is growing at a faster rate than the air passenger business) over the last 10 years has been rather disappointing rising from 219,000 in 2002 to 265,000 in 2011. In the 2003 UK Government

White Paper on the Future of UK Civil Aviation East Midlands Airport was shown as the main airport designated for cargo operations in the UK.

As a comparison, during this period Hahn Airport in Germany has grown from zero to over 286,000 tonnes in 2011 despite its proximity to Frankfurt Airport which handles around 1.9 million tonnes per annum of air cargo. Both airports (East Midland and Hahn) offer nominal 24-hour operation and handle comparable amounts of passenger traffic (3 to 4 million passengers per annum).

Although it is located in good proximity to the M1 motorway, East Midlands Airport is badly located to serve the air cargo markets of SE and southern England where demand is the greatest. The evidence of the last 10 years shows that the airport is used by air cargo operators because they have little other choice, rather than having huge enthusiasm to grow their business at the airport. The runway is too short to allow fully loaded wide-body freighters such as the B747-400F to take-off in summer at maximum allowable take-off weights.

### **5.10 Manchester Airport**

In 2011 Manchester Airport handled 759,000 Wales' originating and destination passengers, equivalent to 4.1% of the total of 18.3 million with 167,500 ATMs. The airport has three passenger terminals and two close parallel staggered runways each 3,050 metres long. The airport has a good range of medium cost and low cost domestic and European flights provided by flyBe, Ryanair, easyJet and the major European carriers. There are also frequent flights to Heathrow and Gatwick Airports.

Manchester has some longhaul flights to North America (New York, Newark, Philadelphia, and Orlando) the Middle East and the Indian Sub-Continent. The USA flights are carried out by American, United, US Airways and Virgin. The flights to the Middle East are saturated with capacity from the major Middle East carriers. Emirates operate three flights per day to Dubai with B777s, and soon will probably introduce A380s on the route. Etihad has two flights per day to Abu Dhabi and Qatar Airways has 10 flights per week to Doha. Virgin has scheduled flights to Barbados in the Caribbean. There are also extensive charter longhaul and shorthaul flights for inclusive tour groups.

EasyJet operates a big route network to 29 destinations in Europe and North Africa, while Ryanair fly to 34 points in Europe. Many of these flights are at very low frequency. There are also many charters to holiday destinations. Passenger volume peaked in 2006 at around 22.1 million easing back since to 18.6 million in 2011.

Manchester Airport is very well located in terms road access to the M56, M62 and M6 motorways and is a relatively short distance from the city centre. Access from north Wales by road is very good, but the airport is too far north to be convenient for south Wales' passengers.

Manchester Airport Group, in a consortium with other financial institutions, is now in the process of acquiring Stansted Airport from Heathrow SP limited (formerly known as BAA). The sale arose as a result of a decision of the Competition Commission that was upheld on final appeal that was lost by BAA.

## **5.11 Liverpool Airport**

In 2010 Liverpool Airport handled 237,000 Wales' originating and destination passengers, equivalent to nearly 5% of the total volume at the airport of 4.9 million. The airport has a good range of medium cost domestic and European Flights provided easyJet and Ryanair. EasyJet operates to 32 destinations, and Ryanair claim to fly to 67 points in Europe. Many of these are at very low frequency. There are also many charters to holiday destinations. Passenger volume peaked in 2007 at around 5.46 million, since when it has eased back to 5.2 million in 2011.

Liverpool Airport is the closest to north Wales and is very well located in terms road access to the M56 motorway. Access by rail is less good, requiring change of mode to bus or taxi. The airport is located to the south east of the city centre. Access from mid Wales is therefore quite good, but has the same distance drawbacks as Manchester for passengers from south Wales. The airport has a single 2,285 metre runway. The airport terminal capacity has been expanded to reach around 8 million passengers per annum.

The main problem with the site is its close proximity to built-up urban areas including housing estates and its inability to operate night or longhaul flights. Its extensive network of shorthaul low cost flights will continue to make it attractive to the north Wales market.

## **5.12 The Thames Estuary Airport Project**

The proposed Thames Estuary Airport would be a major new state-of-the-art 4 parallel runway airport to be located on the Isle of Grain, partly on the site of the former BP oil refinery. The project is supported by a consortium led by the distinguished architects Norman Foster and Associates and the project has the active support of the Mayor of London who is a fierce opponent of the third runway at Heathrow Airport.

The airport, if built, would have an ultimate capacity of 150 to 200 million passengers per annum which would be at least double the size of the current Heathrow Airport capacity, but would provide London with a world class competitive airport, something that is very difficult to achieve on the restricted Heathrow Airport site. There are however major problems with this project:

- the basic cost of the airport - £25 to 35 billion;
- the huge cost of major road and rail infrastructure, estimated at £30-40 billion, to connect the airport to London and to the conurbations to the west;

- the distance from London and the counties of Surrey, Hampshire, Berkshire, and Buckinghamshire which provide high yield passengers for Heathrow at present would be much greater and less convenient;
- compulsory transfer of air traffic from Heathrow and possibly Gatwick Airports to operate at the new airport would be required;
- the provision of the necessary skilled workforce in the vicinity of the new airport would be a concern;
- the impact of reducing traffic or closing other airports, particularly Heathrow and Gatwick, would affect the local population in terms of travel convenience and employment;
- it would be significantly less convenient than Heathrow for all travellers outside the south east of England;
- the time taken to secure planning permission and to construct the airport and its facilities currently estimated at about 20 years. (This could probably be reduced to 10 years with a reform of the planning laws.)

There are also several groups that support the idea of an artificial island airport further out into the Thames Estuary including one project on the Goodwin Sands east of Kent which would reduce the incidence of aircraft flying over urban areas significantly more than the Isle of Grain site. The problem with all of these proposals is that it would make the chosen airport site even further from central and west London and the infrastructure costs development would be much higher than for the Isle of Grain site.

From a Welsh perspective, at first sight the impact of the Thames Estuary Airport - replacing Heathrow and possibly Gatwick Airports - would be unwelcome news. It would make travel more difficult, longer and less convenient for use of longhaul flights. However this inconvenience for Wales and South West England, and the West Midlands would enhance the opportunity for building a new major international airport in the South West.

### 5.13 Other Expansion Possibilities at the South East Airports

There are a number of possible expansions at the existing south east airports that could increase traffic for international flights. Prominent amongst these would be:

- ***Adding a third parallel runway at Heathrow, either on the site proposed by BAA north of the A4 that was rejected by the UK Coalition Government, or building a second close parallel run way to the south of the existing airport site.***

If the latter were to proceed it would require the demolition of Terminal 4 and the cargo facilities on the south side of the site. It would also affect housing areas to the south of the airport but would not take up significantly more land for the airport. We are



doubtful that the southern runway project would replace the BAA northern scheme as the number of movements that would be added would be smaller due to the need to have more runway crossings on the existing southern runway.

- ***Moving to continuous mixed-mode operation on both the existing Heathrow runways.***

While this adds the least capacity - 60,000 additional ATMs - we believe this is the most likely solution to be accepted by the Government as it is the least bad solution for aircraft flying over central London and requires no planning inquiries that take up a huge amount of time.

- ***Building a second parallel runway at Gatwick Airport.***

There are at least three possible schemes here including a new northern runway, a close parallel southern runway and a wide spaced southern runway. We believe that the wide spaced southern runway that adds the most capacity will be the favoured scheme by Gatwick Airport and is the most likely proposal to be put forward at the Davies Commission as it adds the most capacity. However, the Government is not likely to favour Gatwick expansion over Heathrow unless it is willing to approve the construction of two new runways at the site. We feel this is an unlikely outcome as it is not easy to accommodate two new efficient runways on the Gatwick site.

- ***Building a second runway at Luton Airport.***

Luton is a very confined site located on a hill with limited possibilities for adding a second runway. In addition any permutation would add less capacity there than at the other major SE Airport sites. As Luton has not applied to build a second runway we feel that this would be an unlikely development.

- ***Building one or more runways at Stansted Airport.***

Of the existing major SE airports Stansted is the only airport capable of being relatively easily expanded to four parallel runways. What is of more importance is that the road and rail infrastructure development costs would be significantly less than for developing the equivalent for the Thames Gateway Airport site at the Isle of Grain. If the objective is to build a 4 parallel runway airport to replace Heathrow as the premier UK hub airport then expanding Stansted is the easiest and cheapest solution from a technical and economic viewpoint. There is a chance that Stansted may be recommended for development over other sites by the Davies Commission.

From a Welsh viewpoint expansion at Stansted is less attractive than expansion at Heathrow or even at Gatwick.

- ***Building a major new airport at a new inland site.***

While such a possibility may be considered by the Davies Commission and the UK Government, it seems very unlikely that such a development would proceed, as if a new site is to be considered, a coastal location that would allow 24-hour operation and less environmental impact would seem to be a better way forward.

## 6. Impact of the New DfT 2013 Forecast

In January 2013 the DfT published a new aviation forecast for the period up to 2050. The forecast is very detailed and takes into account a large number of factors in addition to economic growth, energy prices and the cost of air travel including increase in population by region, the impact of carbon tax, the evolution of the efficiency of the airline fleet and the impact of air passenger duty tax. In addition the forecast analyses the future traffic pattern in considerable detail by purpose of travel, shorthaul and longhaul flights, scheduled full service, low cost and charters. It also makes predictions for the evolution of international to international traffic both in the UK and for UK traffic changing planes at the European and Middle East airport hubs.

The forecast looks at constrained demand under three scenarios of different economic growth projections (High, Medium and Low) with no new airports or additional runways and in addition looks at unconstrained growth assuming only the existing airport but with additional runway capacity installed as needed. The unconstrained and constrained forecasts are set out in Attachment 4 and a simple comparison of the 3 scenarios unconstrained versus constrained demand is shown in the table below:

	2010	2020			2030			2040			2050		
		Low	Central	High	Low	Central	High	Low	Central	High	Low	Central	High
Unconstrained Demand	211	238	259	281	281	320	359	314	391	483	350	482	661
Constrained Demand	211	236	255	277	276	313	347	306	372	451	339	447	Cannot meet demand

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What the DfT forecast shows is that the current airports UK system cannot meet the demand but the difference between the two forecasts is not very large except in 2050. This difference is illusory as it hides the situation in SE England which is especially serious as demand there cannot be met at either Heathrow or Gatwick which under all scenarios are operating at 100% runway utilisation by 2020. Under the constrained scenarios traffic is forced out of Heathrow and Gatwick to other SE airports and other regional airports which is a suboptimal solution for attracting inward investment into the UK.

The evolution of the maximum capacity of Cardiff and Bristol Airports in terms of Air Transport Movements (landings and take-offs) and passengers is shown below:

<b>Runway Capacity ATMs/a</b>	<b>2008</b>	<b>2030</b>	<b>2050</b>
Bristol	150	226	226
Cardiff	105	150	150
<b>Passenger Capacity mppa</b>			
Bristol	10	12	12
Cardiff	3	8	8

We have also looked in more detail what the DfT forecasts show for Cardiff and Bristol Airports in terms of utilisation and this analysis is shown below:

<b>DfT 2013 Forecast</b>		<b>mppa</b>	
<b>Airport</b>	<b>Scenario</b>	<b>2030</b>	<b>2050</b>
<b>Bristol</b>	Low	7.7	10.7
	Central	9.7	12.3
	High	12.4	
<b>Cardiff</b>	Low	0.9	1.3
	Central	1.1	7.8
	High	1.2	

The forecast shows for the period up to 2030 the outlook for growth at Bristol Airport is much better than for Cardiff Airport. In 2050 under the Central Scenarios Bristol Airport is full and only then is the traffic forced to move to Cardiff Airport. If the High Scenario is followed neither airport can meet the 2050 demand. In the Low Scenario in 2050 the traffic at Cardiff is very disappointing at only 1.3 million passengers. This shows that the outlook for Cardiff Airport is not very promising for many years forward, a conclusion with which we are in total agreement. We have also looked at the projections for the development of the population base:

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<b>Underlying DfT NTEM Regional Income and Population Forecasts</b>						
NTEM UK Region/Area	Income £billion			Population million		
	2011	2041	% change	2011	2041	% change
<b>South West</b>	48.7	63.7	31%	5.2	6.4	23%
<b>Wales</b>	26.0	32.0	23%	3	3.3	12%
<b>London</b>	97.0	124.9	29%	7.6	9.5	25%
<b>South East</b>	96.0	118.5	23%	8.5	10.1	19%
<b>Eastern England</b>	60.4	78.7	30%	5.8	7.3	26%
<b>North East</b>	21.8	26.1	20%	2.6	2.8	11%
<b>Yorkshire and Humberside</b>	46.6	62.0	33%	5.3	6.4	22%
<b>North West</b>	63.9	75.7	18%	6.8	7.4	9%
<b>West Midlands</b>	48.4	58.6	21%	5.4	6.2	14%
<b>East Midlands</b>	40.3	52.2	30%	4.4	5.4	22%
<b>Scotland</b>	51.2	60.7	19%	5.1	5.4	6%
<b>Total</b>	<b>600.4</b>	<b>753.3</b>	<b>25%</b>	<b>59.6</b>	<b>70.3</b>	<b>18%</b>

Source: DfT's National Trip End Model (NTEM). Population estimates do not include N. Ireland

The figures for Wales for both income and population growth are below the average for the UK. However the estimates for the South West are much more encouraging indicating significantly above average growth. With this profile of change it would be reasonable for this to result in an increased propensity to fly for the region.

We have also looked at the expected development of flights at Bristol Airport as shown in the new DfT forecast. This shows the evolution of flights at Bristol Airport over the period 2010 to 2050 as follows:

<b>Demand</b>	Domestic (Excl. intl transfers)	Short haul	Long haul	Hub transfers	<b>Grand</b>
<b>mppa</b>	Total	Total	Total	Total	<b>Total</b>
Bristol 2010	0.8	4.9	0.1	0.0	5.8
Bristol 2030	1.1	7.6	0.9	0.0	9.7
Bristol 2050	1.5	10.2	0.6	0.0	12.3

All the Bristol longhaul flights are expected to be for charter leisure passengers.

By way of contrast the evolution of longhaul flights at Manchester and Birmingham shown as much more significant over this period (2010 to 2050).

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<b>Demand</b>	Domestic (Excl. intl transfers)	Short haul	Long haul	Hub transfers	<b>Grand</b>
<b>mppa</b>	Total	Total	Total	Total	<b>Total</b>
Manchester 2010	1.0	11.4	4.9	0.3	17.7
Manchester 2030	1.5	19.3	7.1	0.3	28.1
Manchester 2050	2.1	33.3	12.5	7.3	55.2
Birmingham 2010	1.0	6.2	1.0	0.0	8.2
Birmingham 2030	1.5	12.5	2.6	0.0	16.7
Birmingham 2050	1.8	21.0	14.7	0.8	38.3

We have also looked at the split of traffic type full-service scheduled, low cost carrier scheduled and charter for the 4 regional airports of immediate interest including Bristol and Cardiff airports (number of destinations):

<b>Airport</b>	<b>Full Service Scheduled</b>				
	2011	2020	2030	2040	2050
Manchester	80	91	117	140	163
Birmingham	50	56	64	52	37
Bristol	16	18	28	36	39
Cardiff	2	3	4	8	8

<b>Airport</b>	<b>Low Cost Carriers</b>				
	2011	2020	2030	2040	2050
Manchester	65	54	58	59	54
Birmingham	51	21	19	11	12
Bristol	60	82	89	98	90
Cardiff	22	17	17	16	17

<b>Airport</b>	<b>Charter</b>				
	2011	2020	2030	2040	2050
Manchester	100	75	84	100	121
Birmingham	19	24	28	28	0
Bristol	10	7	5	8	10
Cardiff	0	0	0	0	0

The analysis shows the inadequacy of Bristol Airport to cope with the intrinsic demand for longhaul passengers in the South West and Wales and shows how insufficient SE England airport capacity pressurises longhaul growth at Birmingham and to a slightly lesser extent at Manchester. The analysis also illustrates the difficulties Cardiff Airport will face trying to rebuild and grow its future passenger traffic base. This DfT work is important as it shows that

Bristol and Cardiff combined into a single new built replacement longhaul capability airport in the Severn Estuary would be able to attract some longhaul traffic (as was shown in the Pilning study included in the DfT publications for the 2003 public consultation exercise).

## **7. Other possible solutions**

In this paper we have analysed all the realistic options for current airports that could practically serve the Welsh air passenger travel market. We have excluded Bournemouth, Southampton, London City and Southend airports from the analysis partly as there is no recent published data on the origin of passengers at these airports and also because their impact on Welsh air travel is low and is not likely to change significantly in the next five years. The last passenger survey including London City Airport showed that around 3,000 passengers per year from Wales used the airport.

The analysis of all the airports shows that none of them, including Cardiff Airport, offer a good way forward for Welsh travellers due to site restrictions, airport location and surface access constraints. We now turn to two other solutions – the ‘Western Gateway’ scheme and a Severnside Airport.

### **7.1 The ‘Western Gateway’ scheme**

Frustration at the decline of Cardiff Airport, has led one south Wales-based group to put forward a plan to use Cardiff Airport as a “western Gateway’ to the UK to take advantage of plans for the electrification of the Great Western rail line from London to south Wales. This would involve widening and lengthening the main runway at Cardiff to accommodate full laden wide-body jets.

We fully understand the sense of frustration at Cardiff Airport’s current position, as well as the need to improve services for existing business and leisure passengers from south Wales. We also understand the importance of this issue for the future prospects for inward investment to Wales. However we are concerned that the proposal will face significant obstacles, and believe that a better solution is available which would meet a wider range of objectives: i) the interests of Wales, ii) the interests of the West of England and iii) the wider interests of the UK economy. This better option merits fuller exploration in the months ahead.

### **7.2. A Severn Estuary Airport**

We share the view of the Western Gateway project that airport development west of London is desirable. We can also see that the Severn Barrage project would create an opportunity for a major new inter-modal transport hub – although no airport should be dependent on that eventuality. The big difference in our thinking is that the tandem hub concept of linking the two

airports by a high speed railway line is abandoned in favour of a single major new international airport in the Severn Estuary east of Newport on the Welsh side of the channel to replace both Bristol and Cardiff airports.

Our predecessor company Vulcan Associates completed a major report for Newport City Council in 2003 that was submitted to the UK Government as part of the consultation process on the *Future Development of UK Civil Air Transport*. This report was the result of more than 12 months of studies by Vulcan into the technical and economic viability of a major new cargo and passenger airport to effectively replace the existing Cardiff and Bristol Airports.

The Vulcan study looked in detail at the projected traffic for all the airports in the south west of the UK and also at the road and rail connectivity and the environmental impact of a Severn Estuary Airport. The conclusions on connectivity (with relatively minor alterations of the road and rail network) and environmental impact were particularly favourable to the new airport. The study concluded that this airport location would permit 24-hour operation which is a critical feature for major air cargo operations. This is a feature that is not available at any other appropriate major airport site with the exceptions of Manston Airport in Kent and East Midlands Airport.

The new airport would be well positioned to serve the cargo markets of southern England, Wales and the West Midlands where, in aggregate, greatest demand exists. A critical advantage of the new airport would be that it would be located on a site that eventually could be expanded to have four parallel runways, similar to that at Paris Charles de Gaulle Airport, should this become a long term requirement.

Both Cardiff and Bristol Airports face limited growth prospects due to location and site limitations that cannot be easily overcome. In spite of the slowdown in the growth of civil air transport in the UK due to constrained capacity at Heathrow and Gatwick and the effect of Air Passenger Duty taxation as well as the economic recession from 2008 onwards, there still is a strong case for seriously examining the construction of a major new airport in the Severn area, providing sufficient passenger traffic can be 'seeded' there from existing airports. The future traffic risk is not a factor on which commercial banks are very willing to advance major lending on airport projects.

By 'seeding' traffic from Bristol and Cardiff Airports and allowing a reasonable planning and construction timetable of say 8 to 10 years the volume of traffic that could be seeded could amount to between 10 and 11 million passengers per annum. This is a much higher figure than BAA was able to deploy at the opening of Stansted Airport's first major expansion in 1991.

Further evidence to support the Severn estuary airport is provided by the South West England Green Paper Consultation Document published in 2002. In this paper the UK Government

published the results of a study of establishing a new “greenfield airport” at Pilning immediately to the east of the second Severn Bridge crossing, close to North Bristol and less than 10 miles from the likely Severn estuary airport site. This showed that in a constrained case, with no new runway constructed at the SE Airports, passenger volume at the new airport would reach 33 million passengers per annum by 2030 assuming only the closure of the existing Bristol Airport. In this scenario it was assumed that Cardiff Airport would continue to operate. If Cardiff Airport were to close (which would be a logical consequence of a decision to build the new airport) this would have added a further 1 to 3 million passengers per annum bringing the total at the new airport to around 35 million passengers per annum by 2030.

While this study is now 10 years out of date, its principles are probably still correct, although the passenger volume would probably be reduced as a result of slower economic growth and the burden of extra taxation on the industry. We believe that it would be reasonable to assume a traffic generation potential in the region of 25 to 30 million passengers per annum by 2050 for the Pilning site, were it to be developed. This is very much in line with current MSP Solution’s thinking for the Severn estuary airport. We very much prefer a site further down the Severn estuary slightly offshore past the Caldicot Levels rather than Pilning as this would be far less damaging in terms of noise pollution and would be more likely to allow for 24-hour cargo operation. In addition the land availability at Pilning is relatively restricted. This would make it difficult to have 2 parallel wide-spaced runways to enable independent operations on each runway. This limitation would not apply on the Welsh side of the Severn.

### ***The Importance of Air Cargo***

The importance of establishing a major airport for cargo operations in the UK is a critical feature of aviation policy that has been ignored by all Governments since World War 2. As a consequence of this neglect the needs of air cargo operations have always been secondary to those of the passenger business. This policy has resulted in the UK having a relatively poor position in the air cargo market that has been dominated by the US based carriers such as FEDEX and UPS who have also made major inroads into the worldwide express parcels market.

Even the major European airline groupings such as Lufthansa and Air France-KLM have much bigger air cargo operations than International Consolidated Airlines Group (BA-Iberia). If the UK were to build a modern state-of-the-art cargo airport this would reverse the relative decline of air cargo in the UK and would allow the country to grow its share significantly in a market that in the long term is predicted to grow continuously at a faster rate than the air passenger business.

A further concept that could be developed to enhance the attractiveness of the new airport for cargo activities would be to build an integrated cargo hub linking all 4 modes of transport: air, road, rail and marine. There is an opportunity here to attract cargo traffic at a much faster rate to the new airport if transfers between the other transport modes can be accomplished more



easily, more quickly and especially more cheaply than is possible at other major European airports.

There is no 4-way transport hub located anywhere in Europe or for that matter anywhere else in the World. This is because all major existing airports have been located purely from a passenger business standpoint and have largely ignored the possibility of cargo requirements. As a consequence road and rail facilities have always been made taking into account the movement of passengers rather than cargo. So although Paris (Charles de Gaulle), Amsterdam (Schiphol), Frankfurt Airport and even London Heathrow and Gatwick airports have significant rail links, none of them have facilities for rail cargo handling.

If the new airport could be linked to a suitable port for deep water container ships there would be a strong possibility of establishing significant new cargo business breaking down cargos from marine to air and air to marine that is not currently undertaken anywhere in the UK or continental Europe. Such a development would make the airport highly attractive to both cargo operators using dedicated freighters such as B747-400F, B747-8F and B777-200F long haul aircraft as well as express parcel companies using much smaller B737, A320, B757 and B767 freighters serving the “just in time” short to medium haul cargo markets.

If such a port were not to be available it would still be worthwhile seeing how the new airport could be conveniently linked in by rail to the existing ports of Bristol Avonmouth, Newport, Cardiff and possibly Port Talbot, if this were to be developed into a container port.

Cargo projections are always difficult to assess as there is no equivalent airport to serve as a reference point. If we take two approximate reference points:

- Heathrow Airport handled 1.48 million tonnes of air cargo in 2011
- East Midlands Airport handled 264,000 tonnes of air cargo in 2011.

The vast majority of the air cargo at Heathrow was loaded into the belly hold capacity of wide-body passenger aircraft, probably around 85%, while at East Midlands more than 95% was handled by dedicated air freight aircraft. If the new Severn Estuary Airport were to be built on a site that would permit 24-hour operation, it could probably attract around 500,000 tonnes over a relatively short time period. If a 4-way efficient transport hub were to be created it would accelerate and catalyse the growth of air cargo at the new site. This would at least double the cargo opportunity to 1 million tonnes per annum if a major air express parcels operation could be established that would also attract in large scale operations of the strategic longhaul air cargo operators.

To achieve business at a much higher level than 1 million tonnes the airport would have to attract in business conducted elsewhere in continental Europe. This extra volume would only

arise if the airport could generate a significant amount of completely new business created by the transport hub, and finally it would also require a growing number of wide-body longhaul passenger scheduled flights. While the first two conditions could probably be met relatively quickly, the build-up of a large amount of large wide-body longhaul passenger flights would take much more time unless the Government continued its existing policy of no new runways at any of the south east airport for 20 years or more.

We feel that continuation of the current Coalition Government aviation policy is unlikely and the increasing political pressure for economic development will lead to the construction of at least one new runway at Heathrow Airport or two or more runways at another south east airport site. In such an event the development of a large number of wide-body scheduled passenger flights at a Severn estuary airport site would probably be delayed by 10 years.

However, the case for the new Severn estuary airport is not predicated on the rapid growth of A380 or B777 longhaul flights. The case rests on its attractiveness for combining the existing shorthaul destinations served from Bristol and Cardiff airports and converting over time many of these flights into connecting services to facilitate the establishments of a limited number of longhaul scheduled flights using a combination of long range narrow body aircraft such as the A319LR/B737-700ER/B737-800/-900 and smaller wide-body aircraft such as the A330, B767, B787 and A350XWB types.

***What impact would new runway capacity built at the SE Airports have on the case for consideration of a new airport to replace Bristol and Cardiff Airports?***

If the UK Government goes ahead with the development of the development of Thames Estuary Airport which leads either to the eventual closure of Heathrow Airport or the forced transfer of longhaul flights to the new airport, the case for consideration of a major new airport gateway in the west to replace Cardiff and Bristol Airports would be significantly increased. The Thames Estuary Airport would be much more difficult to access for Wales and West of England passengers than the current flights operated from Heathrow.

Similarly if the Davies Commission recommends development at Stansted or Gatwick Airports, unless such expansion includes the building of two or more runways at one site, there would be no case for either of these airports to replace Heathrow as the long haul hub airport. At this level of expansion they would offer no more capacity than that currently provided by Heathrow.

Building four runways at Gatwick would not be easy as the site can only readily accept one new runway to the south of the existing operations. Adding a third runway at Gatwick to the North of the existing site would cause difficulties with restricted operation over the urban areas of Horley. So Gatwick is not easy to develop as a hub airport to replace Heathrow.

Stansted could accommodate four runways and it is probably the cheapest site to develop. Although not ideally suited for traffic from the west and south of London, there is a chance that it could be selected instead of the third Heathrow runway, especially if that remains the current BAA northern scheme. Stansted with four parallel runways could accommodate a similar level of traffic as the Thames Estuary Airport Project (150 to 200 million passengers per annum),

Expansion of either Gatwick or Stansted sites would be less favourable for Wales and the West of England travellers than expansion at Heathrow.

If the UK Government rejects all other SE airport expansion proposals in favour of developing the 3<sup>rd</sup> runway at Heathrow the time taken to complete the project will still probably take 10 years. Building the new airport runway on the current proposed northern site requires demolition of housing and displacement of an old church. This process will take considerable time as it is likely to give rise to a series of legal injunctions and appeals all of which are time consuming and uncertain in outcome. During this time capacity for developing additional long haul flights in the UK will be severely constrained except at Stansted which is the only major SE airport with significant spare capacity.

We remain doubtful whether many longhaul airlines will be willing to start significant services at Stansted over the next 10 years unless the UK Government re-introduces the London Airports' traffic distribution rules that were phased out in the 1990s.

So even if the (additional) Heathrow 3<sup>rd</sup> runway is approved, we believe there is still a good case for a new Severnside airport to be seriously considered. The traffic demand will have grown considerably over this period and we doubt that separate expansion at the existing Bristol and Cardiff airports will offer the same network development opportunity as a new purpose built state-of-the-art airport located in the Severn estuary. A single new airport would offer the opportunity of operating much bigger aircraft and increasing the choice of destinations and a far greater chance of developing longhaul flights.

### ***Construction of the Severn Barrage - potential impact on the Severn estuary airport project***

The introduction of the Severn Barrage major renewable energy project could potentially transform the prospects for a new Severnside airport project. It would also result in possible major changes in the availability of existing marine ports in the Severn area. If the barrage was widened to permit new major road and rail links across the Severn between Wales and England, this would also significantly enhance the attractiveness of the new airport to a new catchment in south west England. It is our belief that the barrage project – all other considerations apart – also needs to be studied carefully in the context of the creation of a major new transport infrastructure hub comprising state-of-art rail and motorway road links to a combined major airport and maritime port.

If this project were to proceed it might be possible to create a major new state-of-art container port capable of taking the largest ships, possibly a port for bulk commodities such as oil, coal, iron ore and cereals. A facility to switch cargo rapidly from sea to air, sea to rail, sea to road, air to sea, air to road and air to rail, and air to air (and vice-versa) that is not possible anywhere else in Europe would be highly attractive to commercial cargo operators.

It is our belief that to be successful world class concepts need world class quality facilities properly integrated to be able to work for their overall collective benefit. Introducing serious compromises by seeking to use existing suboptimal facilities will result in failure to maximise opportunities and, even worse, could result in failure of the overall project.

For the reasons explained above we believe that the airport should be considered in the context of the Severn Barrage Project, but it is important to understand that its development is NOT dependent on the Severn Barrage project proceeding.

## 8. CONCLUSIONS

Based on comprehensive analysis it is our belief that there is no single existing airport site that can conveniently meet the medium and long term development needs of Wales or south west England. We also believe that Wales has too small a population to base its long term aviation needs on solo development. **Wales and the South West of England need to work together closely to develop a joint approach towards aviation that will result in a major new airport facility for the whole of South West Britain.**

We believe that the ‘Western Gateway’ tandem hub proposed for linking the existing Cardiff and Bristol airports is not a practical proposal. Neither airport is capable of 24-hour operation and both airports are badly connected to road and rail. We cannot see how a high speed rail link between the two airports would be justified in term of economic benefits nor how it could be achieved taking into account that Bristol Airport is difficult to access and is on a hill.

We now come back to the project examined by our predecessor company Vulcan Associates that was submitted by Newport City Council to the UK DfT in 2003. This called for a detailed study for a major new international airport with an initial single long 3,600-4,000 metre runway in the Severn estuary. The airport would be designed from the outset to handle flights 24 hours per day. The design also would allow possible extension to four parallel runways over time as demand requires.

The airport would handle within a relatively short time a volume of 250,000 tonnes rising to 1 million tonnes or more of air cargo. In the longer term 2 million tonnes per annum of air cargo would be attainable. Initial passenger demand would be 10 to 11 million increasing to 25 to 35

million passengers per annum as the airport began to develop into a hub with a good range of longhaul direct flights, not just flights to the Middle East Hubs: Dubai, Doha and Abu Dhabi.

In short, the future of Welsh air travel is intimately linked with the same activity in the United Kingdom. The optimal solution for both Wales and south west England requires them both to move together constructively on a major new Severn estuary airport, if possible as part of an integrated transport hub. It needs to be considered first and foremost as a self standing-project (helped by known plans for rail electrification) but also in relation to any prospective Severn Barrage Project.

In this paper we have used new information taken from the latest UK DfT 2013 air traffic forecast which supports the case for a new large international airport to replace Cardiff and Bristol airports. We believe that the forecast provides further strong evidence for our case.

Resources now need to be put forward to carry out the appropriate studies to assess the economic and technical results, benefits and performance of such a project whether or not the Severn Barrage Project is implemented.

John Borkowski and Angus Walker  
MSP Solutions Limited  
March 2013

**Propensity to Fly**

**1. The Development of Air Travel in Wales and South West England**

In the DfT forecasts of 2000, an analysis of the propensity to fly was carried out for selected parts of the UK including Wales to be used as a measurement of the underlying demand. The factor used that was describe as “the propensity to fly” was defined by the number of return air passenger journeys made by the population of an area of the UK divided by its local population. This information is reproduced in the table shown below:

**UK DfT Propensity to Fly from the UK Regions**

Region	Population (million)	One-way air trips (million)	Propensity to fly	% versus UK average	Rank
	A	B	B/A/2		
E Midlands	4.245	6.44	0.759	60%	7
Eastern	2.543	4.93	0.969	77%	5
London	7.233	42.51	2.939	233%	1
N East	3.082	3.53	0.573	45%	12
N West	6.391	12.97	1.015	80%	6
S East	11.073	31.85	1.438	114%	3
S West	4.989	7.24	0.726	58%	9
W Midlands	5.356	8.07	0.753	60%	7
Yorkshire/Humber	5.084	7.35	0.723	57%	10
ENGLAND	49.997	124.89	1.249	99%	
SCOTLAND	5.115	17.61	1.721	136%	2
WALES	2.946	3.40	0.577	46%	11
N IRELAND	1.698	4.90	1.443	114%	3
<b>UNITED KINGDOM</b>	<b>59.756</b>	<b>150.80</b>	<b>1.262</b>		

The conclusions of this DfT analysis is that of all the areas of the UK that were studied Wales has the second lowest propensity to fly (11<sup>th</sup> position) slightly ahead of North East England. South West England was also not very high in the list ranked in 9<sup>th</sup> position and it follows closely behind the West Midlands in 8<sup>th</sup> position.

In the 2000 forecasts the DfT also attempted to examine how the propensity to fly could vary over time and also for different traffic scenarios based of 4 discrete forecasts:

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- RASCO Reference Case (RRC) with three new runways by 2030 at the SE Major Airports
- South East Constrained (SEC) with only one new runway at the SE Major Airports
- UK constrained Case (UKC) with no airport development beyond approved plans in 2000
- Unconstrained Case where no restrictions on demand being met were placed on the airports system.

The year 2030 results of the DfT forecasting models are set out in the table below:

### UK DfT Propensity to Fly from the UK Regions

Region	2000 Population (million)	2000 Propensity to fly	2030 Population (million)	2030 Propensity to fly			
				RRC	SEC	UKC	No constraints
E Midlands	4.245	0.759	4.799	2.02	1.96	1.13	2.06
Eastern	2.543	0.969	2.996	1.82	1.65	1.04	1.91
London	7.233	2.939	8.208	6.94	6.39	3.82	7.24
N East	3.082	0.573	3.201	1.59	1.57	0.96	1.61
N West	6.391	1.015	6.683	2.89	2.78	1.61	2.93
S East	11.073	1.438	12.756	2.98	2.75	1.68	3.11
S West	4.989	0.726	5.784	1.95	1.92	1.13	1.98
W Midlands	5.356	0.753	5.741	2.22	2.14	1.09	2.24
Y and H	5.084	0.723	5.517	1.99	1.95	0.70	2.01
ENGLAND	49.997	1.249	55.684	3.05	2.87	1.65	3.14
SCOTLAND	5.115	1.721	4.836	4.84	4.79	3.01	5.22
<b>WALES</b>	2.946	<b>0.577</b>	3.091	<b>1.64</b>	<b>1.62</b>	<b>0.95</b>	<b>1.65</b>
N IRELAND	1.698	1.443	1.811	2.67	2.64	2.13	3.42
<b>UNITED KINGDOM</b>	<b>59.756</b>	<b>1.262</b>	<b>65.423</b>				

Source of Information: UK DfT 2002 Green Paper Consultation Documents.

The analysis shows that, while the propensity to fly under all forecast scenarios in 2030 grows significantly upwards from the 2000 estimate, the relative position of Wales in the UK tables does not change significantly and in all cases it is close to the bottom of the range.

While there is some possibility that these figures may change over time, we believe that this supposition which is broadly true reinforces the need for Wales and the Welsh Assembly Government to be much more realistic for the future development of Cardiff Airport. It also shows why it is important to find a future common airport solution for both Wales and South West England and including the West Midlands.

**Analysis of passenger traffic at Bristol and Cardiff Airports**

**Analysis of the Passenger Traffic at Bristol and Cardiff Airports in 2007**

Region	Bristol		Cardiff	
	000's	%	000's	%
<b>2007</b>				
East Anglia	1	0.0%	0	0.0%
East Midlands	3	0.0%	0	0.0%
North West	4	0.1%	1	0.0%
Northern	4	0.1%	0	0.0%
Scotland	4	0.1%	1	0.1%
South East	76	1.4%	8	0.5%
South West	5,126	85.2%	105	3.1%
Wales	781	11.3%	1,787	95.2%
West Midlands	99	1.8%	21	1.0%
Yorkshire/Humber	4	0.0%	1	0.1%
<b>Total</b>	<b>6,101</b>	<b>100.0%</b>	<b>1,925</b>	<b>100.0%</b>
Proportion of English Traffic	5,317	87.1%	136	7.1%
Proportion of Wales Traffic	781	12.8%	1,787	92.8%

Source of information: CAA Air Passenger Survey 2007



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## Appendix 3

### DfT 2013 Forecasts of passenger demand 2010 to 2050 - unconstrained and constrained

#### DfT 2013 Forecasts of passengers by purpose and world region: 2010-2050 (unconstrained)

(mppa)	2010	2020			2030			2040			2050		
		Low	Central	High	Low	Central	High	Low	Central	High	Low	Central	High
<b>INTERNATIONAL</b>													
UK Business	17.1	21.2	24.6	27.7	24.6	31.5	38.2	28	38.9	51.9	31.4	47.6	70.6
UK Leisure	97.4	109.2	120.7	131.4	130.5	150.8	165.9	146.4	187.3	223.5	164.1	236.3	309.5
<b>Total UK</b>	<b>114.5</b>	<b>130.4</b>	<b>145.3</b>	<b>159</b>	<b>155.1</b>	<b>182.3</b>	<b>204.1</b>	<b>174.4</b>	<b>226.2</b>	<b>275.3</b>	<b>195.5</b>	<b>283.9</b>	<b>380.1</b>
Foreign Business	13.3	14.1	15.9	17.4	15.8	19.3	22.6	17.5	22.9	29.2	19.1	26.9	37.7
Foreign Leisure	34.5	39.5	41.1	42.8	46.3	48.5	51.3	51.1	57.2	67	56.6	68.6	92.2
<b>Total Foreign</b>	<b>47.8</b>	<b>53.5</b>	<b>57</b>	<b>60.3</b>	<b>62.1</b>	<b>67.8</b>	<b>73.9</b>	<b>68.6</b>	<b>80.1</b>	<b>96.1</b>	<b>75.7</b>	<b>95.5</b>	<b>129.9</b>
Originating and Terminating Passengers	162.3	183.9	202.2	219.3	217.2	250.2	278	243	306.3	371.5	271.3	379.4	510
Transfers - International to International.	21.1	25.7	24	23	31.8	28.2	25.8	35.8	33.6	31.6	39.7	40.5	39.3
<b>Total International</b>	<b>183.4</b>	<b>209.6</b>	<b>226.3</b>	<b>242.3</b>	<b>249</b>	<b>278.4</b>	<b>303.8</b>	<b>278.8</b>	<b>339.9</b>	<b>403.1</b>	<b>311</b>	<b>420</b>	<b>549.4</b>
Total UK International	114.5	130.4	145.3	159	155.1	182.3	204.1	174.4	226.2	275.3	195.5	283.9	380.1
Total Foreign International	68.9	79.2	81	83.3	93.9	96.1	99.7	104.4	113.7	127.7	115.4	136.1	169.3
<b>Total International</b>	<b>183.4</b>	<b>209.6</b>	<b>226.3</b>	<b>242.3</b>	<b>249</b>	<b>278.4</b>	<b>303.8</b>	<b>278.8</b>	<b>339.9</b>	<b>403.1</b>	<b>311</b>	<b>420</b>	<b>549.4</b>

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### DfT 2013 Forecasts of passengers demand 2010-2050 (unconstrained)

(mppa)	2010	2020			2030			2040			2050		
		Low	Central	High	Low	Central	High	Low	Central	High	Low	Central	High
<b>DOMESTIC (Internal "end to end")</b>													
Business	12.6	13.2	15.1	18	14.9	19.2	25.9	16.7	23.8	37.1	18.4	29.1	52.4
Leisure	12	12.5	14.4	17.1	14.1	18.2	24.6	15.8	22.5	35.2	17.4	27.5	49.3
Miscellaneous	2.5	2.5	2.9	3.5	2.9	3.7	5	3.2	4.6	7.2	3.6	5.7	10.2
<b>Total Domestic</b>	<b>27.2</b>	<b>28.1</b>	<b>32.4</b>	<b>38.5</b>	<b>31.9</b>	<b>41.2</b>	<b>55.5</b>	<b>35.7</b>	<b>50.9</b>	<b>79.5</b>	<b>39.4</b>	<b>62.3</b>	<b>112</b>
<b>GRAND TOTAL</b>	<b>210.6</b>	<b>237.7</b>	<b>258.7</b>	<b>280.8</b>	<b>280.9</b>	<b>319.6</b>	<b>359.3</b>	<b>314.5</b>	<b>390.7</b>	<b>482.6</b>	<b>350.4</b>	<b>482.2</b>	<b>661.4</b>
<p>1. International figures are terminal passengers and count domestic interlining passengers changing at hub airports.</p> <p>2. Scheduled figures include both "full service" and "no frills" airlines.</p> <p>3. Domestic passengers exclude those using domestic flights to connect to international flights at a hub airport.</p> <p>4. Miscellaneous includes passengers at minor airports not surveyed in the source data and other non-surveyed passengers such as domestic charters, oil rig traffic etc., most, but not all, will be domestic.</p> <p>5. 2010 is modelled.</p>													

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## DfT 2013 Forecasts of Passengers Demand 2010-2050 (Constrained)

(mppa)	2010	2020			2030			2040			2050		
		Low	Central	High	Low	Central	High	Low	Central	High	Low	Central	High
<b>INTERNATIONAL</b>													
<b>UK Business</b>													
Short Haul	13.4	16.0	18.4	20.7	18.6	23.5	27.9	21.1	28.5	36.4	23.4	33.3	
All Long Haul	3.8	5.1	6.1	6.9	5.9	7.8	9.7	6.7	9.5	13.1	7.6	11.7	
<b>All UK Business</b>	<b>17.2</b>	<b>21.2</b>	<b>24.5</b>	<b>27.6</b>	<b>24.5</b>	<b>31.3</b>	<b>37.6</b>	<b>27.8</b>	<b>38.0</b>	<b>49.5</b>	<b>31.0</b>	<b>45.0</b>	
<b>UK Leisure</b>													
Scheduled Short Haul	58.4	67.9	74.2	80.4	80.5	91.9	98.9	89.7	109.9	127.5	98.8	131.1	
All Scheduled Long Haul	19.6	22.6	25.0	27.0	26.6	31.2	33.9	30.2	38.8	46.2	34.0	49.1	
All Charter	19.3	17.6	19.5	21.3	20.9	24.1	26.3	23.2	29.5	34.7	25.8	36.1	
<b>All UK Leisure</b>	<b>97.3</b>	<b>108.1</b>	<b>118.6</b>	<b>128.7</b>	<b>127.9</b>	<b>147.2</b>	<b>159.0</b>	<b>143.0</b>	<b>178.3</b>	<b>208.4</b>	<b>158.5</b>	<b>216.3</b>	
<b>Foreign Business</b>													
Short Haul	9.9	10.6	11.9	13.1	12.0	14.5	16.9	13.2	17.2	21.4	14.4	20.1	
All Long Haul	3.3	3.4	3.9	4.3	3.8	4.7	5.6	4.2	5.5	7.1	4.6	6.4	
<b>All Foreign Business</b>	<b>13.3</b>	<b>14.0</b>	<b>15.8</b>	<b>17.4</b>	<b>15.7</b>	<b>19.2</b>	<b>22.5</b>	<b>17.4</b>	<b>22.7</b>	<b>28.5</b>	<b>19.0</b>	<b>26.5</b>	
<b>Foreign Leisure</b>													
Short Haul	24.8	28.0	29.2	30.7	32.5	34.5	36.3	35.6	40.2	46.6	39.0	47.5	
All Long Haul	9.7	10.9	11.0	11.1	12.4	12.4	12.7	13.7	14.2	16.6	15.1	16.6	
<b>All Foreign Leisure</b>	<b>34.5</b>	<b>38.9</b>	<b>40.2</b>	<b>41.7</b>	<b>44.9</b>	<b>46.9</b>	<b>48.9</b>	<b>49.3</b>	<b>54.4</b>	<b>63.2</b>	<b>54.1</b>	<b>64.1</b>	
<b>Int. to Int. Transfers</b>	<b>21.1</b>	<b>25.5</b>	<b>23.7</b>	<b>22.7</b>	<b>31.0</b>	<b>27.0</b>	<b>24.0</b>	<b>33.4</b>	<b>28.6</b>	<b>25.7</b>	<b>37.2</b>	<b>36.2</b>	
<b>Total International</b>	<b>183.4</b>	<b>207.7</b>	<b>222.9</b>	<b>238.2</b>	<b>244.0</b>	<b>271.6</b>	<b>292.0</b>	<b>270.9</b>	<b>322.0</b>	<b>375.3</b>	<b>299.8</b>	<b>388.0</b>	

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### DfT 2013 Forecasts of Passengers Demand 2010-2050 (Constrained)

(mppa)	2010	2020			2030			2040			2050		
		Low	Central	High	Low	Central	High	Low	Central	High	Low	Central	High
<b>DOMESTIC (Internal "end to end")</b>													
Business	12.6	13.1	15.1	18	14.8	19.3	25.9	16.6	23.6	36.6	18.3	28.7	
Leisure	12	12.4	14.3	17.1	14	18.1	24.2	15.7	21.8	32.9	17.1	25.7	
Miscellaneous	2.5	2.5	2.9	3.4	2.8	3.6	4.6	3.2	4.3	6.2	3.4	5	
<b>Total Domestic</b>	<b>27.2</b>	<b>28.1</b>	<b>32.4</b>	<b>38.4</b>	<b>31.7</b>	<b>41</b>	<b>54.7</b>	<b>35.4</b>	<b>49.8</b>	<b>75.6</b>	<b>38.8</b>	<b>59.4</b>	
<b>GRAND TOTAL</b>	<b>210.5</b>	<b>235.8</b>	<b>255.2</b>	<b>276.6</b>	<b>275.8</b>	<b>312.6</b>	<b>346.7</b>	<b>306.4</b>	<b>371.7</b>	<b>450.9</b>	<b>338.6</b>	<b>447.5</b>	
The National Air Passenger Allocation Model cannot meet 2050 demand in the High Scenario.													
<ol style="list-style-type: none"> <li>1. International figures are terminal passengers and count domestic interlining passengers changing at hub airports.</li> <li>2. Scheduled figures include both "full service" and low cost airlines.</li> <li>3. Domestic passengers exclude those using domestic flights to connect to international flights at a hub airport.</li> <li>4. Miscellaneous includes passengers at minor airports not surveyed in the source data and other non-surveyed passengers such as domestic charters, oil rig traffic etc., most, but not all, will be domestic.</li> <li>5. 2010 is modelled.</li> </ol>													

DfT 2013 Forecast - Terminal passengers by region by airport category

<b>Terminal Passengers by Region of surface journey to airport origin: max use 2010-2050 (constrained)</b>					
<b>Surface to SE airports</b>	<b>Max Use: million passengers</b>				
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>
Northern Ireland	0	0	0	0	0
Scotland	0	0	0	0	0
North	2	2	2	1	1
Midlands	6	9	10	7	5
Wales	1	1	1	1	1
South West	5	6	7	6	5
<b>Regional total</b>	<b>14</b>	<b>19</b>	<b>20</b>	<b>15</b>	<b>12</b>
<b>SE passengers</b>	<b>89</b>	<b>112</b>	<b>136</b>	<b>156</b>	<b>167</b>
<b>Total surface passengers at SE Airports</b>	<b>103</b>	<b>131</b>	<b>157</b>	<b>171</b>	<b>179</b>
<b>Other airports</b>					
Northern Ireland	6	7	9	12	16
Scotland	20	23	29	34	42
North	28	34	43	54	66
Midlands	13	15	19	29	39
Wales	3	4	5	7	9
South West	7	8	11	16	21
<b>Regional total</b>	<b>77</b>	<b>90</b>	<b>117</b>	<b>153</b>	<b>193</b>
<b>SE passengers</b>	<b>2</b>	<b>4</b>	<b>7</b>	<b>17</b>	<b>39</b>
<b>Total surface passengers at other airports</b>	<b>78</b>	<b>95</b>	<b>124</b>	<b>171</b>	<b>231</b>