Manston Airport

A NATIONALLY INSIGNIFICANT INFRASTRUCTURE PROJECT

Barry James | NSIP | 23/1/2019

Foreword

As we wrote this and read all the reports that dealt with Aviation connected with Manston is became apparent that "experts" had a different way of interpreting the many statistics involved. It also became clear that even the same statistics had different interpretations dependent on whether the information was being used to defend or attack aviation use at Manston. It is hoped that we have tried to remain neutral in our report.

Even when the same report was used to back the claim that Manston was viable important statistics have been selectively interpreted to benefit that viability. As an example Boeing wrote a report stated worldwide aviation would (in their opinion) grow by 6%. What was ignored was this applies to passenger growth and the Manston DCO is for a Cargo Hub using cargo freighters and not passenger planes with bellyhold cargo.

Executive Summary

To be a Nationally Significant Infrastructure Project (NSIP) Riveroak Strategic Partners (RSP) have to show that the UK would benefit from the reinstatement of Manston Airport and that taking the land from the legal owners would benefit the greater need of the population at large. The case for this they have failed to do simply because that need (for a cargo hub handling air freighters only) is simply not required in the United Kingdom and that current capacity restraints will not be reached until 2050 at the earliest if at all. *[2]

- • There is no overall shortage of freight capacity in the UK or South East specifically. While Heathrow is constrained, there is significant spare freight capacity at the established dedicated freighter hubs at Stansted and East Midlands.*[1 Exec summary]

- • Cargo activity in the UK has become much consolidated on the 3 cargo hubs (Heathrow, Stansted and East Midlands). All three of these airports have plans to significantly expand cargo capacity, and they forecast strong growth in cargo tonnage. Furthermore, other established passenger airports have the capability of handling much higher cargo volumes if demand existed. *[1 exec summary]

- • There has been a strong trend towards bellyhold freight, with the role of dedicated freighters diminishing. The most recent (2017) Department for Transport ("DfT") forecasts to 2050 assume the number of freighter flights in the UK will remain flat at 2016 levels.*[1 exec summary]

- • Trucking is a highly integrated component of the air freight business model, and not merely a substitute for air freighter flights when airport capacity is constrained. The increasing use of truck feeder services is due to cost efficiencies and is not restricted to the UK. *[1 exec summary]

- • Manston is in a poor location to serve the wider South East or UK market. Other structural disadvantages include lack of critical mass, lack of a passenger hub, and night flight restrictions. These factors have limited Manston's role to that of a niche freight airport. *1 exec summary

This is analysed under the heading **freight market**

- Further there are the following reasons to worry about the submission as follows

  - 2. Why would the Planning Inspectorate grant a DCO to a UK shell Company with control hidden behind an offshore corporate veil in a Belizean Tax Haven, and especially one that is depending on raising the finance AFTER the DCO is granted? (RSP seem not to have any income unlike many infrastructure companies)

- 3. Without a cap on ATMs why hasn't RSP considered a Public Safety Zone (PSZ) at each end of the runway?

- 4. It seems from the submission that the Northern Grass zone isn't needed as it isn't fundamental to the operation of a cargo hub so why is it included in the CPO powers asked for?

- 5. Why are the (only) two noise monitors positioned 6.5km from the runway (placing the Ramsgate one in the sea) when Central Ramsgate is 3.2KM from the runway?

- 6. Why have RSP reversed the conventional wisdom of landing and taking off INTO the wind? 20 years of commercial aircraft flying dictates the predominant wind is from the South West over the UK which would mean that 70% of cargo flights would overfly Ramsgate on landing and take-off over Herne Bay.

7. How have RSP come to the conclusion that the Manston site is worth £7.5M when "In Spring 2006 Kent County Council acquired the undeveloped area of Manston Business Park, amounting to some 40 acres of developable land, from the Administrator of Planestation plc for £5.35 million"? (*5 KCC-Position-Statement-on-Manston-Airport page 7)

8. Justification for NSIP, We would like the Tribunal to ask RSP why they haven't considered any of the surplus airfields in the middle of the country. For instance both Mildenhall and Lakenheath are looking for buyers and have far better motorway connections without a town of 40000 inhabitants at the end of the runway.

9. Environment

RSP confirm within their documents that the effect of noise and pollution would have an adverse effect on the residents of Thanet "12.7.72 Considering the impact is permanent and a large number of dwellings…………….significant adverse effects…….Ramsgate, Manston, Wade and West Stourmouth" **One has to consider that the possible benefit to the Community at large is outweighed by the detrimental effect on the Residents in the above towns.** (Our emphasis) Further there is another potential environmental risk being glossed over, that is, the volume of heavy goods and fuel bowser vehicles proposed along the Thanet Way daily.

1. FREIGHT MARKET

OVERVIEW OF THE UK FREIGHT MARKET

In 2016 the total freight market in the UK amounted to 484 million tonnes which includes shipping, road haulage and air freight. The airfreight proportion of this market has averaged 2.3 million tonnes which equates to ½ of one percent. This is hardly surprising considering the relative cost of each element with shipping being the most cost effective followed by road haulage and airfreight being up to 4x the cost of shipping by sea.

What has also been a trend since 2004 is freight sharing with passenger flights. This is called bellyhold freight and significantly reduces the overall cost due to cross subsidies and makes up 95% of all freight tonnage at Heathrow the UK's biggest freight airport.

Both these trends count against Manston because passenger numbers are constrained by the catchment area and the determination of RSP to state their preferred route is freighter only.

From 2006 to 2016 the study of the individual freight airports show that bellyhold freight has been increasing to the detriment of air cargo freighters. E.g. Heathrow has increased its total amount of freight handled by 17.5%. From 2006 to 2016 the total freight handled in the UK has increased by a paltry 2.58% (2.31 Million tonnes to 2.38 million tonnes over the same period). East Midlands increased by 9% and Stansted by 9.5%. Obviously with these taking more of a share other airports have gone backwards, Gatwick for instance has lost 50% of its airfreight business in the last 10 years.

However a cargo NSIP only has to prove that they will achieve 10000 ATM's and not the freight tonnage which in theory could mean 5000 aircraft landing and taking off empty which would be hardly sustainable considering the capital expenditure needed to open the airport.

Overall, 29.7% of UK air freight in 2016 was carried on cargo only aircraft, with 70.3% carried in the bellyhold of passenger aircraft.

The Department of Transport (DfT) recently released a report "Moving Britain Forward" *[2]

The following is from the freight element of the report and clearly shows that the DfT believes that freighter only ATM's are in decline and with the choosing of a 3rd runway at

Heathrow this trend will almost certainly continue. With both Stansted and East Midlands both expanding capacity the chance of there being a market for Manston is receding every month it remains closed. Further recent (2016 and 2017) freight tonnage into and out of Gatwick show above average increases due to their management making increasing use of long haul bellyhold freight. They are still only 50% of the 2006 (CAA figures) so can still mop up any constraints found at Heathrow.

Freight

4.4 Freight, in terms of both tonnage and numbers of aircraft movements, has not kept pace with the growth in passenger numbers. In 2011 (70%) and 2016 (69%) most freight by tonnage is carried in the holds of passenger aircraft ('bellyhold'). Total freight carried at the UK airports rose from 2.3 million tonnes in 2011 to 2.4 million tonnes in 2016, with a growth of about 5% in the weight of cargo carried on both freighter and passenger aircraft.[81]

4.5 Figure 4.5 illustrates that the past five years see an extension of trends apparent in the previous decade with modest growth (by weight) of both types of freight. The decline in freighter ATM numbers but relatively constant levels of freight tonnage highlight that air freight has been increasingly carried on bigger freight aircraft.

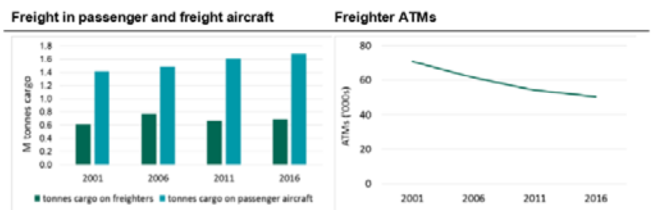
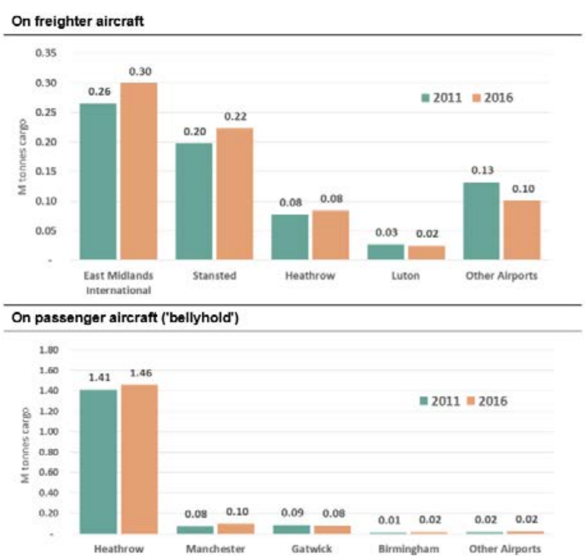


Figure 4.5 Historic freight carried at all modelled airports

4.6 The top five airports for the tonnage of cargo carried in freight aircraft and for freight carried bellyhold in passenger aircraft have changed relatively little from 2011 to 2016. Cargo carried on freighter aircraft is dominated by East Midlands and Stansted which consolidated their positions together carrying 56% of cargo tonnage in 2011 and 63% in 2016.

4.7 Heathrow remains much the most significant airport in terms of freight tonnage carried on passenger aircraft with around 85% of the UK total in 2016. Much of this freight is carried on long-haul aircraft, and reflect Heathrow's strength in that market.

4.8 Figure 4.6 illustrates the top five airports for freight by tonnage for the two types of freight carriage. In both cases it is clear that freight continues to concentrate at a few airports where there are extensive freight handling facilities.



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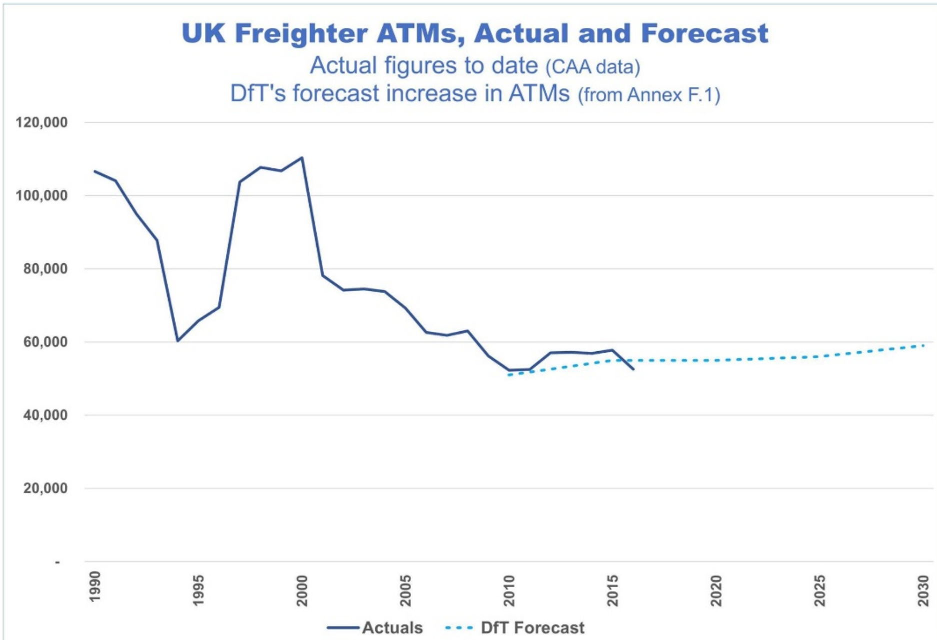


Manston Airport history

Manston has had a civilian conclave since 1959 but since 1989 after it changed the name to Kent International Airport it became dependent on passenger charters and freight however no matter what it renames itself it is only likely to be involved in a niche market because of its geographical position. At its closest it is an hour from the A2/M25 junction adding considerably to the costs of any freight forwarder.

Taking the Civil Aviation Authority (CAA) figures from 1990 to 2014 it is apparent that cargo has only ever been marginal compared to the rest of the freight airports such as Heathrow, East Midlands and Stansted however what it does show is that the average load per ATM during the 24 years of operation was 44 tonnes and this is not reflected in the forecasting by Dr. Dixon.

Several reports have stated the reasons why Manston would not succeed and these include the following points:-

“Note that at no time in the period since 1990 has Manston played a significant part in the UK air freight market. Its share peaked at 2.0% in 2003, and in the 5 full years prior to its closure in 2014 (2009-13), it had an average share of 1.3%. The number of cargo ATMs only exceeded 1,000/year on a single occasion since 2000 (1,081 in 2003), averaging 462/year in the 2009-13 period”

“Although there are no local airspace restrictions, Manston lies beneath some of the busiest cross channel airways giving access to Europe and so movements would need to share airspace capacity with heavy traffic flows to and from the main London airports.”

“Rapid turnaround times that Manston has achieved when handling one or two planes a week. There is no evidence that this could be maintained at higher volumes – in fact, the longer turnaround times at other, busier, airports suggests that it cannot”

“With enough stands, and warehousing and terminal space, Manston could handle a lot of traffic, but that doesn’t mean that it will. In fact if it were this simple why didn’t Wiggins/Planestation and Infratil not build more stands instead of asking for night flights”

Even under previous configurations of the airport they should have been able to handle 21000 cargo ATM’s however because of the geography of the site few Cargo freight forwarders considered it a viable option. In point of fact Gatwick is considered too far south and since 2006 they have lost 50% of their freight tonnage.

CAA produces airport statistics

Monthly and annually for all UK airports. **CAA airport data**

Freight. Tonnes **Source – CAA data**

Airport	**2006**	**2015**	**2016**	**% change in 2016**	
HEATHROW	1,263,128.9	1,496,537.4	1,541,028.7	3	
EAST MIDLANDS INTERNAT	272,302.9	291,688.6	300,101.2	3	
STANSTED	224,312.2	207,996.4	223,202.8	7	
MANCHESTER	148,957.4	100,020.7	109,630.2	10	
GATWICK	211,856.8	73,371.1	79,587.9	9	
BIRMINGHAM	14,681.0	7,163.8	30,009.7	319	
LUTON	17992.9	28007.8	25425.7	-9	
EDINBURGH	36388.8	19322.0	20368.9	5	
GLASGOW	6288.7	13192.8	12920.7	-2	
PRESTWICK	28536.7	11241.6	10821.9	-4	
DONCASTER SHEFFIELD	167.2	3201.1	9340.8	192	
BELFAST INTERNATIONAL	38416.7	30388.7	7597.4	-75	
ABERDEEN	4021.6	6545.5	5730.8	-12	
NEWCASTLE	306.3	3717.1	4574.4	23	
COVENTRY	7785.4	2258.5	2031.6	-10	
Total London area airports	1,717,360	1,805,941	1,869,314	4	78.4% of UK total
Total All Reporting UK Airports	2314546.0	2299328.0	2385231.0	4.0	

Azimuth Associates

Dr. Dixon has written a report (https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-002459-7.4%20-%20Azimuth%20Report.pdf to explain just why RSP believe Manston is an NSIP, however many more experts have repudiated all of her forecasts (this includes the figures in York Aviation's reports that she quotes in her forecasts). It does seem rather strange that the only report in support of a Cargo Hub at Manston (and there have been a few) is the one written by Dr. Dixon.

Name of report	Commissioned by	Date of report	Verdict
Davies Commission	HM Gov	Various 2013 onwards	Manston too small to be a feeder hub
Falcon	TDC	July 2014	Not viable
KCC	KCC	March 2015	Not viable
Price Waterhouse	TDC	22 June 2015	Insufficient resources for CPO
Avia	TDC	September 2016	Not viable
Avia final	TDC	August 2017	Not viable
York Aviation	SHP	September 2017	Sally Dixon's work was flawed
Critique of Azimuth	NNF	February 2018	Sally Dixon's work was fatally flawed
Altitude Aviation	SHP	March 2018	Not Viable and Sally Dixon's work is flawed

Azimuth Associates (Dr. Dixon) has produced a series of forecasts with the intent of "proving" RSP's contention that reopening Manston would be an NSIP (an NSIP in cargo aviation terms is 10000 air traffic movements (ATM's)) however it is particularly noticeable that she has worked backwards to achieve this aim instead of looking at Manston's past performance and working forward. Several reports have clearly stated that her forecasts are simply unrealistic. (Altitude Aviation and York Aviation's (*3) reports)

We are, however, more concerned about the fundamentals of the way in which she approaches her forecasts. The NSIP requirement is for 10000 ATMs which historically Manston has never achieved. In fact from 1990 until 2012 (22 years) Manston failed to achieve 10000 ATMs at all and yet according to Dr. Dixon RSP will achieve that magic figure inside 7 years simply by increasing the number of aircraft stands from 2 to 19. Something is simply wrong.

Table 3.7 Manston Airport Air Freight Forecast

Year of Operation	Air Freight Class C ATM	Air Freight Class D ATM	Air Freight Class E ATM	Total Air Freight ATM	Total Air Freight Volume (tonnes)	Total Air Freight HGV Movements
1	0	0	0	0	0	0
2	1,882	1,974	1,396	5,252	96,553	9,903
3	2,194	2,052	1,558	5,804	108,554	11,427
4	3,650	4,314	1,736	9,700	167,091	18,064
5	3,754	4,314	1,868	9,936	173,741	19,305
6	3,858	4,392	1,894	10,144	181,436	20,736
7	4,482	4,470	1,920	10,872	192,908	22,695
8	4,690	4,548	1,946	11,184	200,673	24,324
9	4,898	4,548	1,946	11,392	216,765	27,096
10	5,002	4,626	1,972	11,600	212,351	27,400
11	5,202	4,811	2,051	12,064	222,377	29,650
12	5,410	5,003	2,133	12,547	234,508	32,346
13	5,627	5,204	2,218	13,048	244,690	34,956
14	5,852	5,412	2,307	13,570	256,989	38,072
15	6,086	5,628	2,399	14,113	270,579	41,628
16	6,329	5,853	2,495	14,678	283,904	45,425

From Dr. Dixon *4

With reference to the previous history of Manston, compiled over a 24 year period, it shows that every ATM averaged 44 tonnes of cargo which is an historical fact and should have been the basis for the forecast. Notwithstanding RSP have failed to produce a meaningful business plan breakdown it makes sense to look at where Manston's niche market lay.

Manston figures from 1990-2014

	Freight			Passengers			Totals			avg tonnage per plane
Year	atms	Tonnage	average per atm	atms	Numbers	Avg per atm	Atms	Planes	Planes per week	
1990	105	2068	19.70	342	18608	54.41	447	224	4.3	39.39
1991	187	2925	15.64	86	4414	51.33	273	137	2.6	31.28
1992	155	1938	12.50	91	6459	70.98	246	123	2.4	25.01
1993	152	2204	14.50	130	7810	60.08	282	141	2.7	29.00
1994	203	5326	26.24	53	3382	63.81	256	128	2.5	52.47
1995	227	5073	22.35	49	2523	51.49	276	138	2.7	44.70
1996	92	1918	20.85	13	941	72.38	105	53	1.0	41.70
1997	68	2206	32.44	62	2936	47.35	130	65	1.3	64.88
1998	223	5655	25.36	46	2269	49.33	269	135	2.6	50.72
1999	700	22785	32.55	46	1511	32.85	746	373	7.2	65.10
2000	920	32239	35.04	64	7594	118.66	984	492	9.5	70.08
2001	911	35521	38.99	26	5761	221.58	937	469	9.0	77.98
2002	800	32240	40.30	5	52	10.40	805	403	7.7	80.60
2003	1081	43026	39.80	25	3256	130.24	1106	553	10.6	79.60
2004	730	26626	36.47	2603	100592	38.64	3333	1667	32.0	72.95
2005	177	7612	43.01	4454	206875	46.45	4631	2316	44.5	86.01
2006	322	20841	64.72	139	9845	70.83	461	231	4.4	129.45
2007	444	28371	63.90	164	15556	94.85	608	304	5.8	127.80
2008	412	25673	62.31	128	11625	90.82	540	270	5.2	124.63
2009	485	30038	61.93	96	5335	55.57	583	292	5.6	123.87
2010	491	28103	57.24	660	25692	38.93	1151	576	11.1	114.47
2011	389	27495	70.68	1083	37169	34.32	1472	736	14.2	141.36
2012	432	31078	71.94	255	8262	32.40	687	344	6.6	143.88
2013	511	29306	57.35	1129	40143	35.56	1640	820	15.8	114.70
2014	229	12696	55.44	392	12385	31.59	621	311	18.3	110.88
	10446	462963								88.64

Using this as a basis and comparing it to the figures produced by Azimuth it becomes apparent Dr. Dixon has chosen to reduce the tonnage per ATM simply to ensure the 10000 ATM's are reached.

Year	Azimuth ATM	Azimuth Tonnage	Average per ATM	Historical ATM	Tonnage	Average per ATM
2	5252	96553	18.38	2194	96553	44
5	9936	173741	17.48	3948	173741	44
10	11600	212351	18.30	4826	212351	44
15	14113	270579	19.17	6149	270579	44

Extrapolated from the CAA and Dr. Dixon's report

Using the appropriate, more cost effective cargo tonnage it does show that even after 20 years the figure of 10000 will not be reached. It may be that RSP wants to attract far smaller freight planes however even then freight planes would on average carry far bigger loads than Dr. Dixon utilises.

Notwithstanding the above it is still our contention that even these figures will not be reached due to the previous reasons quoted.

2. FUNDING

On the acceptance of the DCO the Planning Inspectorate wrote to RSP to advise them on the terms of them being accepted for Examination. This letter dated 14th August 2018 made it clear there were several areas that needed immediate work BEFORE examination. The Funding Statement (document 3.2) was clearly singled out as being subject to revision "As reflected in Box 30 of the Checklist, the Inspectorate considers that the Funding Statement poses substantial risk to the examination of the application." We couldn't agree more. Further it clearly want more information on the following:

- *In the generality, further evidence that adequate funds will be available to enable the Compulsory Acquisition of land and rights within the relevant time period.*
- *Further information in respect of Riveroak Strategic Partner's (RSP) accounts, shareholders, investors and proof of assets.*
- *Further clarification in respect of the term "completion of the DCO" (Funding Statement para 12, 13, 27).*
- *Further details of RSP's Directors, staff, auditors etc.*
- *Further details of the funders who have already expressed interest and others that are likely to come forward (Funding Statement, para 23).*
- *Further justification as to why Article 9 of the draft DCO is appropriate and provides sufficient security for individuals in consideration of the provisions of the Human Rights Act 1998.*
- *Further information on the sources and availability of funding for the Noise Mitigation Plan.*
- *Further information on the joint venture agreement (Funding Statement, para 19 etc.).*
- *Further details of how the costs set out in the Funding Statement at paragraph 15 have been estimated.*
- *Further evidence to support various statements such as:*
- *"The investors are willing to underwrite the cost of any blight claims or eventual claims in compensation [...]" (Funding Statement, para 10).*
- *"Riveroak anticipates that it will raise further equity and debt finance following the making of the DCO in order to develop the authorised development to completion" (Funding Statement, para 11).*
- *"[Riveroak] have drawn down £500,000 from their investors" (Funding Statement, para 20).*

Point 1 is the compensation to the owners in the event the DCO (and CPO) is granted and is based on a valuation by CBRE of £7.5M for the 720-800 acres. This valuation can only be derisory as based on previous valuations and purchases, notably the purchase in 2005 by KCC "In Spring 2006 Kent County Council acquired the undeveloped area of Manston Business Park, amounting to some 40 acres of developable land, from the Administrator of Planestation plc for £5.35 million" (*5 KCC-Position-Statement-on-Manston-Airport page 7)

Further in 2005 Infratil purchased the airport from the administrators of the defunct Planestation for a figure of £17M

Infratil Limited is a successful company listed on the New Zealand stock exchange with the primary purpose of investing in electricity distribution, public transport and ports. The company was established in 1994 with NZ$50m of capital. At the time it acquired Manston and Prestwick airports it controlled assets worldwide in excess of NZ$ 4.4 billion.

Following Wiggins' demise, Infratil Limited bought Manston Airport from the Administrator for £17 million in August 2005.

From KCC report (*5 KCC-Position-Statement-on-Manston-Airport)

From the 1st example and without inflation the developable land should be worth around £100M and from the second at least £25M (with inflation).

The whole structure has been designed to obfuscate the real ownership of RSP and to hide the source of funds and who controls the entity.

RSP is a series of shell companies registered in the UK but controlled by an entity, MIO Investments Limited, which is based in Belize. These UK registered companies include the following entities

Name	Company number	Shareholding	In control
Riveroak Strategic Partners	10269461	1000 Riveroak Manston Ltd 9000 MIO Investments Ltd	Unknown
Riveroak Manston Limited	10286975	1 Anthony Freudmann 2 Niall Lawlor 1 GY Manston LLC (USA)	Niall Lawlor
Riveroak Operations Limited	10311804	1 Riveroak Strategic Partners	RSP
Riveroak AL Limited	10269458	1 Riveroak Strategic Partners	RSP
Riveroak Fuels Limited	11535715	1 Riveroak Strategic Partners	RSP

It is understandable just why the Planning Inspectorate is concerned about "Further information in respect of Riveroak Strategic Partner's (RSP) accounts, shareholders, investors and proof of assets." As the ultimate control is masked within M.I.O. Investments Limited based in Belize.

Further RSP confirm that they do not have the funds to complete the DCO process only that they say "*Riveroak anticipates that it will raise further equity and debt finance following* *the making of the DCO in order to develop the authorised development to completion*" (Funding Statement, para 11).

The final point that the PI identify *"[Riveroak] have drawn down £500,000 from their investors*" (Funding Statement, para 20) is an oddity in itself seeing that this £½ million seems to have been placed in a separate legal entity "Freudmann Tipple International Limited (05429140)"

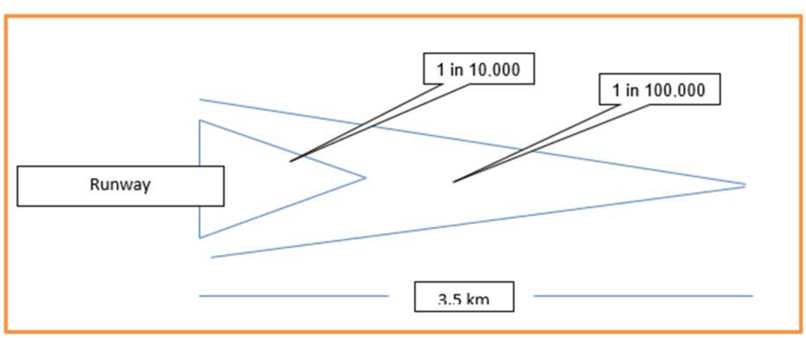
10. Related party transactions

At the balance sheet date, Mr A Freudmann, a director and shareholder owed the company £Nil (2017: £36,495). Interest has been charged on all outstanding balances at 3%.
During the year, the company held funds in trust for Riveroak Operations Limited, a company of which Mr A Freudmann is a director. At the balance sheet date, the company held £588,906 (2017: £187,324).

3. PUBLIC SAFETY ZONE

Our submission notwithstanding that 10000 ATM's are unachievable RSP should have considered whether Manston Airport needs a PSZ because they state that the potential number of ATM's is 83220 and they also state they will not cap the number of flights. The logic says that both 83220 and PSZ's are potentially capable they should be considered together (worst case scenario)

The area of a Public Safety Zone corresponds to the 1 in 100,000 individual risk contour for an airport. These tend to be two triangular shapes extending out for 3-4 kilometers from either end of the runway. Whilst aircraft follow a number of routes surrounding an airport, it is statistically more likely for an airport-related aircraft incident to occur on landing rather than on take-off so the landing PSZ tends to be a longer triangle than the take-off triangle.



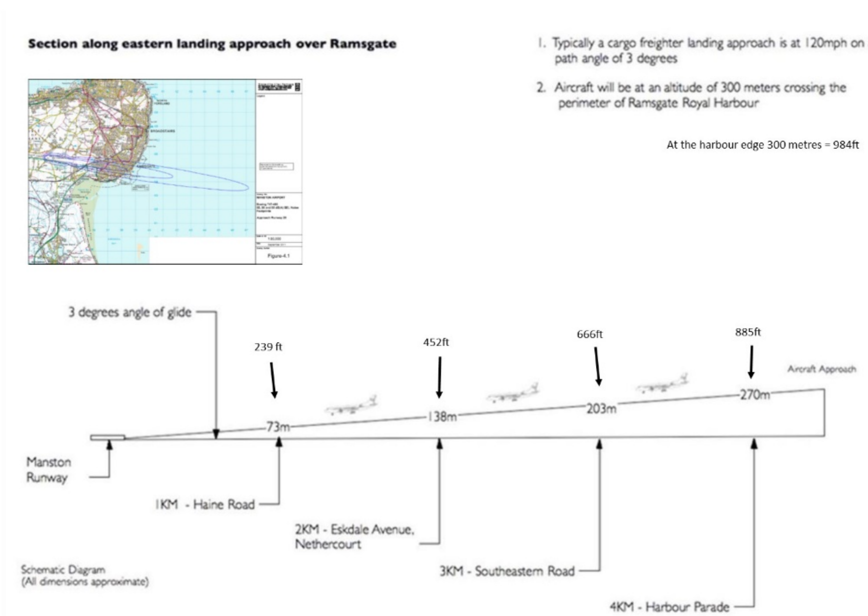
The last Masterplan done for Manston in 2010 (*6 page 22) acknowledged that its PSZ should have been done in 2006. It was not. But by looking at other airports and knowing the pattern of aircraft take off and landings at Manston it is possible to gauge the likely shape of the PSZ that would affect Ramsgate.

The number of variables to be taken into consideration when determining the risk contours are:

- Annual traffic movements
- Maximum Take-off Weight Authorised (MTWA)
- The crash consequence model includes population density
- The number of crashes per million movements done by using crash rates for each aircraft class
- The crash location model for large and light aircraft

(2009-11-KIA-Master-Plan-Final-Infratil)

Aircraft landing at Manston used to line up at 300 metres above the harbour and descended across the most densely populated area of Ramsgate to the runway at the edge of town.



The 1 in 10,000 contour would most likely be a triangle extending a 1-1.5 km beyond the end of the runway. The 1 in 100,000 contour, and thus the PSZ, would extend approximately 3.5-4km from the end of the runway. It would cover a substantial area of Ramsgate right down to the harbour and including part of the town Centre. Three schools, Clarendon House Grammar School, Christ Church Primary School and Ellington Infant School, are within the 1 in 100,000 risk contour.

The 1 in 10,000 risk contour would include a number of residential streets on the Nethercourt Estate, It also includes the, as yet unbuilt, estate to be named **Manston Green.** This new estate of some 785 dwellings, given planning permission prior to the consultations, isn't even mentioned in the 10500 pages of the DCO submission and has not even been considered for compensation purposes but lies well within the PSZ for a busy airport. These residents would need to be moved and in the case of Manston Green the developer would need to be compensated for the loss of their development.

Position of Manston Green development.

4. NORTHERN GRASS

Without going into a great deal of detail it is apparent that much of the land north of the B2050 isn't required by RSP in their pursuit of achieving 17000 ATM's. To make it clear from section 3 we do not believe this number of ATM's is achievable either however in the interest of fairness we will assess their needs notwithstanding.

There are other Aviation experts who will deal with the detail however just to be clear we reproduce a map of the area we believe isn't required to run a cargo hub.

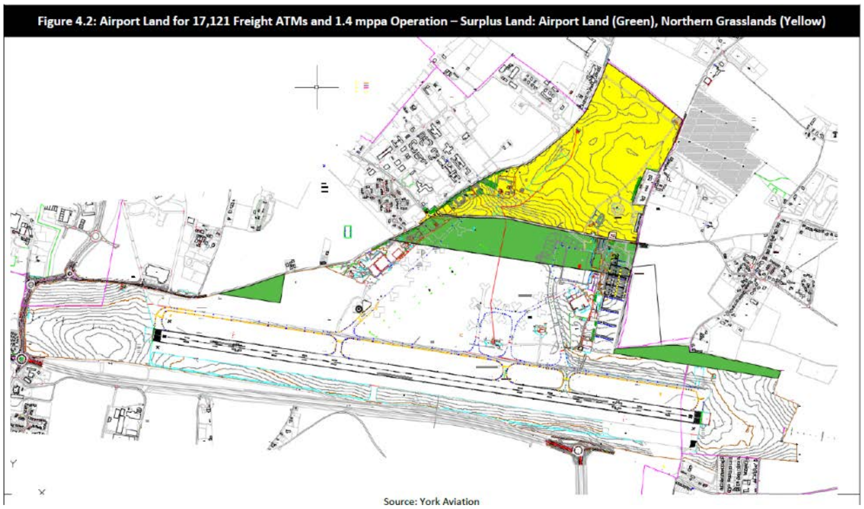


Figure 4.2: Airport Land for 17,121 Freight ATMs and 1.4 mppa Operation – Surplus Land: Airport Land (Green), Northern Grasslands (Yellow)

Source: York Aviation

Reproduced from a report dated November 2017 York Aviation *7 SHP-York-Aviation-Summary-Report-Final pg 57

From the same report they believe that a cargo hub could be run perfectly well, notwithstanding the ATM's aren't possible, and they believe the surplus land would be used to cross subsidise a loss making cargo hub.

"*4.19 No other justification is given for the extent of the commercial development shown on the 'Northern Grassland' part of the site. In our view, it is certainly not 'associated development 'required to support the operational airport, other than in terms of providing a financial cross subsidy from rental income for general commercial buildings*." And further

"*4.24 We can see no justification for the inclusion of the 'Northern Grasslands' within the DCO as associated development as there will be little requirement for the relocation of freight forwarding activity from adjacent to the UK's main cargo hub at Heathrow to Manston and any requirement could be accommodated south of the B2050. The development on the Northern Grasslands site appears to be speculative commercial development which, based on the precedent at East Midlands Airport – the UK's principal airport for pure freighter operations – would be expected to be largely for non-aviation related uses."*

*7 SHP-York-Aviation-Summary-Report-Final pg 58

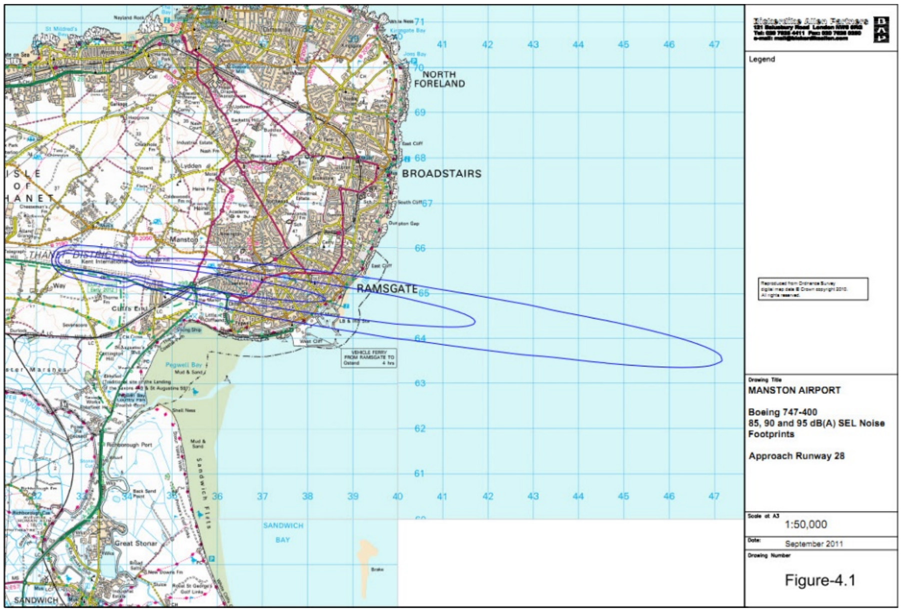
5. NOISE MONITORING

The DCO clearly states that they will be monitoring the noise from aircraft landing and taking off by positioning 2 noise monitors 6.5km from the runway. This, however, isn't possible at the Ramsgate end of the runway. Ramsgate at its closest is 1.2KM and at the harbour is 4km and even allowing for where the aircraft starts rolling 6.5KM will terminate in the main shipping channel. Whoever wrote that statement obviously has no idea how close a town of 40000 people is from the end of the runway?

6. LANDING AND TAKE-OFF

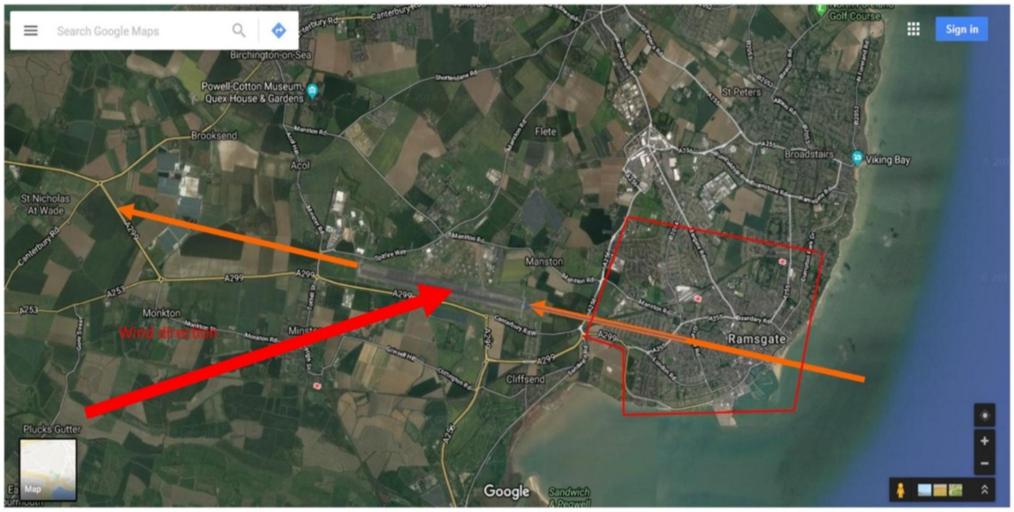
20 years of commercial aircraft flying dictates the predominant wind is from the South West over the UK which would mean that 70% of cargo flights would overfly Ramsgate on landing and take-off over Herne Bay. Within the Environmental statements RSP seem to imply that this 20 years of practice will be changed to the complete opposite which is rather odd seeing as aircraft land into the wind for stability and also take-off into the wind to facilitate a smoother lift.

70% of all landings are over Ramsgate because of the wind and only 30% of take-offs are over Ramsgate. Clearly this will have to be examined but using conventional wisdom 7000 landings a year will be from the harbour to Manston and 3000 take-offs will be over Ramsgate generating the following noise contours.

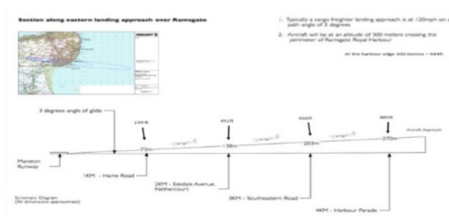


Landings from the East Boeing 747

Take off to the East Boeing 747 noise contours at 85, 90, and 95 Db



Predominant wind direction is from the South West. This means 70% of aircraft land in the direction of the orange arrows over the marked red zone and take off in the direction of Herne Bay



7. VALUATION

See section 2

8. Justification for NSIP

We would like the Tribunal to ask RSP why they haven't considered any of the surplus airfields in the middle of the country. For instance both Mildenhall and Lakenheath are looking for buyers and have far better motorway connections without a town of 40000 inhabitants at the end of the runway.

Nowhere in the document "TR020002-002382-2.3 - NSIP Justification" does it mention whether other surplus airfields have been assessed.

In the document "TR020002-002386-3.1 - Statement of Reasons" there is the following

"4.10 A cargo-focused airport at Manston Airport would meet that need as it has several advantages:

4.10.1 A long runway that can accommodate all types of aircraft;

4.10.2 Close to London but outside congested London airspace;

4.10.3 A focus on freight rather than passenger flights and significant airport capacity will provide a reliable and thus attractive service to freight companies; and

4.10.4 Dual carriageway or better access to the M25, London and the Channel."

Nowhere however have RSP considered that Mildenhall or Lakenheath, both surplus and operational, could meet the needs of their cargo hub without the need for a DCO and CPO powers. Both airfields are more central, would meet the needs of a hub and are closer to the market. Being as they are both close to the A14 (access to the midlands and the seaport of Felixstowe) and M11 (access to the M25)

There, of course, maybe other surplus airfields as both the USAF and RAF continually review their requirements.

9. Environment

Within their documentation RSP state that there would be adverse effects on the Ramsgate population but they think that their uncosted (as in derisory payments without sufficient monies to pay for it) is sufficient to justify the 7000 landings and 3000 take-offs a year (notwithstanding our belief this is unachievable). In the last 20 years of Manston's life they failed to achieve 10000 ATM's so there is no one alive today living in Ramsgate that has lived through the number of ATM's RSP propose and further this excessive disruption cannot be justified as RSP have yet to prove that a Cargo Hub is viable.

CONCLUSION

Finally it must be proven to the satisfaction of the Examiner that various criteria have been met. It is in our contention this is a resounding NO. The Planning Act 2008 makes things clear and it is also apparent that PINS isn't convinced.

"Further justification as to why Article 9 of the draft DCO is appropriate and provides sufficient security for individuals in consideration of the provisions of the Human Rights Act 1998."

Further consideration should be examined carefully:-

Guidance Related to Procedures for Compulsory Acquisition (DCLG February 2010) (issued under section 124 Planning Act 2008) sets out general considerations which are to be applied *when considering whether compulsory acquisition is justified. The following guidance is given (at paragraph 24):*

"The first criterion is that the land is required for the development to which the development consent relates. For this to be met, the promoter should be able to demonstrate to the satisfaction of the decision-maker that the land in question is needed for the development for which consent is sought. The decision-maker should be satisfied, in this regard, that the ***land to be acquired is no more than is reasonably required for the purposes of the development****"* (our emphasis)

Further

"In practice it is necessary, when considering confirmation of any CPO, to address the question of whether there is a ***compelling case in the public interest (***our emphasis***)****, in order to address the policy in the Circular and in order to address considerations arising when Article 1 Protocol 1 and Article 8 (European Convention on Human Rights ("ECHR")) rights are engaged. As a result the addition of a statutory test is unlikely to change the way in which confirmation of CPO's (or in the case of DCO, inclusion of powers of compulsory acquisition) is likely to be approached."*

And

"The overarching public interest test is whether there is a ***compelling case in the public interest (***our emphasis***).*** *As the Circular advises (17), an authority should be sure that the purposes for which it is making the CPO* ***sufficiently justify interfering with the human rights of those with an interest in the land affected."*** *(*Our emphasis*)*

And

Before proceeding to any CPO the Examining Authority should seek further information on their plans for the site from the new owners. The Examining Authority must be in a position to ***assess the degree of interference with the landowner's human rights****, and also, if appropriate, to* ***consider the benefits of their alternative proposals for the site to strike the public interest balance****. (*Our emphasis*)*

In seeking to justify any CPO the Examining Authority would have to show that the benefits of what it proposed would be so extensive that (notwithstanding the merits of the new owners' proposals) ***the public interest v human rights balance would still be in favour of the CPO. (***f*)*

*It should be remembered that a CPO is a last resort, Counsel would not advise against attempting to negotiate. Indeed, in order to strike the balancing exercise properly (and safely) it is in the Examining Authorities interest to understand the new owner's position, and their intentions for the land. *Guy Williams, Landmark Chambers*

What is clear is that nowhere in the DCO application is a comparison made with the existing owners plans either financially or which would benefit the wider (Thanet) community better. It should be part and parcel of the examining authority to look at both schemes and to assess whether there is a compelling case in the public interest. As the Circular advises (17), an authority should be sure that the purposes for which it is making the CPO sufficiently justify interfering with the human rights of those with an interest in the land affected.

References

*[1] Altitude Aviation Report Web reference for original report. Attached as appendix 1

http://www.stonehillpark.co.uk/images/uploads/documents/Altitude_Aviation_Report.pdf

*[2] (DfT "Moving Britain Ahead") Web reference for original report. Attached as appendix 2

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624990/transport-investment-strategy-web.pdf

*[3] York Aviation "Key Findings of York Aviation Report" Web reference for original report. Attached as appendix 3

http://www.stonehillpark.co.uk/images/uploads/documents/SHP-York-Aviation-Summary-Report-Final.pdf

*[4] RSP Transport Assessment. Available on PINS

https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR020002/TR020002-002434-5.2-15%20-%20Environmental%20Statement%20-%20Volume%2015%20-%201%20of%202%20-%20Transport%20Assesment%20-%20Part%201%20of%202.pdf

*5 KCC-Position-Statement-on-Manston-Airport. Attached as appendix 4

*6 2009-11-KIA-Master-Plan-Final-Infratil. Attached as appendix 5

*7 SHP-York-Aviation-Summary-Report-Final. Attached as appendix 6

Analysis of the Freight Market Potential of a Reopened Manston Airport

Issued: January 2018

(Analysis completed in October 2017)

Scope of the Report and Limitation of Liability

- This report contains the results of our analysis in relation to potential air cargo demand at the former Manston Airport site (the "Work"). It has been prepared for Stone Hill Park Limited ("SHP") in connection with the proposed application for a Development Consent Order by RiverOak Strategic Partners Limited and for no other purpose. The proposed application is for the redevelopment and reopening of Manston Airport for international air freight along with passenger, executive travel and aircraft engineering services ("the Project"). The proposed application would also, we understand, seek to compulsorily acquire the whole of the former Manston Airport site from SHP.
- We do not accept a duty of care to any person other than SHP in respect of this report.

ALTITUDE AVIATION ADVISORY LIMITED

January 2018

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1. Introduction

1.1. Objectives of the Study

1. This report has been commissioned by Stone Hill Park Limited ("SHP"), the owners of the former Manston Airport site. The site is currently subject to a proposed application for a Development Consent Order (“DCO”) under the Planning Act 2008 currently promoted by RiverOak Strategic Partners Limited (“RSP”). The proposed application is for the redevelopment and reopening of Manston Airport for international air freight along with passenger, executive travel and aircraft engineering services (“the Project”). RSP contends that the Project is a Nationally Significant Infrastructure Project for airport development for air freight and hence, should fall within the Planning Act 2008. RSP's proposed application could also seek powers of compulsory acquisition over the site, allowing RSP to compel the purchase of the site from SHP's ownership to RSP's ownership. The report has been developed in this context.

2. To date, RSP has generated a range of submissions as part of the DCO pre-application process. These include reports commissioned from Azimuth Associates (“Azimuth”)[1] and Northpoint Aviation Services (“Northpoint”)[2].

3. The objective of this report is to provide a review of the Azimuth and Northpoint reports. We also review other relevant documents, including two AviaSolutions reports[3] commissioned by Thanet District Council.

4. The Azimuth and Northpoint submissions are notable for making major assertions as fact without providing relevant supporting evidence. While we have drawn on our own extensive experience in the UK and international airport sector, we have utilised published material to support our analysis. As such, we have made efforts to limit the extent to which we rely on our own opinions, assumptions and/or calculations.

5. The focus of our analysis is the air cargo sector. We provide an evidence based assessment of key issues impacting the future development of air cargo in the UK. This comprises of:

   - Review of key historic and likely future trends in the air cargo sector.
   - Assessment of the ability of existing airports to meet future freighter and bellyhold cargo demand in the UK.
   - Appraisal of the ability of the Manston Airport site (if re-opened) to support the future development of the UK air cargo sector. Specifically, we investigate whether the site has the potential to meet the objectives specified by RSP in its proposed DCO application.

6. In this report, we do not, at this stage, undertake an in-depth review of air passenger related issues.

[1] (Azimuth Associates, 2017 a), (Azimuth Associates, 2017 b), (Azimuth Associates, 2017 c)
[2] (Northpoint Aviation Services)
[3] (AviaSolutions, 2016), (AviaSolutions, 2017)

1.2. Structure of the Report

7. Later in this section (Section 1.3), we provide an overview of the air cargo sector for the general reader. This includes an explanation of some key terms used in our report and an overview of important market dynamics. In the appendices (sections 10 and 11), a fuller description is provided.

8. A brief overview of Altitude Aviation Advisory is presented in Section 1.4.

9. The next section of the report (Section 2) is the Executive Summary.

10. In Section 3, we review the introductory section of the Azimuth suite of reports. In particular, we review the stated aims of the Azimuth reports, and comment on whether the questions put forward by Azimuth are appropriate and sufficiently targeted to adequately support the proposed DCO application.

11. In sections 4 to 7, we present our own analysis of the UK and global cargo market, including historic trends and outlook. This is then referenced later in the report when we critique the Azimuth freight forecasts.

    - Section 4 – We provide an analysis of how the UK cargo sector has developed, and focus on individual airports that are relevant in the consideration of the future potential for Manston. We also provide a summary of Manston's historic performance.
    - Section 5 – We investigate if there is an overall shortage of airport freight capacity in the UK, or if shortages are restricted to Heathrow only.
    - Section 6 – We provide a review of published capacity expansion plans from existing airports. This allows us to build up a picture of freight capacity at UK airports in the period to 2050.
    - Section 7 – Our forecast for UK freight demand is presented in this section. Our forecasts are compared with other published projections. We also assess whether there is likely to be any overall imbalances between demand and supply in the period to 2050.

12. In Section 8, we provide a comprehensive review of the Azimuth freight forecasts for Manston. This includes a critique of the methodology as well as the forecast projections themselves.

13. In the appendices, background material on the air freight segment and recent trends is included. There is also a case study of two major European freighter airports and further supporting analysis for some of the material in the main body of the report. We also review other related reports by Northpoint (on behalf of RSP) and AviaSolutions (on behalf of Thanet District Council).

14. Finally, a list of figures and a list of references are included at the end of the document.

1.3. Introduction to the Air Cargo Sector

15. Generally, products that make use of air transportation are high value and/or time critical, and can be easily packaged.

16. Whilst there are many different types of *air cargo*, at a high level, most can be categorised as either *freight*[4] or *mail*. Most freight can then be defined as either *general* or *express*.

    - Mail is typically letters and parcels, delivered to final destination by the postal service of a given country.
    - Express freight is typically "next-day" shipments that are collected from the shipper by close of business and are required by the consignee by close of business the following day.
    - General freight is everything else (this category is very broad, and also includes several types of low-volume specialist products such as hazardous, valuable and live animal cargo).

[4] In this report, we concentrate on the freight segment (which is more relevant in the context of Manston). Where it is not meaningful to distinguish between freight and mail, we provide analysis of the air cargo segment overall.

17. Air cargo can be carried either in a dedicated aircraft (a *freighter* or *cargo only aircraft*), or in the hold of commercial passenger aircraft (when it is known as *bellyhold cargo*).

18. A freighter aircraft will be able to carry more cargo than can be carried in the bellyhold of a similarly sized passenger aircraft. Furthermore, freighter aircraft are able to handle larger individual pieces of cargo than can be loaded in the bellyhold of passenger aircraft.

19. With this exception, there is typically no aircraft driven preference from the customer as to whether cargo is shipped in a freighter or in the bellyhold of a passenger aircraft. Other sources of preference include:

- Freighters may be the only option if there are no passenger flights offering bellyhold capacity (the number of unserved destinations has shrunk as the number of passenger flights has grown).
- From an origin with both bellyhold and freighter capacity, a larger number of frequencies and destinations may be available via bellyhold, due to the generally more extensive schedules of passenger airlines than cargo airlines.
- Bellyhold capacity on passenger aircraft is often significantly cheaper to provide than freighter capacity, as many of the largest fixed costs are assigned to the passenger business (e.g. aircraft operation, landing fees, fuel needed to fly the aircraft[5]).

20. In recent years, bellyhold has been capturing an increasing share of the overall air cargo market. This is a global development, primarily due to faster growth in passenger demand than cargo demand. Therefore, bellyhold cargo capacity has been growing ahead of cargo demand, diminishing the need for dedicated freighter aircraft.

21. The air transport of air freight is typically carried out by one of three types of operator:

- *Cargo only airlines* (using freighters), such as Cargolux.
- *Passenger airlines* (using bellyhold space on passenger aircraft), such as British Airways. Some passenger airlines also operate a number of freight-only aircraft (a relatively small number compared to the number of passenger aircraft they operate).
- *Integrators*, such as DHL, use a mix of their own freighter aircraft and purchased space on passenger aircraft. A large majority of the cargo handled by integrators is express freight. Integrators have a wider role than purely air transportation; they transport freight from door-to-door using a network of vans and trucks, as well as aircraft when necessary.

22. All carriers make extensive use of trucking in order to get freight to/from an airport. *Road feeder services* use trucks to bring freight to an airport from consolidation points across the catchment region.

23. Additionally, trucks will replace flights where it makes economic sense to do so.

- For express freight, where next day delivery is required, this typically includes destinations within ca. 500km of the airport.
- For general freight (i.e. without next day delivery requirement), trucks may be the more economic option for any intra-regional route. Replacement of flights with trucks has become more prevalent in Europe, to the extent that Airbus comments on it in their most recent forecast.

24. In this report, we refer to the concepts of *passenger hub* and *cargo hub* airports. These are terms that can be used somewhat loosely, and on occasion can simply be used to signify a large airport. For clarity, we define here precisely what we mean by these terms.

25. First, it is useful to present the Airports Commission[6] definition of a passenger hub:

[5] Incremental fuel needed for the uplift of cargo will typically be charged to the cargo business.
[6] (Airports Commission, 2015, p. 13)

> *"Airlines and alliances route their traffic through one or more key airports ('hubs'), with feeder traffic from other airports in the network (the 'spokes') supplementing local origin and destination traffic at the hub. For passengers, the hub-and-spoke model maximises the choice of direct destinations at the hub airport and offers potential to travel to a very wide variety of destinations on one ticket."*

26. Although the UK has several large airports, Heathrow is the only major passenger hub in the UK. A significant proportion of its passengers are transfer or connecting passengers (changing flights at Heathrow). In contrast, Gatwick is not a major passenger hub, despite being the 8th largest airport in Europe in 2016. Its traffic primarily consists of passengers starting or finishing their air journey at Gatwick.

27. The concept of a cargo hub is similar to a passenger hub. Cargo is fed into the hub from a wide geographic area. This can be through cargo feeder flights generating *transhipment cargo* (cargo which is transferred from one aircraft to another at the cargo hub). The other source of cargo that feeds into a cargo hub is from road feeder services. These trucking routes play a similar role to flights in bringing freight from a large catchment into the airport, which is then transferred to a flight (or even onto another trucking service).

28. Major passenger hubs are frequently also acting as cargo hubs (due to the significant amount of bellyhold capacity available, the schedule connectivity, and the economies of scale). Heathrow is the UK's largest cargo hub, despite having a relatively small number of dedicated freighter services. Frankfurt is a leading example of a major passenger hub that also has an extensive range of freighter flights.

29. The other two cargo hubs in the UK are East Midlands and Stansted. Neither airport is a passenger hub. In both cases, cargo is almost exclusively carried on dedicated freighter aircraft. *Dedicated freighter hubs* (cargo hubs at non-passenger hub airports) typically have fairly unrestricted operating conditions (e.g. 24-hour operations, slot availability) and are centrally located. Integrators usually account for a substantial share of cargo at dedicated freighter hubs.

30. These definitions are important in the context of Manston. The location of Manston on a peninsula prevents its development as a cargo hub[7]. Even if the airport was to successfully attract high cargo tonnage in the future (which we consider unlikely), it would merely become a large cargo airport rather than a cargo hub.

31. The final term to introduce is *freight forwarders*. These are firms specialising in arranging storage and shipping of merchandise. Freight forwarders typically provide warehousing, negotiate and book aircraft cargo space, prepare documentation, arrange insurance and track progress of freight. They also consolidate cargo, where several smaller shipments are assembled and shipped together to avail of better freight rates and security of cargo[8]. Freight forwarder activity is usually concentrated at major cargo hubs (whether bellyhold or dedicated freighter hubs). This is due to economies of scale benefits.

[7] True cargo hubs are at the centre of their catchment area, with 360-degree connectivity (i.e. receiving road feeder services from all spokes of the wheel). Due to its location, Manston could only receive road feed from the west of the airport.

[8] www.businessdirectory.com

1.5. About Altitude Aviation Advisory

32. Altitude was formed in May 2013, and brings together a wide range of experience gained within the aviation sector. The two principals have worked in the aviation sector for a combined total of more than 50 years.

33. Team members have been involved in a diverse mix of strategic and commercial projects for a wide range of clients including airports, airlines, investors, debt providers, government and regulatory bodies. Our main service areas are airport transactions, business optimisation, traffic forecasting, route development and economic regulation.

34. Since 2013, we have worked directly for 10 different UK airports on a range of strategic, business planning and traffic forecast assignments. We have also provided due diligence support for various UK airport transactions covering 8 airports (all to financial close). In total, we have undertaken multiple projects across 13 different UK airports, either directly and/or as part of a transaction.

35. While the UK is our home market, the company has a global footprint. Our team experience encompasses over 150 airports worldwide. In 2017 alone, we have undertaken projects in Australia, Italy, USA, Russia, Denmark, Turkey, Belgium, Ireland, Serbia, Iceland, Hungary, Cyprus, and Portugal.

36. The Altitude team has considerable cargo experience. This includes previous employment working in the cargo division of a major airline and consultancy experience leading stand-alone cargo strategy projects in geographies as diverse as the UK, Eastern Europe, Middle East, and North America.

2. Executive Summary

2.1. Overview

37. We have undertaken an in-depth review of the Azimuth reports, and developed our own analysis of the future potential for freight at a reopened Manston Airport.

38. Manston has historically played a role as a niche air freight airport. We do not see potential for a more significant role in the future. This is in contrast to Azimuth. Azimuth's forecasts show the airport more than doubling its previous annual freight record in the first year of freight traffic returning. By year 18 of Azimuth's forecast, Manston is forecast to exceed the 2016 freight tonnage at East Midlands Airport (the largest dedicated freighter hub in the UK). This is simply not credible or likely.

39. We have identified significant weaknesses in the Azimuth analysis and forecasts. The following factors have not been acknowledged and/or adequately reflected:

- There is no overall shortage of freight capacity in the UK or South East specifically. While Heathrow is constrained, there is significant spare freight capacity at the established dedicated freighter hubs at Stansted and East Midlands.
- Cargo activity in the UK has become very consolidated on the 3 cargo hubs (Heathrow, Stansted and East Midlands). All three of these airports have plans to significantly expand cargo capacity, and they forecast strong growth in cargo tonnage. Furthermore, other established passenger airports have the capability of handling much higher cargo volumes if demand existed.
- There has been a strong trend towards bellyhold freight, with the role of dedicated freighters diminishing. The most recent (2017) Department for Transport ("DfT") forecasts to 2050 assume the number of freighter flights in the UK will remain flat at 2016 levels[9].
- Trucking is a highly integrated component of the air freight business model, and not merely a substitute for air freighter flights when airport capacity is constrained. The increasing use of truck feeder services is due to cost efficiencies and is not restricted to the UK.
- Manston is in a poor location to serve the wider South East or UK market. Other structural disadvantages include lack of critical mass, lack of a passenger hub, and night flight restrictions. These factors have limited Manston's role to that of a niche freight airport.

40. We consider the Azimuth freight forecasts to be extremely optimistic, with negligible supporting evidence. In particular:

- Historic performance is ignored (both at Manston or more generally across the UK market – the Azimuth growth forecast for Manston would be unprecedented in a UK context).
- There is a heavy reliance on qualitative techniques, with no substantive attempt to quantify the size of the markets Manston will be competing in, or how it would gain market share.
- Many of the references from published studies are too generic to be meaningful or are taken out of context.
- In making the case for Manston, Azimuth seeks to rely on reports prepared by York Aviation in 2013 and 2015. We share York Aviation's view, as set out in a parallel report commissioned by SHP, that these reports do not support Azimuth's conclusion that there would be a substantive role for Manston in the UK air freight industry.

41. Finally, we also view the Azimuth cargo air transport movement ("ATM") projections for Manston to be very optimistic and again unlikely. The projected average freight loads per flight are much lower than historic levels, and also lower than typically seen at cargo airports specialising in general freight (i.e. with

[9] (Department for Transport, 2017a, p. 33)

limited integrator presence). Even if the freight forecasts were achieved (which we consider very unlikely), we would anticipate significantly lower numbers of cargo air transport movements.

2.2. Introduction

42. Azimuth has published four reports in support of RSP's proposed DCO application. Volume 1[10] aims to answer the following questions:

> *"Does the UK require additional airport capacity in order to meet its political, economic, and social aims?*
>
> *Should this additional capacity be located in the South East of England?*
>
> *Can Manston Airport, with investment from RiverOak, relieve pressure on the UK network and meet the requirement of a nationally significant infrastructure project?"*

43. Azimuth concludes that *"the answer to each of the above questions is overwhelmingly yes"*. However, the questions conflate different issues. The first two questions provide poor context for the third question, and are not relevant to RSP's proposals for Manston.

44. We agree that the UK needs additional airport capacity, and that it should be located in the South East of England. This is not surprising given that:

- In September 2012, the Government asked Howard Davies to chair an independent Commission to identify and recommend options to maintain the UK's position as Europe's most important aviation hub[11] ("the Airports Commission").
- The Airports Commission concluded that "*a new runway in the South East is needed by 2030*". It also "*concluded that the best answer is to expand Heathrow's runway capacity*" as "*Gatwick… is unlikely to provide as much of the type of capacity which is most urgently required: long-haul destinations in new markets. Heathrow can provide that capacity most easily and quickly. The benefits are significantly greater, for business passengers, freight operators and the broader economy*[12]".
- In October 2016, the Government announced that its preferred scheme to meet the need for new airport capacity in the South East was a Northwest runway at Heathrow. This was subsequently confirmed in its revised draft Airports National Policy Statement ("ANPS"), published in October 2017. The ANPS[13] stated that "*The Heathrow Northwest Runway scheme delivers the greatest support for freight. The plans for the scheme include a doubling of freight capacity at the airport*." The draft ANPS, once ratified by Parliament, will settle the "need" case for the Northwest runway at Heathrow, but no other form of airport development.

45. However, while we agree with the positive response to the first two questions, it does not automatically lead to a "yes" for the third question. The third question covers fundamentally different issues to the first two questions.

46. There are clear distinctions between different types of airport capacity. The Gatwick option would have provided more incremental runway movements than the recommended Heathrow option[14]. However, a key reason for recommending Heathrow was that *"It delivers more substantial economic and strategic benefits than any other shortlisted option, strengthening connectivity…*[15]*"*

[10] (Azimuth Associates, 2017 a, p. I)
[11] (Airports Commission, 2015, p. 37)
[12] (Airports Commission, 2015, p. 4)
[13] (Department for Transport, 2017b, p. 31)
[14] (Airports Commission, 2015, p. 238)
[15] (Airports Commission, 2015, p. 245)

47. RSP is promoting a reopened Manston Airport on the basis of providing capacity for dedicated freighter flights:

- Bellyhold freight comprises ca. 70% of UK freight (see Figure 4), a proportion that has been growing since 2004 (see Figure 5). Azimuth's freight forecasts do not assume any bellyhold freight[16]. We agree with this Azimuth assumption, and consider that the development of bellyhold freight at Manston is extremely unlikely.
- Azimuth's forecasts passenger traffic of ca. 1.4 million by the 20th year of operation[17]. We consider these forecasts to be optimistic. However, even taking these forecasts at face value, the passenger throughput would represent less than 1% of 2016 passenger traffic at London airports.

48. Therefore, rather than asking "*Can Manston Airport, with investment from RiverOak, relieve pressure on the UK network and meet the requirement of a nationally significant infrastructure project?*", more relevant, targeted questions would be:

- Considering planned airport expansions, will there be a need for further airport capacity in the UK for dedicated freighters?
- Will the South East in particular require additional capacity for dedicated freighters?
- Would a reopened Manston be well placed to effectively serve a significant proportion of the dedicated freighter market?
- Are there other potential airport options for new dedicated freighter capacity?

49. In the rest of the Executive Summary, we address each of the sub-questions above in turn.

2.3. Need for Further Airport Capacity in the UK for Dedicated Freighters

Current Situation

50. There is no overall shortage in UK airport capacity for dedicated freighter operations. Both of the two largest freighter hubs, East Midlands and Stansted, can accommodate significantly more freighter services than they currently operate (see Section 5.3).

51. The UK does lack available dedicated freighter capacity at its major passenger hub airport, Heathrow.

- Heathrow is also the UK's largest freight airport with ca. 65% of the UK's overall throughput (see paragraph 109).
- Freight forwarder activity has consolidated around Heathrow on the strength of its extensive network of long haul passenger services. These services, typically using widebody aircraft, provide substantial bellyhold cargo capacity.
- At Heathrow, only ca. 5% of freight is carried on dedicated freighters (see Figure 4). A lack of available runway slots restricts freighter activity. In the absence of operating constraints, major passenger hubs tend to also play a role as key hubs for freighter aircraft (e.g. Frankfurt). Freighter services complement the connectively provided by passenger flights, while the cargo industry benefits from economies of scale and scope from the consolidation of activity at a hub airport.

52. Where dedicated freighter flights cannot be accommodated at Heathrow (due to capacity constraints), freight customers have the following choices:

- Operate freighter flights (or use existing freighter flights) from other UK airports where capacity is available (e.g. Stansted, East Midlands).
- Transport freight in the bellyhold of passenger flights from Heathrow (or other UK airports).

[16] (Azimuth Associates, 2017 c, p. 11)
[17] (Azimuth Associates, 2017 c, p. 16)

- Transport freight to a major European air freight hub (e.g. Liege, Frankfurt), typically by road truck.
- Use surface modes of transport (road, rail, water) for the whole journey (note that this is not a realistic option for most potential air freight consignments due to the distances involved and/or urgency of shipment).

53. Azimuth asserts that UK air freight has been constrained since 2000[18]. Furthermore, Azimuth concludes that shortage of airport capacity is leading to more trucking of freight ("*flying freight from Manston, negating the need to truck, to and from European airports for air transportation*[19]").

54. We consider that these conclusions are highly simplistic:

- As discussed above, we agree there is a shortage of dedicated freighter capacity at the UK's main passenger hub airport (Heathrow). However, freighter capacity is available at other airports. For example, both Stansted and East Midlands have expanded freighter activity significantly since 2000, and continue to have spare capacity.
- Therefore, any shortage of air freight capacity in the UK relates specifically to Heathrow hub capacity rather than a more general lack of capacity.
- Trucking is a highly integrated component of the air freight business model, and not merely a substitute for air freighter flights when airport capacity is constrained. The increasing use of truck feeder services is due to cost efficiencies and is not restricted to the UK (see Figure 32). We see no evidence that the growth in trucking is primarily driven by lack of Heathrow capacity for air freighter flights.
- In any case, even if there were significant levels of trucking caused by constraints at Heathrow, this would only be reduced by the provision of more Heathrow runway capacity. As there is already spare capacity at other airports in the UK, provision of further capacity would not make any significant difference to trucking levels. There is no reason why economic decisions to truck freight rather than fly would change in the absence of new Heathrow capacity.

Future Requirement

55. We have assessed the future demand for air freight in the UK, reflecting some notable trends:

- Increasing role of passenger aircraft in the carriage of air freight, and the relative diminishing in importance of freighter aircraft. Passenger demand has developed strongly in recent years. This has led to expansion of cargo capacity in the bellyhold of passenger aircraft outstripping growth in air freight demand (see Figure 37).
- This trend has led to cutbacks in dedicated freighter operations from leading airlines such as Cargolux, IAG, Air France-KLM and Singapore Airlines (see paragraph 425). Airbus forecasts growth of just 42 freighters in European fleets by 2036[20]. In the UK, freight tonnes carried on all-freighter aircraft peaked in 2004, and has fallen from 37% of the total air freight to 30% by 2016 (see Figure 5). The most recent Department for Transport forecasts to 2050 assume the number of freighter flights in the UK will remain flat at 2016 levels[21].
- There has also been a clear move towards consolidation of air freight activity at major passenger or freight hubs[22]. In the UK, the leading 3 airports (East Midlands, Stansted and Heathrow) have steadily grown their share of overall UK air freight tonnes on dedicated freighter services – from 41% in 1990 to 86% in 2016 (see Figure 7). The UK bellyhold market is even more consolidated,

[18] (Azimuth Associates, 2017 a, p. 8)
[19] (Azimuth Associates, 2017 a, p. 19)
[20] (Airbus, 2017a, p. 105)
[21] (Department for Transport, 2017a, p. 33)
[22] See Paragraph 24 onwards for our definition of passenger and cargo hubs. Note that the location of Manston on a peninsula prevents its development as a cargo hub. Even if the airport was to successfully attract high cargo tonnage in the future, it would merely become a large cargo airport rather than a cargo hub.

with the leading 3 airports (Heathrow, Manchester, Gatwick) achieving a combined market share of 97%+ in each year since 1996 (see Figure 11).

56. These fundamental market trends have not been recognised or have been ignored by Azimuth in its assessment of the potential for a re-opened Manston.

57. We have developed a forecast of UK air freight demand to 2050, linked to UK economic growth (see Section 7.1). We forecast a compound annual growth rate ("CAGR") 2016-40 of 2.4%, much higher than recent growth rates (e.g. CAGR 2010-16 of 0.4%, CAGR 2000-2016 of 0.2%). This results in ca. 4.2m tonnes of demand in 2040.

58. Based on published expansion plans and various prudent assumptions (see Section 6.4), we estimate that the available air freight capacity at the leading 5 UK airports alone will be around 5m tonnes per year in 2040. This is comfortably higher than the envisaged demand levels. Furthermore, the potential freighter capacity is significantly above our freighter demand forecast, and the potential bellyhold capacity is significantly above our bellyhold demand forecast.

59. Furthermore, we do not envisage overall capacity shortages in the shorter term. Only towards 2050 could capacity start to become constrained, assuming no further development of capacity from 2040 onwards. Therefore, any business that Manston could capture would primarily be at the expense of other UK airports.

Conclusion

60. The UK currently has sufficient overall airport capacity for air freight, albeit capacity at Heathrow is constrained.

61. Based on planned expansions at the existing major airports, we do not envisage a need for additional freight capacity to be developed in the period to 2040, or possibly 2050.

62. Therefore, there is not a compelling need for development of further airport capacity for freighter aircraft in the UK.

2.4. South East Requirement for Additional Dedicated Freighter Capacity

63. Cargo is less time sensitive than passengers. Therefore, an airport's cargo catchment area is typically many times larger than its passenger catchment. This is one of the key factors that leads to the high degree of consolidation seen for air cargo.

- For example, Leipzig Airport considers its catchment covers a 10-hour trucking radius (see Figure 38), while Liege sees its catchment as all areas within access of a full day trucking (see Figure 39).
- East Midlands serves the whole of England and Wales, exploiting its central location in England.
- Similarly, the extensive network of long haul flights from Heathrow means it attracts freight from the whole of Great Britain.

64. Mainly due to the hub strength of Heathrow, 78% of 2016 UK air freight was flown from airports in the South East & East of England. Heathrow and Stansted alone achieved 65% and 7% market share respectively.

65. Much of the UK's high value manufacturing is located outside London and the South East[23]. In Q1 2015, only 15% of UK manufacturing jobs were located in London and South East[24]. Clearly, a substantial proportion of air freight using Heathrow in particular will be travelling to/from other areas of the UK.

66. We do not see a need for new air freight capacity to be located in the South East specifically. New capacity would be most usefully concentrated at existing major air freight hubs, whether in the South East

[23] (Heathrow Airport, 2014, p. 19)
[24] (House of Commons Library, 2015, p. 7)

(Heathrow, Stansted) or outside (East Midlands). This would enable the air freight industry to continue to benefit from the economies of scale and scope flowing from market consolidation.

67. The Airports Commission negatively assessed the freight potential of Gatwick due to its location. It stated, "*Gatwick's position to the south of London limits its effectiveness as a national freight hub*[25]." This is consistent with our view that locations which can be accessed from a wide national catchment (whether in the South East or not) are more advantageous than locations in less accessible parts of the South East. We would also consider Gatwick to be a more accessible location than Manston.

2.5. Market Position of a Reopened Manston

68. We have argued above that there is no requirement for additional air freighter capacity in the South East, over and above developments already in the pipeline (being consented or planned) at existing airports.

69. However, even if our assessment is incorrect and further capacity is needed in the future, Manston would not be an effective solution.

70. While a re-opened Manston would contribute to overall UK freighter capacity, it clearly would not provide "hub" capacity of the type that is constrained at Heathrow.

- The inability of Manston to achieve more than 43,000 tonnes[26] in any single year in the period from 2000 until its 2014 closure highlights that the capacity provided at Manston was not a suitable substitute for Heathrow freighter capacity.
- In the same way, many other UK airports have material underutilised freighter capacity despite Heathrow constraints.

71. Manston's geographical location severely restricts its ability to develop into a national dedicated freighter hub. Were Manston airport to be re-opened at some point in future, it would likely be competing directly with East Midlands and Stansted for cargo-only flights. The outlook for the airport in this scenario is poor.

72. Firstly, the location of Manston on a peninsula physically limits the size of its catchment area.

- Within a 3-hour drive, only the South East & East of England, and a small part of the Midlands, are accessible (see Figure 17).
- In comparison, most of England and Wales can be accessed within 3 hours of East Midlands Airport, while Manston's catchment is essentially a sub-set of the Stansted catchment.
- The case studies of Liege and Leipzig, as well as the strong growth of cargo at East Midlands, indicate the importance of a large catchment area and central location. While these airports attract cargo from an extensive area, they also benefit from strong cargo demand within their immediate catchment.

73. In addition to Manston's poor geographic location, it is also relatively far from important transport infrastructure. The motorway network is not especially close (the airport is ca. 22 miles from the M2 and 38 miles from the M20). Successful freight airports in the UK and Europe have been shown to be extremely close to the national motorway network, helping to minimise the shipper/consignee to airport transport time[27].

74. Secondly, there is a consensus[28] in the air freight industry that the ability to handle night flights is critical for many types of air cargo (in particular for express freight, but also for other types of cargo).

- East Midlands and Stansted are both able to accommodate flights 24 hours per day.

[25] (Airports Commission, 2015, p. 24)
[26] Average ca. 28,000 tonnes/year for the period 2000-2013 (last full year of operation). Source: CAA airport statistics.
[27] For example, East Midlands Airport is within 3 miles of the M1 motorway. Similarly, Stansted is less than 3 miles of the M11 motorway. The Heathrow Cargo Centre is within 3 miles of the M4, ca. 5 miles from the M25 and ca. 8 miles from the M3.
[28] For a typical industry comment on this issue, see paragraph 446

- Both Liege Airport and Leipzig Airport cite the ability to accept night flights, and the support of local government in doing so, as factors in their success.
- It is unclear (in the context of historic restrictions) whether or not night flights would be allowed at Manston Airport were it to reopen. However, it does seem clear that restrictions on night flying would have severe limitations for air cargo potential at the airport.

75. Finally, as noted previously, there is a clear move towards consolidation of freight activity at a few large airports. In order to be successful, Manston would need to reverse this well-established trend. It is not apparent how this could be achieved, even with markedly lower airport charges (which in turn would compromise the financial viability of the airport).

76. Therefore, even if there was a future need for additional airport capacity for freighter activity, Manston is poorly placed in both geographic and potential operational terms to service such a requirement. Other airports are in a much better position to exploit any such future opportunities.

2.6. Other Potential Options for New Dedicated Freight Capacity

77. Azimuth concludes that "*Manston is the only real choice for the location of a freight-focused airport in the South East of England*[29]". As discussed above, we dispute the need for a new freight-focussed airport, or that any such airport would need to be located in the South East. If new capacity was needed in the South East, a more central location than Manston's position on a peninsula would be desirable.

78. Bournemouth Airport is dismissed by Azimuth on account of its location and distance from the motorway network. We agree that these are significant disadvantages but similar issues apply to Manston (with its location arguably even more compromised than Bournemouth).

- From the South West, West London and the Midlands, Bournemouth is generally more accessible than Manston.[30]
- Bournemouth Airport[31] highlights that:

> *"With ample room to grow, our thriving cargo facility is expanding to meet the demands of importers and exporters from across the UK. Accommodating a huge variety of freight and passenger aircraft, Bournemouth supports cargo logistics round the clock, with the following benefits: 2271m runway, excellent good weather record, congestion free (with no slot restrictions), experienced in handling many cargo aircraft including the AN-124 Ruslan, 'Freighter friendly' airport management."*

79. As discussed, the South East is not necessarily the best location for new freighter capacity. Outside the South East, Doncaster Sheffield Airport has a central UK location. It markets itself as "*the UK's Freighter Gateway*[32]":

> *At the centre of the UK with easy access to the M18, M1, A1M, M62 and M180 Doncaster-Sheffield is the ideal airport for freighter operations. DSA is justifiably gaining the reputation as the most effective freighter airport in the UK. The attributes that are delivering this include…. exceptional performance record, 24 hour operation, runway 2,893m x 60m, CAT III, Class "D" controlled airspace, no slot constraints/congestion, Competitive jet fuel prices, short taxiing distances, excellent cargo reception and handling, inclusive pricing, NEQ capacity up to 9,300kg Hotac."*

[29] (Azimuth Associates, 2017 a, p. 19)
[30] For example, the following distances have been sourced from Google Maps for the typical fastest routing. Bournemouth Airport to Hounslow: 90 miles, Manston Airport to Hounslow: 103 miles. Bournemouth Airport to Bristol: 70 miles, Manston Airport to Bristol: 201 miles. Bournemouth Airport to Birmingham: 167 miles, Manston Airport to Birmingham: 197 miles.
[31] www.bournemouthairport.com/about-us/doing-business-together/cargo/
[32] www.therouteshop.com/profiles/doncaster-sheffield-airport/

80. Both these airports are currently operational, and benefit from a large site with a long runway. Doncaster Sheffield operates 24 hours a day, whilst night flights at Bournemouth can be arranged with prior notice.

81. Furthermore, Birmingham and Doncaster Sheffield have longer runways than Manston, with spare capacity to develop freighter activity. Both have superior locations than Manston.

2.7. Conclusion

82. It is highly unlikely that a re-opened Manston could play any significant role in serving the needs of the UK air cargo industry. There is currently no shortage of overall capacity, and future demand growth into the long term can be met with planned expansion from the leading cargo airports in the UK.

83. The Azimuth freight forecasts for Manston are summarised below:

- In Year 2 (the first year of freight traffic), tonnage is forecast to be more than double the previous Manston peak annual value.
- By Year 11, freight throughput is forecast at similar tonnage to 2016 Stansted performance. Growth from Year 2 to Year 11 is forecast at CAGR 9.7%.
- By Year 18, Manston is forecast to exceed the 2016 freight tonnage at East Midlands Airport (the largest dedicated freighter hub in the UK).

84. We consider the forecasts to be extremely optimistic, not credible or likely, with negligible supporting evidence.

- Growth in freight at Manston would be unprecedented in a UK market context, and in complete contrast to previous historic performance.
- As discussed previously, we do not expect there to be an overall shortage of freighter capacity in the UK or South East. Even if we are wrong in this assessment, Manston and other smaller airports have shown no signs of benefiting from supposed capacity shortages in recent years. Furthermore, there is demonstrable spare capacity at Stansted and East Midlands, both better established and located.
- The rationale for why Manston will be able to achieve a massive uplift on previous performance is weak. The stated advantages of using Manston were present when the airport struggled to grow freight volumes, despite investment in infrastructure and marketing (the previous owners invested £7m on new aprons and taxiways, increasing the freight capacity to 200,000 tonnes[33] per annum). Lack of Manston capacity was not a factor.
- As well as the forecasts ignoring historic performance, they also do not reflect the very clear market trends towards consolidation of freight at major passenger and dedicated freighter hubs. UK airports outside the major three freight hubs have seen volumes fall. There is also a trend away from freighter services towards bellyhold freight.

85. Manston previously operated as a niche air freight airport. While it could theoretically regain this role in the future, its structural disadvantages (location, lack of critical mass, lack of passenger hub, night flight restrictions etc.) will severely limit its potential. Even if reinvested, relaunched and supported, we would not expect freight volumes to be materially above historic levels, and considerably below the volumes forecast by Azimuth.

86. Finally, the forecast of freighter ATMs is simply not credible.

- By year 20, ca. 17,000 freighter flights are forecast for Manston.

[33] (Wiggins Group plc, 2002, p. 16)

- This represents one-third of current UK freighter flights, in a market where the number of freighter ATMs has been contracting. This trend has been recognised by the DfT, with its 2017 forecasts to 2050 assuming the number of freighter flights in the UK will remain flat at 2016 levels[34].

87. In particular, we note that York Aviation's professional opinion[35] is that the capability of Manston Airport is 21,000 annual air cargo aircraft movements. This capacity is more than enough to accommodate any potential a re-opened Manston Airport may have.

88. In paragraph 48, we put forward four questions in relation to RSP's proposals for Manston. These are more relevant and targeted than the broader questions posed by Azimuth in its first report[36]. The answers to our questions have been developed over the course of the Executive Summary of this report. We summarise our conclusions in the table below.

Question	Response
Considering planned airport expansions, will there be a need for further airport capacity in the UK for dedicated freighters?	No, planned expansions at existing airports should comfortably provide sufficient freighter capacity until 2040 and beyond.
Will the South East in particular require additional capacity for dedicated freighters?	No, Stansted is planning significant capacity growth. A third runway at Heathrow will provide additional bellyhold capacity (putting downward pressure on freighter demand). Finally, the South East market can be well served by airports more centrally located in England.
Would a reopened Manston be well placed to effectively serve a significant proportion of the dedicated freighter market?	No, a reopened Manston would only serve a niche role, similar to its historic record. It has a poor location and operating restrictions.
Are there other potential airport options for new dedicated freighter capacity?	Yes, there are many UK airports with excess freighter capacity. For example, Doncaster Sheffield Airport has a central UK location. It markets itself as the UK's freighter gateway. It benefits from a large site with a long runway, and has 24 hour operations.

Table 1 – Summary of Analysis of Potential Future Freight Role for a Reopened Manston Airport

89. As can be seen above, when one asks more targeted questions, the outcome is very different to that presented by Azimuth. Our overall conclusion is that the RSP proposals and the Azimuth forecasts are deeply flawed. The outlook put forward by RSP / Azimuth does not reflect market realities. We would expect freight tonnage and freight ATM outturn at a reopened Manston to be considerably below the Azimuth forecasts.

[34] (Department for Transport, 2017a, p. 33)
[35] (York Aviation, 2017)
[36] (Azimuth Associates, 2017 a, p. I)

3. Review of Azimuth Reports - Context

3.1. Aims of Azimuth Report

90. This section reviews the first Azimuth report, titled "*Manston Airport: A National and Regional Aviation Asset, Volume I, Demand in the south east of the UK, March 2017*".

91. The first Azimuth report[37] aims to answer the following questions:

> *"Does the UK require additional airport capacity in order to meet its political, economic, and social aims?*
>
> *Should this additional capacity be located in the South East of England?*
>
> *Can Manston Airport, with investment from RiverOak, relieve pressure on the UK network and meet the requirement of a nationally significant infrastructure project?"*

92. Azimuth concludes that *"the answer to each of the above questions is overwhelmingly yes"*. However, the questions conflate different issues. The first two questions provide poor context for the third question, and are not relevant to RSP's proposals for Manston.

93. We agree that the UK needs additional airport capacity, and that it should be located in the South East of England. This is not surprising given that:

- In September 2012, the Government asked Howard Davies to chair an independent Commission to identify and recommend options to maintain the UK's position as Europe's most important aviation hub[38] ("the Airports Commission").
- The Airports Commission concluded that "*a new runway in the South East is needed by 2030*". It also "*concluded that the best answer is to expand Heathrow's runway capacity*" as "*Gatwick… is unlikely to provide as much of the type of capacity which is most urgently required: long-haul destinations in new markets. Heathrow can provide that capacity most easily and quickly. The benefits are significantly greater, for business passengers, freight operators and the broader economy*[39]".
- In October 2016, the Government announced that its preferred scheme to meet the need for new airport capacity in the South East was a Northwest runway at Heathrow. This was subsequently confirmed in its revised draft Airports National Policy Statement ("ANPS"), published in October 2017. The ANPS[40] stated that "*The Heathrow Northwest Runway scheme delivers the greatest support for freight. The plans for the scheme include a doubling of freight capacity at the airport*." The draft ANPS, once ratified by Parliament, will settle the "need" case for the Northwest runway at Heathrow, but no other form of airport development.

94. However, while we agree with the positive response to the first two questions, it does not automatically lead to a "yes" for the third question. The third question covers fundamentally different issues to the first two questions.

95. There are clear distinctions between different types of airport capacity. The Gatwick option would have provided more incremental runway movements than the recommended Heathrow option[41]. However, a key reason for recommending Heathrow was that *"It delivers more substantial economic and strategic benefits than any other shortlisted option, strengthening connectivity…*[42]*"*

[37] (Azimuth Associates, 2017 a, p. I)
[38] (Airports Commission, 2015, p. 37)
[39] (Airports Commission, 2015, p. 4)
[40] (Department for Transport, 2017b, p. 31)
[41] (Airports Commission, 2015, p. 238)
[42] (Airports Commission, 2015, p. 245)

96. RSP is promoting a reopened Manston Airport on the basis of providing capacity for dedicated freighter flights:

- Bellyhold freight comprises ca. 70% of UK freight (see Figure 4), a proportion that has been growing in recent years (see Figure 5). The Azimuth freight forecasts do not assume any bellyhold freight[43]. We agree with this Azimuth assumption, and consider that the development of bellyhold freight at Manston is extremely unlikely.
- Azimuth forecasts passenger traffic of ca. 1.4 million by the 20th year of operation[44]. We consider these forecasts to be optimistic. However, even taking these forecasts at face value, the passenger throughput would represent less than 1% of 2016 passenger traffic at London airports.

97. Therefore, rather than asking "*Can Manston Airport, with investment from RiverOak, relieve pressure on the UK network and meet the requirement of a nationally significant infrastructure project?*", more relevant, targeted questions would be:

- Considering planned airport expansions, will there be a need for further airport capacity in the UK for dedicated freighters?
- Will the South East in particular require additional capacity for dedicated freighters?
- Would a reopened Manston be well placed to effectively serve a significant proportion of the dedicated freighter market?
- Are there other potential airport options for new dedicated freighter capacity?

98. Over the course of this report, we address each of the sub-questions above in turn (an overview of our analysis is included in the Executive Summary).

3.2. Aviation Economic Contribution

99. Azimuth[45] refers to a study by the Centre for Economics and Business Research on the impact on trade of airport capacity shortages. Given the distinctions between different types of airport capacity[46], general references to the economic impacts of airport capacity shortages have limited relevance. More relevant is whether there is or will be a shortage of airport capacity for dedicated freighter aircraft. In Section 5, we address this issue directly.

100. On a similar basis, references to a European shortage of runway capacity[47] in Paragraph 2.2.2 are too general to be meaningful in the context of Manston Airport. Additional capacity can only contribute to alleviating shortages if it is the right type of capacity and in the right location.

3.3. RSP Vision for Manston Airport

101. The RSP vision for Manston Airport[48] also creates misconceptions. The Azimuth report states the vision is "*To revive Manston as a successful freight-focused airport*". This implies Manston was previously a successful freight airport. In analysing this, the following points are particularly relevant:

- Its throughput has never exceeded ca. 43,000 tonnes or more than 2.0% UK market share in a single year.
- The airport was also chronically loss making, with major operating losses each year from 2006 until its closure (period of data availability).

[43] (Azimuth Associates, 2017 c, p. 11)
[44] (Azimuth Associates, 2017 c, p. 16)
[45] (Azimuth Associates, 2017 a, p. 5)
[46] Passenger hub capacity, other hub capacity, freighter hub capacity, other freighter capacity, geographic location of capacity relative to demand etc.
[47] (Azimuth Associates, 2017 a, p. 5)
[48] (Azimuth Associates, 2017 a, p. 1)

- The historic volumes and financial performance clearly indicates that Manston Airport was not a viable financial proposition, despite considerable investment in freight capacity.

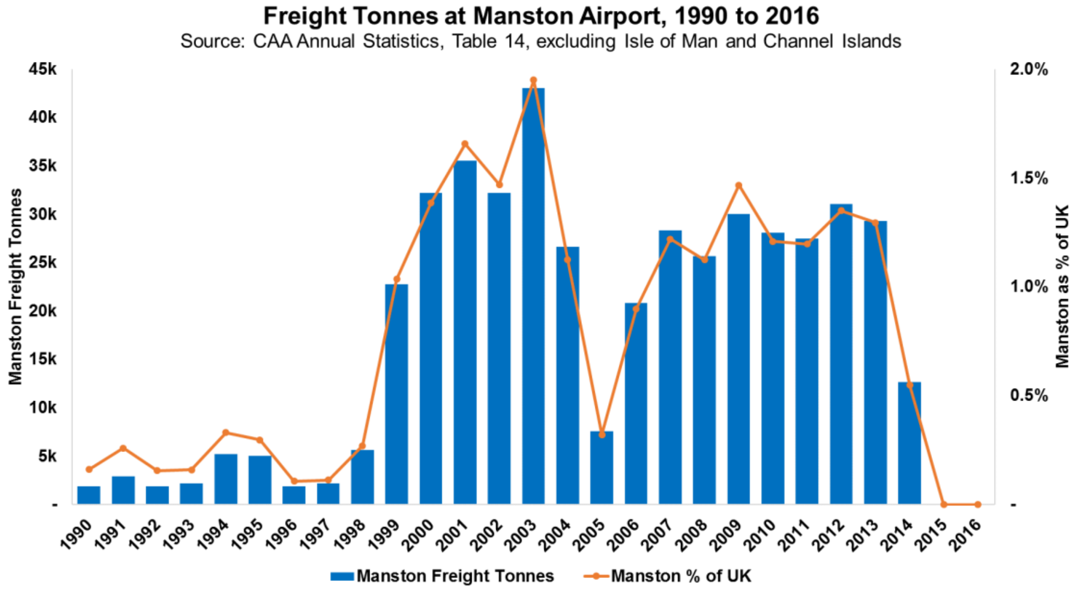

Figure 1 - Manston Airport Freight Tonnes 1990-2016

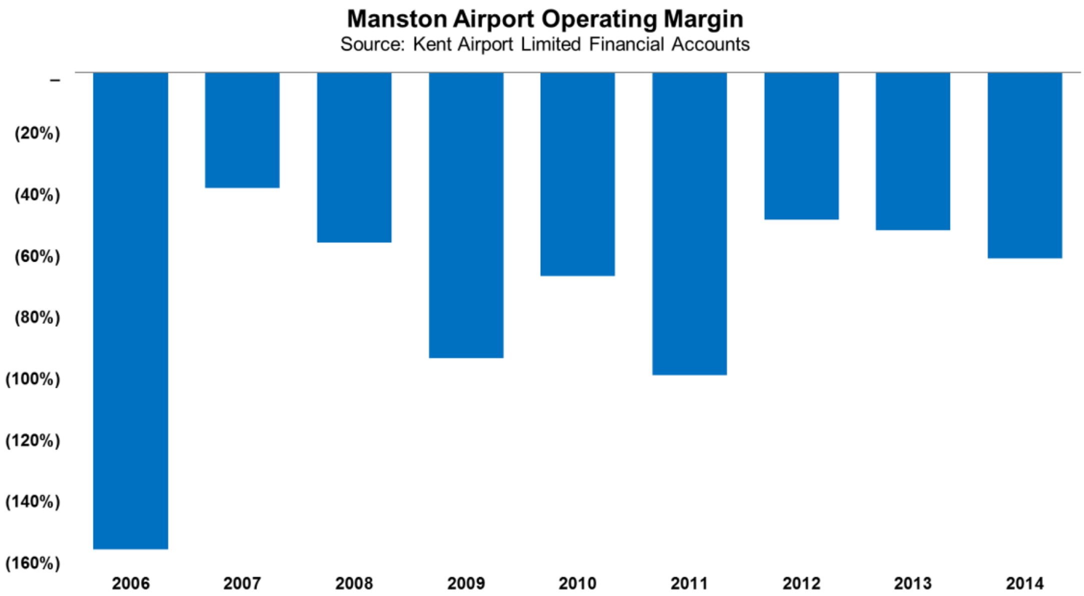

Figure 2 - Manston Airport Operating Margin (Operating Profit / Revenue) 2006-2014

102. As part of the RSP vision, it is stated that "*The only cargo hubs in the UK are East Midlands and Stansted airports, both of which focus on the integrator market. The UK needs a new hub for dedicated freighters, providing them with rapid turnaround times and the specialist security clearing ability that is currently absent at other UK airports.*"

- This description ignores Heathrow, which accounted for ca. 65% of all UK freight in 2016. It also implies, without foundation, that the focus on integrators at East Midlands and Stansted is incompatible with dedicated freighter provision.
- Furthermore, no evidence is presented to support the assertion that other UK airports are unable (either now or in the future) to support rapid turnaround times or possess specialist security clearing ability.

103. The reported vision also comments that "*The ideal location for this is close to the main market in the South East. RiverOak's long-term plan is to integrate Manston into the UK's airport network, effectively providing Heathrow with its fourth runway primarily dedicated to freighter cargo*."

- We highlight in paragraph 219 that the surface catchment area for freight is very wide, and there is no requirement for additional airport capacity for freight to be located in the South East specifically.
- The comment about Manston acting as a fourth runway for Heathrow is evidently untenable. Manston is ca. 100 miles from Heathrow, a similar distance as Birmingham Airport. Heathrow's existing two runways recorded ca. 473,000 air transport movements in 2016[49] (ca. 236,500 per runway), whereas Manston has never achieved more than 5,000 commercial air transport flights (passenger, cargo, air taxi combined) in a single year in the period since 2000.

[49] CAA Airport Statistics

4. Development of the UK Air Cargo Industry

4.1. Introduction

104. This section provides an overview of the development of the air cargo sector in the UK. The aim of this section is to highlight the key trends and the characteristics of the main airport players.

105. This analysis is then referenced in the following sections when considering the future outlook for the sector, and the role a reopened Manston could conceivably play.

4.2. UK Air Freight Development Since 1990

106. Since 1990, the UK air freight market can be divided into two distinct periods based on the growth trends seen. The period 1990-2000 was generally one of strong growth, with CAGR of 6.9% and positive annual growth in 9 of 10 years. In contrast, the period since then (2000-2016) has been one of stagnation (CAGR 0.2%, positive annual growth in only 8 of 16 years).

107. The 11th September terrorist attack in 2001, and the global financial crisis in 2008-09 coincided with particularly poor years for the UK air freight market.

108. In 2016, 2.4m tonnes of freight tonnes was handled at UK airports. This is the first year the previous 2004 peak was (slightly) exceeded.

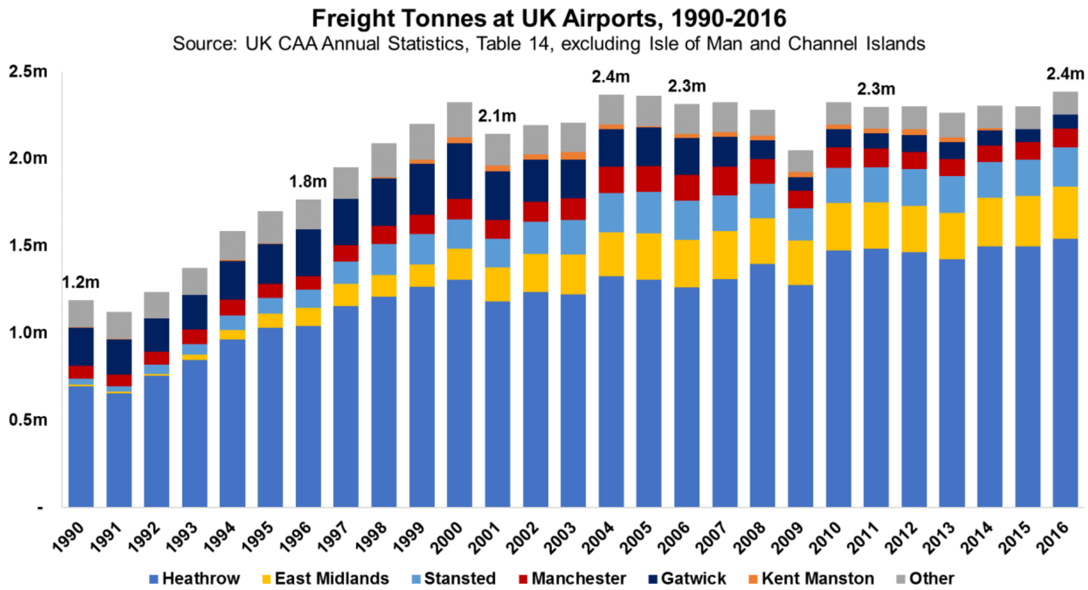

Figure 3 – Timeseries of UK freight tonnage

109. Heathrow is the airport in the UK that handles the most air freight. It has occupied this position through the entirety of the period 1990-2016. This is despite having constrained capacity (on the number of aircraft movements) through much of the period. In 2016 the airport achieved a market share of 64.6%.

110. East Midlands and Stansted are now the second and third largest airports for air freight in the UK. It has taken these airports 20+ years to reach this level, having grown from a very low market share in 1990. They had a 2016 market share of 12.6% and 9.4% respectively.

111. Manchester is the fourth largest UK airport for air freight. Note that it has grown very slowly, and continues to do so (1990-2016 CAGR of 1.6%, compared to 2.8% for UK airports excluding Manchester; 2011-2016 CAGR of 0.25%, compared to 0.77% for UK airports excluding Manchester).

112. In 2016 Gatwick was only the 5th largest UK air freight airport, having been clearly second-largest until ca. 2000.

113. Between them, these 5 airports accounted for ca. 95% of all UK air freight handled in 2016 (up from 87% in 1990).

114. Note that at no time in the period since 1990 has Manston played a significant part in the UK air freight market. Its share peaked at 2.0% in 2003, and in the 5 full years prior to its closure in 2014 (2009-13), it had an average share of 1.3%. The number of cargo ATMs only exceeded 1,000/year on a single occasion since 2000 (1,081 in 2003), averaging 462/year in the 2009-13 period (see Section 4.11).

4.3. UK Freighter versus Bellyhold Mix

115. At the top 5 airports in the UK, there are two distinctly different models of freight operation in place. At East Midlands and Stansted, virtually all freight is carried on cargo only aircraft (the low-cost carriers that operate passenger flights from these airports do not currently handle freight).

116. In contrast, at Heathrow, Manchester and Gatwick, less than 10% of freight is carried on cargo only aircraft (5.4%, 9.2% and 0.0% respectively).

- Overall, 29.7% of UK air freight in 2016 was carried on cargo only aircraft, with 70.3% carried in the bellyhold of passenger aircraft.

117. Despite Heathrow's low *proportion* of freight carried on cargo only aircraft, it continues to handle a significant share of the total UK freight carried on cargo aircraft[50].

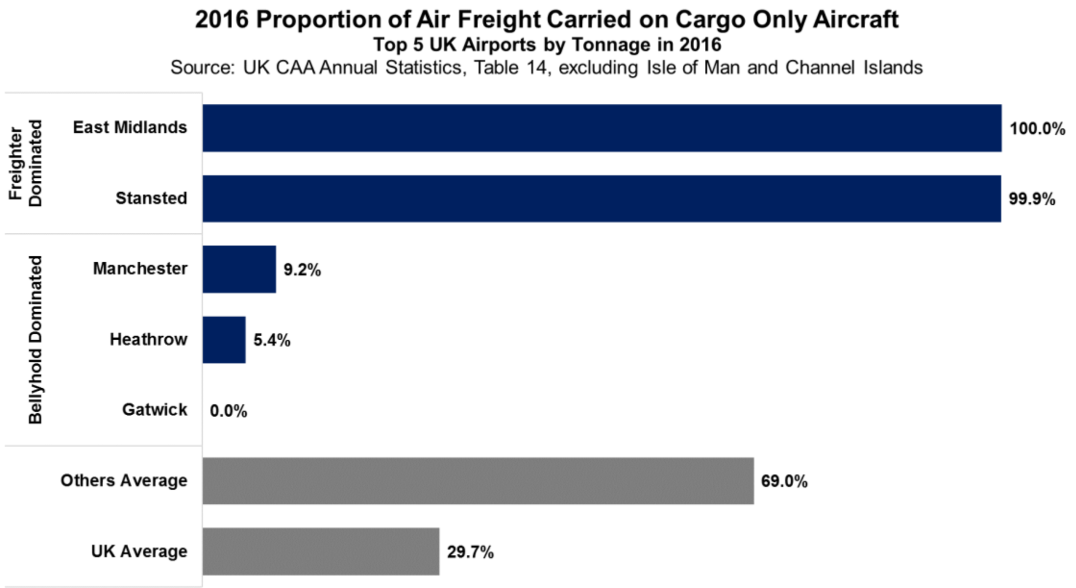

Figure 4 – Freighter/Bellyhold split at selected UK airports

[50] In 2016, Heathrow handled 12% of all UK freight carried on cargo only aircraft (a share it has broadly maintained since 2003).

118. Freight carried on all-cargo aircraft peaked in 2004, and has fallen significantly since while bellyhold freight has generally been growing. This is consistent with global trends highlighted in the appendix (Section 11.3) of this report.

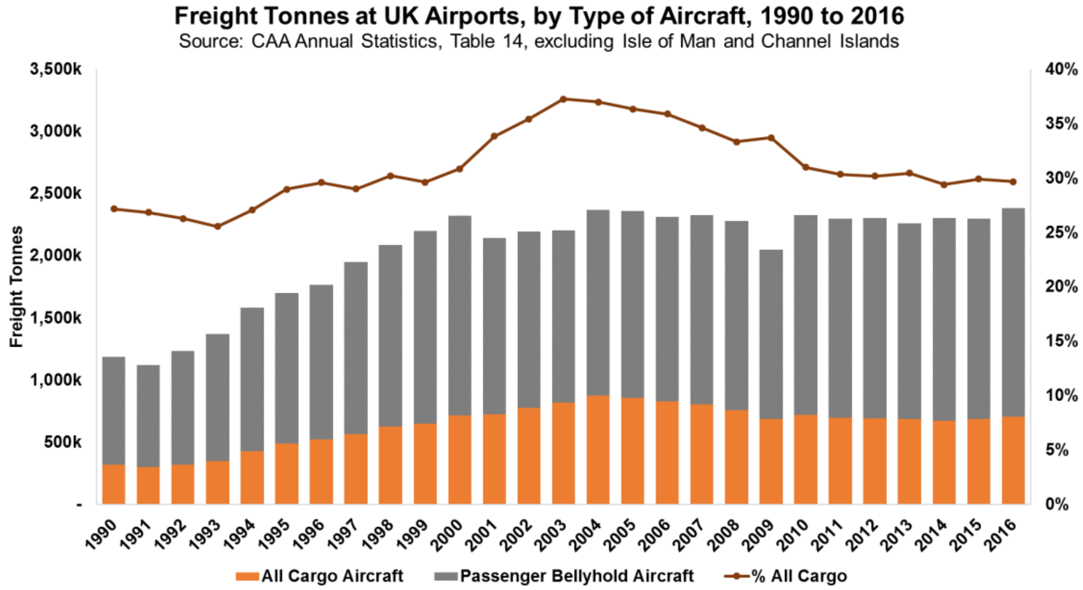

Figure 5 – Split of UK air freight between bellyhold and dedicated freighter aircraft

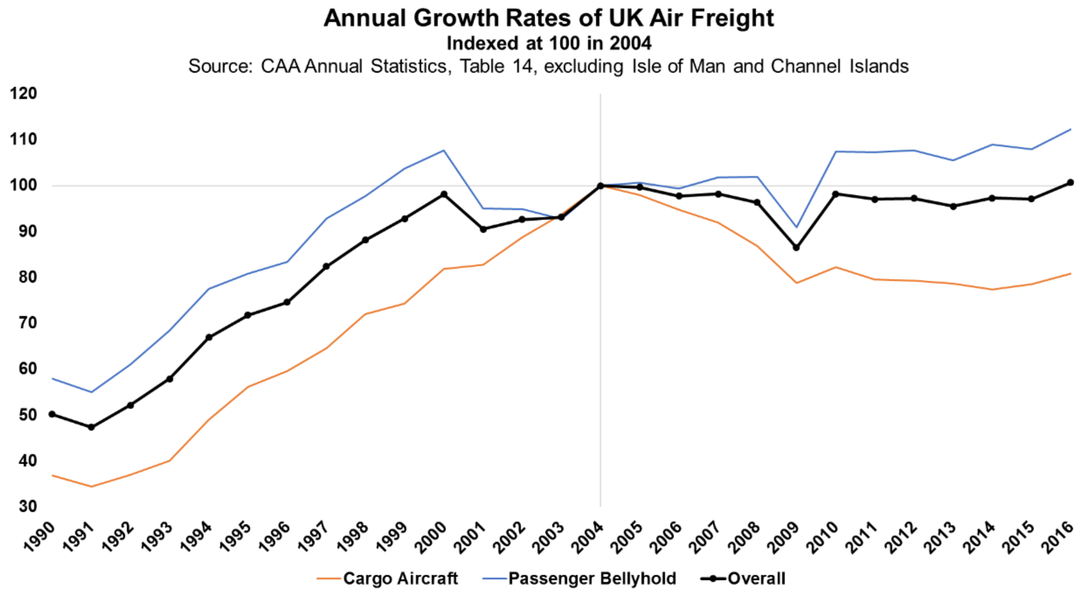

Figure 6 – Annual growth rates of UK freight

4.4. UK Freight on Cargo Only Aircraft

Airport Consolidation

119. In 1990, there were many UK airports from which carriers operated cargo only flights. Since then, there has been a very clear trend to consolidate cargo only operations at a few airports. In 2016, the three largest airports for freight (carried on cargo only aircraft) accounted for 86% of this UK market, up from 41% in 1990.

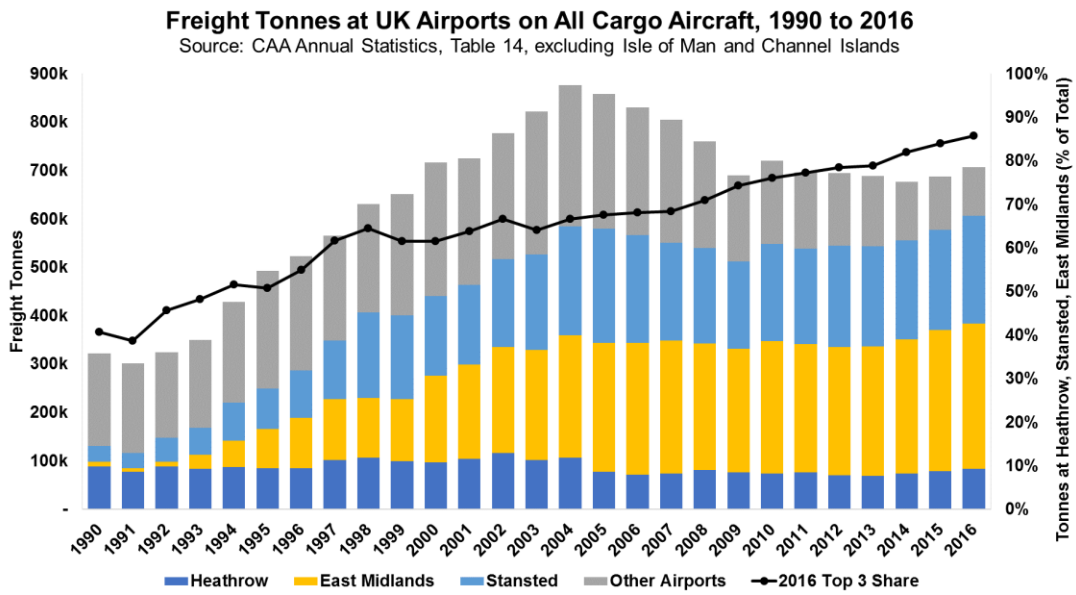

Figure 7 – Timeseries of UK freight on cargo-only aircraft

120. Historically, the following four airports have all been highly ranked in the UK for freight on cargo aircraft:

- Liverpool #5 in 1996 (peak tonnage in 1995, ca. 30,000 tonnes).
- Belfast International #4 in 2015 (ca. 38,000 tonnes in 2006).
- Prestwick #4 in 2001 (ca. 43,000 tonnes in 2001).
- Manston #4 in 2013 (ca. 43,000 tonnes in 2003).

121. However, by 2016 total freight on cargo aircraft across these airports was less than 20,000 tonnes (with Manston having shut completely).

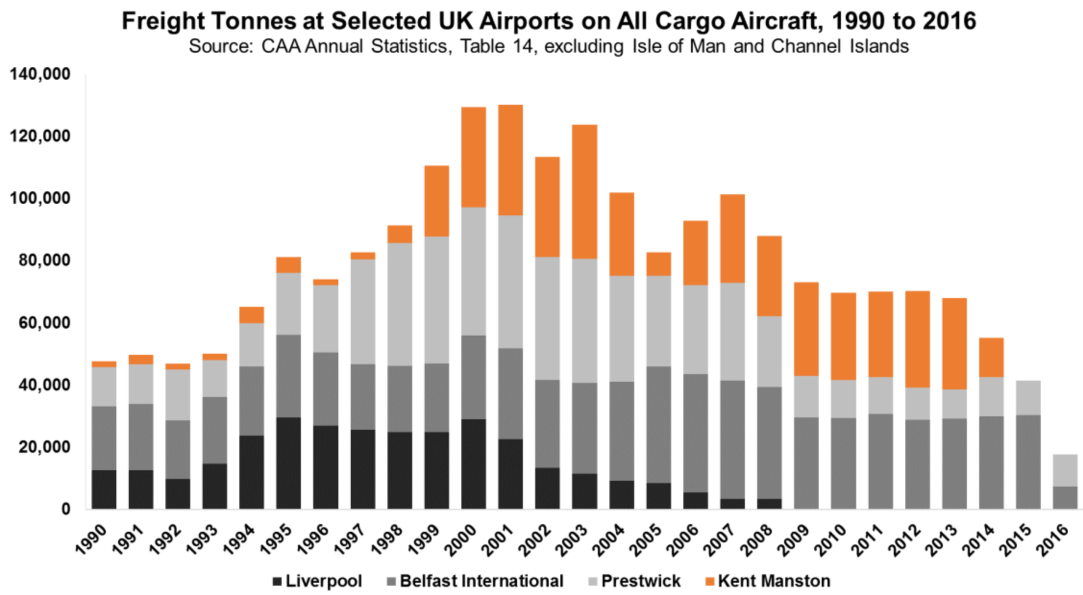

Figure 8 – Reduction of freight on cargo-only aircraft at selected airports

122. Note that none of the airports above has material capacity constraints. The trend towards consolidation of freight at a few airports is driven by cost efficiencies. It has resulted in airports which previously had significant freight volumes on all-cargo aircraft seeing their share of the market shrink/disappear.

123. In fact, of the 16 airports with more than 1,000 tonnes of freight on cargo aircraft in 1990, only 3 had higher equivalent freight volumes by 2016 (East Midlands: +290,000 tonnes, Stansted: +191,000, Luton: +4,000 tonnes, other 13 airports combined: -134,000 tonnes).

124. A similar trend can be seen when analysing the number of cargo aircraft movements; there is a sharp reduction in freighter flights from airports outside the "big three" of Heathrow, Stansted and East Midlands.

- Total freighter flights from other airports fell by almost 75% between 2000 and 2016 (from ca. 74,000 to ca. 19,000). Birmingham is the only significant cargo airport in this category that managed any meaningful growth in cargo ATMs (from 497 in 2000 to 1,184 in 2016).
- The number of freighter flights from the top 3 airports (Heathrow, East Midlands and Stansted) has varied relatively little over the same period.

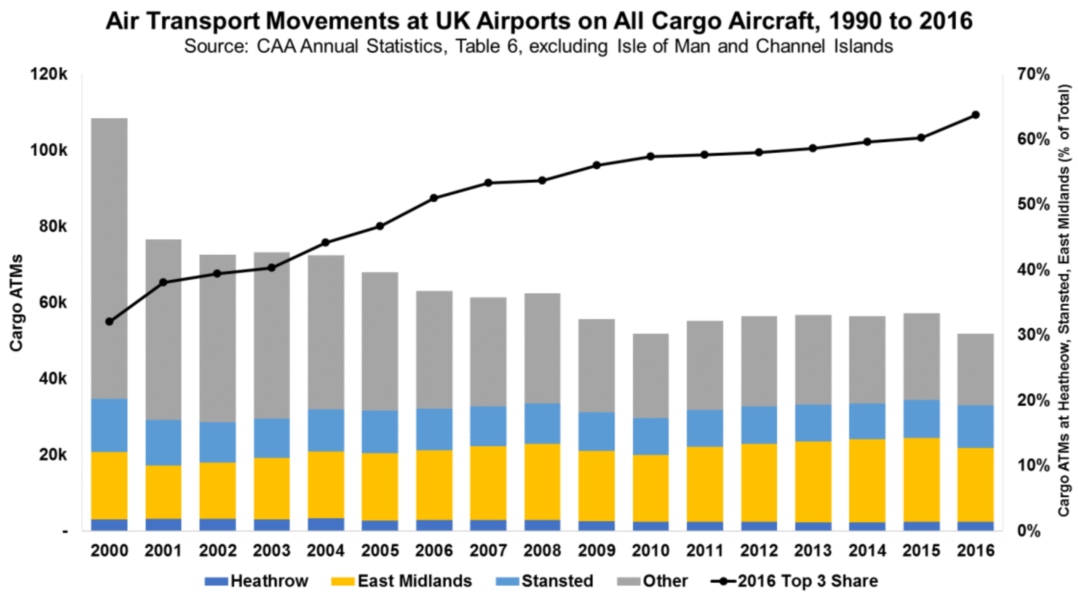

Figure 9 – Consolidation of freight on cargo-only aircraft at Heathrow, East Midlands and Stansted

125. Note that the decline in freighter movements has generally occurred at airports with limited infrastructure constraints. This indicates that airport capacity issues are not the main driver for the reduction in freighter flights at UK airports.

126. The Azimuth cargo ATM forecasts for Manston exceed 17,000 by year 20 (see Figure 25). This forecast should be seen in the following context:

- The most recent (2017) Department for Transport forecasts to 2050 assume the number of freighter flights in the UK will remain flat at 2016 levels[51].
- The Manston cargo ATM forecast is equivalent to 33% of the 2016 UK cargo ATM total, and over 80% of 2016 UK cargo ATMs if the two dedicated freighter hubs (East Midlands and Stansted) are excluded.
- After East Midlands and Stansted, Edinburgh is the next largest UK airport in terms of cargo ATMs, with 5,195 flights in 2016 (less than one-third of the projected Manston level in year 20).
- Since 2001, East Midlands and Stansted are the only UK airports to surpass 10,000 cargo ATMS in any single year.

[51] (Department for Transport, 2017a, p. 33)

Cargo-only Growth at a Regional Level

127. The change over time in the volume of freight carried on cargo only aircraft differs significantly by UK region. This is at least partially due to the locations of the larger airports at which freight has tended to consolidate since 2003.

128. For example, freight on dedicated cargo aircraft has grown substantially in the Midlands region, where East Midlands Airport has steadily developed into a major base for cargo only operations (in particular, express cargo). In contrast, freight on dedicated cargo aircraft has fallen in recent years in both the South East & East of England region and the Other UK regions.

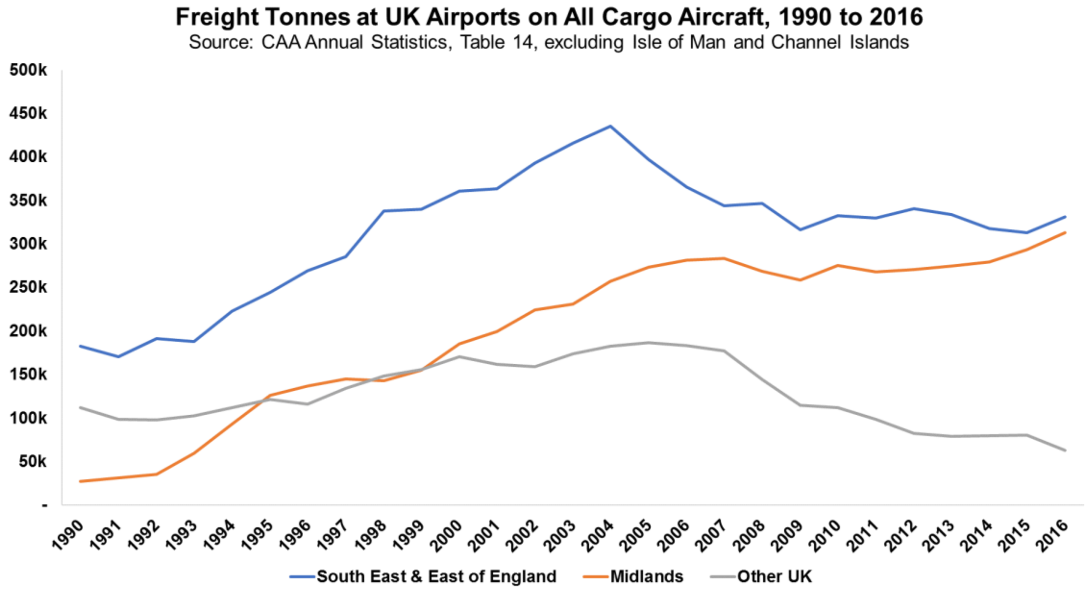

Figure 10 – Breakdown of UK freight on cargo-only aircraft, by region.

129. This reduction in freight on dedicated cargo aircraft in the South East & East region is sometimes attributed to shortage of suitable airport capacity. However, this does not explain the similar decline seen in the Other UK regions. Nor does it explain why this decline has not continued at the South East & East of England region airports through the period 2009-16 (through which the same constraints existed, and the decline continued at Other UK regional airports).

4.5. UK Bellyhold Freight

130. Heathrow handled 87% of all UK bellyhold freight in 2016. Manchester and Gatwick are the only other airports with significant bellyhold freight; in 2016, they had bellyhold market share of 5.9% and 4.7% respectively. These three airports have been the largest three airports for bellyhold freight since 1990, and have held a bellyhold market share of 96-98% over this period.

131. Heathrow dominates this segment as a result of its extensive long-haul network operated by wide body aircraft, which have significant cargo capacity. Freight tonnage on passenger aircraft has continued to grow at Heathrow (CAGR 2006-16 2.0%) despite the airport effectively operating at full runway capacity.

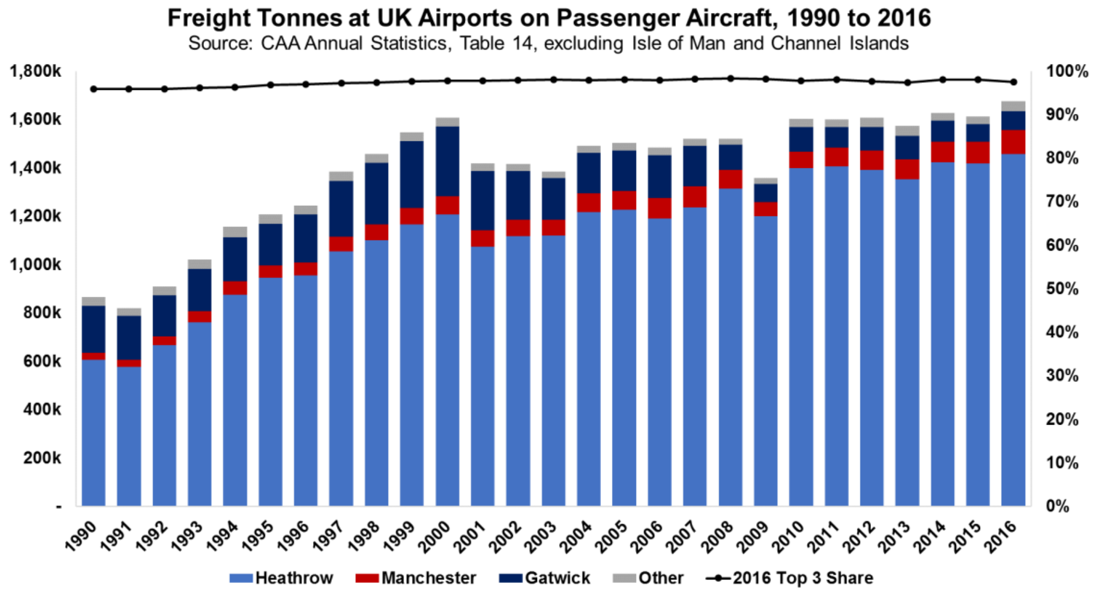

Figure 11 - Timeseries of UK freight on passenger aircraft

4.6. UK Air Mail

132. Mail is a relatively minor component of overall UK air cargo (ca. 200,000 tonnes in 2016 compared to 2.4m tonnes of air freight). For completeness, we include a brief overview of the UK air mail sector.

133. While volumes have fluctuated year on year, there has been no sign of sustained growth since the turn of the century (consistent with the widespread adoption of electronic communications).

134. As with air freight, air mail is concentrated on a small number of airports (Heathrow, East Midlands, Stansted, Edinburgh), with similar consolidation trends. Royal Mail has focussed on a small number of airports for night mail flights.

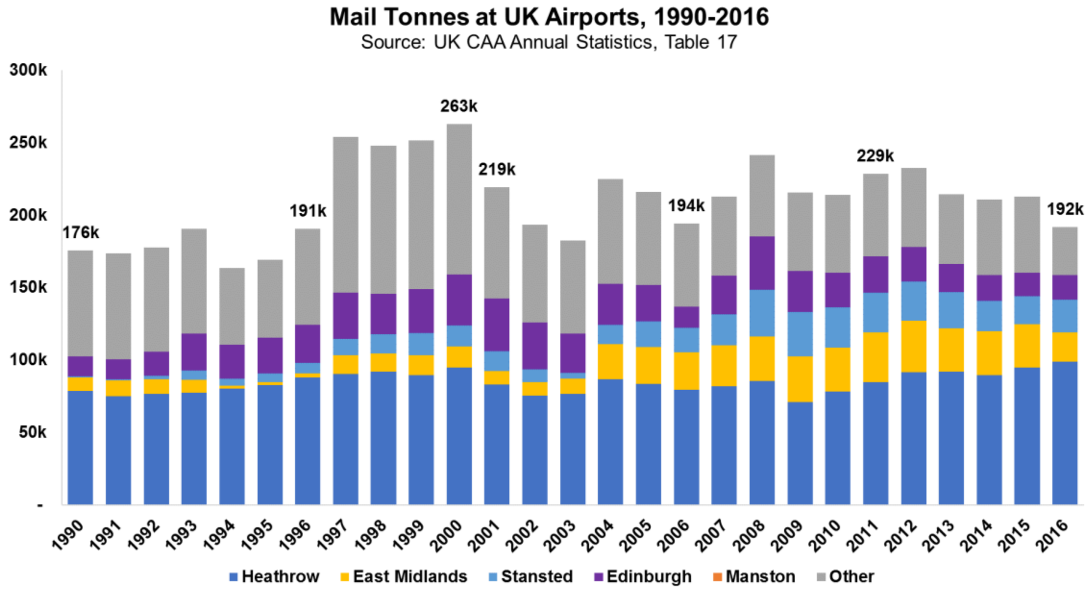

Figure 12 – Timeseries of UK Mail tonnage

4.7. Heathrow

135. As previously noted, Heathrow is the largest freight airport in the UK by some margin (as well as the largest passenger airport and only major passenger hub). It dominates the UK bellyhold segment and has a significant share of UK freight carried on dedicated freighters[52].

136. Despite operating very close to its air transport movement (ATM) limit for a number of years, Heathrow has managed to grow the volume of freight it handles faster than the overall UK market. It has had a higher annual growth rate than the average of other airports in the UK in 7 of 11 years over the period 2006-16, and also has a higher CAGR over that period (+2.0% compared to -2.2% at other UK airports).

137. It is likely that Heathrow cargo capacity has also been increasing through the adjustment of its mix of aircraft. There are two aspects to this:

- An increase in the proportion of ATMs allocated to widebody long haul flights, instead of narrow-body short-haul flights;
- The tendency for new long haul aircraft types (with the notable exception of the A380) to have more space for cargo than previous models.

138. We analyse each of the above factors in turn in the following paragraphs.

Widebody Share of Overall Flights

139. Data from OAG shows that the widebody share of Heathrow annual ATMs has risen from 34.0% in 2007 to 38.8% in 2017. Only two years in the ten-year period 2007-17 have seen this proportion fall. The airport stated in 2016 that "*fleet size at Heathrow has not fully matured and there is further potential to upsize / densify*"[53].

Cargo Capacity for Newer Aircraft Types

140. In general, older aircraft types have a lower cargo capacity than their newer equivalents. Of the older aircraft, the B747-400 is the most common in the UK. Likely replacements for this aircraft all have significantly higher cargo volume (given the payload available, volume is likely to be the constraining factor in the majority of markets to/from the UK). For example, the B777-9X has indicative cargo capacity of 109m^3 compared to just 71m^3 for the B747-400.

141. Further, industry sources reinforce the view that newer aircraft have a beneficial impact on cargo capacity. For example, American Airlines has commented:

> *"The introduction of the 787-9 brings another more fuel-efficient aircraft type with even greater cargo capacity into the American Airlines fleet…. On routes where we operate the aircraft, our cargo customers will see notable capacity improvements"*[54]

142. An exception to the trend for newer aircraft to have more cargo capacity is the A380, which has less cargo capacity than a B747. However, there are no indications that there will be any material increase in the prevalence of this aircraft in the UK[55].

143. Further analysis is provided in the appendices (see Section 13.1).

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[52] The number of cargo ATMs operated at Heathrow is fairly low (ca. 2,500 in 2016) but average loads are high.
[53] (Heathrow Airport, 2016a, p. 8)
[54] (Vance, 2016)
[55] See Section 13.2 in appendix

144. The following charts, based on UK CAA data, shows that Heathrow has generally been successful at increasing its average freight tonnage per ATM, helping to maintain growth despite operating near its ATM limit.

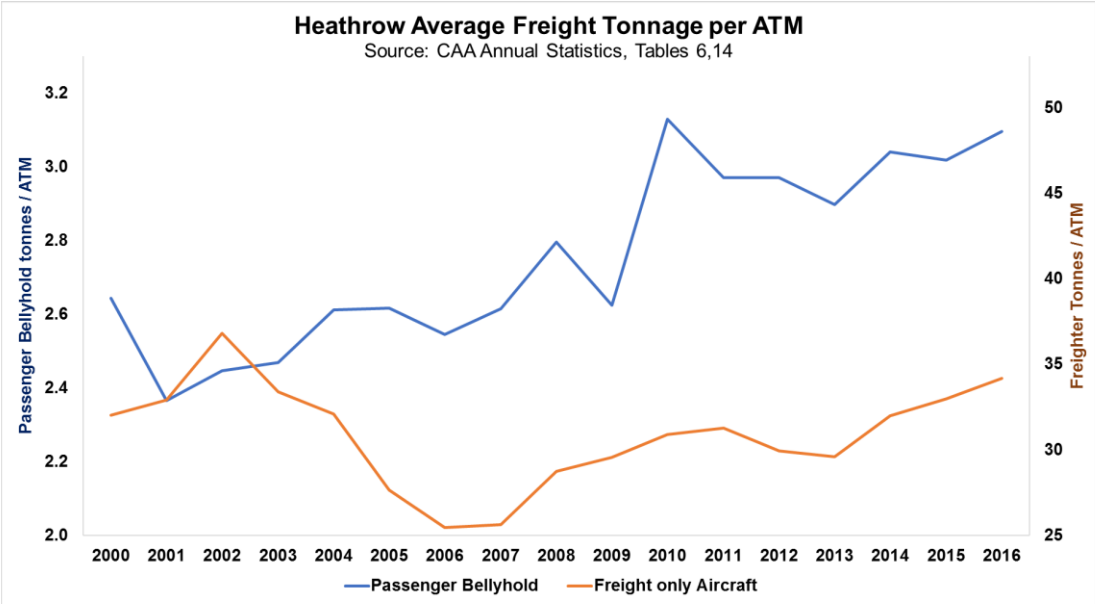

Figure 13 – Change over time of average tonnage per ATM at Heathrow

4.8. East Midlands

145. East Midlands Airport has a significant freighter operation. Since 2000, it has been the largest airport in the UK for cargo-only operations by tonnage handled (circa 300,000 tonnes of freight and ca. 20,000 tonnes of mail in 2016). The number of cargo ATMs in 2016 was ca. 19,000.

146. Almost all the freight handled by the airport is carried on cargo-only aircraft[56]. Bellyhold freight represents a tiny minority of tonnage at the airport, as most passenger flights are operated by low-cost carriers, which do not currently carry freight.

147. The type of freight handled at East Midlands Airport is predominately express cargo, a sector of the air freight market that has shown strong growth over the past decade. East Midlands is also a significant mail handling airport in the UK[57]. The airport states:

> *"DHL is the largest operator with services to key hubs in the USA and in Europe. UPS also link to their hubs in the USA and Europe and TNT have a smaller operation with a link to Europe"*[56]

148. Several of these integrators have invested significantly in operations at East Midlands Airport. For example, DHL invested £90m on infrastructure at East Midlands Airport in 2014[58].

149. The appeal of East Midlands Airport to the integrators is linked to the airport's location in the centre of England, where it is well placed to serve the whole of the UK. The ability to operate night flights is a key advantage. The airport states:

> *"The express freight operators provide an international next-day delivery service. This relies on the excellent surface access connectivity (90% of England and Wales is within a 4*

[56] (East Midlands Airport, 2015, p. 57)
[57] (East Midlands Airport, 2015, p. 16)
[58] (DHL, 2014)

hour (55mph) truck drive away from East Midlands Airport) along with the ability to operate aircraft at night"[57]

150. For express freight in particular, it is important to minimise trucking time between the shipper/consignee and the airport. As such, the location of an airport relative to warehouse locations is important. The map below highlights locations of large warehouse facilities in the UK[59]. A large number are seen to be near to East Midlands Airport, or on the motorway network with quick access to East Midlands Airport.

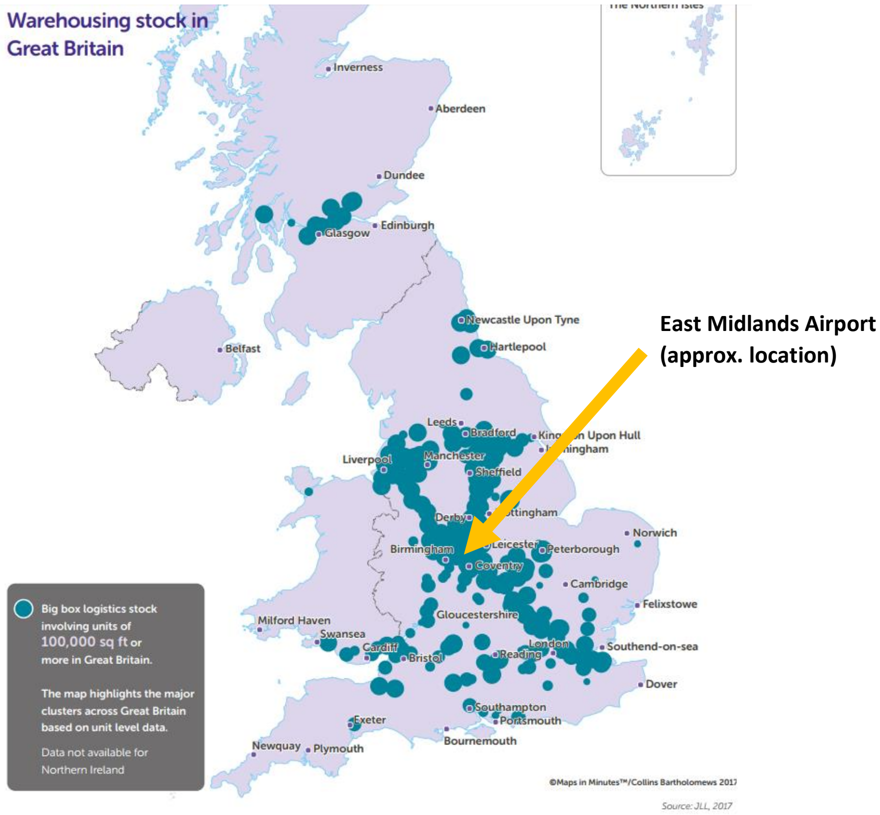

Figure 14 – Locations of large warehousing units in the UK, Source: Freight Transport Association

151. Regarding accessibility of the airport, East Midlands Airport states:

"There are in the region of 500 HGV movements to and from East Midlands Airport every day. However because of the nature of the freight hubs at East Midlands Airport, with pure-freight aircraft flying overnight, the vast majority of these vehicle movements take place very late at night (normally after 9pm) and very early in the morning (between 2am and 5am) and as such have no impact on peak motorway traffic levels"[57]

152. This pattern of utilisation fits with the airport's traffic being weighted heavily toward express freight. By implication, we can say that the vast majority of truck movements to/from East Midlands are not impacted by peak motorway traffic levels (as they are not using the motorway network at these times).

153. The "*East Midlands Gateway*", a project consisting of new warehousing and a rail freight station, is currently in development at a site next to East Midlands Airport. It is planned that the first warehouses will be occupied by September 2018. Construction of the rail station is due to begin after December 2019[60].

[59] (Freight Transport Association, 2017, p. 74)
[60] http://slp-emg.com/wp-content/uploads/2017/05/New-branding-A3.pdf

154. The importance of night flights to express freight has been stated before in this document, and is emphasised again by the breakdown of East Midlands ATMs, showing that ca. 64% of cargo ATMs in 2014 were at night (17,029 of 26,681)[61].

4.9. Stansted

155. Stansted has developed to become the main airport in South East & East region for freight on all cargo aircraft. It handled ca. 223,000 tonnes of freight in 2016, with further ca. 23,000 tonnes of mail (the number of cargo ATMs in 2016 was ca. 11,000). Amongst the London airports, it handled the highest volume of dedicated freighter traffic, and was also "*the most significant hub for express freight*"[62].

156. On express freight, the airport adds: *"The airport's express freight market, anchored by key operators such as FedEx and UPS, is the second biggest in the UK*"[62] (behind East Midlands Airport). TNT and around ten other companies also operate weekly services from the airport.

4.10. Others (excluding Manston)

157. Other airports that are significant for freight in the UK are Manchester, Gatwick and Birmingham. Together with the three airports discussed above, they accounted for 96% of UK air freight (by tonnage) in 2016. As an airport in the south of the country, Gatwick is worthy of more detailed examination.

Gatwick

158. In 2016, Gatwick handled 3% of the UK's air freight (ca. 80,000 tonnes). This was all in the bellyhold of passenger aircraft. However, it has previously had a share of the UK market as large as 18.5% (in 1990).

159. The proportion of Gatwick freight carried on cargo-only aircraft was between 6% and 25% over 1990-2006. In 2007, freighter share at Gatwick dropped to 1.4%, before falling close to 0% from 2012 onwards.

160. In 2008, a revised air traffic rights agreement between the UK and the USA meant that a significant number of long-haul UK-US operations switched from Gatwick to Heathrow. The loss of widebody capacity at Gatwick saw bellyhold freight fall by ca. 40% in 2008. It remained around the 2008 level in 2016.

161. Gatwick is operating reasonably close to its ATM capacity. This limits the growth potential for freight through additional passenger or freighter flights.

162. As of 2017, fewer than 10% of existing ATMs at Gatwick are used by widebody aircraft[63]. Thus, there is significant scope for Gatwick to increase its cargo capacity by increasing the share of widebody aircraft using the airport. To some extent this will happen naturally as passenger demand increases. Widebody share has risen in every year since 2014 (from 7.3% in 2014, to 9.4% in 2017[63]).

163. On routes where widebody capacity is in place at Gatwick, there is every indication that demand for freight is at least as strong as its closest competitor Heathrow; Gatwick Airport cites examples such as Emirates, Continental and Delta achieving *higher* freight tonnage per ATM at Gatwick than at Heathrow[64].

164. Freight volumes at Gatwick have grown strongly in 2016 and 2017 so far. This is driven by the rapid expansion of long haul routes by a number of airlines, including Norwegian, British Airways, Cathay Pacific and WestJet. We would expect this trend to continue as more slots are deployed for long haul flights, increasing bellyhold freight capacity.

[61] (East Midlands Airport, 2015, p. 111)
[62] (Stansted Airport, 2015b, p. 6)
[63] (OAG)
[64] (Gatwick Airport, 2015)

4.11. Manston

Historic Freight

165. Freight at Manston has accounted for an average of 0.8% of the UK total in the period 1990-2014 (prior to closure). Its peak share of the UK market occurred in 2003, when it reached 2.0%.

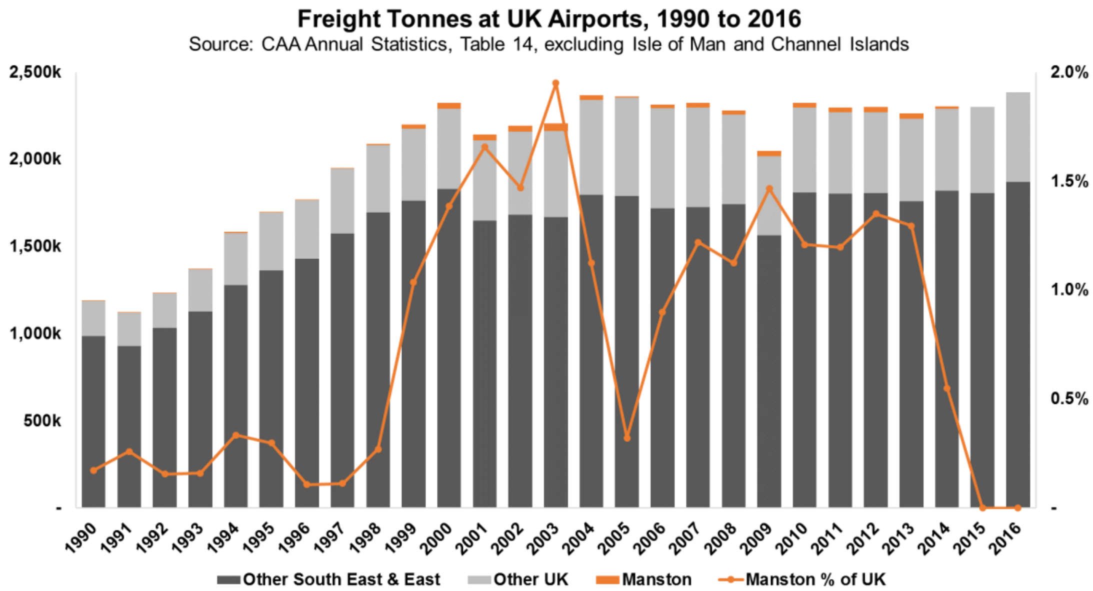

Figure 15 – Timeseries of UK freight, including that handled at Manston

166. The total number of cargo air transport movements at Manston averaged ca. 550 per year in the period 2000-14. This is equivalent to less than one aircraft rotation per day on average (peak year in 2003 was 1.5 rotations per day). Manston's share of UK cargo ATMs briefly peaked at 1.5% in 2003. In every year since 2005, Manston cargo ATMs have accounted for less than 1% of the UK total.

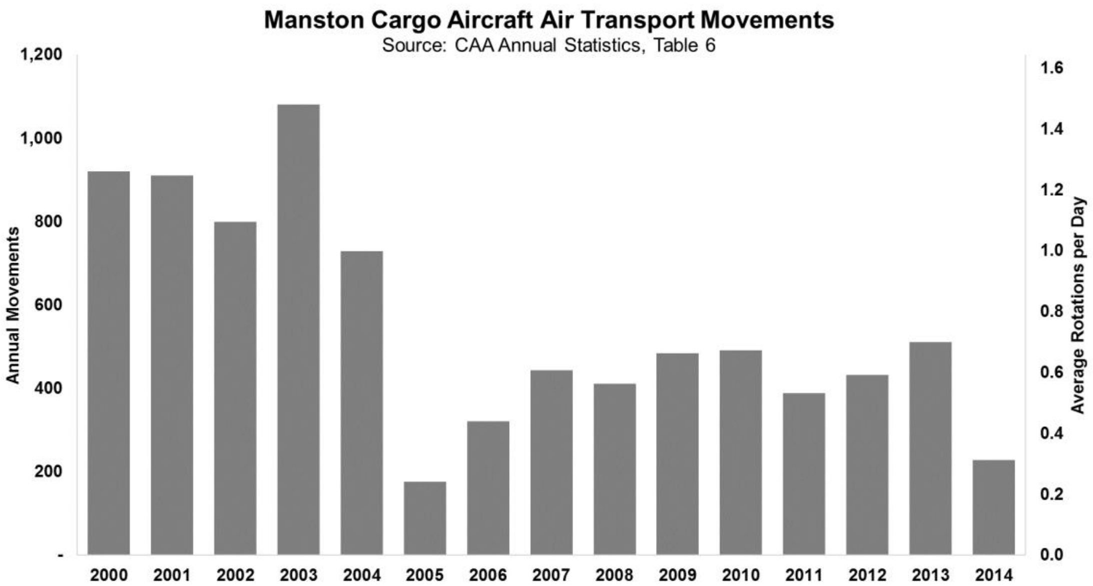

Figure 16 – Manston cargo-only aircraft movements

167. The hypothesis has been put forward that Manston previously was unsuccessful as it lacked the infrastructure to handle additional flights. However, with a peak of 1.5 rotations[65] per day, it seems certain that higher numbers of flights per day could have been handled if market demand was there.

168. As noted previously, the previous owners invested £7m on new aprons and taxiways, increasing the freight capacity to 200,000 tonnes[66]

Competitiveness of a Reopened Manston

169. Were Manston airport to be re-opened at some point in the future, it would likely be competing directly with East Midlands and Stansted for cargo-only flights. The outlook for the airport in this scenario is poor.

170. Firstly, the location of Manston on a peninsula physically limits the size of its catchment area.

- Within a 3 hour drive, only the South East & East of England, and a small part of the Midlands, are accessible.
- In comparison, most of England and Wales can be accessed within 3 hours of East Midlands Airport, while Manston's catchment is essentially a sub-set of the Stansted catchment.
- The case studies of Liege and Leipzig (Section 12), as well as the strong growth of freight at East Midlands, indicate the importance of a large catchment area and central location. While these airports attract cargo from an extensive area, they also benefit from strong cargo demand within their immediate catchment.

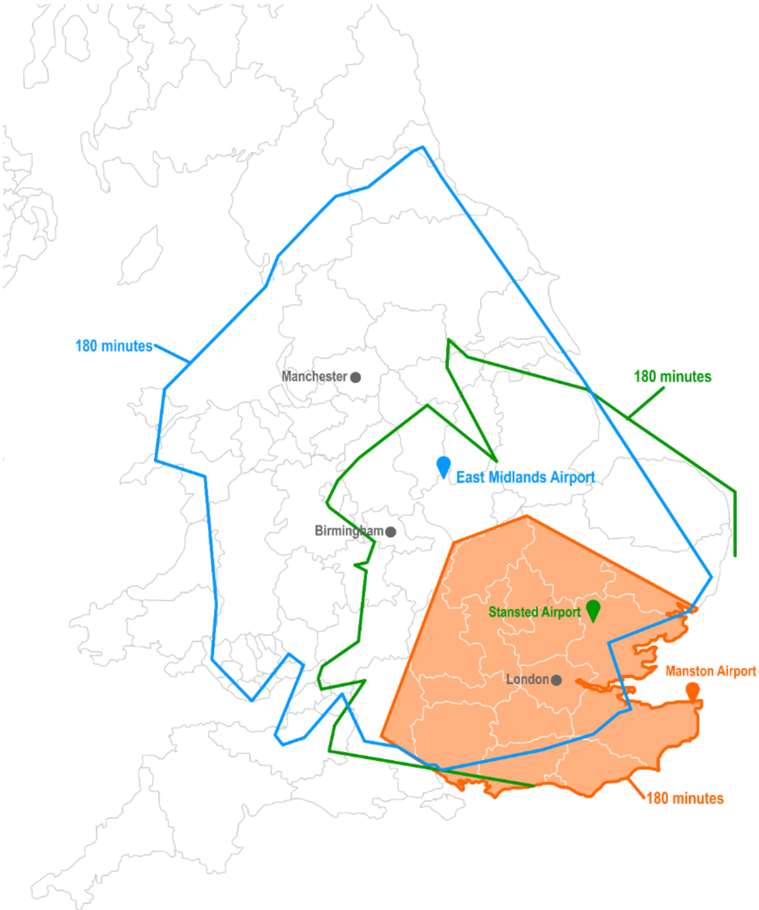

Figure 17 – 3-hr catchment region of Manston in comparison with those of East Midlands and Stansted
Source: Altitude analysis, Google Maps (truck speed set at 55 miles per hour)

[65] A rotation is an aircraft turnaround at an airport, representing an arrival and a departure flight.
[66] (Wiggins Group plc, 2002, p. 16)

171. In addition to Manston's poor geographic location, it is also relatively far from important transport infrastructure. The motorway network is not especially close (the airport is ca. 22 miles from the M2 and 38 miles from the M20). Successful freight airports in the UK and Europe are extremely close to the national motorway network, helping to minimise the shipper/consignee to airport transport time.

172. Secondly, there is consensus in the air freight industry that the ability to handle night flights is critical for many types of air freight (in particular for express freight, but also for other types of freight).

- East Midlands and Stansted are both able to accommodate flights 24 hours per day.
- Both Liege Airport and Leipzig Airport cite the ability to accept night flights, and the support of local government in doing so, as factors in their success (see appendices, Section 12).

173. It is unclear (in the light of historic restrictions) whether or not night flights would be allowed at Manston Airport were it to reopen. However, it does seem clear that restrictions on night flying would have severe limitations for air freight potential at the airport. Observations at other freight hubs such as East Midlands, a significant volume of freight activity takes place during night time hours, including onward (or inward) road haulage taking advantage of road capacity overnight to move freight outside of peak traffic periods. Manston's local road network is not ideally placed to accommodate large volumes of HGV traffic arriving in quiet hours

174. Finally, as noted previously, there is a clear move towards market consolidation of freight activity at a few large airports. In order to be successful, Manston would need to reverse this well-established trend. It is not apparent how this could be achieved, even with markedly lower airport charges (which in turn would compromise the financial viability of the airport).

175. Therefore, even if there was a future need for additional airport capacity for freighter activity, Manston is poorly placed to service such a requirement and better existing operational alternatives are available.

5. Current Freight Demand vs Supply at UK Airports

5.1. Context

176. Azimuth asserts that UK air freight has been constrained since 2000[67]. Furthermore, Azimuth concludes that shortage of airport capacity is leading to more trucking of freight ("*flying freight from Manston, negating the need to truck, to and from European airports for air transportation*[68]").

177. We consider that these conclusions are highly simplistic. They do not recognise the operational needs and behaviours that underpin the freight market:

- As discussed below, we agree there is a shortage of dedicated freighter capacity at the UK's main passenger hub airport (Heathrow). However, freighter capacity is available at other airports. For example, both Stansted and East Midlands have expanded freighter activity significantly since 2000, and continue to have spare capacity.
- Therefore, any shortage of air freight capacity in the UK relates specifically to Heathrow capacity rather than a more general lack of capacity.
- Trucking is a highly integrated component of the air freight business model, and not merely a substitute for air freighter flights when airport capacity is constrained. The increasing use of truck feeder services (see Figure 32) is due to cost efficiencies and is not restricted to the UK. We see no evidence that the growth in trucking is primarily driven by lack of Heathrow capacity for air freighter flights.
- In any case, even if there were significant levels of trucking caused by constraints at Heathrow, this would only be reduced by the provision of more Heathrow runway capacity. As there is already spare capacity at other airports in the UK, provision of further capacity would not make any significant difference to trucking levels. There is no reason why economic decisions to truck freight rather than fly would change in the absence of new Heathrow capacity.

178. In the remainder of this section of our report, we provide an analysis of current UK airport capacity for freight, and whether this has constrained demand. In the following section (Section 6), we investigate the outlook for future airport capacity for freight at UK airports.

5.2. Literature Review

179. As noted above (see paragraph 176), Azimuth asserts that UK air freight has been constrained since 2000. Its case for Manston relies heavily on this assertion, yet no evidentially supported and reasoned justification is provided. Three references are provided.

180. The first document cited is the Air Transport White Paper from the Department for Transport[69]. We have not found references to air freight being constrained in this document, which in any case dates from 2003.

181. The second document is by Oxford Economics[70]. This report is a technical note which examines how increased airport capacity (or conversely the lack of additional new capacity) could affect air freight and the economy. The study was undertaken for Transport for London / Mayor of London, promoters of the new Thames Estuary hub airport scheme.

[67] (Azimuth Associates, 2017 a, p. 8)
[68] (Azimuth Associates, 2017 a, p. 19)
[69] (Department for Transport, 2003)
[70] (Oxford Economics, 2013)

182. References in the Oxford Economics report to existing capacity constraints focus on Heathrow, and its forward-looking analysis is primarily in the context of the potential benefits of the proposed new hub airport. For example, on Page 8:

> *"Capacity constraints at Heathrow, however, set in as early as 2005 and future cargo growth is threatened by the inability of London area airports to keep up with demand. A new hub airport for London, with enough capacity to meet demand for the next 30 to 40 years, would be particularly important for the growth of bellyhold cargo."*

183. The Oxford Economics report also notes the divergent trends between short haul and long haul cargo in the UK. On Page 14, the factors that could explain the decline in short haul air cargo are explored.

> *"In all likelihood, short-haul cargo may have fallen due to both capacity constraints at Heathrow and freight forwarders substituting road or rail transport for short-haul destinations. In addition, the cost of air cargo is higher on short-haul routes because a larger portion of the trip is spent on the ground and more time in the air is spent climbing and descending. Lastly, the lack of widebody planes on short-haul journeys make bellyhold cargo less attractive at those distances to begin with."*

184. On Page 16, the Oxford Economics report goes on to state:

> *"The fact that volumes have fallen so dramatically could be due to both capacity constraints at Heathrow and also to the substitution of air cargo on short-haul distances with rail or truck transport. Which phenomenon is more important? The opening of the Channel Tunnel in 1994 between the UK and France has made it faster and cheaper to transport cargo by road between continental Europe and the UK. In terms of truck transport, it is estimated that 97,000 tonnes of air freight actually crosses the English Channel by truck per year, as compared to 87,000 tonnes flown on bellyhold. In fact, the volume of short-haul cargo peaked around the time the Channel Tunnel opened and has declined ever since. Therefore, this hints that much of the decrease in short-haul volumes may be due to the relatively lower cost of truck transport to continental Europe rather than capacity constraints at London area airports. In other words, the generalised cost of surface transport (relative to air transport) has decreased, spurring a modal shift on short-haul routes."*

185. The final reference is to rankings of European Union countries for the quality of air transport infrastructure[71]. This appears to relate to overall air transport infrastructure, and is not specific to freight. In any case, the UK is ranked reasonably highly in the most recent results (#7 out of 28 EU countries for 2015/16).

186. To summarise, the three studies quoted by Azimuth do not provide any meaningful support for the assertion that UK airport capacity for freight has been constrained for many years. The Oxford Economics study identifies constraints at Heathrow and hub capacity specifically but also highlights other factors for recent freight trends. The 2003 Air Transport White Paper and the European Union infrastructure ranking study do not address the issue directly.

187. In the next subsection of our report, we show that there is no overall shortage in UK airport capacity for dedicated freighter operations (the type of capacity a reopened Manston would potentially provide as identified by RSP).

188. In paragraph 235, as part of our review of the Azimuth forecasts for Manston, we highlight how results from a York Aviation study have been applied incorrectly.

[71] https://ec.europa.eu/transport/facts-fundings/scoreboard/compare/investments-infrastructure/quality-airports-infrastructure_en#2015-2016

5.3. Analysis of Current Freight Demand vs Supply at UK Airports

189. There is no overall shortage in UK airport capacity for dedicated freighter operations. Both of the two largest airports, East Midlands and Stansted, can accommodate more freighter services than currently operating (sufficient to meet demand). Many other airports in the UK have spare capacity for freighter services.

190. In this sub-section of our report, we examine the current freight capacity at UK airports. In the following section (Section 6), we analyse future UK airport freight capacity.

East Midlands Airport

191. East Midlands Airport does not require slot coordination[72]. It is designated as a Level 2 airport, with the UK slot coordinator (Airport Coordination Limited) only providing data collection services[73]. IATA[74] defines a Level 2 airport as one "*where there is potential for congestion during some periods of the day, week or season, which can be resolved by schedule adjustments mutually agreed between the airlines and facilitator*". In other words, the airport cannot be considered as facing significant capacity constraints.

192. The airport does not appear to have any limit on the number of overnight ATMs it can operate. Note that it *does* have limits on the amount of noise any given aircraft can make at night. There is a limit on the land area that is exposed to noise above a certain threshold, as well as a rule preventing operation of the noisiest aircraft types between 23:00 and 07:00 (as per many other UK airports including Heathrow, Gatwick, Stansted).

193. The airport appears to have established a common position with the local authority which supports operation of the airport. For example:

> *"The Council will provide for the operational growth of East Midlands Airport whilst having regard to its impact on local communities and the wider environment…. Noise-sensitive development, particularly housing, will be resisted where it can be demonstrated that the noise levels associated with the airport would be detrimental to the occupiers or users of any such development"*[75]

194. The airport's runway[76] is long enough to handle the typical large cargo aircraft flying today, including the B747-400, B747-8F and the AN-225. It can also handle the A380, which could be relevant if older examples of that model are converted to a cargo aircraft in future[77].

Stansted Airport

195. Stansted is designated as a Level 3 coordinated airport. A process of slot allocation is required whereby it is necessary for all airlines to have a slot allocated by a coordinator. Therefore, Stansted is facing some capacity constraints in peak periods.

196. Nevertheless, there remains significant capacity available at most times of day, as shown below for the Summer 2017 scheduling season.

[72] Allocation of airport "slots" to airlines by an independent body. A slot provides permission for an airline to arrive or depart an airport for a specific time at a specific weekday and for a specific period applied for.
[73] https://www.acl-uk.org/faqs/
[74] (IATA, 2017c, p. 22)
[75] (East Midlands Airport, 2015, p. 69)
[76] East Midlands Airport runway length is 2,893m, compared to ca. 2,750m for Manston Airport.
[77] (East Midlands Airport, 2015, p. 73)

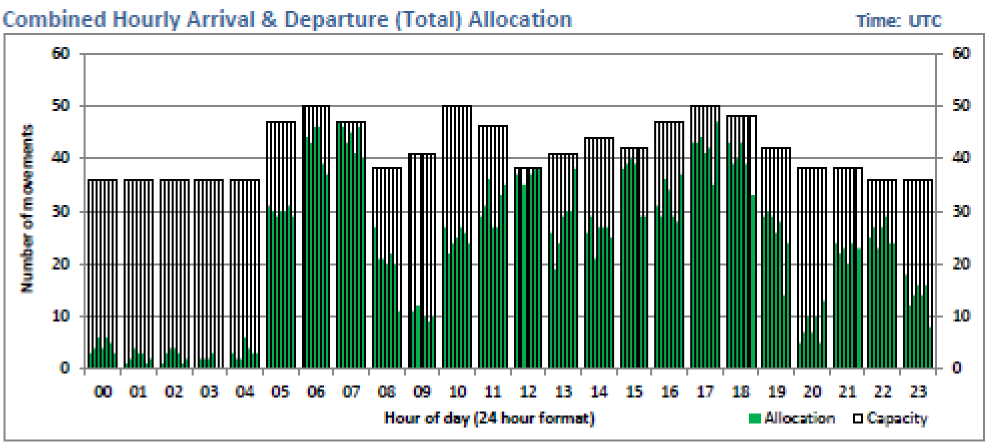

Figure 18 - Peak Week, Hourly Runway Allocation, Stansted Airport, Summer 2017. Source Airport Coordination Limited[78]

197. The number of cargo ATMs grew by ca. 13% in 2016 (source: Altitude analysis of CAA data), indicating that capacity constraints are not severe for freighters.

198. The airport is more tightly regulated than East Midlands Airport. Stansted's annual number of ATMs is limited. Currently, these limits stand at 243,500 passenger aircraft ATMs and 20,500 cargo aircraft ATMs[79]. These limits compare to 2016 movements of ca. 153,000 passenger ATMs and ca. 11,000 cargo ATMs. The airport considers the ultimate capacity of the runway to be 285,000 ATMs[80].

199. Separately, there is a quota on the overall number of ATMs allowed between the hours of 23:30-06:00 (7,000 ATMs in the summer season and 5,000 in the winter season). In 2013, the airport reports there were ca. 9,300 night ATMs in total, and that cargo aircraft ATMs take up a "*sizeable proportion*" of the quota[80].

Heathrow Airport

200. The UK does lack available dedicated freighter capacity at its only major passenger hub airport, Heathrow.

- Heathrow is also the UK's largest freight airport with ca. 65% of the UK's overall throughput (see paragraph 109).

201. Freight forwarder activity has consolidated around Heathrow on the strength of its extensive network of long haul passenger services. These services, typically using widebody aircraft, provide substantial bellyhold cargo capacity to a wide range of destinations.

202. At Heathrow, only ca. 5% of freight is carried on dedicated freighters (see Figure 4).

- If more capacity for freighter services existed at Heathrow, we would anticipate much greater levels of dedicated freighter activity.
- In the absence of operating constraints, major passenger hubs tend to also play a role as key dedicated freighter hubs (e.g. Frankfurt). Freighter services complement the connectivity provided by passenger flights, while the cargo industry benefits from economies of scale and scope from the consolidation of activity.

203. Where dedicated freighter flights cannot be accommodated at Heathrow (due to capacity constraints), freight customers have the following choices:

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78 (Airport Coordination Limited, 2017, p. 11)
79 (Stansted Airport, 2015a, p. 9)
80 (Stansted Airport, 2015b, p. 29)

- Operate freighter flights (or use existing freighter flights) from other UK airports where capacity is available (e.g. Stansted, East Midlands).
- Transport freight in the bellyhold of passenger flights from Heathrow (or other UK airports).
- Transport freight to a major European air freight hub (e.g. Liege, Frankfurt), typically by truck.
- Use surface modes of transport (road, rail, water) for the whole journey (note that this is not a realistic option for most potential air freight consignments due to the distances involved and/or urgency of shipment).

204. The capacity constraints at Heathrow also limit the number of passenger flights that can be operated. This in turn will have an impact on the bellyhold capacity that is available. However, it is not clear whether this is a substantial issue in relation to potential freight volumes.

- Heathrow continues to dominate the long haul passenger segment (72% of UK passengers in 2016[81]).
- Where demand is available, it is typically more economic to use constrained Heathrow slots for long haul flights (compared to short haul). Heathrow's share of overall UK long haul passengers has actually grown since 2002 (from 70% to 72% in 2016). In comparison, its share of short haul passengers has dropped from 24% to 17%. This indicates that short haul services are being squeezed out of Heathrow to accommodate long haul growth (due to current capacity constraints)[82].
- Air freight is focussed on long haul markets. Less than 10% of Heathrow freight in 2016 was to/from UK and Europe[83], despite accounting for 62% of passenger flights[84].
- Therefore, the extent to which constraints on Heathrow passenger flights are limiting bellyhold freight at Heathrow is difficult to establish from current publicly reported information.

205. Note that AviaSolutions[85] has undertaken analysis that suggests that average cargo loads at Heathrow are markedly lower than average cargo capacity.

> *"At Heathrow with a significant number of wide-bodied aircraft (35%), we estimate the average belly-hold freight capacity to be 7 tonnes per ATM at LHR (2015), significantly higher than the actual freight per ATM of 3 tonnes".*

206. This indicates there is excess bellyhold capacity at Heathrow. However, capacity may nevertheless be insufficient for demand on certain routes, directions of travel or at particular times of year, etc.

Other Airports

207. In addition to spare capacity at East Midlands and Stansted, other South East and regional airports could also accommodate significant freight volumes if the demand was there. This is true for both freight on dedicated freighter aircraft or bellyhold freight.

208. Bournemouth Airport[86] highlights that:

> *"With ample room to grow, our thriving cargo facility is expanding to meet the demands of importers and exporters from across the UK. Accommodating a huge variety of freight and passenger aircraft, Bournemouth supports cargo logistics round the clock, with the following benefits: 2271m runway, excellent good weather record, congestion free (with*

[81] Source CAA airport statistics, Altitude calculations
[82] Source CAA airport statistics, Altitude calculations.
[83] (Heathrow Airport, 2017, p. 5)
[84] CAA airport statistics
[85] (AviaSolutions, 2016, p. 31)
[86] www.bournemouthairport.com/about-us/doing-business-together/cargo/

> *no slot restrictions), experienced in handling many cargo aircraft including the AN-124 Ruslan, 'Freighter friendly' airport management."*

209. Bournemouth Airport has some disadvantages due to its coastal location and distance from the motorway network. However, similar issues apply to Manston (with its location arguably even more compromised than Bournemouth, given its position on a peninsula). From the South West, West London and the Midlands, Bournemouth is generally more accessible than Manston[87].

210. Outside the South East, Doncaster Sheffield Airport has a central UK location. It markets itself as "*the UK's Freighter Gateway*[88]":

> *"At the centre of the UK with easy access to the M18, M1, A1M, M62 and M180 Doncaster- Sheffield is the ideal airport for freighter operations. DSA is justifiably gaining the reputation as the most effective freighter airport in the UK. The attributes that are delivering this include…. exceptional performance record, 24 hour operation, runway 2,893m x 60m, CAT III, Class "D" controlled airspace, no slot constraints/congestion, Competitive jet fuel prices, short taxiing distances, excellent cargo reception and handling, inclusive pricing, NEQ capacity up to 9,300kg Hotac."*

211. Both of these airports are currently operational, and benefit from a large site with a long runway. Doncaster Sheffield operates 24 hours a day, whilst night flights at Bournemouth can be arranged with prior notice.

212. Finally, there are a range of other UK airports (currently in use) that previously carried significant volumes of freight, and would be able to do so again if demand returned.

- Prestwick handled ca. 42,000 tonnes of freight in 2001, compared to only ca. 11,000 in 2016. We are not aware of any reasons why Prestwick would be unable to handle similar or higher volumes in the future (assuming demand existed).
- Similarly, Liverpool had negligible freight throughput in 2016 but has handled as high as ca. 30,000 tonnes in 1995. Again, we would assume the airport has the capacity to accommodate similar or higher volumes in the future.
- Gatwick bellyhold freight volumes have been as high as ca. 290,000 tonnes in the past, compared to ca. 80,000 tonnes in 2016. As more long haul routes are added at the airport, freight throughput is once again growing. In the 12 months ending September 2017, Gatwick added ca. 15,000 tonnes of cargo (+20.3%)[89].

213. Taking all UK airports combined, the difference between peak year and 2016 freight tonnes was ca. 225,000 tonnes (freight on dedicated freighters only)[90].

- This excludes airports which have closed (e.g. Manston, Plymouth), where commercial activities have been downsized (e.g. Blackpool, Coventry) and London airports (where pressure on slots may reduce the ability to recover to historic volumes should dedicated freight demand return).

[87] For example, the following distances have been sourced from Google Maps for the typical fastest routing. Bournemouth Airport to Hounslow: 90 miles, Manston Airport to Hounslow: 103 miles. Bournemouth Airport to Bristol: 70 miles, Manston Airport to Bristol: 201 miles. Bournemouth Airport to Birmingham: 167 miles, Manston Airport to Birmingham: 197 miles.
[88] www.therouteshop.com/profiles/doncaster-sheffield-airport/
[89] http://www.mediacentre.gatwickairport.com/press-releases/2017/booming-global-connections-drive-gatwick-to-record-september.aspx
[90] CAA airport statistics.

5.4. Conclusion

214. We conclude that there is no overall shortage of freight capacity at UK airports, whether for dedicated freighters or bellyhold freight.

- The two largest dedicated freight airports have spare capacity.
- There is significant excess capacity at a range of other UK airports that are currently in use. These airports have seen demand reduce due to trends towards consolidation at major airports and switch to trucking.

215. We acknowledge that there is a shortage of freighter capacity at Heathrow. Slot constraints could also be having some impact on the bellyhold market, although the impact may be relatively moderate.

216. However, it is important not to conflate Heathrow constraints with the wider capacity situation. We see no evidence to support the assertion that there is a long-standing shortage of overall UK airport capacity for freight. Indeed, the evidence is to the contrary, given the reductions in freight throughput experienced by many UK airports.

217. There would be substantial benefits to adding freight capacity at Heathrow, the UK’s only major passenger hub airport. It can also be argued that freight capacity at a proposed new hub airport in the Thames Estuary would also generate strong benefits if it could be delivered. This option, though, was emphatically ruled out by the Airports Commission.

218. Therefore, it is difficult to see what benefit would accrue from adding freight capacity at non-hub airports, as there is already sufficient supply at advantageous geographic locations. In particular, freight volume at Manston has never exceeded ca. 43,000 tonnes in any single year. This is despite the supposed shortage of UK airport freight capacity and despite a previous owner investing to increase Manston's capacity to 200,000 tonnes per annum.

219. From a freight perspective, we do not consider it meaningful to focus on the South East alone as a separate market. Freight is less time sensitive than passengers. Therefore, for major airports, the freight catchment area is typically many times larger than the passenger catchment area. This is one of the key factors that leads to the high degree of market consolidation seen for air freight.

- East Midlands serves the whole of England and Wales, exploiting its central location in the UK.
- Similarly, the extensive network of long haul flights from Heathrow and its hub operation means it attracts freight from the whole of Great Britain.
- For Europe’s major freight hubs, the catchment can be even wider. For example, Leipzig Airport considers its catchment covers a 10-hour trucking radius (see Figure 38), while Liege sees its catchment as all areas within access of a full day trucking (see Figure 39). The catchment areas for these two airports are particularly wide, as a result of their wide range of air services.

220. Mainly due to the hub strength of Heathrow, 78% of 2016 UK air freight was flown from airports in the South East & East of England. Heathrow and Stansted alone achieved 65% and 7% market share respectively.

- Much of the UK’s high value manufacturing is located outside London and the South East[91]. In Q1 2015, only 15% of UK manufacturing jobs were located in London and South East[92].
- Clearly, a substantial proportion of air freight using Heathrow in particular will be travelling to/from other areas of the UK.

221. More important is the type of airport capacity. Freight has consolidated around the three major air freight airports (Heathrow for bellyhold, while freighter activity is concentrated on East Midlands, Stansted and

[91] (Heathrow Airport, 2014, p. 19)
[92] (House of Commons Library, 2015, p. 7)

Heathrow). This enables the air freight industry to benefit from the economies of scale and scope flowing from consolidation. These cost efficiency pressures are unlikely to reverse.

6. UK Capacity Outlook

6.1. Context

222. In the previous section, we demonstrated that there is currently no overall shortage of freight capacity at UK airports.

223. In this section of the report, we analyse the scope for developing freight capacity at existing airports, in order to meet future demand.

- We focus on the published expansion plans of the three major freight airports.
- We consider the spot years of 2029 (prior to assumed new runway opening at Heathrow in 2030), 2040 (medium term planning horizon) and 2050 (long term planning horizon).

224. We also review comments in the Azimuth report in relation to the future role of individual airports.

6.2. Review of Individual South East Airports

Heathrow Airport

225. In its final report, the Airports Commission[93] "*unanimously concluded that the proposal for a new Northwest Runway at Heathrow Airport… presents the strongest case*." Heathrow is working on a timeline of a 2025 opening[94]. However, we consider that an assumed opening date of 2030 is more prudent, given the complexity of the planning and construction process. This aligns with the Airports Commission's stated need for one additional runway to be in operation in the South East of England by 2030.

226. Heathrow is developing its infrastructure to increase its cargo handling capability. The airport states:

> *"We are developing proposals for a complete overhaul of our cargo facilities as part of our expansion plans for an additional runway. Redevelopment of the airfield will provide an opportunity for the first time to expand the site and create new efficiencies*[95]

227. The airport has commented on the factors that currently reduce its competitiveness for cargo, and has developed a strategy to address these issues:

> *"Our customers have told us about the bottlenecks caused by some of the infrastructure, inefficient facilities and processes that are slower and more arduous than those of our European competitors. Our stakeholders rate us as poor for our facilities and value for money"*[96]

228. In its 2016 document 'Heathrow Cargo Strategy', Heathrow states:

> *"Our cargo strategy will lift freight volumes to 3 million tonnes a year by 2040"*[97]

229. Based on UK CAA data for 2016, this represents CAGR of 2.7% over 2016-40. Documentation from the airport indicates that growth is likely to come from additional bellyhold capacity rather than freighter ATMs:

> *"This will provide capacity at Heathrow for freight and cargo to be carried in the belly hold of passenger flights"*[98]

[93] (Airports Commission, 2015, p. 9)
[94] https://www.heathrowexpansion.com/local-community/important-dates-information/ (retrieved 19th October 2017).
[95] (Heathrow Airport, 2014, p. 20)
[96] (Heathrow Airport, 2016b, p. 2)
[97] (Heathrow Airport, 2016b, p. 2)
[98] (Heathrow Airport, 2014, p. 20)

230. Azimuth[99] discusses Heathrow in its first report.

231. Azimuth states that "*Indeed, more than 99% of air freight at Heathrow is carried in the bellyhold of passenger aircraft*". This is incorrect. Since 2010, the proportion of bellyhold freight at Heathrow has consistently been around 95%. A CAA report seems to be incorrectly attributed by Azimuth as a source for this figure.

232. It is also suggested that:

> *"The addition of a third runway at Heathrow is unlikely to resolve the capacity issues for dedicated freighters. Since Heathrow's passenger market has been constrained for some years, it is likely that the new runway will be used to meet this pent-up demand".*

- This is a pessimistic viewpoint. Heathrow's runway capacity in 2016 was 99% utilised[100]. With ca. 50% additional capacity on opening of a third runway, we would envisage some opportunities for additional freighter flights. Despite severe slot constraints, the number of freighter movements at Heathrow has remained stable since 2010[101].
- Therefore, there is some prospect of more freighter traffic at Heathrow after the opening of the third runway. Nevertheless, we do not dispute that there will be ongoing constraints on freighter activity at Heathrow, especially in the very long term.
- Of course, the major expansion of passenger flights following the new runway opening will lead to a substantive uplift in bellyhold capacity. As previously discussed, for most types of general freight, there is no inherent market preference for bellyhold or freighter carriage (with cost often the key deciding factor, which generally favours bellyhold). Therefore, the new Heathrow runway will add a significant amount of new cargo capacity into the UK market.

233. The Azimuth report also speculates that:

> *"Should Low Cost Carriers, who do not carry belly-freight for operational reasons, fill much of the additional runway capacity, Heathrow's freight handling, in terms of tonnes per year, is unlikely to increase substantially."*

- We view the references to low cost carriers as not relevant. Even if low cost carriers switch to Heathrow (which may depend on the level of airport charges after the new runway opens), this will have limited impact on bellyhold capacity.
- The full service short haul carriers operating at Heathrow currently contribute very little in terms of freight tonnage. Less than 10% of Heathrow freight is to/from UK and Europe[102], compared to 62% of passenger flights[103].
- There are several factors that cause this. In general, air freight is less competitive than trucking for shorter distances. Furthermore, the cargo carrying capacity of short haul aircraft (typically narrowbody types) is limited. Finally, air freight that is flying short distances tends to be express cargo, which is more likely to use dedicated freighter aircraft.
- Therefore, whether low cost carriers operate a significant proportion of Heathrow short haul services in the future will not have a significant impact on bellyhold availability. Similarly for long haul low cost, as these airlines typically carry bellyhold cargo (e.g. Norwegian).

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[99] (Azimuth Associates, 2017 a, pp. 15-16)
[100] 474,963 ATMs compared to cap of 480,000 (source CAA airport statistics).
[101] Cargo ATMS at Heathrow since 2010 were 2010: 2,414; 2011: 2,456; 2012: 2,378; 2013: 2,347; 2014: 2,332; 2015: 2,388; 2016: 2,452; (source: CAA airport statistics).
[102] (Heathrow Airport, 2017, p. 5)
[103] In 2016 Heathrow handled 477,614 aircraft movements. 295,605 of these flew Domestic or European routes [source: CAA airport statistics, Altitude analysis].

234. Azimuth also compares Heathrow processing times unfavourably to Manston Airport. We noted above (see paragraph 227) that Heathrow has a strategy to improve its process efficiency. However, the broader point is that this is not a meaningful comparison.

- Using a dedicated freighter at an unconstrained airport should nearly always be the fastest way of transporting air freight, assuming equivalent trucking time to reach the airport[104].
- However, for the majority of general cargo, the time-sensitivity is in the order of days rather than hours. A bellyhold freight consignment through a major hub will typically be much cheaper. Freight can be consolidated with other freight consignments. The incremental cost of carriage for bellyhold is relatively low, meaning that rates charged are typically much more competitive than for freighters – especially if there is not enough volume to fully utilise freighter capacity.

235. Finally, Azimuth[105] refers to a York Aviation study, in the context of Heathrow:

> *"York Aviation figures show, there will be a shortfall of slots for dedicated freighters, likely to be in the region of 45,000 by 2050".*

- This is an incorrect reading of the York report, which York Aviation rebut in detail in its November 2017 report commissioned by SHP[106].

236. In summary, the Azimuth analysis substantially underplays the potential for freight growth at Heathrow.

Stansted Airport

237. The airport has outlined infrastructure improvements to facilitate cargo traffic growth, including the potential for more cargo handling facilities to be built, and increasing the number of stands for cargo aircraft from 16 to 24[107].

238. Stansted Airport also published a 'Sustainable Development Plan' document in 2015 detailing the future demand it expects to handle:

> *"There is potential for cargo goods volume at the airport to increase on the single runway, potentially doubling the current throughput of cargo on dedicated aircraft to around 400,000 tonnes per annum….. Further growth can be expected from belly hold cargo as the range of airlines and destinations operating from the airport increases. The current modest amount carried in the belly hold of passenger aircraft could increase to around 60,000 tonnes a year"*[108]

> *"There is potential that cargo movements could rise to make full use of the current movement limit, however this needs to be considered against growth in passenger movements and the night quota. For planning purposes we have assumed that the number of cargo movements will be in the range of 15,000 and 18,000 per annum…. The majority of the cargo movements are expected to operate during the late evening and at night. Cargo aircraft will continue to operate during the off-peak periods between passenger movement peaks"* [109]

239. Note, the document is vague regarding the timescales relating to its forecast; it never states the year in which it expects demand to reach the forecast level. An assumption that the figure of 460,000 tonnes per annum is achievable by 2040 results in a CAGR of 2.7%[110].

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104 Although for most parts of the UK, trucking time to Heathrow will be significantly shorter than to Manston.
105 (Azimuth Associates, 2017 a, p. 16)
106 (York Aviation, 2017)
107 (Stansted Airport, 2015b, p. 36)
108 (Stansted Airport, 2015b, p. 26)
109 (Stansted Airport, 2015b, p. 29)
110 We believe this is a reasonable assumption, as both Stansted and East Midlands forecast are owned by MAG; MAG produced both forecast documents in the same year and using the same formatting and template; 2040 is the stated forecast year for East Midlands.

240. A plan for 15,000-18,000 cargo ATMs, when there is currently a limit of 12,000 overnight ATMs in total, possibly indicates growth of general cargo is expected.

241. Azimuth[111] argues that freighter services at Stansted will be forced out by passenger services.

> *"However, the airport is under pressure from Ryanair to increase the number of passenger flights. Ryanair is the dominant carrier at Stansted Airport and, since the LCC model is based on fast turnarounds, the airline will not tolerate interference from cargo handling. Ryanair is increasing their offering to more distant destinations including Turkey, North Africa, Cyprus and the Middle East. For the airline to maintain four rotations per day to maximise the profitability of each aircraft, late evening and night time slots will be required. Freight carriers have traditionally used these night slots."*

242. Azimuth continues:

> *"Since the airport also has a limit on total movements, this may mean Stansted has to choose between increasing passenger movements or retaining its freight. In this case, it seems likely that Stansted's management will preference passenger movements."*

243. There is no foundation for a number of the points raised above. Taking the various points in turn:

- No supporting evidence is provided for the statement that Ryanair is applying pressure on the airport to increase passenger flights (especially the implication that this would be at the expense of cargo flights). The Summer 2017 peak week runway profile (Figure 18) clearly indicates significant capacity for Ryanair to expand operations.
- We do not see any reason why handling freight from dedicated freighters would have any impact on the turnaround time of Ryanair aircraft.
- Azimuth appears to have limited understanding of the low cost carrier sector. We estimate that Ryanair averaged less than 2.5 rotations per aircraft per day across its network in FY17 (based on an analysis of its financial accounts).
- Ryanair operate from airports with night curfews or with night restrictions. Across 2017, an analysis of OAG schedule data for Stansted suggests that less than 3% of Ryanair flights operate in the night time period. Stansted Airport expects that cargo aircraft will continue to operate during the off-peak periods between passenger movement peaks (see paragraph 238).
- Stansted Airport has a separate movement cap for cargo and passenger ATMs. There is also an overall ATM cap[112], which is the sum of the separate passenger and cargo ATM caps. Therefore, the suggestion that Stansted will need to prioritise passenger flights over cargo flights is misplaced.
- Finally, no acknowledgement seems to have been made by Azimuth that Stansted Airport has stated that it is planning to grow freight tonnage alongside developing the passenger business (see paragraph 238).

Gatwick Airport

244. As discussed in paragraph 212, Gatwick has previously carried bellyhold volumes of ca. 290,000 tonnes (ca. 210,000 higher than the 2016 outturn). Gatwick had lost freight volumes as traffic mix has changed, in particular following the loss of long haul services after changes to traffic distribution rules in 2008.

245. Freight volumes have been growing rapidly since 2015, helped by the recent expansion of long haul services (many by low cost carriers). As more long haul services are added at the airport, we would expect continued growth.

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[111] (Azimuth Associates, 2017 a, pp. 14-15)

[112] www.acl-uk.org/wp-content/uploads/2017/07/STN-Local-Rule-4-1.pdf . Note that the airport also has an overall movement cap, which comprises of passenger ATMs + cargo ATMs + 10,000 other movements.

246. Azimuth[113] only comments briefly on Gatwick:

- "*It has increased its annual tonnage from only 3,000 in 2014 to 73,000 tonnes in 2015*." This is a somewhat surprising statement. Growth of this scale would merit more than a passing mention. However, the true freight tonnage in 2014 was ca. 89,000 tonnes, not 3,000 tonnes (source: CAA airport statistics).
- "*Gatwick is not a serious competitor in the freight market*." We note that current freight throughput (year ending September 2017) was almost 90,000 tonnes, more than double the peak annual value achieved by Manston in its entire existence. It was the 5th largest UK freight airport in 2016.

Other South East Airports

247. Azimuth[114] discusses the potential of other South East airports. As noted previously, we do not believe there is requirement for new freight capacity in the South East specifically. Therefore, we only briefly comment on the potential of other airfields.

- Bournemouth is only fleetingly considered by Azimuth. As highlighted in paragraph 208, we consider there to be some potential for freight development from this airport, a view shared by the airport itself.
- We also note that in its analysis of Southampton, Azimuth wrongly states that it handled 185,000 tonnes in 2015 (the correct figure is 185,000 kilogrammes or 185 tonnes). The short runway at Southampton constrains its ability to serve the freight market.

6.3. Review of Individual Regional Airports

East Midlands Airport

248. East Midlands is the UK's leading airport for dedicated freighter activity. Its central location enables it to serve a wide catchment, encompassing England, Wales and Scotland.

249. This is acknowledged by Azimuth[115]. However, it argues that the airport is not in a good position to serve the South East.

> *"At present the airport serves a wide catchment area as shown in Figure 2. However, surface access to these geographically distant businesses, of which many are concentrated in the South East, is hampered by congestion on the UK's road network. Therefore, total time taken to deliver from origin to final destination increases, particularly around the bottlenecks on some of the major motorways. Figure 2 clearly shows the number of businesses located in the South East, within the Manston catchment area.*

250. Earlier in the report (see paragraph 170 onwards), we provide a comparative analysis of the accessibility of East Midlands versus Manston. Given the wide catchments areas for cargo (see paragraph 219), we consider that the East Midlands is very accessible for the South East market. The M25 orbital motorway can be reached in just over 1.5 hours.

251. East Midlands Airport notes that the vast majority of vehicle movements to/from the airport take place very late at night or very early in the morning (see paragraph 151). Therefore, motorway bottlenecks alluded to by Azimuth should have a limited impact, as journeys will not be taking place during peak hours. In any case, congestion on the UK motorway system will affect all UK airports (including a reopened Manston).

[113] (Azimuth Associates, 2017 a, p. 16)
[114] (Azimuth Associates, 2017 a, pp. 18-19)
[115] (Azimuth Associates, 2017 a, pp. 17-18)

252. East Midlands has a benign planning environment (see paragraph 192 onwards). Despite the relatively low level of restrictions, the airport acknowledges sensitivity to developments that will impact on night time noise:

> *"Any further consideration or development at the airport related to night flights will require the application of stringent controls over night-time noise."*[116]

253. East Midlands Airport has land available for development of additional cargo facilities in order to support growth:

> *"The DHL Hub building opened in 2000 and it was always intended that the site would be developed in phases. Land continues to available for phased development on the western side of the building"*[117]

> *"Land will be reserved for the development of an integrator hub at Cargo East on land between the Pegasus Business Park and the runway/taxiway. This will enable the development of additional apron to serve the new hub operation. The building will be of a significant scale and will provide for the sortation systems required by the integrated carriers and also landside vehicle access for vans and for HGV's"*[117]

> *"Opportunities will be identified for incremental redevelopment and improvements to the existing Transit Sheds in Cargo East. A site for new cargo development, to the east of the current Royal Mail hub, will also be reserved. These development schemes will be made on a case by case basis and in response to operators' requirements"*[118]

254. As noted in paragraph 153, a rail interchange adjacent to the airport is in development, further strengthening its market position.

255. In the 'Sustainable Development Plan' document referenced previously, East Midlands Airport also publishes a demand forecast for the airport.

256. This forecast assumes that freight at East Midlands continues to be carried on freight-only aircraft, and that the type of freight carried by integrators (primarily express) will grow faster than that carried by other types of carrier.

> *"The forecast for future cargo tonnage is for some 618,000 tonnes in 2035 and some 700,000 tonnes in 2040…. by 2040, the number of cargo movements could grow to around 42,600. This reflects the growth of the integrated carriers and that the average freight load per cargo aircraft movement is predicted to increase from 14.4 tonnes in 2012 to 17.9 tonnes at 2040"* [119]

> *"The future split of day and night movements is expected to be similar to that of today"*[120]

257. Note that the airport does not include in its forecast any significant growth of mail (as it expects "*structural changes to the mail market. This is as a result of the shift from letters to parcels*"[119]).

258. In addition to stating its forecast demand, East Midlands Airport made clear statements on its future capacity in its 'Sustainable Development Plan' document. It does not believe it will be constrained by 2040:

> *"There are therefore no plans for the development of a second runway within the planning horizon covered by this Master Plan (2040) …. The capacity of the East Midlands Airport*

[116] (East Midlands Airport, 2015, p. 69)
[117] (East Midlands Airport, 2015, p. 79)
[118] (East Midlands Airport, 2015, p. 80)
[119] (East Midlands Airport, 2015, p. 61)
[120] (East Midlands Airport, 2015, p. 111)

runway is estimated to be between 34-36 runway movements per hour. This provides the airport with sufficient runway capacity for the foreseeable future and will be more than sufficient to accommodate an airport of a scale to handle 10 million passengers and 1.2 million tonnes of cargo annually” [121]

“the Land Use Plan identifies the land, the uses and the facilities required to support the operation of an airport capable of handling 10 million passengers annually and 1.2 million tonnes of cargo”[122]

“there will need to be a minimum of seven additional cargo stands provided including the ability to regularly park aircraft up to Code F (Boeing 747-8F) size”[123]

Other Regional Airports

259. There are a range of other regional airports with spare freight capacity which could play a larger role in the future.

- Doncaster Sheffield (see paragraph 210).
- Manchester Airport is the largest passenger airport outside the South East. It operates a two-runway system (the only UK airport with two runways except Heathrow). It has previously handled substantially more freight than currently handled.
- Similarly, Liverpool and Prestwick have previously handled much higher freight volumes than currently. Both airports have significant spare runway capacity and a large site to develop cargo infrastructure (Prestwick already has the facilities to handle specialist cargo). While Prestwick may be too far north to effectively serve the South East market, it could relieve pressure on other UK airports by capturing a larger share of freight demand to/from Scotland and the North of England. Liverpool is well connected to the UK motorway network, and the airport is owned by the operators of Liverpool Port.

6.4. Overall Capacity Outlook to 2040

260. We have projected the overall airport capacity for freight in 2040. For the three largest freight airports, future capacity has been sourced from the published plans described in the previous sub-section.

- While Heathrow and Stansted do not explicitly state their maximum expected future cargo capacity, we can assume each airport will have at least enough capacity to serve its predicted demand[124].
- The Heathrow figure assumes the opening of the planned third runway.

261. For other airports, we assume the following:

- Gatwick has handled ca. 0.2m annual tonnes of freight as recently as 2006. We assume it has the capability (demand permitting) to handle similar volumes in the future.
- Manchester handled ca. 0.17m annual tonnes of freight in 2007, and in its 2006 Masterplan, the airport forecast cargo tonnage of 0.25m tonnes by 2015[125]. We assume that the airport will be able to accommodate freight up to its masterplan forecast (0.25m tonnes).

[121] (East Midlands Airport, 2015, p. 73)
[122] (East Midlands Airport, 2015, p. 9)
[123] (East Midlands Airport, 2015, p. 75)
[124] Documentation from these airports indicates they have identified and made provision for developments of ground facilities (warehouses, stands etc…) to accommodate the forecast demand. Only Heathrow requires development of runway capacity.
[125] (Manchester Airport, p. 29)

- We assume that the remaining UK commercial airports (which are still fully operating) can handle freight tonnage at the level of previous peak year throughputs. This provides an assumed capacity of ca. 0.3m tonnes.
- Finally, we assume that by 2040, an additional 0.1m tonnes could be handled at airports with large sites but limited historic freight throughout (e.g. Doncaster Sheffield). This is likely to be a conservative assumption.

262. Total UK air freight capacity in 2040 is estimated to be ca. 5.4m tonnes per annum (including the impact of a new Heathrow runway). Of this, ca. 65% could be bellyhold capacity, with ca. 35% from freighters. Capacity at the three main cargo airports (Heathrow, East Midlands and Stansted) is estimated to be ca. 4.6m tonnes.

Airport	Estimated 2040 Capacity (m tonnes)	Possible Utilisation	
		Freighter	Bellyhold
Heathrow	**3.00**	0.09	2.91
East Midlands	**1.10**	1.08	0.03
Stansted	**0.46**	0.40	0.06
Manchester	**0.25**	0.03	0.23
Gatwick	**0.20**	0.00	0.20
Other UK	**0.39**	0.30	0.09
Total UK	**5.40**	**1.89**	**3.51**

Table 2 – Summary of estimated 2040 air freight capacity at UK airports
Source: Heathrow Airport, East Midlands Airport, Stansted Airport, Manchester Airport, UK CAA, Altitude analysis and assumptions

6.5. Capacity Outlook Prior to New Runway at Heathrow (2029)

263. We have also considered the potential capacity available prior to the third runway at Heathrow (assumed to open in 2030). There is limited information on the phasing of future capacity developments in the period to 2040, so this estimate has a greater reliance on our assumptions.

264. We have modelled the potential UK air freight capacity in 2029 at ca. 3.6m tonnes. This is based on the following prudent assumptions:

- No additional passenger or cargo ATMs at Heathrow compared to 2016. We assume that the airport will be able to accommodate freight growth at half the achieved annual growth rate for bellyhold tonnes/ATM recorded from 2006-16.
- We assume that the current Stansted and East Midlands capacity is at least 20% above 2016 freight outturn. We then model that the incremental capacity to be added by 2040 will be brought onstream at a constant rate.
- We model that Manchester is able to handle freight that was forecast for 2015 in its 2006 masterplan (same as 2040 assumption).
- For all other existing commercial UK airports, we assume the airports can handle historic peak values.

265. This is a deliberately cautious approach. Neither Stansted nor (especially) East Midlands face substantial freight constraints currently, and should be able to handle much higher freight volumes in the coming years.

6.6. Post 2040 Capacity Outlook

266. In the long term, there is the possibility of additional runway capacity in the South East. The Airports Commission stated in its final report:

> *"Even with a third runway at Heathrow, capacity in the London and South East system could be highly constrained by the 2040s and, as the Commission noted in its Interim*

Report, there would be likely to be sufficient demand to justify a second additional runway by 2050 or, in some scenarios, earlier"[126]

267. The regulatory environment, particularly with regard to noise and night flying, looks likely to be a key determinant as to the overall capacity that might be available for cargo movements post-2040.

[126] (Airports Commission, 2015, p. 334)

7. UK Demand vs Supply Outlook

7.1. Our Forecast for the UK Market

Context

268. We have assessed the future demand for air freight in the UK, reflecting some notable trends:

- Increasing role of passenger aircraft in the carriage of air freight, and the relative diminishing in importance of freighter aircraft. Passenger demand has developed strongly in recent years. This has led to expansion of cargo capacity in the bellyhold of passenger aircraft outstripping growth in air freight demand (see Figure 37).
- This trend has led to cutbacks in dedicated freighter operations from leading airlines such as Cargolux, IAG, Air France-KLM and Singapore Airlines (see paragraph 425). As of Q4 2016, 15% of widebody freighter capacity globally was in storage (see Figure 36). Airbus forecasts growth of just 42 freighters in European fleets by 2036[127]. In the UK, freight tonnes carried on all-freighter aircraft peaked in 2004. Since 2004, its share of total air freight has fallen from 37% (ca. 876,000 tonnes) to 30% by 2016 (ca. 708,000 tonnes, see Figure 5).
- There has also been a clear move towards consolidation of air freight activity at major passenger or freight hubs. In the UK, the leading 3 airports (East Midlands, Stansted and Heathrow) have steadily grown their share of overall UK air freight tonnes on dedicated freighter services – from 41% in 1990 to 86% in 2016 (see Figure 7). The UK bellyhold market is even more consolidated, with the leading 3 airports (Heathrow, Manchester, Gatwick) achieving a combined market share of 97%+ in each year since 1996 (see Figure 11).
- Cargo ATMs across UK airports have contracted, from ca. 108,000 in 2000 to ca. 52,000 in 2016. The most recent (2017) Department for Transport forecasts to 2050 assume the number of freighter flights in the UK will remain flat at 2016 levels[128].

269. We expect these trends to continue into the long term. These fundamental market developments do not appear to have been recognised by Azimuth, or have been ignored, in its assessment of the potential for a re-opened Manston.

Forecast Approach

270. Air cargo forecasting is complex, with a wide variety of factors influencing long-term demand. These include:

- High-level economic factors (such as overall GDP growth of the producer and consumer countries, and exchange rates) as well as low-level economic factors (e.g. business rates and import/export taxes).
- The state of global relations and the proliferation of protectionist trade measures.
- The mix of products being traded (remembering that generally only high-value items are suitable for air freight).
- The rate of product miniaturisation (which reduces air cargo volumes/tonnages).
- Development of entirely new products (e.g. iPhone and the global uptick in air freight when a new model is released).
- Technological advances enabling mode shift to or from air freight.

[127] (Airbus, 2017a, p. 105)
[128] (Department for Transport, 2017a, p. 33)

- Fuel prices impacting the competitiveness of air freight relative to other modes (while some products must travel by air, for others this is a preference, which is influenced by price).

271. It is also reasonable to suggest that there is less of a global focus on air cargo forecasts than, for example, air passenger forecasts. As such, there is less detailed, less well-defined, and less-robust data available upon which to base air cargo forecasts.

272. In the interests of simplicity and transparency, we have adopted a very high level econometric approach.

- Future freight growth has been linked to projections of future UK GDP growth.
- We use the UK Office for Budgetary Responsibility long term predictions of UK GDP[129]. In real terms, UK GDP is anticipated to grow by CAGR 2.2% in the period 2016-40 (CAGR 2016-29: 2.2%, 2029-40: 2.3%) with CAGR of 2.4% for period 2040 to 2050.

Forecast Results – Base Case

273. We project the size of the UK air freight market in 2040 to be ca. 4.2m tonnes per annum. This breaks down as ca. 3.1m tonnes of bellyhold demand and ca. 1.1m tonnes of freighter demand. We also project that:

- 2029: ca. 3.3m tonnes (of which ca. 0.9m tonnes of freighter demand).
- 2050: ca. 5.1m tonnes (of which ca. 1.2m tonnes of freighter demand).

274. Key assumptions made in generating our base case forecast include:

- Low growth experienced in the last decade will not continue, with future demand elasticities only slightly below historic long-term observed ratios.
- Future demand elasticities will decline slightly with time (also due to increasing market maturity).

275. We forecast the 2016-40 growth rate to be 2.4% CAGR. This is slightly behind the level of growth seen in the long-term historic data (between 1990 and 2016, CAGR was 2.7% CAGR). Nevertheless, we view our forecast as relatively optimistic. Our forecast growth rate is well ahead of the level of growth seen in more recent years (e.g. 2010-16 CAGR of 0.4%).

276. Our forecast growth rate is behind global forecast growth by Airbus (CAGR 2016-36 of 3.8%). This is not unexpected given that the UK is a relatively mature market, and that our forecast is for a longer period. Note also that our forecast is for tonnage, compared to flown tonne-kilometres for Airbus (as such, changes in the average sector length would influence the Airbus forecasts).

Forecast Results – Scenario with lower demand elasticity

277. We have also produced a scenario in which we lower our forecast demand elasticities to be in line with observed ratios from the four most recent historic years (i.e. 2013-16, over which UK air freight tonnage has grown at 1.8% CAGR). GDP growth in this scenario is as per our base case.

278. This scenario results in a UK demand of 3.6m tonnes of air freight in 2040 – significantly lower than our base case forecast (see Figure 19). This highlights the strength of the market recovery we are assuming in our base case.

[129] (Office for Budget Responsibility, 2017, January)

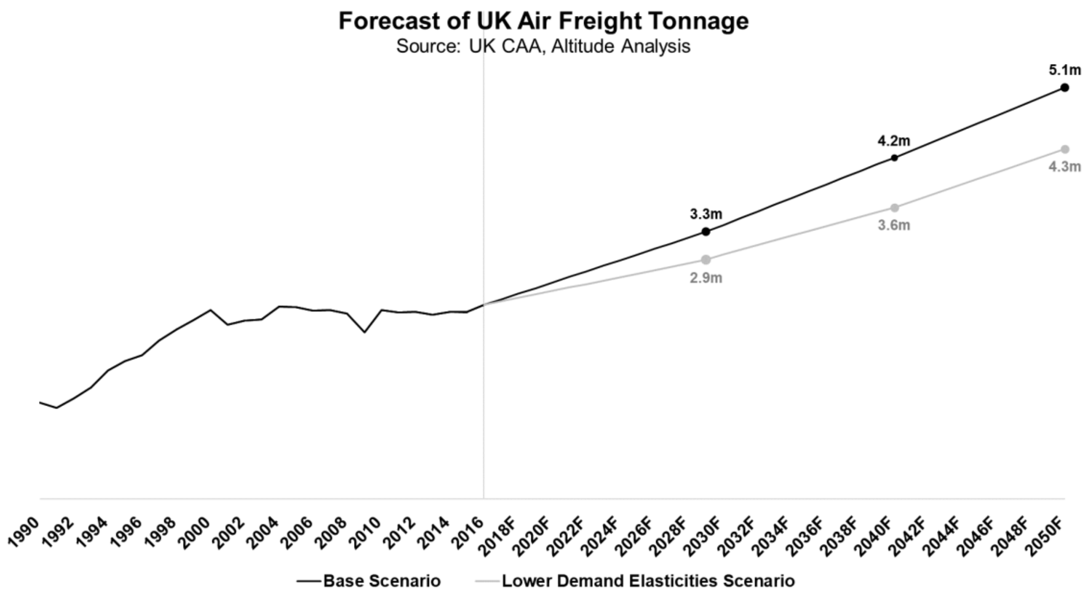

Figure 19 – Altitude forecast of UK air freight demand to 2050

7.2. Other UK Market Forecasts

East Midlands Airport UK Market Forecast

279. In its 2015 'Sustainable Development Plan' document, East Midlands Airport has published its assumptions for the size of the UK market in 2040. It predicts total demand of 4.4m tonnes per annum:

> *"A review of the airport's cargo forecasts has also been carried out. This assumes growth in the UK's total air freight demand, doubling from 2012 levels (2.3 million tonnes) to 4.4 million tonnes by 2040 (combined annual growth rate of 2.3%)"*[130]

280. This gives an average growth rate that is similar to our forecast but from a starting point of 2014 rather than 2016. Growth in the period 2014-16 was significantly lower than 2.3%, explaining the minor differences in the 2040 projections.

York Aviation London Airports Forecast

281. York Aviation published a report in 2015 for the Freight Transport Association and Transport for London. The report included a prediction of the volume of air freight demand in London in 2050. Note the final year of outturn data upon which this forecast is based appears to be 2013.

282. York Aviation's forecast air freight demand at London airports is 4.2m tonnes per annum by 2050[131]. Using the report's stated figure for 2013 freight tonnage at London airports (1.8m tonnes), the forecast CAGR 2013-50 is 2.3%.

283. However, while the growth rate is similar to our UK wide forecast growth, there are again differences in the starting point (achieved growth in the period 2013-2016 was lower than the average growth rate of the whole forecast period).

[130] (East Midlands Airport, 2015, p. 16)
[131] (York Aviation, 2015, p. 19)

7.3. Future Requirement for Freight Capacity at UK Airports

284. As indicated previously, we have compared our forecast demand with our assumed airport capacity for three spot years:

- Prior to new Heathrow runway (2029, last year before assumed new runway opening).
- Medium term planning horizon (2040).
- Long term planning horizon (2050).

285. For the period to 2040, the potential air freight airport capacity in the UK is comfortably higher than the volume of demand we forecast for the UK as a whole.

- In 2029, we forecast base case demand of 3.3m tonnes, compared to a conservatively modelled airport capacity of 3.6m tonnes. In practice we would anticipate that both Stansted and East Midlands capacity could be significantly higher than we have assumed. Therefore, we do not see any overall capacity shortage prior to the third runway at Heathrow.
- By 2040, we forecast demand of 4.2m tonnes, compared to assumed airport capacity of ca. 5.4m tonnes.

286. Furthermore, the potential freighter capacity is significantly above our freighter demand forecast, and the potential bellyhold capacity is also ahead of our bellyhold demand forecast.

287. By 2050, if there is no further capacity development, demand levels are projected to approach capacity provision. This may lead to capacity constraints at preferred airports for the freight sector.

288. Based on planned expansions at the existing major airports, we do not envisage a need for additional freight capacity to be developed in the period to 2040, and possibly not until 2050.

289. Therefore, there is not a compelling need for development of further airport capacity for freighter aircraft in the UK (other than that already in the pipeline or at operational airports with identified potential future capacity).

8. Review of Azimuth Freight Forecasts

8.1. Context

290. In this section, we assess the Azimuth freight forecasts for Manston. As part of this assessment, we review in turn:

- Arguments put forward by Azimuth in Volume 1 in relation to the future potential of Manston. These arguments are then deployed later on in the Azimuth study in support of its freight forecasts.
- The discussion of forecasting approaches put forward by Azimuth in Volume II.
- The research Azimuth undertook (interviews) and their findings and conclusions (Volume II).
- The methodology adopted by Azimuth in its freight forecasts for Manston Airport, set out in Volume III.
- The Manston freights forecasts that have been developed by Azimuth (Volume III).

291. Note that there is a degree of repetition across the various Azimuth reports. To avoid excessive duplication, we review similar points only once.

8.2. Supporting Arguments (Volume I)

292. In this sub-section, we review the key arguments for Manston that Azimuth[132] deploy in Volume I of its report. We critique these points in the same order as they appear in the Azimuth report.

General

293. In Table 2 (P11), Azimuth outlines the leading European airports for freighter movements. In relation to the table, on Page 10 it comments that:

> *"The figures highlight the reliance on belly-freight at most of the UK's airports…. As the UK progresses with negotiations to exit the EU, the Country will find it advantageous to have sufficient capacity at airports that can handle dedicated freighters, without the need to truck to airports in mainland Europe."*

294. We make a couple of observations:

- By Year 5 of the Azimuth[133] forecasts, the predicted freight throughput of Manston is already ahead of the 2014 volumes of some of the leading European airports in the table (Dublin, Rome, Frankfurt Hahn). This highlights the scale and speed of the freight growth that is forecast for Manston by Azimuth.
- The non-UK airports in the table are predominantly major passenger hubs or large passenger airports (typically primary capital city airports). The only exceptions to this are the major integrator hubs at Leipzig and Liege, and Frankfurt Hahn (one of the smaller freight airports in the sample, with lower throughput than envisaged for Manston in Year 4 of the forecasts). This illustrates the importance of "hub" capacity for freighter operations, where wide body long haul passenger flights complement dedicated freighter operations. Manston would not provide this type of capacity.

295. Azimuth also quotes Oxford Economics, Transport for London and York Aviation studies highlighting freight capacity shortages (Volume I, P1-13). We reiterate our previous comments that we do not believe there is an overall shortage of freight capacity. Azimuth ignores the context of these studies, and does not distinguish between hub capacity and freighter capacity at other airports. We refer to the November

[132] (Azimuth Associates, 2017 a)
[133] (Azimuth Associates, 2017 c, p. I)

2017 report by York Aviation[134] which clearly explains how Azimuth misrepresents the studies relied upon to the extent that York Aviation make clear that *" the York Aviation work relied upon by RSP does not, and cannot be taken to, support RSP's proposed alteration to Manston Airport and, therefore, cannot be relied upon by RSP, the Planning Inspectorate, the Secretary of State and any future appointed Examining Authority (should RSP submit the application and the Secretary of State accepts the application)".*

296. Therefore, it does not follow, as stated on Page 13, that "*It is clear from the figures presented here that the capacity available at Manston Airport is vital to the continued competitiveness of the UK.*"

297. Azimuth acknowledges the importance of integrators and freight forwarders on Page 14:

> *"The RiverOak vision is to encourage integrators and freight forwarders to locate in the Manston area, have a competitive pricing structure, and build on the previous excellent cargo handling service provided by the airport."*

298. However, both integrators and freight forwarders consolidate activity at major hubs. It is not clear why they would relocate to the peripheral location of Manston. Heathrow is the major consolidation point in the South East. Even under the highly optimistic Azimuth forecasts, Manston freight throughput would remain a fraction of the Heathrow outturn volumes.

299. Page 14 of the Azimuth report outlines various advantages that Manston apparently benefits from. However, these stated advantages were insufficient to enable the airport to be viable when it was operational.

300. Page 22 raises concerns about the number of destinations served from Heathrow.

> *"The Aviation Policy Framework indicates the Government's concerns over the falling number of destinations served by Heathrow Airport and the impact on connectivity. Profitable routes are operated at higher frequencies, reducing the number of destinations served (DfT, 2013, p. 28). This reduces the possibility of using bellyfreight to those destinations no longer served from Heathrow and indicates the need for dedicated freighters on those routes."*

- It is not clear that the number of destinations served from Heathrow is falling (recent trend is inconclusive).
- As discussed in paragraph 204, capacity constraints have primarily impacted short haul routes, which are less relevant for bellyhold freight. The freight tonnage per flight has been increasing at Heathrow in recent years (see Figure 13).

BREXIT and Security Issues

301. Section 5.2 (P22-23) discusses the potential effect of BREXIT on UK aviation. We agree with the comment that "*There are many unknowns at this stage*". However, only positive outcomes (in relation to Manston) are considered. Some major assertions are made that are based on conjecture and lack logic.

302. For example, on Page 23, it is speculated that:

> *"Friction at the borders between EU countries and the UK, particularly at the Channel ports, is likely to increase to meet the demands of security checks and ensuring tariffs are paid where necessary. This may serve to switch transport away from trucking to air freight, avoiding congestion at the Channel Crossings."*

[134] (York Aviation, 2017, p. 9)

303. Two major assumptions are made. Firstly, that any border issues will be significant and of a permanent nature. However, this will not necessarily be the case. A news report in the Guardian[135] interviewed the chief executive of the Belgian port of Zeebrugge.

> *"Gridlock at the border, vast motorway car parks and jobs lost: British ports have been vocal about the risks of a hard Brexit. In case Conservative MPs missed the message, the Port of Dover advertised at the party conference, warning that an extra two minutes on lorry inspections could lead to queues of 17 miles at Dover and similar "chaos in Calais and Dunkerque".*
>
> *Across the North Sea, continental ports are worried about the great unknowns of Brexit. One of the most exposed is the Belgian port of Zeebrugge, which does 45% of its trade with the UK. "We are vulnerable if something happens to the trade from the UK to the continent," said port chief executive Joachim Coens. "So what I mainly hope is that we could continue having a good trade relationship with the UK… as we have been doing for centuries."*
>
> *However, Zeebrugge is less concerned about the resumption of customs checks – "I think we can handle that," says Coens. The Belgian port could even take business from Calais, he suggests, because it specialises in people-free freight – "roll on, roll off" in industry jargon – removing problems about drivers having to clear UK border controls.*
>
> *Meanwhile, Zeebrugge is fast-tracking the development of apps and scanners to further reduce paperwork. It is developing a UK-specific programme for every stage of the logistics chain, which would allow goods to clear customs even when lorries are miles from the port."*

304. The second major assumption is that customs checks would not have a similar impact on processing times for air freight. As air freight is much more time sensitive than trucked freight, the addition of an hour (say) to processing time would have a much greater impact on air freight than trucking.

305. Even if BREXIT was to negatively impact trucked freight from Europe into the UK, it could equally impact trucked freight in the other direction. Therefore, there could be less flown freight into the UK for onward trucking distribution to other parts of Europe.

306. Azimuth continues:

> *"It is also likely that increased trade will occur between Britain and more geographically distant countries. Trucking of goods to these countries will not be an option thus increasing the need for air freight, making the capacity Manston can provide nationally significant to the Nation's airport infrastructure*".

- This outcome is a possibility.
- It is also plausible that the UK could lose trade with other parts of the world. For example, if Japanese car manufacturers relocated assembly plants from the UK to locations within the single market, this would have a negative impact on trade and freight.

307. In summary, the impact of BREXIT is essentially unknown. No business decision or planning application can be made based on such an unknown.

308. Also on Page 23, Azimuth speculates on the impact of increasing passenger security at airports, following terrorism attacks at Brussels and Istanbul airports.

[135] https://www.theguardian.com/politics/2017/oct/07/zeebrugge-brexit-braced-for-tariffs-trade-loss

> *"Airports are not designed to security check all visitors as they enter the airport. If required, it will cause huge delays and require passengers to arrive many hours (almost certainly at least three) before their flight. These delays impact belly-freight, making a switch to dedicated freighters more likely."*

309. We do not see the logic in this assertion. If passengers need to arrive at the airport earlier, this will not impact aircraft turnarounds or the loading or unloading of freight. These are independent processes. Therefore, it is difficult to see how such a development would have any impact on bellyhold freight.

310. The potential positive impact of e-commerce development is discussed on Page 24. The analysis of the opportunity is anecdotal. No consideration is given to how e-commerce may be replacing other types of freight.

Previous Manston Performance

311. Finally, on Page 26, there is some discussion on why Manston was unsuccessful, despite an efficient cargo product:

> *"Manston established a reputation for speedy handling of perishable cargo, with unloading and throughput times much faster than competitor airports."*

312. Azimuth goes on to state:

> *"Since Manston suffered from a severe lack of investment, and constraints on the ground are likely to have resulted in capacity restrictions that prevented growth past the figures for cargo shown in Table 4. With only one cargo stand, aircraft were unable to exit to the runway if another aircraft taxied into the cargo area behind it. The airport had limited storage, had not invested in up-to-date handling equipment, and closed their Border Inspection Post. In spite of the lack of investment, there was considerable growth in Manston's cargo market from 2010 until 2013. This growth strongly indicates that Manston, with the investment required would have a strong future."*

313. We understand that there was significant investment from previous owners. In 2002, it was reported that £7m had been invested on new aprons and taxiways, increasing the freight capacity to 200,000 tonnes[136]). It seems unlikely that the low level of freighter activity was due to lack of capacity.

- The report states that Manston had 2,073 ATMs in 2013, its last full year of operation. This was also the busiest year for ATMs since 2005. However, CAA data indicates that only 511 fights were cargo related.
- This is equivalent to an average of less than 1 rotation per day in its final full year. If demand was there, we would expect that the airport should have been able to handle much greater levels of freight activity.

314. The Azimuth conclusion (see above) that a reopened Manston would have a strong future is based on the "*considerable growth in Manston's cargo market from 2010 until 2013*". The actual growth was 1,203 tonnes (CAGR 1.4%). In fact the airport did not achieve significant growth at any stage in the last decade of operations, with the 2013 outturn only 2,680 tonnes ahead of the 2004 value.

[136] (Wiggins Group plc, 2002, p. 16)

8.3. Approach to Forecasting (Volume II)

315. In Volume II of its reports, Azimuth[137] discusses at some length air freight forecasting literature and its own research methodology.

316. In the interests of brevity, we do not provide detailed comment on Azimuth's literature review. In general, we find the review is very broad, with much of the material of limited relevance (e.g. use of game theory). The approach is also somewhat academic, with minimal practical application.

317. Azimuth[138] concludes that:

> *"…in the case of Manston Airport, closed for several years and lacking investment for many more, this approach is not appropriate. Any attempt to build an econometric model would have to establish criteria whereby a proportion of the total predicted UK air freight traffic was 'diverted' to Manston. However, deciding upon the proportion to divert to Manston raises significant problems.*
>
> *Therefore, instead of providing a mathematical forecasting model, this review of the literature suggests a qualitative approach that aims to predict human and organisational behaviour. Indeed, the DfT (2014, p. 3) place a heavy reliance on an understanding of human behaviour in achieving realistic outputs. A qualitative approach that gathers the opinions of industry experts would allow areas of potential demand for Manston Airport to be identified. It is this type of approach that has been selected in the case of Manston Airport."*

318. We disagree with the conclusion that a purely qualitative methodology is appropriate. While qualitative approaches can be useful, they are most robust as a complement to a quantitative approach. Furthermore, qualitative approaches are typically only adopted for relatively short term forecasts.

319. The issues with a purely qualitative approach in the context of Manston Airport are:

- Assumptions are subject to bias, lack transparency and are impossible to independently verify.
- Does not identify current market size for relevant segments.
- Forecasts do not reflect historic traffic patterns.

320. In particular, we would have expected some attempt at quantification of the overall UK market size for the different freight segments assumed in the Azimuth forecasts. Otherwise, it is extremely difficult to gauge what level of market share for Manston is implied in each freight niche.

321. In describing its research methodology, Azimuth[139] state that:

> *"It should be noted that a comparative case study approach was not deemed possible, as no airports in sufficiently similar circumstances were identified."*

[137] (Azimuth Associates, 2017 b, pp. 6-25)
[138] (Azimuth Associates, 2017 b, p. 20)
[139] (Azimuth Associates, 2017 b, p. 22)

322. While no two airports are exactly alike, there are various airports with similar characteristics to Manston prior to its closure. For example, Prestwick Airport is an airport with modest passenger volumes that also accommodates dedicated freighter flights. Its peak annual freight tonnage was ca. 43,000 tonnes, almost identical to the equivalent value for Manston (source: CAA airport statistics).

- Prestwick Airport[140] has "*the ability to handle large pieces of specialist cargo*".
- It has invested in the "*latest security screening technology which ensures even long and heavy pieces of cargo can be processed quickly and securely*".
- A dedicated sales team has been established, "*targeting high yielding and specialist areas, whilst still delivering a high quality and cost effective service to routine loads". Furthermore, the "management team also continues to promote the airport as a major UK cargo hub at key global events and trade shows and is doing significant work on evaluating the potential for the airport to become a handling consolidation point for Scotland's perishable export industry and the local aerospace industry*".

323. Despite this investment, the airport's current freight throughput is well below historic levels (ca. 11,000 tonnes in 2016, source: CAA airport statistics). The airport identifies the following challenges:

- "*… the dedicated freighter only aircraft market that the Company has specialised in has been in global decline*".
- "*However, income per tonne has remained static over the last 3 years primarily because of the static market, increasing belly hold capacity and the overall competitive nature of the business*".

324. We note there are many similarities to Manston. The proposed strategy for a reopened Manston has some notable areas of commonality with the current Prestwick strategy. Prestwick incurs substantial financial losses, as did Manston for many years before its closure.

325. Clearly there are some differences. The demand in Scotland will not be as strong as in the South East. However, the level of airport competition is much stronger in the South East.

326. It should also be noted that Azimuth[141] is forecasting ca. 341,000 tonnes of freight on dedicated freighters within 20 years of reopening. This is higher than current freighter tonnage at any UK airport. Therefore, clearly there is no equivalent case study that supports the Azimuth growth forecasts.

[140] (Glasgow Prestwick Airport Limited, 2016)
[141] (Azimuth Associates, 2017 c, pp. 11-12)

8.4. Expert Interviews and Discussion (Volume II)

327. The qualitative forecasts by Azimuth[142] were informed by interviews with 24 different parties.

- Only a minority of the parties interviewed appear to be airlines or freight forwarders. Many of the interviewees seem to be of limited direct relevance.
- It is not clear how much air cargo to/from the UK is transported by interviewees. With the notable exceptions of DHL and FedEx, most operators interviewed appear to be relatively small. Azimuth[143] comment that "*there was a wide range between 90 tonnes and 20,000 tonnes per year for the smaller shippers to vast amounts for the integrators*."
- There is limited visibility on how much cargo these operators used to fly through Manston when it was open.

328. There is also a lack of information on the following points:

- Which airports would a re-opened Manston be capturing cargo from?
- Why do operators not use East Midlands or Stansted, given stated concerns with Heathrow?
- What are the relative economics of using Manston versus bellyhold freight at Heathrow, freighters at alternative UK airports or trucking?

329. Not all the comments support the RSP case for Manston:

- Page 30: *"… it's not going to work if you can only fly between 10.00 and 21.00".* This suggests the airport would need to accommodate night flights to be viable.
- Page 41: "*Integrators monopolise the freight-friendly airports such as East Midlands (DHL) and are reluctant to change their operations, preferring to cope with slot restrictions at Heathrow rather than moving to other more cost effective airports (DHL, FedEx). The explanation for this is the focus on associated fixed costs and the resources involved to make a move to another airport (FedEx)*". This confirms that integrators (and associated high freight tonnage) will be unlikely to move to Manston. The remaining opportunities discussed are mainly in niche areas.

330. We question some of the responses from interviewees:

- On Page 42, Frankfurt is highlighted as an example of a successful cargo airport which does not have 24 hour operations. This is not a relevant comparison in the context of Manston. Frankfurt is one of Europe's leading passenger hubs (over 60m passengers in 2016), with dedicated freighter flights complementing bellyhold provision.
- On Pages 43/44, it is hypothesised that "*With London being a major economy and with scant landing slots available for cargo, a portion of Frankfurt cargo is likely being transported from Frankfurt to London by truck. Manston could readily handle this business in a more cost effective and timely manner, with less environmental impact than trucking from Frankfurt to the UK.*". There is simply no supporting evidence for this assertion, or consideration of the possibility that trucking may be more cost effective (and environmentally friendlier) than flying.
- On Page 46, there is speculation of the impact of Brexit. "*With the UK's exit from the EU, more stringent border control procedures can be expected… Given increased friction at the border crossings, this market is more likely to consider moving to airfreight*". We address this issue from paragraph 302 onwards.

[142] (Azimuth Associates, 2017 b, pp. 25-46)
[143] (Azimuth Associates, 2017 b, p. 26)

331. In the discussion section of the Azimuth[144] report, a range of market opportunities for Manston are put forward. We have commented on many of these areas in depth earlier in our report. On Page 58, Azimuth discusses how future preferences may shift away from bellyhold freight.

> *"Whilst the UK air freight market is currently dominated by belly-hold rather than dedicated freighters, this is the reverse of the situation in the rest of Europe. Several factors may contribute to a change to this dominant model. These include reduced capacity on aircraft such as the A380, the LCC model, which generally focuses on rapid turnarounds, which preclude the carriage of freight. In addition, many interviewees talked of freight being bumped from passenger aircraft and the negative impact this has on their business. If the market was to move away from belly-freight and towards the use of more dedicated freighters, Manston would be well placed to attract this growing market".*

332. We disagree with this assessment:

- Trends in the UK and globally have been strongly towards bellyhold (due to passenger demand and hence belly hold capacity outstripping air cargo demand, see Appendix Section 11.3).
- The A380 is the exception. In general, newer widebody aircraft types have more bellyhold capacity than predecessors (see paragraph 140 onwards).
- There is limited freight uplift from full service passenger airlines operating short haul routes. Therefore, increased penetration of low cost carriers in this segment will not have a major impact (see paragraph 233).

333. On Page 64 of the Azimuth report, it is speculated that Manston could act as a base for Amazon, including the development of a drone hub. No supporting evidence is provided. For the locational reasons highlighted previously, Manston does not seem an obvious choice to host such activity.

[144] (Azimuth Associates, 2017 b, pp. 56-66)

8.5. Methodology Used in Manston Forecasts (Volume III)

334. Volume III of the Azimuth[145] report provides freight forecasts for the first 20 years of Manston Airport (after assumed reopening).

335. In the preamble, Azimuth once again seeks to justify its qualitative approach (Page 3).

> *"The second option was to take a qualitative approach focused on collecting market data. This allows base data to be derived from a method that takes account of how commodities are currently transported and how they are likely to be transported in the near future. This approach is particularly applicable in the Manston case since the airport is not currently operational. Indeed, in the short-term, any useful forecast needs to be built from the likely behaviour of potential airport users.*
>
> *This method is confirmed by the ACI-North America, who represents local, regional and state governing bodies that own and operate commercial airports in the United States and Canada, and recommends deriving customised inputs from a detailed market assessment. This assessment should be informed by carriers, their business partners and other supporting entities in the air freight community (ACI-NA, 2013, p. 3)."*

336. We do not believe that the ACI[146] study provides sufficient rationale for the Azimuth forecast approach. The same ACI study states on Pages 46/47:

> *"The best source of customized inputs in a forecast derives from a detailed market assessment. Carriers, their business partners, and all of the supporting entities in the air cargo community can provide meaningful input to ensure that the forecast is anchored in reality and adds clarity to the planning requirements."*
>
> *"Use the most reliable and current data – A correct and solid traffic basis is essential. If not available, different data sources should be consulted to establish the best possible estimates."*
>
> *"Typically, at least two forecast scenarios are developed to provide a range of potential future activity levels. The baseline forecast represents a continuation of the airport's current role in the region and in the national transportation system. The baseline forecast represents the most likely scenario and will be used for future planning. An alternative scenario(s) can be used as a sensitivity analysis to assess the ability of the airport to respond to optimistic demand factors that depart from the baseline forecast."*

337. Therefore, ACI is not advocating a completely qualitative approach.

- The Azimuth study does not provide a detailed market assessment (rather, anecdotal evidence about the size of selected niches).
- Interviews only covered a small selection of current UK operators.
- No attempt has been made to establish a solid traffic base (from which Manston could seek to capture market share).
- The ACI study suggests that historic traffic performance should inform baseline projections, rather than be disregarded. Alternative scenarios are more appropriate for the types of optimistic demand factors incorporated in the Azimuth forecasts.

[145] (Azimuth Associates, 2017 c)
[146] (Airports Council International - North America, 2013)

338. The ACI study (Page 50) goes on to highlight the different demand data that should be considered, including segmenting tonnage by origin/destination, commodity, desired level of service[147] and shipment size.

339. Key factors to consider are summarised on Page 52, including regional demographics, regional employment and production, regional industrial location patterns, shifts in commodity demand and shifts in distribution practices and patterns.

340. A more balanced assessment of the ACI guidelines is that both qualitative and quantitative methods play an important role in the development of air cargo forecasts. It is not our reading that ACI proposes that a purely qualitative approach is sufficient.

341. On Page 3 of its report, Azimuth makes reference to the Airport Commission:

> *"The Airports Commission also recommends using the Delphi Method, pointing out that relying on, "a single, central-point forecast would be a risky approach" (Airports Commission, 2013, p. 8)."*

- The Airports Commission developed multiple scenarios in its traffic forecasts.
- However, despite this, only one scenario is presented in the Azimuth projection.

342. Volume III also refers to York Aviation and Transport for London analysis (Page 1). As highlighted previously and as supported by York Aviation themselves (see paragraph 235), Azimuth makes incorrect interpretations from the studies.

343. Azimuth also quotes selected secondary data in support of its forecasts. On Page 4, it quotes a one month snap shot of global freight volume growth from November 2016. In the context of long term forecasts for Manston, this is meaningless.

344. Boeing and Airbus freight forecasts are also highlighted.

- Boeing and Airbus are both leading industry bodies which regularly publish air cargo forecasts.
- Boeing on a bi-annual basis (most recent in 2016).
- Airbus, annually (most recent in 2017).
- Note that both forecasts are in units of flown tonne-km – a combination of the tonnage of cargo flown and the distance it is flown for (as such, changes in the average sector length would affect the forecasts). The tonne-km forecasts include both bellyhold and cargo carried on dedicated freighters (though these are not separated in the projections).

345. Global Airbus projections are then used as the source for a simplistic annual growth for Manston for years 11-20 of the Azimuth forecast.

- There are obvious difficulties in comparing growth rates for tonnage at a UK airport (in a mature market) with global freight tonne-km projections (which include forecast growth in faster growing economies).

346. We have undertaken a more in-depth review, outlined in the paragraphs below.

347. In its latest forecast, Boeing predicts air cargo growth of 4.2% CAGR over the period 2015-35[148]. The most recent Airbus forecast, for the period 2016-36, gives a CAGR of 3.8%[149].

[147] Trade-off between the cost and the quality of service as determined by transit time, reliability and security, often compared to the same characteristics for available surface options.
[148] (Boeing, 2016, p. 2)
[149] (Airbus, 2017a, p. 101)

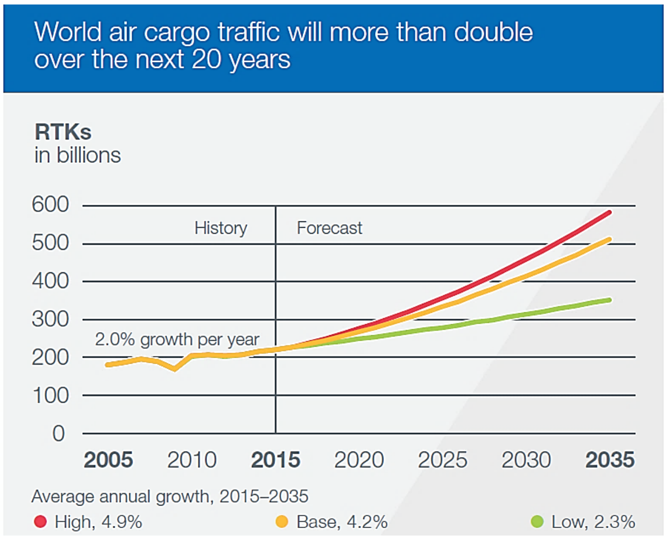

Figure 20 – Global 20-year air cargo forecast - timeseries of high, base and low forecasts

Source: Boeing

348. Boeing also provides a regional breakdown of expected growth rates[150]. For the flows involving Europe, most are below the global average CAGR. Growth of intra-Europe air cargo is forecast to be the lowest of any regional flow shown (2.2%). This indicates global growth projections need to be treated with caution in the context of the UK market.

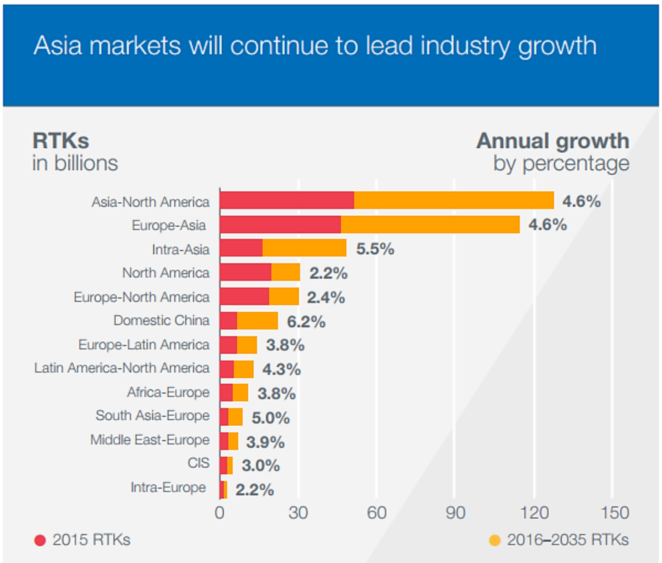

Figure 21 –Global 20-year air cargo forecast – size, and growth rates, of key flows

Source: Boeing

349. While Airbus and Boeing forecast strong growth in tonne-km in future years, it should be noted that only limited growth in freighter aircraft is envisaged for European based airlines. Airbus forecasts growth of just 42 freighters in European fleets by 2036[151] (Boeing does not appear to provide an equivalent number).

350. History shows that Airbus and Boeing forecasts tend to be optimistic. Boeing has reduced its 20-year forecast of growth in every iteration since at least 2010/11, while Airbus has reduced forecast growth in

[150] (Boeing, 2016, p. 16)
[151] (Airbus, 2017a, p. 105)

every iteration since at least 2012. This has resulted in lower tonne-km at the end of each forecast e.g. the 2017 version forecasts lower tonne-km for 2036 than the 2015 version forecast for 2034.

351. Similarly, the number of dedicated freighter aircraft Airbus expects to be in operation by the end of its 20-year forecast has been reduced by around one third, from ca 3,000 (based on the 2012 forecast[152]) to ca, 2,000 (based on the 2017 forecast[149]). We note this downgrading of freighter outlook has not been mentioned in the Azimuth reports, notwithstanding its use of Airbus cargo projections.

- Note the drop of one third in the number of freighters expected to be operating in future is greater than the drop in its cargo tonne-km CAGR forecast, implying increasing dependence on bellyhold capacity to meet air cargo demand. This is consistent with historic trends, highlighted previously in this report.

352. Alongside the figures discussed above, Boeing publishes high and low forecasts. These show global air cargo CAGRs of 4.9% and 2.3% respectively. Notice that the downside (-1.9ppts) is significantly larger than the upside (+0.7ppts). Notwithstanding the differences in geography and forecast units highlighted previously, our projections for the UK sit within this range (CAGR 2.5% for same time period as Boeing projection).

353. Both the consistent reductions of the forecast numbers with each new iteration, and the large potential downside (relative to upside), indicate some uncertainty for the sector in the future.

8.6. Manston Air Freight Forecasts (Volume III)

354. Given the lack of transparency in the Azimuth forecasts, it is not possible to undertake a detailed critique of the forecast building blocks / assumptions. The only breakdown provided is by imports and exports. There is no segmentation by carrier type, commodity type etc.

355. The freight forecasts for Manston are summarised in the chart below.

- In Year 2 (the first year of freight traffic), tonnage is forecast to be more than double the previous Manston peak annual value.
- By Year 11, freight throughput is forecast at similar tonnage to 2016 Stansted performance. Growth from Year 2 to Year 11 is forecast at CAGR 9.7%.
- By Year 18, Manston is forecast to exceed the 2016 freight tonnage at East Midlands Airport (the largest dedicated freighter hub in the UK).

[152] (Airbus, 2012, p. 137)

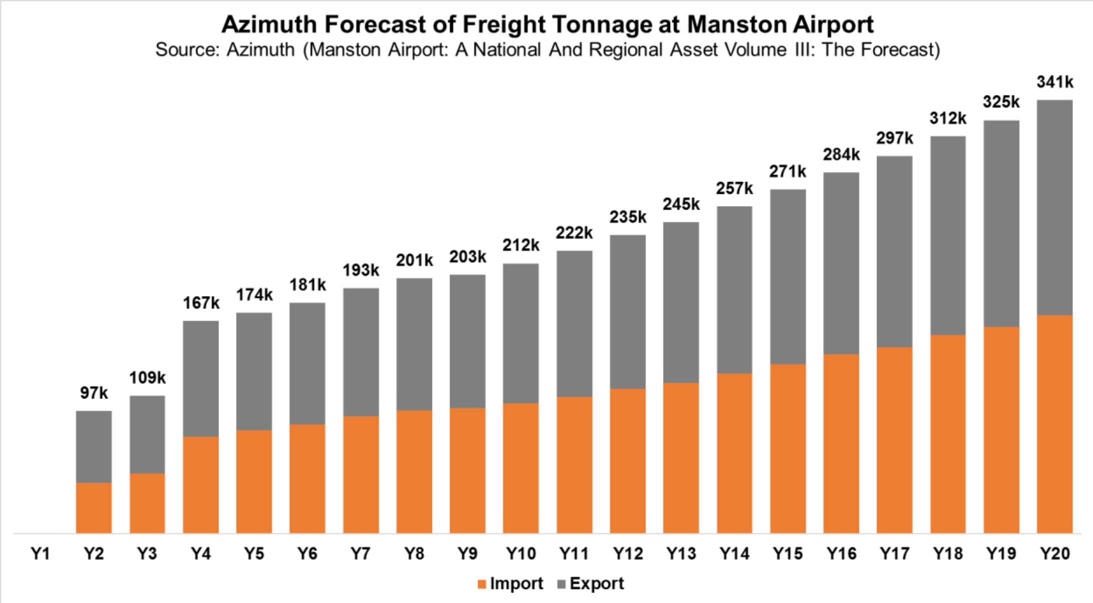

Figure 22- Azimuth Forecast of Freight Tonnage at Manston Airport

356. We have contrasted the projected air freight growth with historic Manston growth, historic UK growth and our base case demand projections for the UK.

- By year 20 of the Azimuth forecasts (assumed to be 2039), Manston freight throughput is forecast to have grown by almost 12 times the 2013 outturn (the last full year of operations). The equivalent CAGR from 2013 is 9.9%.
- This compares to our projected demand growth for the UK market of 2.3% over the same period.

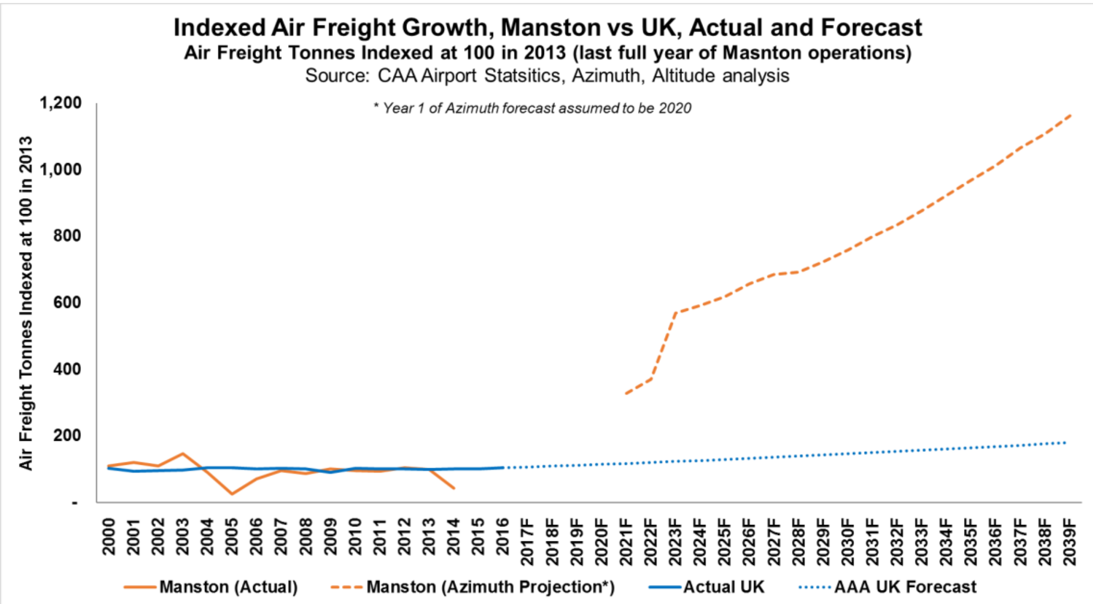

Figure 23- Azimuth Forecast Compared to Historic Growth and UK Forecast

357. We have also compared the Azimuth projections for Manston to the 2016 performance at the leading air freight airports in the European Union.

- The projected volumes for Manston by year 5 would see it comfortably within the top 20 EU airports in 2016.
- By year 20, Manston's projected volumes would be higher than all but the 12 largest EU airports in 2016.
- 19 of the airports in the top 20 are either major/large passenger hubs or major integrator hubs. The one exception is Luxembourg, the home base of Cargolux, which is one of the largest all cargo airlines in the world with a fleet of 27 freighter aircraft[153]. Given that Manston is not expected to develop into either a passenger or an integrator hub, this shows the level of ambition in the Azimuth projections.

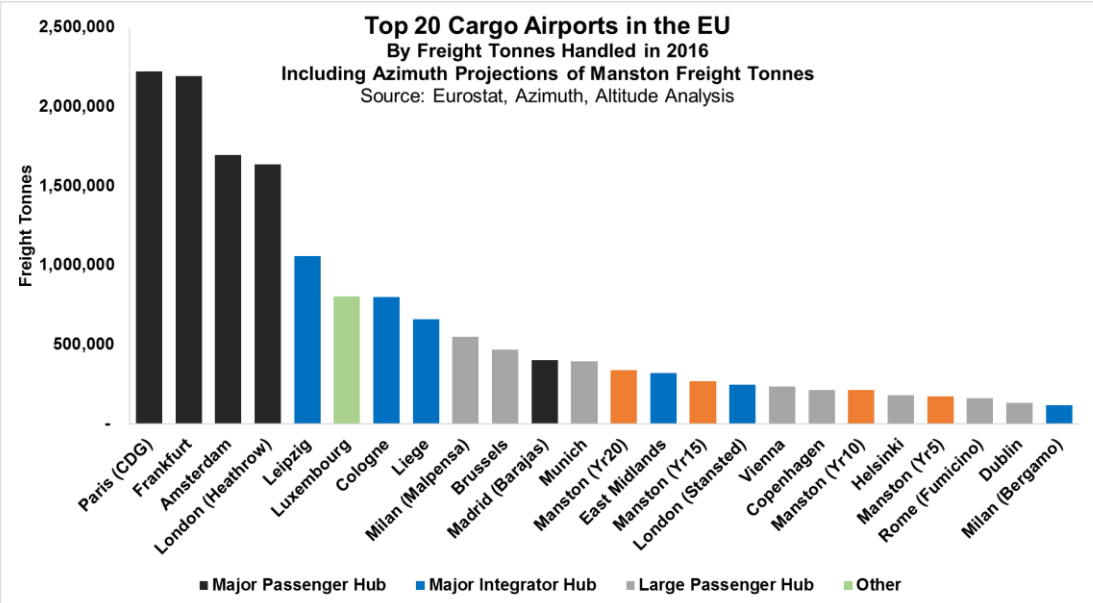

Figure 24- Azimuth Forecast Compared to EU Air Freight Benchmarks

358. Not surprisingly, we consider the forecasts to be not credible, given their extreme optimism and the negligible supporting evidence.

- Growth in freight at Manston would be unprecedented in a UK market context, and in complete contrast to previous historic performance at Manston.
- We do not expect there to be an overall shortage of freighter capacity in the UK or South East. Even if we are wrong in this assessment, Manston and other smaller airports have shown no signs of benefiting from supposed capacity shortages in recent years.
- The rationale for why Manston will be able to achieve a massive uplift on previous performance is weak at best. There is no evidence that bellyhold will not continue to dominate the UK market. The stated advantages of using Manston were present when the airport struggled to grow freight volumes, despite investment in the airport. Lack of capacity was not a material factor.
- As well as the forecasts ignoring historic performance, it also does not reflect the very clear market trends towards consolidation of freight at major passenger and dedicated freighter hubs. UK airports outside the major three freight airports have seen volumes fall.

[153] Ranked the 9th largest cargo airline in the world in 2016 (source: aircargonews). Source for Cargolux fleet is the Cargolux website.

359. There also seems to be a discrepancy between the methodology description and the long term forecast results. On Page 7 it is stated:

> *"Therefore, from Years 11 to 20 an annual percentage growth has been applied to the figures derived for Year 10."*
>
> *"However, to be conservative, and in line with the Airbus forecast, a 4% uplift on the Year 10 figures has been applied to extrapolate the long-term forecast for Manston Airport. "*

360. We therefore expected that long term growth for Manston (Year 11 onwards) would be 4%. The Year 10 to Year 20 CAGR is 4.8% (adding ca. 25,000 tonnes by Year 20, compared to a 4.0% CAGR).

361. As highlighted previously, there are significant issues with using a simplistic annual growth uplift based on global manufacturer forecasts for global tonne-km. Further issues are:

- The manufacturer forecasts have a track record of optimism, and have consistently been revised down in later iterations.
- The Airbus forecast referenced has since been updated, with growth of CAGR 3.8% (lower than the forecast used by Azimuth).
- There is significant variation in growth rates for different parts of the world, with the European market more mature than average. Within the European context, the UK is one of the more mature markets. Therefore, use of a global figure is likely to significantly overstate demand growth in the UK and is not an appropriate tool for looking at demand in the UK market.
- While Airbus and Boeing forecast strong growth in tonne-km in future years, it should be noted that only limited growth in freighter aircraft is envisaged for European based airlines. Airbus forecasts growth of just 42 freighters in European fleets by 2036[154] (Boeing does not appear to provide an equivalent number). Therefore, demand in the most relevant segment for Manston is likely to be lower than the overall average.

362. We are also surprised to see imports and exports almost entirely balanced in the Azimuth forecasts.

- Exports were a minority of overall freight before Manston was closed. Exports accounted for between 6.0% (2010/11) and 24.3% (2004/05) in the last 11 years of operation. The average export percentage in the period 2002/03 to 2013/14 was 12.6%.
- The UK is generally an import rather than an export market for goods. HMRC[155] data indicates that exports accounted for 37.5% of total UK air freight to/from non-EU countries by weight in 2016.
- Therefore, the assumption that flights will be equally loaded for both inbound and outbound operations seems very optimistic.

[154] (Airbus, 2017a, p. 105)
[155] www.uktradeinfo.com/Statistics/BuildYourOwnTables/Pages/Table.aspx

8.7. Manston Cargo ATM Forecasts (Volume III)

363. The Azimuth forecasts also include freighter ATM projections, summarised below.

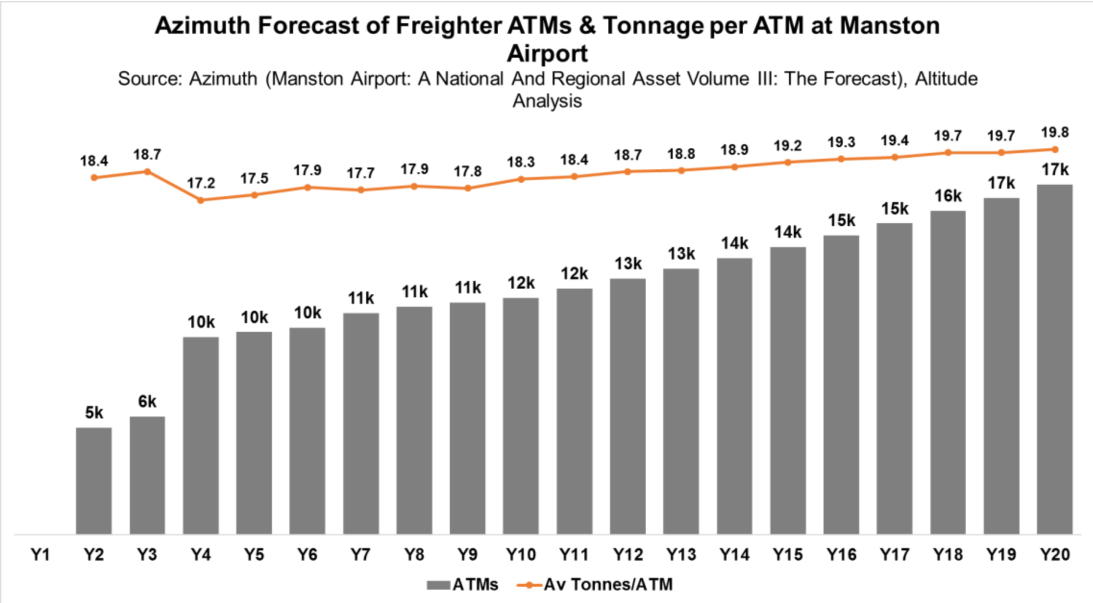

Figure 25- Azimuth Forecast of Freighter ATMs & Tonnage per ATM at Manston Airport

364. The tonnes per ATM forecast figure (ca. 17-20 tonnes) is very low compared to historic levels at Manston. In the last full 5 years of operation, the airport recorded an average of 63 tonnes per cargo ATM.

- The low figure is driven by an assumption that the most predominant cargo aircraft at Manston will be smaller Code C and Code D aircraft. We understand that this differs to the historic pattern, explaining the difference in average loads.
- The projected average load is slightly above current Stansted levels. However, given the lack of integrator operations at Manston, we would have expected the average load figure to be higher.
- As an illustration, if the average load in Year 20 was consistent with historic levels, the same forecast freight tonnage (340,000 tonnes) could be handled by ca. 5,400 cargo flights.

365. We note that York Aviation's professional opinion[156] is that the capability of Manston Airport is 21,000 annual air cargo aircraft movements. This figure is higher than the Azimuth's Year 20 freighter ATM forecast for Manston.

- This is despite very optimistic cargo tonnage projections and average cargo per ATM assumptions that are much lower than historic values.

[156] (York Aviation, 2017)

366. The cargo ATM forecasts have also been compared to leading European airports. This emphasises the extremely challenging nature of the Azimuth forecasts. By year 20, the projected cargo ATMs at Manston are higher than achieved by all but 6 EU airports in 2016. Again, it is noticeable that the leading EU airports for cargo ATMS are either major/large passenger hubs or major integrator hubs, which are not the business models proposed (or that would be realistically achievable) for Manston.

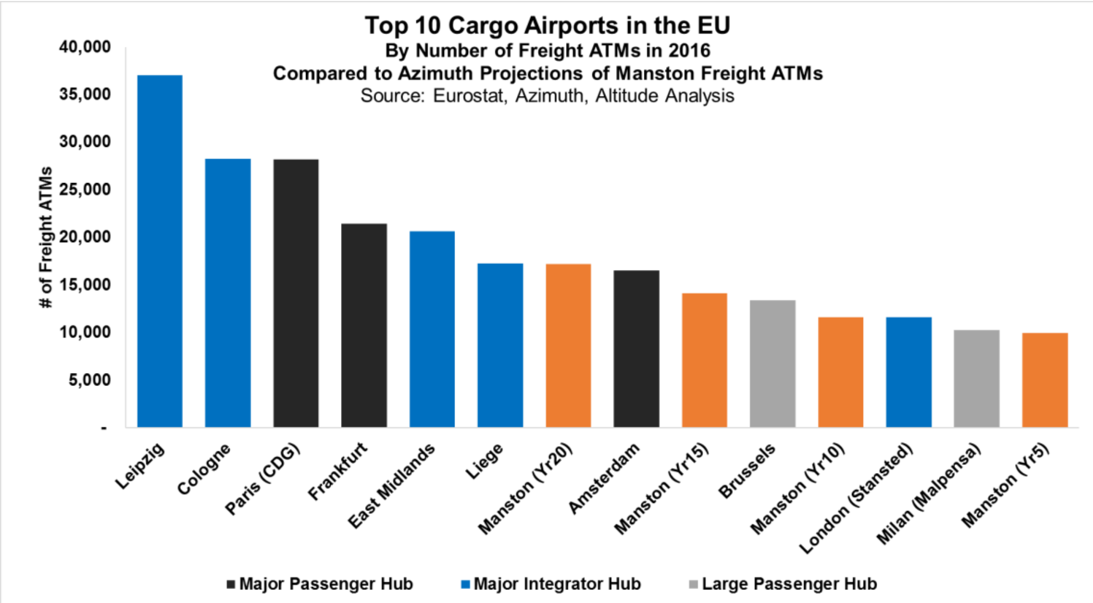

Figure 26- Azimuth Forecast Compared to EU Freighter ATM Benchmarks

367. Finally, we also compare the average air freight tonnes per cargo ATM projected for Manston with leading EU benchmarks. Note that the air freight total includes bellyhold as well as freighter cargo.

368. The projections for Manston indicate low average loads compared to the leading EU airports, with the exception of some integrator hubs (which have a higher proportion of smaller aircraft for short haul flights, reflecting the nature of the express market). This sheds further doubt on the validity of the Azimuth projections for cargo ATMs. If the average loads were higher, this would result in lower cargo ATMs for the same air freight tonnage.

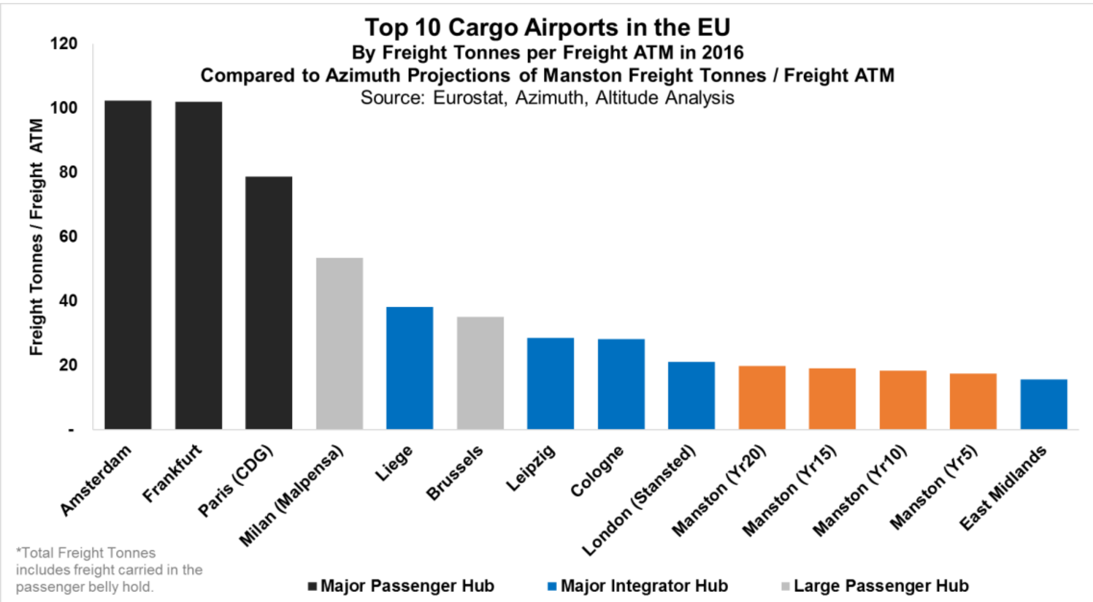

Figure 27- Azimuth Forecast Compared to EU Air Freight Tonnes per Freighter ATM Benchmarks

8.8. Conclusion

369. It is highly unlikely that a re-opened Manston could play any significant role in serving the needs of the UK air cargo industry. There is currently no shortage of overall capacity (beyond that identified specifically at Heathrow), and future demand growth into the long term can be met with planned expansion from the leading cargo airports in the UK.

370. Manston previously operated as a niche air freight airport. While it could theoretically regain this role in the future, its structural disadvantages (location, lack of critical mass, lack of passenger hub, night flight restrictions etc.) will severely limit its potential.

371. Our overall conclusion is that the RSP proposals and the Azimuth forecasts are deeply flawed. The outlook put forward by RSP / Azimuth does not reflect market realities. We would expect freight tonnage and freight ATM outturn at a reopened Manston to be considerably below the Azimuth forecasts. We see no realistic prospect that Manston could ever develop to reach the threshold required of a Nationally Significant Infrastructure Project, namely to increase cargo ATMs by at least 10,000/year compared to the existing capability.

9. Overall Conclusion

372. It is highly unlikely that a re-opened Manston could play any significant role in serving the needs of the UK air cargo industry. There is currently no shortage of overall capacity, and future demand growth into the long term can be met with planned expansion from the leading cargo airports in the UK.

373. The Azimuth freight forecasts for Manston are summarised below:

- In Year 2 (the first year of freight traffic), tonnage is forecast to be more than double the previous Manston peak annual value.
- By Year 11, freight throughput is forecast at similar tonnage to 2016 Stansted performance. Growth from Year 2 to Year 11 is forecast at CAGR 9.7%.
- By Year 18, Manston is forecast to exceed the 2016 freight tonnage at East Midlands Airport (the largest dedicated freighter hub in the UK).

374. We consider the forecasts to be extremely optimistic and not credible, with negligible supporting evidence.

- Growth in freight at Manston would be unprecedented in a UK market context, and in complete contrast to previous historic performance at Manston.
- We do not expect there to be an overall shortage of freighter capacity in the UK or South East. Even if we are wrong in this assessment, Manston and other smaller airports have shown no signs of benefiting from supposed capacity shortages in recent years. Furthermore, there is demonstrable spare capacity at Stansted and East Midlands, both better established and located.
- The rationale for why Manston will be able to achieve a massive uplift on previous performance is weak. The stated advantages of using Manston were present when the airport struggled to grow freight volumes, despite investment in infrastructure and marketing (the previous owners invested £7m on new aprons and taxiways, increasing the freight capacity to 200,000 tonnes[157]). Lack of Manston capacity was not a factor.
- As well as the forecasts ignoring historic performance, they also do not reflect the very clear trends towards consolidation of freight at major passenger and dedicated freighter hubs. UK airports outside the major three freight hubs have seen volumes fall. There is also a trend away from freighter services towards bellyhold freight.

375. Manston previously operated as a niche air freight airport. While it could theoretically regain this role in the future, its structural disadvantages (location, lack of critical mass, lack of passenger hub, night flight restrictions etc.) will severely limit its potential. Even if reinvested, relaunched and supported we would not expect freight volumes to be materially above historic levels, and nowhere close to the volumes forecast by Azimuth.

376. Finally, the forecast of freighter ATMs is not credible.

- By year 20, ca. 17,000 freighter flights are forecast for Manston.
- This represents one-third of current UK freighter flights, in a market where the number of freighter ATMs has been contracting. This trend has been recognised by the Department for Transport, with its 2017 forecasts to 2050 assuming the number of freighter flights in the UK will remain flat at 2016 levels [158].

377. In particular, we note that York Aviation's professional opinion is that the capability of Manston Airport is 21,000 annual air cargo aircraft movements. We would envisage that freighter ATMs at Manston would

[157] (Wiggins Group plc, 2002, p. 16)
[158] (Department for Transport, 2017a, p. 33)

be only a fraction of the level required under Section 23 of the Planning Act of 2003 (being at least 10,000 ATMs/year above the existing capability).

378. In paragraph 48, we put forward four questions in relation to the RSP proposals for Manston. These are more relevant and targeted than the broader questions posed by Azimuth in its first report[159]. The answers to our questions have been developed over the course of this report. We summarise our conclusions in the table below.

Question	Response
Considering planned airport expansions, will there be a need for further airport capacity in the UK for dedicated freighters?	No, planned expansions at existing airports should comfortably provide sufficient freighter capacity until 2040 and beyond.
Will the South East in particular require additional capacity for dedicated freighters?	No, Stansted is planning significant capacity growth. A third runway at Heathrow will provide additional bellyhold capacity (putting downward pressure on freighter demand). Finally, the South East market can be well served by airports more centrally located in England.
Would a reopened Manston be well placed to effectively serve a significant proportion of the dedicated freighter market?	No, a reopened Manston would only serve a niche role, similar to its historic record. It has a poor location and operating restrictions.
Are there other potential airport options for new dedicated freighter capacity?	Yes, there are many UK airports with excess freighter capacity. For example, Doncaster Sheffield Airport has a central UK location. It markets itself as the UK's freighter gateway. It benefits from a large site with a long runway, and has 24 hour operations.

Table 3 – Summary of Analysis of Potential Future Freight Role for a Reopened Manston Airport

379. As can be seen above, when one asks more targeted questions, the outcome is very different to that presented by Azimuth. Our overall conclusion is that the RSP proposals and the Azimuth forecasts are deeply flawed. The outlook put forward by RSP / Azimuth does not reflect market realities. We would expect freight tonnage and freight ATM outturn at a reopened Manston to be considerably below the Azimuth forecasts. We see no realistic prospect that Manston could ever develop to reach the threshold required of a Nationally Significant Infrastructure Project, namely to increase cargo ATMs by at least 10,000/year compared to the existing capability.

[159] (Azimuth Associates, 2017 a, p. I)

10. Appendix - Overview of the Cargo Industry

10.1. Modes of Transport for Transportation of Cargo

380. Air cargo makes up only a small proportion of global cargo (by tonnage). Seabury estimated that in 2016, air cargo had a share of just 1.5% of containerised air and sea trade[160]. For international transit in particular, sea is the dominant mode of cargo transport.

381. In many cases, cargo reaches its destination using a mix of modes. Road and rail are commonly used to collect cargo from many different shippers across a large geographic area, and bring it to a central hub for consolidation, before onward shipping by air or sea (with a similar process occurring at the other end of the air/sea journey in order to distribute cargo to consignees).

382. The different modes of transport each have inherently different costs associated with them, usually related to speed of transit and quantity of product being moved. Air (a relatively fast and relatively low-quantity mode) is more expensive than sea (a relatively slow mode capable of moving vast quantities of product at a time). Generally, products that make use of air transportation are high-value and/or time critical, and can be easily packaged.

383. Transportation of high value items by air helps businesses maximise profits by minimising the time for which its inventory is tied up in supply chains. For high value items, the benefits of being able to quickly realise the value of product inventory and reinvest can outweigh the additional cost of air transport. As such, the proportion of global trade that travels by air is much greater when measured by value (ca. 35%[161]), than when measured by tonnage.

384. For time critical products, the trade off between a) the cost of transport, and b) the deterioration in the value of the product with time, can be a key factor in determining what mode (or modes) to use. Products such as flowers, newspapers and some pharmaceuticals have no value if they are not available to consumers a short period after they are shipped. For these products, air is often the only viable mode of transport.

385. The nature of the cargo, or its physical size, may also influence mode choice (for example heavy plant machinery may be too large for air transport, while air transportation of many substances is restricted or prohibited).

[160] (Seabury, 2017, p. 4)
[161] (IATA, 2017a, p. 5)

10.2. Types of Air Cargo

386. Whilst there are many different types of air cargo, at a high level, most can be categorised as one of general freight, express or mail.

- Mail is typically letters and parcels, delivered to final destination by the postal service of a given country.
- Express cargo is typically 'next-day' shipments that are collected from the shipper by close of business and are required by the consignee by close of business the following day.
- General freight is everything else (note that general freight is a very broad category which also includes several types of low volume specialist cargo such as hazardous, valuable and live animal freight).

387. The air cargo market is served by various different business models. These include:

- Cargo-only airlines, such as Cargolux, which operate aircraft carrying only cargo.
- Integrators, such as DHL Express, which facilitate cargo transportation from shipper through to consignee, and typically own/lease and operate the vehicles necessary to achieve this (and which carry only cargo). Integrators tend to have a focus on express cargo.
- Traditional airlines such as British Airways, which carry cargo on their passenger flights (known as bellyhold cargo). These carriers may additionally operate cargo-only flights (in which case they are known as combination carriers).
- Couriers and road hauliers, which move cargo between the shipper/consignee and the airport hubs.
- Freight forwarders, which typically help shippers to organise the transport of freight, but do not take part in actually moving it.

388. Steer Davies Gleave was commissioned by the UK Department for Transport to improve its understanding of the UK air cargo industry. Its report, 'Air Freight: Economic and Environmental Drivers and Impacts' provides a breakdown of the UK air cargo market in 2008, by type of cargo and type of carrier – see below. General cargo and specialist products accounted for 75% of the market, express for 18% and mail for 7% (all by tonnage)[162].

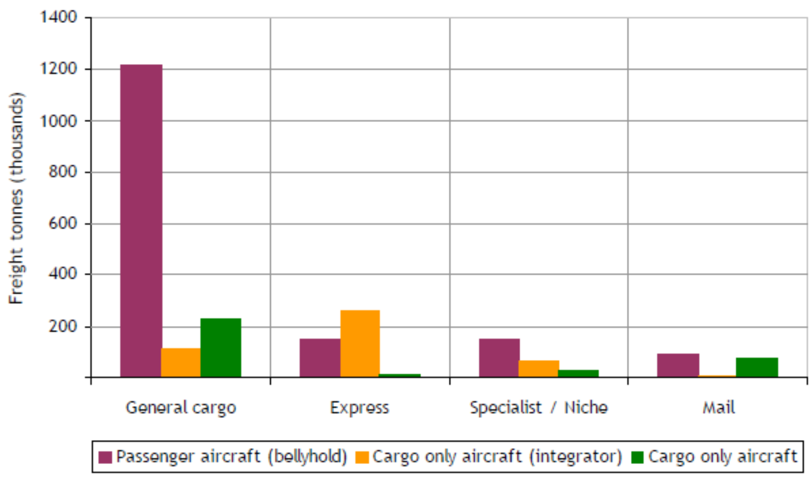

Figure 28 - UK air cargo in 2008 by type of cargo and type of carrier

Source: Steer Davies Gleave [2010], AIR FREIGHT Economic and Environmental Drivers and Impacts

[162] (Steer Davies Gleave, 2010, p. 47)

Bellyhold Cargo

389. A commercial passenger aircraft has a considerable amount of space underneath the passenger cabin, used to store the checked baggage of passengers. The checked baggage generally does not utilise all this space, and some airlines choose to generate additional revenue by filling it with cargo.

390. The routes operated, the aircraft used, and flight timings are typically determined by passenger demand. However, passenger demand does not always align with cargo demand. Some routes may have very little cargo demand, while others may have much more than can be accommodated.

391. The revenue generated from bellyhold cargo can be a significant minority of overall revenue. Furthermore, carrying bellyhold cargo does not substantially increase costs (for example, the aircraft itself and the crew, the landing fees etc are incurred with or without the cargo).

392. Bellyhold cargo can therefore offer an airline a significant revenue upside opportunity, with little downside risk (as long as the airline is careful to price cargo to cover the incremental cost of carriage e.g. increased fuel burn).

393. Loading and unloading cargo from the aircraft can make very short turnaround times impossible to achieve. Therefore short haul low cost operations, which rely on very high aircraft utilisation to achieve profitability, typically do not to carry bellyhold cargo.

394. The capacity available for cargo in the bellyhold of passenger aircraft is difficult to estimate. It depends on many factors, including how many passenger and crew bags there are to accommodate (and how heavy they are, and how efficiently a given airport's staff loads those bags), the volume of fuel needed, the temperature and altitude of the departure airport, the type of engines etc. Many of these factors vary significantly from departure to departure, even if the exact same aircraft hull is used.

395. Complicating matters is that the limiting factor on the amount of cargo that can be uplifted depends on its density. One flight may depart with a bellyhold that is physically full but with spare weight capacity. Another may depart with space available in the bellyhold but not able to carry more weight. Reporting of air cargo load factor typically states only the weight used versus the overall available weight.

Cargo Carried on Cargo Aircraft

396. A cargo aircraft (or freighter) is operated purely for cargo, and carries no commercial passengers. Most of the aircraft used are very similar to commercial passenger aircraft, with the exception that all seats and overhead storage, carpets, toilets, galleys etc. are removed from the space that is normally the passenger cabin; this space is then filled with cargo. Additionally, as there is no checked baggage, all space underneath the passenger cabin is available for cargo. For example, a 747-400 cargo aircraft can carry multiple times more freight than a 747-400 passenger aircraft.

397. As there are no commercial passengers on a freighter aircraft, the size of aircraft operated, the routes and the timings are all chosen to fit cargo demand.

398. IATA highlights the higher average yield from freight carried on cargo-only aircraft in comparison with that carried in the bellyhold of passenger aircraft:

> *"At an aggregate industry level, cargo-only services have exhibited a greater sensitivity to fuel price changes. Cargo only services on average earned a premium of 10% in 2014 over belly hold services"*[163]

399. Note that the yield premium of freighters is not a comparison on a like for like basis. It will include, for example, the impact of freighters serving different markets.

[163] (IATA, 2015, p. 5)

400. The absence of commercial passengers also means that all costs must be covered by the revenue from cargo only. The impact of this on profitability (in comparison with bellyhold cargo profitability) is demonstrated in the following illustrative example (from a 2015 Seabury presentation on air cargo trends).

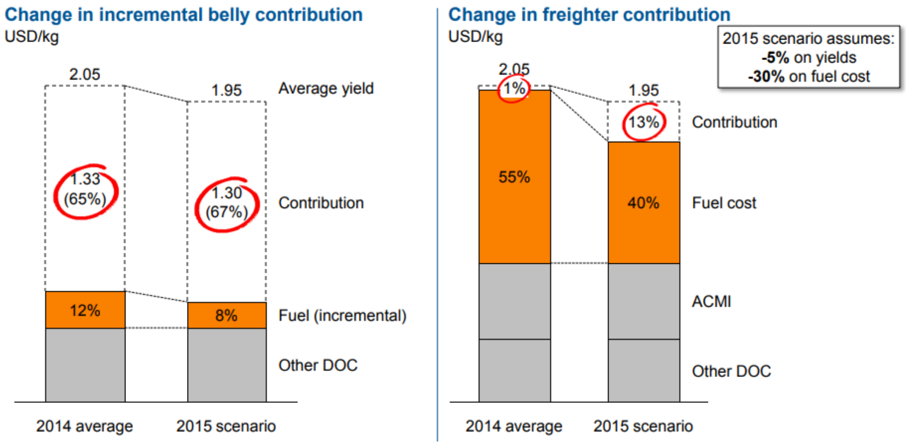

Figure 29 - Freighter vs bellyhold profitability, and impact of fuel price

Source: Seabury [2015], 'Air Cargo 2015: Recent trends and impact on air cargo industry'

401. In 2015, when carrying an item on a freighter, only 13% of revenue goes to profit. Carrying the same item at the same price, but as bellyhold cargo, results in 67% of the revenue going to profit[164].

402. Furthermore, it is seen that freighter profitability is more sensitive to fuel price than bellyhold cargo (fuel price reduced by 30% between 2014 and 2015; illustrative contribution increased by 12 percentage points ("ppts") on the freighter, but only by 2ppts for the bellyhold cargo)[164].

403. Whilst the current low fuel price environment means freighter profitability has increased, it also means future increases in fuel price could significantly reduce the profitability of freighter operations.

404. Another challenge for operators of freighter aircraft is that, unlike passenger demand, cargo demand can be highly directional. A freighter may be full on one sector, and carry very little on the return journey. Long haul freighters may operate circuitous routes with multiple stops (taking them literally all around the world in some cases), in order to minimise flying on sectors with low cargo demand.

405. Freighters may be scheduled (the flight operates regularly to a published timing and route), or charter services (a flight operated on a one off basis to meet irregular/unusually large demand e.g. moving Formula 1 race equipment between one race location and the next).

Trucking

406. The air cargo industry primarily uses trucking in one of two ways. There are road feeder services, operated to move cargo between the shipper/consignee and the airport hub, and there are trucks operated between airport hubs in place of flights.

407. According to Boeing, the use of road feeder services enables carriers to "*extend their networks and add scheduling flexibility*"[165].

408. Integrators generally operate their own road feeder services, while cargo-only and traditional airlines may use third parties (as well as accepting cargo from independent hauliers and couriers).

[164] (Seabury, 2015, p. 7)
[165] (Boeing, 2016, p. 31)

409. The book 'Moving Boxes by Air: The Economics of International Air Cargo' states that trucks operate between airport hubs in place of flights where and when "*the lower unit cost of operating trucks*"[166] makes it sensible to do so. For express freight, this can often be the case on shorter routes, as described by the Steer Davies Gleave report[167]:

> *"for distances of 400 – 500km, cargo will generally go by road. For distances above this, flights will be used, except at weekends, where many packages are only required on the Monday and so can be trucked. The circa 500km cutoff is a function of the integrators next day delivery guarantee."*

410. On such routes, relatively low aircraft utilisation (air transport of express freight is typically required overnight, but not through the day) combined with the lower time benefit of air transport, makes trucks a preferable option in many cases.

411. Regarding less urgent general cargo, the same report states[167]:

> *"Users of air freight with a requirement to send a consignment over 500 kilometres within Europe but without the need for next day delivery, will be likely to purchase a modal option other than air freight".*

412. The lower time benefit of air transport on short routes is derived from the high proportion of the total journey time that is taken up by sorting/handling and ground-based distribution; globally, the average air cargo flight accounts for just 33% of the average air cargo shipment time[168]. On routes with below-average flight times, this percentage falls even lower.

[166] (Morrell, 2011)
[167] (Steer Davies Gleave, 2010, p. 66)
[168] (IATA, 2017a, p. 7)

11. Appendix - Air Cargo Global Market Trends

11.1. Air Cargo Share of Global Cargo

413. While air freight had a share of 1.5% of the world's total air and sea freight in 2016, this share has been dropping during the period since 2000 (when air freight had a share of 2.5% of the global market). This is illustrated in the chart below[169]. Note that over the period 2013-16, air share of the global market has stabilised at ca. 1.5%.

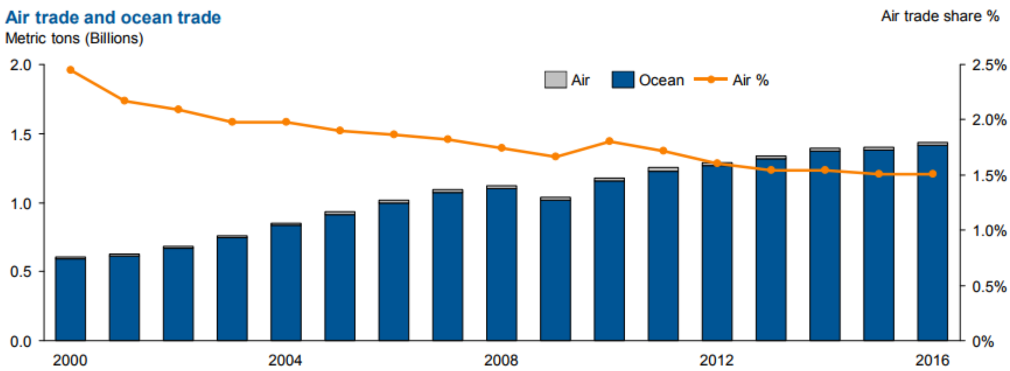

Figure 30 – Evolution of air and ocean freight tonnage with time

Source: Seabury

414. The 2008 financial crisis appears to have marked a shift in the nature of global trade. Before this point, sea and general air freight were growing strongly. In the period since 2008, growth of both has reduced dramatically (sea from 8.9% to 2.5% CAGR, general air freight from 4.3% to 0.9% CAGR). Conversely, the period since 2008 has seen rapid growth of express and mail air freight, as well as China-Europe rail (although these are from a much smaller base, particularly China-Europe rail)[170].

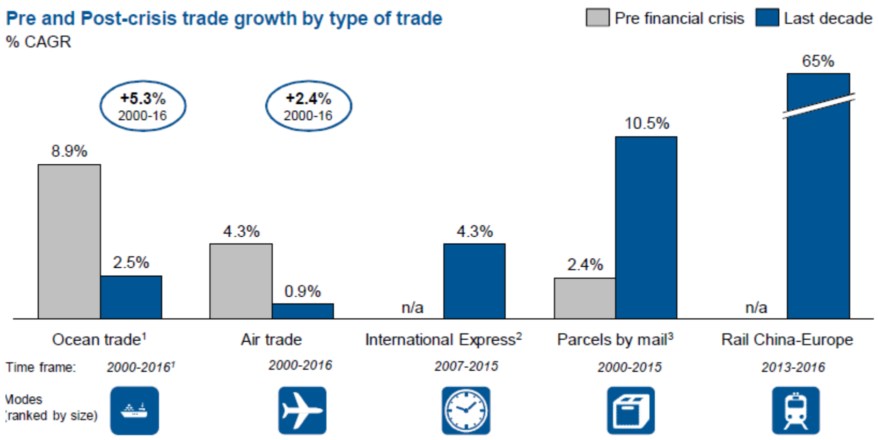

Figure 31 – Cargo growth rates by mode (pre- and post- financial crisis)

Source: Seabury

[169] (Seabury, 2017, p. 4)
[170] (Seabury, 2017, p. 23)

Trucking

415. Within Europe, the past decade has seen an increase in the use of trucking as a substitute for air transport. Referring to Europe, Boeing provides the diagram below, and states[171]:

> *"Since 2006, airport pairs of truck flights grew 3.1 percent on average per year. Weekly frequencies of truck-flights grew 14.3 percent on average per year between 2006 and 2013, but the growth has been at pause since 2013"*

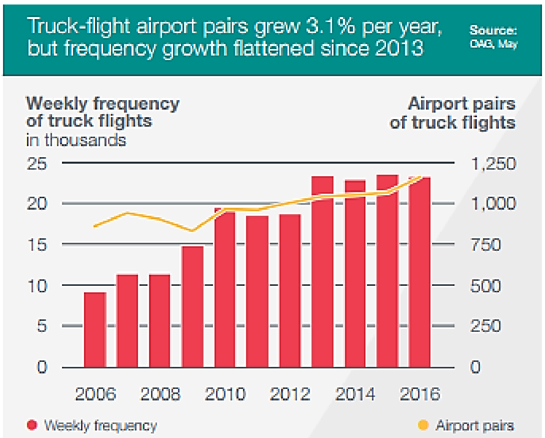

Figure 32 – Example of the growth of trucking within Europe

Source: Boeing

416. The same source also refers to a rise in 'long haul truck-flight operations in Europe', claiming "*their dramatic rise over the past decade has clearly contributed to a decline in growth of scheduled freight carried by air*". Steer Davies Gleave provides data showing a similar trend over the period 2002-07[172]:

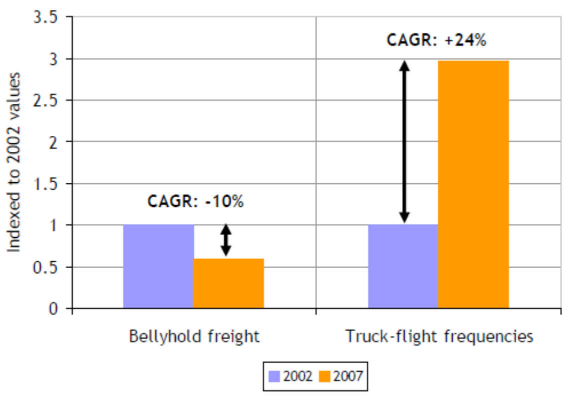

Figure 33 – Comparison of bellyhold airfreight tonnage and truck-flight frequency growth

Source: Steer Davies Gleave (2010), AIR FREIGHT Economic and Environmental Drivers and Impacts

[171] (Boeing, 2016, p. 32)
[172] (Steer Davies Gleave, 2010, p. 7)

11.2. Air Cargo Mix

417. Within air cargo, the low growth of general freight and the rapid growth of express and international mail is shown explicitly in the chart below[173]: Note that a significant proportion of the growth in general freight since 2008 occurred in 2010-11, and that growth of general freight since then has been lower (or even negative).

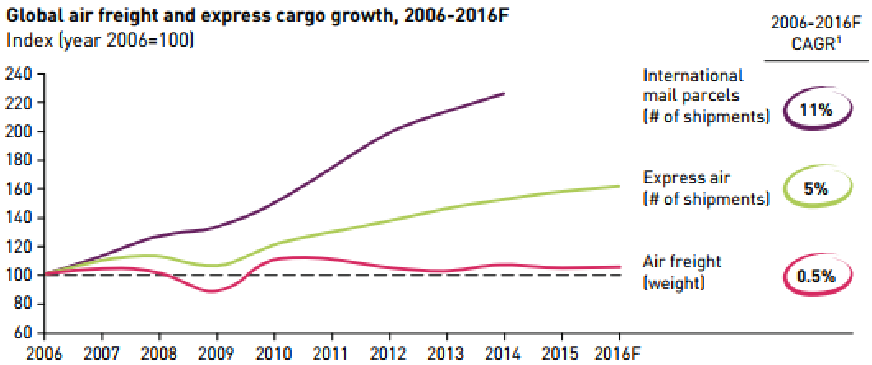

Figure 34 – Air cargo growth rates by type of cargo

Source: Seabury

418. Boeing confirms the relatively fast growth of express cargo[174]:

> *"International express traffic continued to grow faster than the average world air cargo growth rate, expanding 7.2 percent in 2014 and 3.6 percent in 2015".*

419. Within general freight, evolution of certain commodities has hurt air cargo volumes. For example, due to the miniaturisation of electronics, a modern laptop is significantly smaller and lighter than a personal computer from 1995, and so takes less space and weight to ship.

[173] (Seabury, 2016, p. 45)
[174] (Boeing, 2016, p. 7)

11.3. Bellyhold and Freighter Capacity versus Demand

420. In recent years, air cargo capacity has increased dramatically. This has been driven primarily by increased passenger demand resulting in an increase in the number of passenger aircraft (and therefore an increase in bellyhold capacity). Boeing states "*lower-hold capacity increased 27 percent from 2010 to 2015… the number of large freighters in service increased by 8 percent over this same period*"[175]. A similar trend is seen in the chart below from CAPA[176]:

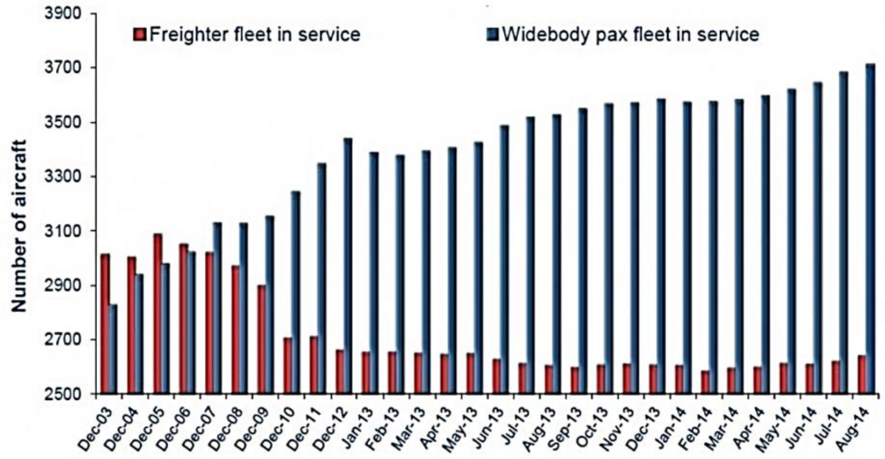

Figure 35 – Number of freighters and widebody passengers aircraft in service globally, Source: CAPA

421. The global financial crisis in 2008 had a significant impact on freighter numbers, while high fuel prices in the period 2011-14 is likely to have been a factor that kept freighter numbers depressed (see paragraph 400).

422. Whilst cargo capacity has been growing rapidly, cargo demand has not kept pace. This is illustrated by the fact that, as of Q4 2016, 15% of widebody freighter capacity globally was in storage[177].

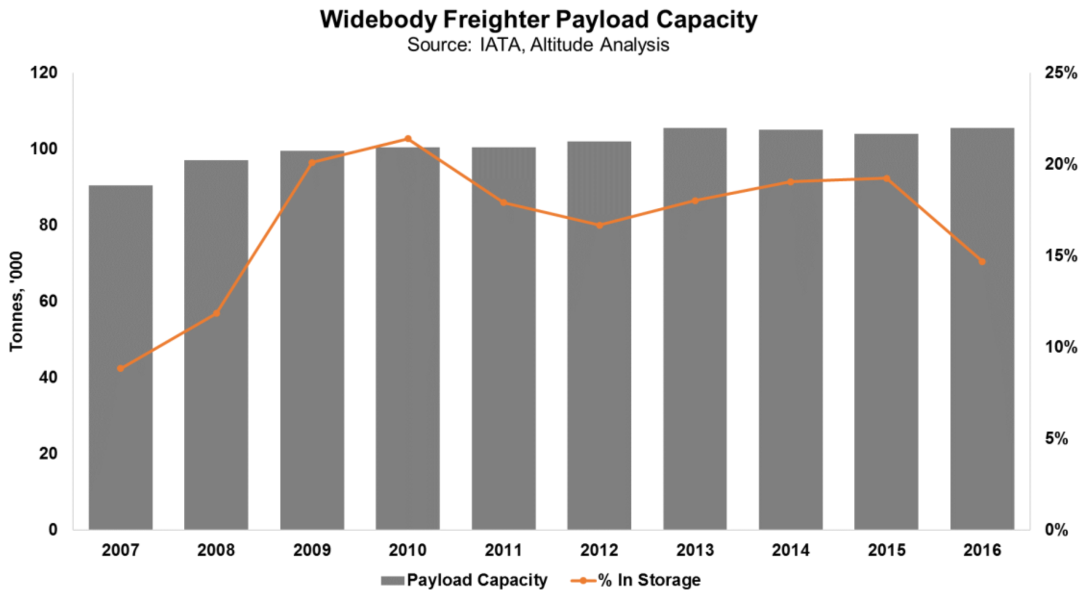

Figure 36 – Change in widebody freighter payload capacity with time

175 (Boeing, 2016, p. 3)
176 (CAPA, 2014c)
177 (IATA, 2016, p. 3)

423. Additionally, the global average load factor achieved by airlines carrying cargo in the first 6 months of 2017 was just 45%[178]. Referring to bellyhold capacity, Airbus states that "*cargo load factors, on average, do not exceed 30 to 40% on international routes*"[179].

424. The chart below from IATA[180] shows the growth of both passenger and freight demand; since 2008, growth of passenger demand has far exceeded growth of cargo demand. This illustrates why growth of bellyhold capacity has outstripped that of freighters, why a number of freighters are being kept in storage, and why there remains significant amounts of unused cargo capacity.

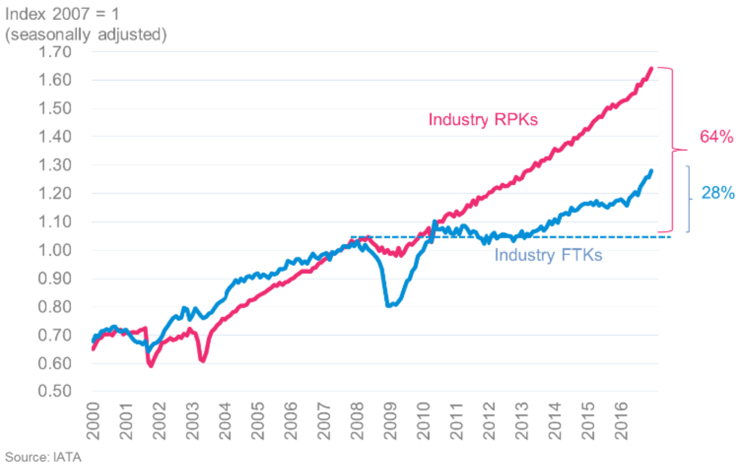

Figure 37 – Passenger growth compared with air freight growth, Source: IATA

11.4. Global Market Outlook

Outlook from Selected Carriers

425. The trend towards a reduced role for dedicated freighter aircraft (see Section 3.3) is reinforced by airline developments. In the text below, we provide selected examples of airlines cutting back on usage of freighter aircraft.

426. Luxembourg based dedicated freighter operator Cargolux (also in the world's top 10 air cargo carriers), acknowledges in its 2016 annual report the challenging operating environment it faces. The annual report also raises the possibility that dedicated freighter operators will not be viable in the future:

> *"There is clearly a current oversupply of capacity in the markets, which makes for a more challenging environment for cargo operators that have to achieve a healthy level of sustainable profitability…. There has been a modal shift from air freight to sea freight over the years whilst rail freight between Asia and Europe is an additional competitive challenge…. I also do not believe that it will be beneficial for shippers and forwarders if dedicated air freight operators were to disappear from the market."*[181]

[178] (IATA, 2017b)
[179] (Airbus, 2014, p. 35)
[180] (IATA, 2016, p. 3)
[181] (Cargolux, 2017, p. 7)

427. In 2014, the largest UK based combination carrier, IAG Cargo, decided to cease long haul flying using its own dedicated freighter aircraft (which had operated from Stansted).

> *"IAG Cargo CEO Steve Gunning said the carrier's dedicated cargo operations "made no profitable contribution" and the end of its freighter services will make the carrier "financially stronger""*[182]

428. Several other leading airlines are cautious about the prospects for the freighter segment. The following quotes are from a selection of combination carriers, all in the world's top 10 carriers of air cargo:

> *"Air France-KLM Martinair Cargo is pursuing its restructuring within a difficult economic environment. Air freight is being impacted by the situation of structural industry overcapacity…. the business is progressively retiring a portion of its full-freighter fleet to refocus most of its activity on the bellies of passenger aircraft. Within the framework of the Perform 2020 plan, this full-freighter fleet will thus be progressively reduced to five aircraft by 2017"*[183]

> *"Air France-KLM said freighters would become a "niche product" as cargo markets face continued overcapacity. Air France-KLM executive VP Erik Varwijk said slowing demand and greater belly capacity on scheduled passenger services made exclusive freighters redundant"*[184]

> *"Emirates VP cargo commercial operations Duncan Watson said the airline does not plan to add more freighter aircraft in the foreseeable future"*[185]

> *"Singapore Airlines Group subsidiary SIA Cargo faces another challenging year as conditions in the cargo market remain unfavourable. SIA Cargo has been unprofitable for seven of the past eight years, with losses further widening in recent quarters. Cargo capacity has been relatively flat since 2009, with additional belly space from passenger aircraft offsetting freighter reductions.… SIA Cargo is cutting its 747-400 freighter fleet in 1QCY2017, to only seven aircraft. At its peak in 2007 SIA Cargo operated 16 747-400 freighters. SIA will need to decide within the next few years whether to cut its freighter operation entirely or start investing in 747 replacements"*[186]

[182] (CAPA, 2014b)
[183] (Air France-KLM Martinair Cargo, 2017)
[184] (CAPA, 2014a)
[185] (CAPA, 2016)
[186] (CAPA, 2017)

12. Appendix - Case Studies of Leading European Cargo Airports

12.1. Context

429. In assessing the future potential of a re-opened Manston Airport, we have undertaken a review of Leipzig and Liege airports. Both are leading airports for all-cargo operations (rather than passenger hubs providing bellyhold capacity).

430. We have identified some of the key attributes that have helped Leipzig and Liege develop major roles within the European air cargo sector.

12.2. Leipzig

431. Leipzig Airport handled more than 1.0m tonnes of cargo in 2016. This throughput made it one of the top 5 cargo airports in Europe[187].

432. Leipzig is located in eastern Germany, ca. 100km from the Czech border and ca. 160km from the Polish border. Regarding its location, the airport states:

> *"[it is] located at the very heart of the central German logistics region…. [it is] an ideally located alternative to enter the growing markets in East Europe and Asia…. Besides outstanding infrastructural connections, the region is characterised by its motivated and qualified workforce and a high level of potential with regard to available space and investment"*[187]

Figure 38 - Trucking isochrones from Leipzig; 6hrs (dotted), 8hrs (solid-medium) and 10hrs (solid-thick)

Source: Leipzig Airport[188]

433. Leipzig Airport markets its proximity to eastern Europe as a benefit due both to the increasing economic power of this region, as well as the reduced flight time to Asia (compared with airports further west).

434. The airport has published a document stating trucking times to locations in eastern and western Europe. Only one of the ten examples given is within the 500km radius often considered as the realistic limit for express cargo. Three of these trucking destinations are over 1000km from Leipzig[189]. This gives some indication as to the possibilities for trucking of general cargo.

[187] (Leipzig Airport, 2017)
[188] (Leipzig Halle Airport)
[189] (Leipzig Halle Airport, 2014, p. 10)

435. Leipzig Airport has direct access to the European motorway network, and also has direct access to the rail network making rail-air transhipment possible.

436. The airport has two 3,600m runways, and operates cargo flights 24 hours a day. It has support from politicians at several levels for 24-hour operations. For example, the President of Saxony has said:

> *"Leipzig is in the second position of all hubs in Germany and this is why the state government and the city of Leipzig are convinced that 24 hours a day air traffic is necessary"*[190]

437. Note that this support appears to have been hard-won; the airport is reported to have spent ca. €100m on a noise control system, and is also said to be in regular communication with relevant stakeholders regarding noise[190].

438. DHL is one of the Leipzig Airport's largest customers. It decided to make the airport its European hub in 2004, began operations there in 2008, and now handles "*an average of 1,600t of cargo every day*"[191]. As of October 2016, DHL's total investment on its Leipzig hub was €655 million[192].

439. DHL Chief Executive Frank Appel said of Leipzig:

> *"It is in an excellent location, strategically positioned in the heart of Europe and is also in an excellent position to reach Asia and that is why we decided to expand our capacities here"*[190]

440. DHL's Leipzig hub manager is reported as adding other reasons for choosing Leipzig, including:

> *"the excellent road and rail connections, unrestricted night flights and a pool of skilled workers"*[190]

441. DHL operations support two of the airport's largest operators of scheduled cargo flights: EAT Leipzig is a wholly-owned subsidiary of DHL (it operates DHL's parcel and express flights, as well as providing adhoc charter services), while AeroLogic is a joint venture between Lufthansa and DHL (primarily operating long haul cargo-only flights for DHL).

442. The airport is also home to Ruslan Salis, a leading air charter company offering heavy lift services for large items of freight. A relatively large number of other carriers also operate charter cargo flights from Leipzig (34 are listed on the Leipzig Airport website). This indicates the airport is able to offer a competitive proposition for a wide range of different types of air cargo.

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[190] (Air Cargo News, 2016a)
[191] (Saxony Economic Development Corporation, 2017)
[192] (Cargo Forwarder Global, 2016)

12.3. Liege

443. The airport handled 660,000t of freight in 2016, making it the 8th largest cargo airport in Europe (bigger than both East Midlands and Stansted). The majority of freight was general freight (ca. 56%), with express accounting for ca. 25%. Freight handled at Liege has grown at an average rate of 5.6% CAGR over the 4-year period 2013-16[193].

444. Liege's proximity to major population centres of northern Europe means that there are "*around 400 million consumers*"[193] within easy reach of the airport. This advantageous position means that 66% of all European freight transits through the region[193].

445. It has direct access to the motorway network. The airport states:

> *"Motorway transport is now the solution preferred by major logistics players and those specialised in the transport of goods in Europe…. The Flexport® is less than one day by truck from the largest European cities, thus reaching around 400 million consumers. It offers the advantage of an excellent, uncongested motorway network"*[193]

Figure 39 - ½ day & full-day trucking isochrones from Liege airport

Source: Liege Airport[193]

446. Whilst Liege benefits from an advantageous geographic location, the regulatory environment in which it operates is also conducive to air cargo; the airport operates 24-hours per day, 7 days per week:

> *"The other advantage at Liège is genuine 24 hour operations, an increasing rarity in Europe…. This does not just mean that the runway operates through the night but that there are no limits of any kind on the number of night slots that can be offered, and no extra charge for landing then…. This has been guaranteed by local government for 30 years and it is backed up by positive action, including purchasing and demolishing some houses under the flight path and spending heavily on noise insulation for others"*[194]

447. Note that when trying to construct a viable slot pair where one end of the route is a constrained airport, the ability to land at any time of day at the other airport can be particularly valuable. As more and more airports become constrained, 24-hour operation may therefore become increasingly important.

448. TNT is the main customer at Liege. Despite a recent buyout of TNT by FedEx, there appears to have been little loss of traffic to FedEx's handling facilities at other airports. This perhaps indicates that integrators are reluctant to shift location once their infrastructure investment has been made.

[193] (Liege Airport, 2017)
[194] (Air Cargo News, 2016b)

449. Other customers with significant tonnage at the airport include CAL, Ethiopian Cargo, Qatar Cargo, El Al Cargo and Icelandair Cargo. Similar to Leipzig, the diverse customer mix is indicative of the competitive proposition the airport offers.

450. The main runway is 3,690m long meaning many kinds of large cargo aircraft can take off at full capacity[195]. Whilst this is typically not necessary for express cargo carriers operating short-haul flights, it may be a key enabler for some long haul freighter operators.

451. Freight-only carriers also get advantages at Liege that they do not find at many other European airports. VP Commercial Steven Verhasselt said in 2016:

> *"The general trend is towards belly cargo but when you are operating a freighter, you want to fly into an airport dedicated to helping that type of cargo…. If we can save you a block hour from not having to taxi or wait for passenger airlines to land first, than [sic] that is a real cost saving and more important than cheaper landing or parking rates"*[196]

452. TNT and CAL both switched from Cologne to Liege in the 1990's "*attracted by Liege's strategy to focus on air freight in general and on the express business specifically*"[197], and are now amongst the largest of the airports customers.

453. The airport continues to expand its cargo handling facilities, with a new €4 million, 6,000m^2 cargo terminal due to open in 2017. It is also taking a role in the development of the 100+ hectares of land around the airport.

- For example, by forming a partnership – Land In Liege – with the land owner, which aims to "create synergies between the airport development and the development of the areas surrounding it"[198].

12.4. Conclusions

Leipzig and Liege airports are typical – albeit leading – integrator hubs. The airports are structurally different from Manston in many regards. There is no realistic prospect for Manston to develop a similar business model. However, without the cargo volumes associated with an integrator hub (or a major passenger hub), Manston will find it very challenging to generate significantly higher cargo throughput than historically achieved.

Liege / Leipzig Feature	Situation at Manston
Located close to motorway network, maximising catchment size.	Located on an A-road, ca. 40 miles from the motorway network (M20).
Catchment contains many of Europe's largest population centres.	Catchment is limited by the English Channel / North Sea.
24-hour operation.	Not clear but likely to be restricted.
Runway length of at least 3,600m, enabling largest aircraft to take off with full payloads.	2,750m runway, potentially limiting take-off payload for largest aircraft.
Significant investment in noise control measures.	Not clear.
Significant investment in cargo handling facilities.	Not clear.
Support from regional government.	Not clear.

Table 4 – Liege/Leipzig Structural Features vs Manston, Source: Altitude

195 (Liege Airport, 2017)
196 (Air Cargo News, 2016b)
197 (Cargo Forwarder Global, 2017)
198 (Land In Liege, 2017)

13. Appendix – Supporting Material

13.1. Assumptions made to calculate indicative cargo bellyhold capacity

454. Despite the difficulties in stating a cargo capacity for an aircraft type (see paragraphs 394-395), by making some assumptions[199] it is possible to generate estimated like-for-like comparison of the potential cargo capacity of different aircraft types.

Aircraft	Typical Passenger Capacity (#)	Indicative Cargo Capacity Volume (m^3)	Mass (kg)	2017 ATMs, UK-World (excl Europe)
Newer Aircraft Types				
B777-300	350-400	116	24,000	15,000
A350-1000	350-400	112	25,000	-
B777-9X	350-400	109	30,000	-
B787-10	300-350	105	21,000	-
A350-900	300-350	95	20,000	2,100
B787-9	250-300	91	22,000	12,000
A330-900neo	250-300	84	15,000	-
B787-8	200-250	71	15,000	11,000
A330-800neo	250-300	64	22,000	-
A380	400+	57	34,000	12,000
Older Aircraft Types				
A340-600	350-400	109	26,000	2,000
A330-300	300-350	84	15,000	6,000
B777-200	300-350	77	22,000	3,000
B747-400	400+	71	25,000	12,000
A340-300	300-350	71	15,000	500
A330-200	200-250	64	22,000	6,000
B767-300ER	150-250	46	23,000	9,000

Note there are additional ATMs where the precise aircraft model is not known: B777: 18,000, B787: 2,000, A330: 500

Table 5 – Indicative cargo capacity of selected aircraft types
Source: Boeing, Airbus, British Airways, JAL Cargo, Qatar Cargo, Qantas Cargo, OAG, Altitude Analysis

455. The following set of assumptions are intended to enable comparison of the cargo capacity (weight and volume) of different aircraft types on a basis that is as close to like-for-like as possible.

456. They do not result in a cargo capacity that is directly comparable with airline or manufacturer stated capacities, nor with cargo capacities actually achieved by the aircraft operators in the real world.

- Seat capacity as stated by the aircraft manufacturer. Where more than one configuration is listed, the highest capacity 2- or 3-class version is assumed (single-class configurations are possible but not common for widebody aircraft, and therefore not representative of the likely average configuration).
- Passenger load factor of 100%.
- A passengers to crew ratio as close to 20 as possible (with the number of crew and the number of passengers as whole numbers).
- Passenger and crew average weight of 85kgs per person.
- An average of 1.1 hold bags per premium (F/J/W) class passenger, and 0.8 hold bags per economy (Y) class passenger/crew member.
- Average premium bag weight of 21kgs and average economy bag weight of 20kgs.
- An allowance of 1500kgs for miscellaneous items (e.g. cabin baggage).
- The maximum possible weight available for passengers/crew/bags/misc./cargo is equal to the difference between the Empty Operating Weight and Minimum Zero Fuel Weight stated by the

[199] See Appendix section 13.1 for detail of these assumptions

aircraft manufacturer. Where the manufacturer defines multiple weight variants, the highest MZFW version is used.

- Average bag volume of $0.18m^3$.
- LD3 container volume of $4.5m^3$, and pallet volume of $11.4m^3$ (Source: Boeing).
- Average LD3 packing factor of 95% for passenger/crew baggage.
- Assumption that no LD3 container will contain both F/J passengers bags and W/Y passenger bags (note no similar assumption is made for transfer/OD bags).
- The hold will be configured with enough LD3 containers to fulfil the passenger/crew baggage requirement (and no more), while adhering to the publicly-known allowable hold configurations (Boeing, Airbus, Qantas Cargo, JAL Cargo, SIA and Scoot]). Note: Available cargo volume is mathematically larger if the number of LD3 units in the hold is maximised. However, the LD3 is less useful for cargo than a pallet (it is smaller, so the maximum dimensions of the freight it can hold is lower; it has a small opening through which freight must be loaded; LD3s are smaller than pallets and are not cuboids; hence they have worse volume utilisation than pallets). In our experience, airlines do not typically use a max-LD3 hold configuration, despite the reduced mathematical cargo volume inherent in substituting LD3s for pallets.
- Bulk hold volume is not included in our cargo volume estimate[200].

13.2. Outlook for A380 in the UK Market

457. We do not believe the A380 will significantly increase in prevalence in the UK market, for the following reasons:

- The only UK airline with outstanding orders for the type is Virgin Atlantic (6 aircraft on order). However, Virgin has continually deferred this order (since 2006) and it is widely considered unlikely that deliveries of these aircraft will ever be made (a Forbes article from 2016 states “Virgin Atlantic’s ever-deferred order for six is basically dead”[201]).
- The other major UK carrier (British Airways) currently has no outstanding A380 orders.
- There are currently outstanding orders of just 97 aircraft; 46 of these are for a single airline, Emirates, which is not based in the UK (but serves the UK market).
- Additionally, just 2 new orders globally have been made for the aircraft since 2015[202].

[200] The bulk compartment is typically around $10\text{-}15m^3$, capable of storing loose-loaded items. At IAG Cargo, this space was primarily used for blankets and newspapers for passengers, with around $2\text{-}4m^3$ typically made available for mail bags/express cargo. Use of this space may vary significantly airline by airline.

[201] (Forbes, 2016)

[202] (Airbus, 2017b)

14. Appendix – Review of AviaSolutions Report

14.1. Introduction

458. AviaSolutions was commissioned by Thanet District Council to investigate the commercial viability of Manston Airport. Its report[203], dated September 2016, is briefly reviewed in this section of the appendix.

459. The AviaSolutions report has a fairly wide scope, including a review of the site development options, analysis of passenger potential, airport financial projections and asset condition reports. Consistent with our overall scope, we focus only on the aspects of the AviaSolutions report addressing cargo potential.

460. Northpoint was subsequently retained by RSP to critique the AviaSolutions report. We review the Northpoint report[204] and the subsequent response from AviaSolutions[205] in the next appendix section (Section 15).

14.2. Potential Development Scenarios

461. AviaSolutions[206] outlines various potential scenarios for cargo activity at Manston. It states that:

> *"In the past, Manston Airport was able to attract a certain level of cargo activity, and a potential future role would be for it to again serve this market. In our assessment, we assume as a minimum that Manston attracts this previous freight, totaling 30,000 tonnes per annum."*

462. Given cargo consolidation trends and competition from more established airports, we consider it possible that a reopened Manston may not be able to achieve historic tonnage. However, as a modelling assumption, we consider this to be reasonable.

463. AviaSolutions then puts forward two possible reasons why the scale of activity in the future could exceed historic levels:

> *"The selection of the East Kent area by a major multinational manufacturing (e.g. an Asian electronics or white goods company) or retail group (e.g. Amazon) as the location of its distribution network. Such location decisions can have a significant impact on freight volumes. However the UK's planned exit from the EU leaves makes this less likely.*
>
> *As a consequence of their lower sensitivity to airport location, freighters are generally amongst the first category of traffic to be 'squeezed' out of busy airports. With the pressure on runway capacity in the South East of England, it is possible that freighters currently operating through the London airport systems might seek to move to an alternative airport."*

464. In relation to the first possible reason, we are not aware of any firm or proposed development that would have a significant impact on freight demand. Therefore, while this a theoretical possibility, the same could apply to any location in the UK. Any future such development would be heavily contested between different UK regions, with more established and more central distribution locations likely to have an advantage.

465. The second reason suggested by AviaSolutions is investigated further in subsequent sections of the AviaSolutions report. We comment on this analysis later in this appendix.

466. AviaSolutions continues, commenting on the potential for integrator services at Manston:

[203] (AviaSolutions, 2016)
[204] (Northpoint Aviation Services)
[205] (AviaSolutions, 2017)
[206] (AviaSolutions, 2016, p. 15)

"We also considered the role of integrators in the air freight market. Whilst general cargo traffic tends to be more flexible about the location of the airport it uses than passenger traffic, this does not apply to the major integrated freight operators. The business model of operators such as DHL, FedEx and UPS is based on a hub and spoke principle involving both aircraft and road feeder services: the surface element of the network has a greater requirement for a central location within the market being served. We consider the geographic location of Manston precludes it from being a suitable base airport for an integrator in particular when compared to UK competitors such as East Midlands Airport."

This assessment of the potential for integrators is consistent with our view.

14.3. Cargo Analysis

467. In Section 6 of the AviaSolutions report, more detailed analysis of the cargo market is undertaken. In assessing the key airport dynamics of the UK market[207], AviaSolutions draws similar conclusions to our analysis:

"The busiest airport for freight has consistently been Heathrow, responsible for two thirds of the country's air freight. This position owes much to the very considerable cargo capacity in the holds of the wide-body aircraft providing the many long haul passenger services from the airport. In contrast, East Midlands' position as the second busiest freight airport is due to its role as the centre of the UK distribution network of the integrated cargo carriers, especially DHL but also UPS and Royal Mail. Stansted is preferred by FedEx and is also used by the cargo operations of a number of airlines. These included British Airways before it discontinued its all-freighter operations in April 2014 and switched to the freighter operations of Qatar Airways.

It has been argued by, for example, York Aviation on behalf of the Freight Transport Association that the stagnation of growth in UK air freight market since 2000 has been caused by a lack of airport capacity in the London area and specifically at Heathrow. Whilst the lack of ATM growth at Heathrow has undoubtedly hampered the development of the national air freight market, it is also true that over this period there was adequate airport capacity available at both Stansted and Manston to support additional dedicated freighter movements. Freighter movements at Stansted decreased over the period, while Manston closed. This strongly suggests that the stagnation of UK airfreight is not a consequence of capacity constraints given the excess capacity at Stansted and Manston."

468. In particular, the highlighted distinction between Heathrow freighter capacity and overall UK or South East freight capacity is key. AviaSolutions further explores the dynamics of bellyhold versus freighter:

"It is important to note that, in the UK market, only 30% of airfreight is carried on dedicated freight aircraft. This is substantially less than the global average, where approximately 56% of RTK's are transported on freighters. In part, this disparity is due to the excellent belly-hold networks available from UK airports and in particular from Heathrow.

As passenger demand increases additional belly-hold capacity will enter the market. This capacity growth is unhooked from the demand scenario for belly-hold cargo and can result in excess capacity in the market. As a result airlines will often sell this belly-hold capacity using a marginal cost pricing structure. This pricing structure does not need to account for the high cost of the aircraft and must only meet the additional marginal cost that each kilogram of cargo incurs. Through the application of this pricing in the key structure, belly-

[207] (AviaSolutions, 2016, p. 27)

hold cargo often undercuts the minimum price that can be charged on dedicated freighter operations.

As a result of this market dynamic, an airport focused on airfreight carried by dedicated freighters may be overly exposed to a declining or stagnant total market, or at best to a market that is not exposed to strong potential."

469. Again, this view of the market aligns with ours. One area of difference is in relation to the bellyhold capacity of newer aircraft. AviaSolutions asserts that:

"However, there are some elements of the market that appear to be limiting the increase in belly-hold capacity. These include

- *Some of the newer aircraft types have a smaller bellyhold cargo capacity than the aircraft they replace; and*
- *Low Cost Carriers (such as easyJet and Ryanair) are gaining market share but generally ignore the freight market."*

470. As we argue in our report, most newer aircraft types have higher cargo capacity than their predecessors (see paragraph 140). Furthermore, short haul passenger flights contribute a small minority of overall freight, regardless of whether operated by full service or low cost carriers (see paragraph 233).

471. AviaSolutions undertook interviews with freight industry representatives[208]. The list of interviewees was not extensive, with 4 people from the air cargo sector. However, compared to the stakeholders interviewed by Azimuth, there interviews are more relevant for analysing the potential for Manston to play a national role in the UK freight sector.

472. The conclusions from the interviews are summarised below:

"We conclude therefore that there is limited interest from the cargo industry in using a re-opened Manston Airport for air freight. The larger scheduled freighter operators are unlikely to relocate their services to the airport, particularly if the airport does not have a unique product offer. We believe it is more likely that were Manston Airport to re-open, the most likely role would be to serve smaller freight operators and the larger operators on an ad-hoc basis. There is no compelling reason to believe that the airport would be able to generate appreciably more freight activity than previously, other than in the context of a shortage of airport capacity in the London area."

473. This summary is consistent with our assessment of the potential market for Manston.

14.4. Potential Future Freight Operations - Model

474. The next stage of the AviaSolutions report[209] investigates potential demand versus supply imbalances in the South East. Not enough detail of the assumptions/workings is provided to be able to undertake a comprehensive review.

475. The approach differs from ours in some important respects:

- Demand growth rates based on trend analysis rather than linked to GDP.
- Future capacity based on assumed average loads for bellyhold and freighter flights at different airports. Future freight capacity expansion plans for airports do not seem to be explicitly taken into account.

[208] (AviaSolutions, 2016, p. 29)
[209] (AviaSolutions, 2016, p. 30)

- Focus on South East airports rather than national demand/supply.

476. Nevertheless, despite the different methodology, the conclusions are broadly similar to our analysis.

- Demand can be fully accommodated up to 2045 in the Heathrow third runway case.
- In all runway scenarios, demand can be fully accommodated up until 2040.

477. AviaSolutions then provides its modelling assumptions on the potential capture by Manston of unaccommodated demand:

> *"For the purposes of our assessment and in recognition of RiverOak's stated intention to develop Manston as a freight airport, we have assumed that half of the remaining unaccommodated demand is flown via Manston, with the other half going to other UK regional airports, potentially led by East Midlands and Manchester."*

478. We consider this a generous assumption, given the strength of alternative options at established airports or from a highly developed trucking network.

479. Later in the AviaSolutions document (Section 7.3.1), the Manston freight forecasts for the Heathrow third runway scenario are presented. Freight tones are modelled at 30,000 from 2018 to 2045, before growing to 100,00 tonnes in 2050. Appendix C (Section 11.1.1) of the AviaSolutions report provides the Manston freight forecasts for the no new runway scenario (the most favourable for Manston). Again, the forecast is for 30,000 tonnes from 2018 to 2040, but growing to 80,000 tonnes in 2045 and 140,000 tonnes in 2050.

480. These figures look reasonable for the short to medium term, with some potential for modest outperformance in a growing market. In contrast, we consider the forecasts to be on the high side in the long term. Even if South East capacity by 2050 is more heavily constrained than we assume, we consider it likely that centrally located regional airports will benefit to a much greater extent than Manston.

14.5. Conclusions

481. Section 8 of the AviaSolutions report provides its overall conclusions for the freight potential at Manston:

> *"Our freight interviews indicated that the demand to use the airport for freight was very limited. This, in large parts, is due to two factors; the infrastructure investments that have already been made by the industry around Heathrow and Stansted, and the geographical location of the airport. Infrastructure, and the associated knowledge, skill and supporting industry at airports such as Heathrow and Stansted, as well as the major European hubs such as Frankfurt, and Paris, would be almost impossible for Manston to replicate. The geographic location of the airport, tucked into the corner of the UK, cannot compete with airports such as East Midlands for Integrator services that are sold as fast delivery, due to the increases in surface transportation times. The interviews did however indicate that charter services and ad-hoc freighter flights would certainly return, providing some revenue income for the airport. In summary, we conclude that freight would return to the airport in limited quantities, not dissimilar to the tonnage previously processed at the airport."*

482. These conclusions are substantially in line with our conclusions (see Section 2.7).

15. Appendix – Review of Northpoint Report

15.1. Introduction

483. In the main body of our report, we have reviewed the reports issued by Azimuth on the potential for freight development at a reopened Manston. RSP also commissioned Northpoint to review the Azimuth forecasts, the original AviaSolutions report and more generally the RSP proposals. Northpoint's analysis was issued in a report titled *"The Shortcomings of the Avia Solutions Report and an Overview of RSP's Proposals for Airport Operation at Manston"*.

484. In this appendix, we briefly review the Northpoint report.

- Where the Northpoint report covers similar ground to the Azimuth reports, we do not repeat our commentary from the main body of our report.
- Furthermore, our focus is on areas of the Northpoint report relating to freight. Other areas, including passenger development and financial viability, are not covered at this stage.
- Finally, we restrict our commentary to the key issues of substance. For example, Northpoint expresses strongly worded opinions on the AviaSolutions approach. While we believe this criticism is misplaced, we have separately reviewed the AviaSolutions report, and do not see the need for further comment in this appendix.

485. Our review of the Northpoint report has been undertaken in chronological order (the same order issues appear in the Northpoint report).

15.2. Manston Airport Benchmarks

486. Northpoint describes the business model for a reopened Manston as a "*mixed use airport offering air cargo, air passenger links and aircraft servicing and recycling*[210]". Northpoint then highlights that this would be:

> *"…in line with the business models of successful benchmark airports such as Alliance Fort Forth in Texas, USA; Hamilton Airport in Ontario, Canada; Bergamo in Italy; Liege in Belgium; and Leipzig in Germany."*

487. There is no explanation of what characteristics these airports may have in common with Manston, or why these airports would be more relevant than UK examples of mixed use airports such as Prestwick.

- See paragraph 322 onwards for a review of Prestwick Airport and similarities to Manston.

488. In the appendices (Section 12), we have provided case studies of Leipzig and Liege airports. The case studies demonstrate very clearly that these airports have very little in common with Manston, and cannot be considered as relevant benchmarks using objective criteria.

489. AviaSolutions[211] subsequently reviewed all the airports put forward by Northpoint and concludes:

> *"There are clearly structural and geographical reasons as to why each of these airports is different to the proposal for Manston Airport. As such, suggesting these are comparable benchmarks is not realistic. In order for Manston Airport to acquire the status of these airports it would need to demonstrate key elements of development, namely; commitments from key express players (DHL / UPS / FedEx / Amazon / Alibaba); an ability to operate night operations with few regulatory restrictions; and geographical advantages from nearby cities, industrial parks, and population centres."*

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[210] (Northpoint Aviation Services, p. 1)
[211] (AviaSolutions, 2017, p. 16)

490. We agree with this assessment. The catchment, location and regulatory framework are all much less favourable at Manston, rendering any comparisons between the airports meaningless.

15.3. Air Cargo Forecast Methodology

491. In Section 2 of its report, Northpoint puts forward its approach to air cargo forecasting and critiques the AviaSolutions approach. The Northpoint methodology appears to be similar to the Azimuth approach, which is reviewed in Section 8 of this report. We focus our assessment of the Northpoint approach on selected key points not covered in the Azimuth forecast review.

492. Northpoint[212] downplays the importance of location for freight, stating that *"In order to forecast where future freight capacity might optimally be developed, it is therefore not appropriate to rely on the geography of consignee demand"*. Instead, the importance of supply side issues is stressed:

> *"The effect of this is to push freight forecasting away from typical neo-classical demand/price mechanism models and any use of airport specific progression, towards supply driven modelling particularly requiring transparency about the supply factors that are used. So, for example, freight operations will be attracted either to where there is a large volume of network carriers flying international services or to where there are few night time restrictions because these are important for express freight operations, or in the case of dedicated freighters where there are no restrictions on slot availability and there is sufficient space to create efficient apron based loading and unloading operations alongside specialist handling facilities such as refrigerated storage, bonded warehouses and major logistics sheds."*

493. Northpoint then argues that *"In the south east of England this points to a relatively small number of airports being suitable for any large-scale freight operations."* Northpoint[213] sees this as an opportunity for Manston, stating that *"…there are few alternatives other than for Manston to cater for non-belly freight movements at south-east airports."*

494. There is an inconsistency in this argument. If the geography of demand is of secondary importance, Northpoint's focus on airport capacity in the South East is misplaced. In any case, South East airports already attract a disproportionate share of the UK's freight demand (see Section 2.4).

495. On Pages 4 and 5 of its report, Northpoint makes a number of assertions, in support of its forecasts, which we dispute:

- *"Based on long-term growth trends in the sector, this report contends that freight capacity in the south-east will need to expand by over 100% in the next 25 years."* No further explanation is provided for such a sweeping statement. As we have highlighted, there is spare freight capacity in the South East currently (see Section 5.3). Furthermore, the focus on South East airports only is not justified (see paragraph 219).
- "*… the expansion for Stansted and Luton for passenger services, primarily of a low-cost nature, means that there will be very few spare slots during the day and more importantly at night, that can be used by express freight carriers for dedicated freight operations*." This assertion ignores the plans of Stansted to grow its freight volumes and to expand its freight infrastructure. It also does not consider the separate planning cap for freight flights (see paragraph 237 onwards).
- *"In this context, and keeping in mind the need for basic infrastructure requirements such as a substantive runway, good road connections and sizeable areas available for apron and shed development, there are few alternatives other than for Manston to cater for non-belly freight movements at south-east airports."* As noted previously, we disagree with a narrow focus on the South East market. Even so, there are other options. In addition to the substantial expected freight

[212] (Northpoint Aviation Services, p. 4)
[213] (Northpoint Aviation Services, p. 5)

capacity growth at Heathrow and Stansted, other airports such as Gatwick and Bournemouth could play a larger role in the future.

- *"Indeed, I anticipate existing volumes at Luton, Stansted and Gatwick will continue to fall as slots and space become increasingly valuable."* The implication that volumes are falling at Stansted and Gatwick is incorrect. Both airports have enjoyed strong growth since 2015 (Gatwick especially, see paragraph 212).

496. On Page 5, Northpoint then outlines the perceived benefits of Manston:

> *"Manston, in contrast, will have no foreseeable slot restrictions, an established reputation for efficient handling and if RSP's proposals are approved, a substantial apron capable of handling several large aircraft concurrently all with excellent airside support facilities and access to dual carriageway roads to London, the M25 orbital and in the foreseeable future to a new Dartford crossing improving access to ports in Essex and in East Anglia. It is even well positioned for trans-shipping freight to trucks, which can then use Dover port or the Channel Tunnel to access the near continent."*

497. We disagree with this assessment of the potential for Manston:

- As discussed previously (Section 4.11), Manston's location is poor.
- The infrastructure advantages are not unique to Manston, while the potential night flight restrictions at Manston are not mentioned.
- We are unconvinced by the potential of improved access to ports. For example, Liverpool Airport currently has very limited freight volumes despite common ownership with Liverpool Port.
- Similarly, it is not clear what advantages could accrue from trans-shipping freight to trucks for onward cross-channel travel. The directional flows where this would make economic sense are not articulated.

498. In referring to the Northpoint forecasts, it is stated on Page 5 that *"They nevertheless demonstrate that, under a range of scenarios, Manston is strongly placed to attract surplus demands in the South East by offering an attractive supply side solution to the air freight industry."* As far as we can see, only one (very optimistic) scenario is presented by Northpoint.

499. Northpoint then provides a wide range of comments on the AviaSolutions forecast methodology (Pages 6-7). AviaSolutions[214] refutes many of these in its follow up report. We make the following observations:

- Northpoint promotes the use of global historic trends and manufacturer forecasts in the context of Manston projections. As we also comment in relation to the Azimuth forecasts (see paragraph 361), the simplistic application of global manufacturer projections to a UK airport is problematic. The divergent freight trends in different markets caution against the application of global metric.
- Northpoint appears to suggest that, for Manston, global forecasts are more relevant than national projections. We find this puzzling. While freight is an international business, UK demand characteristics should not be disregarded.
- Northpoint also seems to argue that bellyhold capacity at Heathrow is constrained, and set to diminish due to newer aircraft types having lower bellyhold capacity than predecessors. However, as we show in Section 4.7, the average freight load for both bellyhold and freighter flights at Heathrow has been growing significantly. This suggests that spare capacity exists and/or average capacity per flight is improving. In the same section, we also highlight that – with the exception of the A380[215] – newer passenger aircraft typically have higher bellyhold capacity than legacy aircraft.

[214] (AviaSolutions, 2017)

[215] As at 31st October 2017, 217 A380 aircraft were in operation with outstanding orders for a further 100. This compares to 1,744 A330/A340/A350 family aircraft in operation, plus a further 1,057 outstanding orders (source: Airbus website). In addition, there is a large

500. The Northpoint report then addresses the issue of cross-channel transhipments (Page 7 onwards). Its argument is that lack of airport capacity in the South East has led to a major increase in trucking from the UK to European airports. As we noted previously, there is not (nor has been) any overall shortage of airport capacity for freight in the South East or the UK more generally (Section 5). Furthermore, the increasing use of truck feeder services is due to cost efficiencies and is not restricted to the UK (see Figure 32).

501. AviaSolutions[216] also correctly points out that:

> *"It is important though to note that a reverse flow also exists with continental European freight being trucked across the Channel to be flown into and out of UK airports. A lack of verifiable data on these flows hinders quantitative analysis, although the practice has existed for many years and despite this the freight industry chose not to use Manston Airport when it was open."*

502. On Page 9, Northpoint draw inappropriate conclusions from York Aviation studies. Our comments on this in relation to Azimuth also apply here. Similarly, we find Northpoint comments on Brexit impacts speculative and one-sided.

503. Northpoint then devotes Pages 10-14 on *"The Availability of Substitutable Bellyhold Capacity"*. We disagree with the following assertions:

- "*However, Avia adduces no evidence on comparative charging rates between bellyhold and freighter carriers and therefore with Heathrow known to be one of the most expensive airports in the world, we remain sceptical that this is a material factor that would drive the re-allocation of consignments from freighters to bellyhold aircraft."* As we illustrate in Section 4.7, Heathrow has grown its share of the UK freight market despite its relative expense. Despite high airport charges, we understand that the incremental costs of cargo carriage at Heathrow are fairly low. Therefore, where excess bellyhold capacity exists, it makes economic sense for airlines to try to fill that capacity with competitive charges for freight customers.
- *"First, just under 50% global air cargo is shipped bellyhold; the comparative figure in the UK is 70%. Since the economies of the UK's main EU competitors are not materially different from our own, there is no logical explanation for this difference other than the shortage of slots available to integrator aircraft or dedicated freighters …"*. There is available airport capacity for integrators / dedicated freighters (see Section 5). A much more credible explanation for the high proportion of bellyhold in the UK is Heathrow, which is Europe's largest passenger hub airport. Heathrow provides an extensive schedule of widebody passenger flights to many of the world's most important air freight markets. Furthermore, the geographical position and island status of the UK make it a less suitable location for freighter flights serving the wider European market (compared to say, Germany). This is especially true for flows to/from Asia.
- *"Second, there are many types of freight (e.g. time critical, heavy, large or live) for which bellyhold capacity cannot provide an acceptable substitute to dedicated freighters*." It is correct that some types of freight are unsuitable for bellyhold. However, this segment of the market is very small and is accommodated at existing airports such as Stansted.
- *"Third, Heathrow's principal attraction for freight forwarders, namely the range of international destinations it serves directly, is also its potential Achilles heel, because that network may not be sufficiently concentrated on certain 'thick' freight routes to be able to cope with the underlying demand – in other words the more complex the passenger network, the greater the likelihood it may not match the required pattern of freight distribution flows."* We do not follow the logic of this. At any airport, there will be some routes where freight demand exceeds bellyhold supply.

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backlog of Boeing widebody orders (ca. 1,200 as at October 2017) in addition to aircraft already in operation. Therefore, the A380 is not overly significant in relation to overall bellyhold capacity.

[216] (AviaSolutions, 2017, p. 18)

This is not a new phenomenon, and we are not aware of any suggestions that there will not be an ongoing role for freighter aircraft in the future. Therefore, it is unclear how this factor will be a negative for Heathrow going forward.

- *"Fourth, new aircraft tend to have less bellyhold capacity than older ones and Heathrow and Stansted are the two airports where these new aircraft are most likely to be introduced."* This point is incorrect and was addressed earlier with regards to Heathrow earlier in this section (paragraph 499). The comment is relation to Stansted is irrelevant, as Stansted bellyhold freight is negligible.
- *"And finally, it is very likely that a sizeable chunk of the available runway capacity at both airports will be taken up by Low Cost Carriers (i.e. Ryanair at Stansted and easyJet at Heathrow), and as with most Low-Cost Carriers, carrying freight does not form part of their business model."* We have previously argued that the airline mix is much less important than the route mix. Short haul full service airlines only generate a small fraction of bellyhold freight, so any differences in airline mix within the short haul sector will have minimal impact (see paragraph 233).
- *"Hence, in the medium to long term it is hard not to see the average freight capacity per aircraft arriving at Heathrow diminishing, even if with the new runway, the total number of aircraft that can operate there increases."* This would require a reversal of historic trends – as discussed above, the average loads per flights have been growing strongly. We would anticipate this trend to continue in the future.

504. We have a very different view of the freight outlook, both generally and specifically for Manston. No credible evidence is presented by Northpoint in support of its assessment. There are major flaws in key lines of argument, with its study exhibiting many of the same fundamental issues as the Azimuth reports.

15.4. Manston Air Freight Forecasts

505. Northpoint present summary air freight forecasts in Appendix A of its report. The forecasts are even more ambitious than the Azimuth forecasts, with 472,000 tonnes projected by 2040. This figure is equivalent to two-thirds of all tonnage on freighter aircraft in the UK in 2016.

506. The building blocks to the forecast are not easy to follow. However, the following assumptions appear highly suspect:

- Stansted to see freight volumes reduce dramatically, in contrast to the airport's own forecasts and expansion plans. It appears all this "spilled" freight is expected to divert to Manston, rather than more established UK competitors.
- Similarly, spill from Gatwick and Heathrow, despite growing long haul services at Gatwick and a new runway at Heathrow. Again, it seems all spill is expected to be captured by Manston.
- There is also a major assumption that a substantial proportion of freight can be "clawed back" from European airports. By 2040, it appears that this factor contributes 100,000 tonnes to Manston in the Northpoint forecasts. The assumption is unfounded and ignores market economic reality.

507. In Section 8.6, we concluded that the Azimuth forecasts were extremely optimistic and therefore not credible. The Northpoint forecasts are even more ambitious. Therefore, we draw similar conclusions in relation to their credibility.

508. As with the Azimuth forecasts, we also note the Northpoint cargo flight projections are high, even taking into account the projected freight tonnage.

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Department for Transport

UK Aviation Forecasts

Moving Britain Ahead

October 2017

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Glossary

Term	Description
Aircraft-kilometres, Aircraft-km	The number of kilometres travelled by an aircraft
AEM	Advanced Emission Model
APD	Air Passenger Duty
ATAG	Air Transport Action Group
ATM	Air Transport Movement - landings or take-offs of aircraft
ATM Demand Model	Part of NAPAM which calculates the number and size (seats) of ATMs needed to serve the demand allocated to the route
Baseline	Case where no new runways are added
Bellyhold	Cargo hold of a passenger aircraft used for freight
BEIS	Department for Business Energy and Industrial Strategy
CAA	Civil Aviation Authority
CAEP	The Committee on Aviation Environmental Protection
Capacity constrained	Modelling case where passenger and ATM demand must fit available future capacity where no significant additional runway or terminal capacity is added
Capacity unconstrained	Modelling case where passenger and ATM demand is not limited by runway or terminal capacity
CCC	UK Committee on Climate Change
CH4	Methane
Charter	As determined by the CAA, flights sold in holiday packages and not operating to a schedule
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DfT	Department for Transport
Domestic interliners	Passengers who start or end the journey in the UK and change to an international flight at a UK hub airport
Domestic passengers	Passengers who complete an end to end journey within the UK
EC	European Commission
EEA	European Environment Agency
EMEP/EEA	The European Monitoring Evaluation Programme (EMEP) / European Environment Agency (EEA) air pollutant emission inventory guidebook (formerly called the EMEP CORINAIR emission inventory guidebook) provides guidance on estimating emissions from both anthropogenic and natural emission sources.
EMME	Transport modelling software used in NAAM2
EU ETS	European Union Emissions Trading System
EUROCONTROL	The European Organisation for the Safety of Air Navigation
FMM	Fleet Mix Model
Foreign passengers	Foreign residency as defined in CAA passenger interview surveys

GIS	Geographic Information System
GDP	Gross Domestic Product (national income)
GHG	Greenhouse gas
GMBM	Global Market Based Measures
HMRC	Her Majesty's Revenue and Customs
HS2	High Speed Two
IATA	International Air Transport Association (airline trade body)
ICAO	International Civil Aviation Organization
International-international	International-international interliners / transfer passengers; i.e. passengers who are transferring via a UK airport or one the four overseas hubs in the model with their origin and destination outside the UK
IMF	International Monetary Fund
IPS	International Passenger Survey
Kg/nm	Kilogram per nautical mile
LCC	Low-cost carrier: low-cost carriers apply a business model that relies on reducing operating costs to provide passengers with relatively cheap tickets – only includes easyJet, Ryanair, Jet 2 and scheduled Thomsonfly services in the department's model.
LDC	Less Developed Country, a NAPDM long-haul forecasting region
Lei	Leisure Passengers
LGW 2R	Gatwick Airport Second Runway, the option promoted by Gatwick Airport Limited
LHR NWR	Heathrow Airport North West Runway, the option promoted by Heathrow Airport Limited
LHR ENR	Heathrow Airport Extended Northern Runway, the option promoted by Heathrow Hub Limited
LRTAP	Long Range Transboundary Air Pollution
Load factor	The proportion of seats on an ATM utilised by passengers
Long-haul	'Long-haul' depicts a destination (or route) to or from an overseas country that is not listed as part of the group of countries defined as 'Western Europe' (or 'short-haul')
MACC	Marginal abatement cost (MAC) curves
Model base year	The year from which the majority of underlying model data is taken, and the first year of model output - 2016 in these forecasts
mppa	Million passengers per annum
$MtCO_2$	Million tonnes of carbon dioxide.
$MtCO_2e$	Million tonnes of carbon dioxide equivalent – a metric which can include other greenhouse gases converted to the warming equivalent of carbon dioxide.
N_2O	Nitrous Oxide
NAAM2	National Airport Accessibility Model, generation 2, a model used to extract travel costs by road and rail from all district to all mainland UK airports

NAEI	National Atmospheric Emissions Inventory
NAPAM	National Air Passenger Allocation Model, a model within the department's aviation demand modelling suite. NAPAM allocates the unconstrained demand output from NAPDM to airports, taking into account capacity constraints
NAPDM	National Air Passenger Demand Model, a model within the department's aviation demand modelling suite. NAPDM forecasts the aggregate national demand for air travel before allocating to airports in NAPAM and taking account of airport capacity constraints
NIC	Newly Industrialised Country, a forecasting region in NAPDM
nm	Nautical Mile
NMF	Network Modelling Framework (DfT rail model)
NPS	National Policy Statement
NTEM	National Trip End Model (DfT model)
OBR	Office for Budget Responsibility
OECD	Organisation for Economic Co-operation and Development. In this report, this grouping refers to countries in the OECD but outside of Western Europe, as defined in NAPDM
OSGR	Ordnance Survey Grid Reference
Passenger-kilometres	The number of kilometres travelled by an aircraft multiplied by the number of passengers on board, sometimes referred to as RPK (Revenue passenger kilometres).
PIANO	An aircraft engine fuel-burn modelling tool
PFM	PLANET Framework Model used by HS2 Ltd
Point-to-point	Direct connection between two destinations
Runway capacity	The annual number of aircraft movements that are able to use an airport's runways and supporting airside infrastructure
Scheduled (Sch)	In the department's aviation demand modelling suite, scheduled carriers refer to only those carriers operating to a schedule, have been defined as such by the CAA and do not fall in the DfT definition of low-cost carriers
Seat-kilometres, seat-km	The number of kilometres travelled by an aircraft multiplied by the number of seats
SESAR	Single European Sky ATM Research
Shadow cost (also referred to as fare premia or congestion premium)	The extra cost of flying required to reduce passenger demand from above an airport’s runway or terminal capacity, to a level that is back within capacity
Short-haul	'Short-haul' has been defined as 'Western Europe', which comprises the following groups of countries: Andorra; Austria; Belgium; Bosnia and Herzegovina; Cape Verde; Channel Isles, Croatia, Cyprus, Czech Republic; Denmark; Estonia; Faroe Islands; Finland; France; Germany; Gibraltar; Greece; Greenland; Hungary; Iceland; Ireland; Italy; Latvia; Lithuania; Luxembourg; Macedonia; Malta; Republic of Moldova; Monaco; Montenegro; Netherlands; Norway; Poland; Portugal; San Marino; Serbia; Slovakia; Slovenia; Spain; Sweden; Switzerland; and Turkey. This is consistent with the definition of 'Western Europe' used in the department's aviation model suite

Suppression	The process whereby passengers respond to a shadow cost by deciding not to fly rather than using a ‘less preferred’ airport
Surface access	Land-based forms of transport used to access airports
Terminal passenger	A person joining or leaving an aircraft at a reporting airport, as part of an ATM.
Transfer traffic	Passengers connecting between their origin airport and destination airport through an intermediate airport
tCO2	tonnes Carbon Dioxide
Terminal capacity	The annual number of terminal passengers that are able to use an airport's terminals including its supporting landside infrastructure
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VFR	Visiting Friends and Relatives
WE	Western Europe, the short-haul forecasting region in NAPDM
WEO	World Economic Outlook
WebTAG	Department for Transport Appraisal Guidance

Executive summary

Introduction

1 This document sets out the Department for Transport (DfT) 2017 forecasts for air passengers, aircraft movements and CO_2 emissions at UK airports. The department's forecasts are a long term strategic look at UK aviation and are used for a number of purposes:

- informing future aviation strategy and policy
- informing decisions around the need and location of airport expansion
- providing emissions information for use in international discussions
- feeding into other government departments and the wider aviation sector

2 In October 2016 the Government accepted the conclusions of the Airports Commission, confirming the need for new runway capacity in the South East of England and announced that its preferred scheme for adding the capacity was a Northwest Runway at Heathrow ('LHR NWR'). A draft Airports National Policy Statement (NPS) was published in February 2017 and from February to May 2017, the department undertook a consultation on the draft Airports NPS which included assessments of all three options for additional capacity in the South East of England shortlisted by the Airports Commission.[1] The department has published a revised draft Airports NPS taking account of the updated evidence base and has launched a public consultation on that document. It is therefore appropriate for this document to include new forecasts for all the shortlisted capacity options.

3 This document comprehensively updates the last DfT forecasts of January 2013, describes how the forecasts are prepared and includes the forecasts for the shortlisted capacity options. The evaluation and appraisal of these options is considered in a separate document.[2]

The aviation market

4 The aviation market has undergone some significant changes since the department last published forecasts in 2013.[3] Passenger demand has grown significantly at UK airports, averaging 4.2% per annum since 2011. In 2016 passenger movements reached an historic high of 267 million at the airports for which the department forecast[4]. Aircraft movements (ATMs) have grown nationally by 10%, despite average load factors being higher and airlines using bigger aircraft.

[1] *Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*, DfT, February 2017.
[2] *Updated Appraisal Report*, DfT, October 2017.
[3] In 2013 the department used base data relating to 2011. The base data used for these forecasts is 2016.
[4] There were a further 1m passenger movements at airports not included in the model.

Passengers mppa	2011	2016	growth	per year
London	134	162	22%	4.0%
Outside London	84	105	25%	4.5%
National	218	267	23%	4.2%

ATMs (000s)	2011	2016	growth	per year
London	991	1107	12%	2.2%
Outside London	971	1042	7%	1.4%
National	1962	2149	10%	1.8%

Seats (million)	2011	2016	growth	per year
London	176	206	17%	3.3%
Outside London	113	131	15%	2.9%
National	289	337	17%	3.1%

5 Short-haul flights have also increased noticeably over the past five years. Both 'full service' scheduled and low cost carrier (LCC) sectors have grown strongly, in part through a marked drop in the market served by charter airlines. Overall, both domestic and long-haul passenger flights increased by 12% over the five year period, compared to a 29% growth in short-haul flights.

6 The pattern of ground origins of passengers has also shifted significantly in the last five years. The majority of recent national growth was concentrated in London, which has seen demand increase by 36%. Passengers at Heathrow grew from 69 million to 76 million - its runways are now effectively full and running at or about its planning cap of 480,000 aircraft movements a year. Gatwick grew from 34 million to 43 million passengers and now operates at capacity over increasingly long periods. The other three London airports, Stansted, Luton and London City, saw a combined increase of 13 million passengers in the five years. Outside London, the larger airports performed the most strongly, led by Manchester with growth from 19 million to 26 million passengers a year over the same time period.

The aviation model

7 The department continues to develop, maintain and operate a comprehensive aviation model. It comprises a suite of interrelated components to produce forecasts for demand at the national level, passengers and aircraft at the larger UK airports and the CO_2 emissions associated with aircraft departures from UK airports.

8 The model was used extensively in the Airports Commission's analysis, when the Commission was appraising their shortlisted capacity options. As the department adopts a policy of continuous improvement to its analytical models, the current model version builds on the technical changes used in that analysis, including the full modelling of competing overseas hubs. In addition it has undergone a significant number of further updates and improvements since 2015, most notably:

- updating all the base demand data to 2016
- validating the model with detailed 2016 statistics of aviation activity
- updating all the macroeconomic inputs on the main drivers of passenger demand (economic activity and fares) with the latest sources on GDP, consumer spending, oil prices and carbon costs available from the OBR, IMF, BEIS and others
- refreshing the aircraft fleet turnover model and fuel burn models with the latest data, a new peer review of this and information about aircraft from the latest version of European Environment Agency's emissions inventory guidebook

9 The purpose of these forecasts is primarily in informing longer term strategic policy rather than in providing detailed forecasts at each individual airport in the short term - commercial and local information not reflected in these national strategic forecasts could be significant at airport level in the short term.

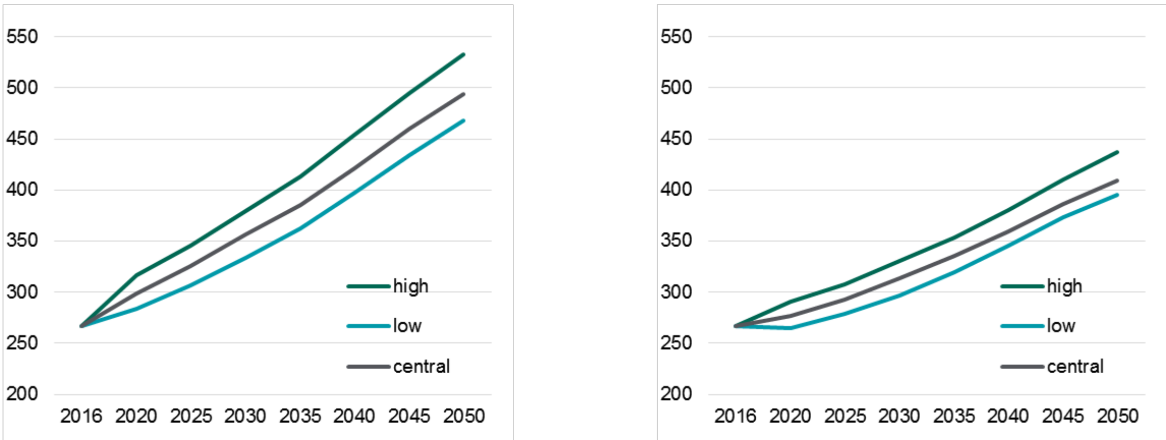
National air passenger forecasts

10 The presentation of the air passenger forecasts as demand growth scenarios reflects the inherent uncertainty in forecasting to 2050. A series of supporting sensitivity tests on the key economic inputs provide further evidence on the potential variability around the underlying economic inputs.

11 Forecasts are made for both unconstrained demand and demand constrained by airport capacity limitations. Unconstrained forecasts give a picture of underlying demand while capacity constrained forecasts form the primary basis of the department's appraisal and decision making processes.

Capacity constraints are forecast to reduce demand growth

Capacity unconstrained | Capacity constrained baseline



Demand is expressed in million passengers per annum (mppa)

12 Without constraints to airport growth, demand is forecast to rise to 355 million by 2030 (central scenario) and 495 million passengers in 2050 within a range of 480 to 535 million. When capacity constraints are taken into consideration, and no new runways are added, national demand is forecast to rise to 315 million by 2030 (central scenario) and 410 million passengers in 2050 within a range of 395 to 435 million passengers. This is a marked slowing of the rate of annual growth, with the new forecasts suggesting annual growth of 1.2-1.5% compared to an annual rate averaging 3.8% since 1990. This is as a result of market maturity, lower long term economic forecasts, capacity constraints and a significant rise in carbon prices.

Airport passenger forecasts

13 In addition to the baseline, the new forecasts take account of the three options for additional capacity in the South East of England shortlisted by the Airports Commission and included as part of the consultation on the Government's revised draft Airports National Policy Statement. The table below shows the capacity constrained forecasts in million terminal passengers per annum in the central demand case.

	Baseline	LGW 2R	LHR ENR	LHR NWR
London airports				
2016	162	162	162	162
2030	187	192	216	222
2040	199	220	235	241
2050	205	249	239	248
Airports outside London				
2016	104	104	104	104
2030	126	124	122	121
2040	160	150	147	146
2050	204	183	190	187
Total demand				
2016	267	267	267	267
2030	313	317	337	343
2040	360	370	382	387
2050	410	432	429	435

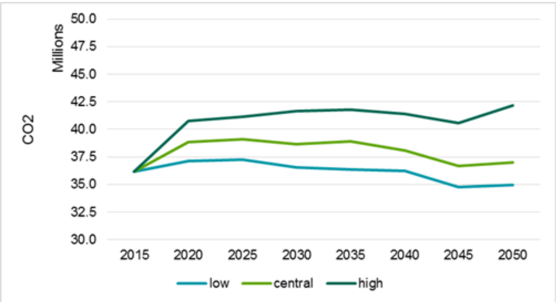
Figures relate to million passengers per annum (mppa)
London airports refer to Gatwick, Heathrow, London City, Luton and Stansted
Baseline: no new runways; LGW 2R: London Gatwick Second Runway; LHR ENR: London Heathrow Extended Northern Runway; LHR NWR: London Heathrow North West Runway

14 Without additional new runways much of the growth is forecast to occur at airports outside London as airports in London become constrained. Adding a new runway at either Gatwick or Heathrow facilitates faster national growth, with more of it focussed in London, while other airports continue to grow. More information on the forecasts are provided elsewhere in this document, particularly in Chapter 7.

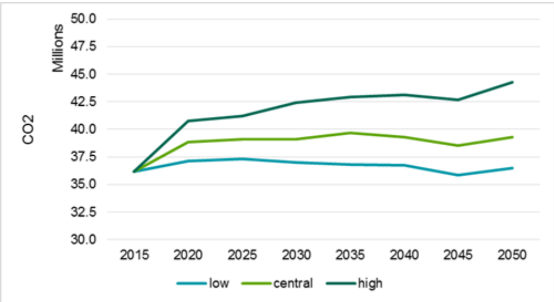
CO_2 emissions

15 Under the central demand forecast with no new runways, annual CO_2 emissions are forecast to be 37.0Mt by 2050. Adding a runway is estimated to result in an additional 1.5 to 2.9MtCO_2 across the range of demand growth scenarios assessed.

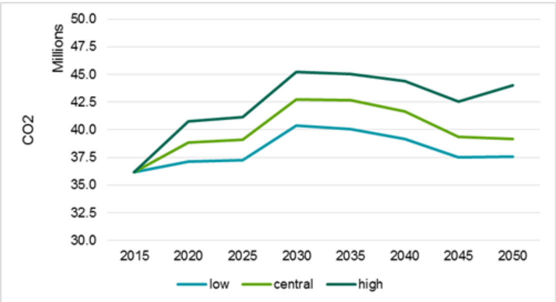
Baseline



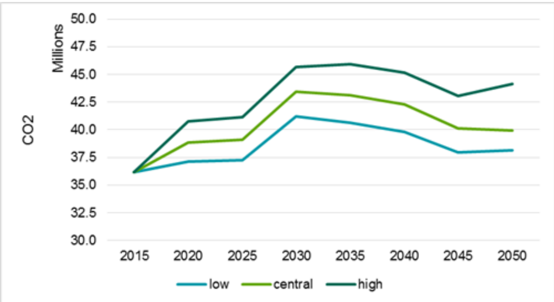
LGW Second Runway



LHR Extended Northern Runway



LHR Northwest Runway



National MtCO_2 emissions, departing flights

1. Introduction

1.1 This document sets out the Department for Transport (DfT) 2017 forecasts for air passengers, aircraft movements and CO_2 emissions at UK airports. The forecasts have a base of 2016 and extend out to 2050. They supersede the last set of forecasts published by the department in January 2013.[5]

Nature and purpose of forecasts

1.2 The DfT forecasts serve a number of purposes. They:

- take a view on a range of expected passenger demand and aircraft movements to inform the future aviation strategy and a range of policies
- can be used to inform decisions on the need for and location of new airport capacity and environmental assessments associated with such decisions
- provide estimates for the expected range of aviation greenhouse gas emissions which are used by the UK government in international negotiations
- are also used across other Government departments, their agencies and others working independently within the aviation sector

1.3 The purpose of these forecasts is primarily in informing longer term strategic policy rather than in providing detailed forecasts at each individual airport in the short term; the uncertainty reflected by future demand growth scenarios at the national level is compounded at the level of the individual airport. At the airport level the department's forecasts may also differ from local airport forecasts. The latter may be produced for different purposes and may be informed by specific commercial and local information – such information is particularly relevant in the short-term. For example, an airport may have reached an agreement with an airline to increase frequencies or routes in the short-term and for some airports, one route may make up a large proportion of their traffic. Nevertheless, for both continuity with previous publications and transparency of the forecasting methodology, airport level forecasts are included in this document.

1.4 While the department aims to accurately reflect existing planning restrictions on the expansion of airports, the forecasts should not be considered a cap on the development of individual airports. In some circumstances more recent airport specific data and forecasts might be used, in conjunction with additional relevant information, to inform local planning decisions.

[5] *UK Aviation Forecasts,* DfT, 2013, https://www.gov.uk/government/publications/uk-aviation-forecasts-2013.

Context of these forecasts

1.5 The forecasts inform a number of areas of aviation policy. On 2 February 2017, the Government published *Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England* (draft NPS).[6] supported by an appraisal of sustainability.[7] A public consultation on the Draft Airports National Policy Statement was held between February and May 2017.

1.6 In the consultation document on the draft Airports National Policy Statement,[8] the government explained it was undertaking further work to update the evidence base, including its passenger demand forecasts, and that it would publish this information as soon as possible during the consultation. The department continued to develop the aviation model taking the opportunity to incorporate the latest market data for 2016 to produce this updated set of demand forecasts. The department has published a revised draft Airports NPS taking account of the updated evidence base and has launched a public consultation on that document. The UK aviation forecasts 2017 (this document) includes new forecasts for the capacity options shortlisted by the Airports Commission, but does not update the evaluation and appraisal of the options - that has been undertaken separately.[9]

1.7 In July 2017 the Government also announced plans to develop a new UK Aviation Strategy to help shape the future of the aviation industry to 2050 and beyond. In August 2017 a call for evidence was published and a series of public consultations on the six objectives of the strategy was announced.[10] The aim of the strategy is to set the direction of long term aviation policy out to 2050 and beyond. These forecasts cover all commercial passenger aviation activity at the UK's most significant passenger airports. They therefore also supplement and inform future consultations on the six objectives of the strategy.

Scope of these forecasts

1.8 This report details the results of the new updated version of the department's aviation model with a base year of aviation demand in 2016. For the period 2016-2050 it includes forecasts of:

- underlying national air passenger demand 2016-2050 (unconstrained demand)
- national air passenger demand 2016-2050 allowing for airport constraints
- passengers predicted to use selected UK airports[11]
- aircraft movements (ATMs) at selected UK airports

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[6] https://www.gov.uk/government/publications/draft-airports-national-policy-statement.

[7] *Appraisal of Sustainability: Draft Airports National Policy Statement* (AoS), DfT, February 2017, https://www.gov.uk/government/publications/appraisal-of-sustainability-for-the-draft-airports-national-policy-statement

[8] Consultation on *Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England, DfT*, *February* 2017, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589082/consultation-on-draft-airports-nps.pdf

[9] *Updated Appraisal Report*, DfT, 2017.

[10] *Beyond the horizon: The future of UK aviation*, DfT, July 2017, https://www.gov.uk/government/consultations/a-new-aviation-strategy-for-the-uk-call-for-evidence. The six stated objectives are to (1) help the aviation industry work for its customers (2) ensure a safe and secure way to travel (3) build a global and connected Britain (4) encourage competitive markets (5) support growth while tackling environmental impacts (6) develop innovation, technology and skills

[11] A list of the airports included in the forecasts is given in the box on page 27. Blackpool and Coventry airports were included in previous set of DfT forecasts but at present, and in the forecasts, are now effectively closed to passenger traffic and the total active UK airports in the modelling is 29.

- passenger and ATM activity at four competing overseas hub airports[12]
- measures of airline activity (distances flown and seats delivered)
- CO_2 emissions of aircraft departing the UK

1.9 Demand forecasts are presented for three demand growth scenarios: central, low and high. Sensitivity tests are also conducted varying the key demand drivers of the forecast growth scenarios.[13]

1.10 The airport capacity options for which forecasts are presented are the baseline and the three options shortlisted by the Airports Commission (Commission) and consulted on in the revised draft Airports National Policy Statement:

- baseline (no new runways)
- a Northwest Runway at Heathrow Airport (LNR NWR)
- an Extended Northern Runway at Heathrow airport (LHR ENR)
- a Second Runway at Gatwick (LGW 2R)

1.11 This report presents the forecasts for these options, plus a capacity unconstrained case. These forecasts are used in further downstream analysis and option appraisal, and that analysis and appraisal is included as information supporting a consultation on the revised draft Airports National Policy Statement.

Airports Commission forecasts

1.12 These are the first DfT forecasts since those published in January 2013, four months after the Airports Commission was set up in September 2012.

1.13 In February 2013 the Commission issued an aviation demand forecasting discussion paper seeking views on the most appropriate methods and tools for producing independent forecasts for their work. That paper recognised that the department's aviation model produced the most detailed national level forecasts available. However, it did raise some requirements which the Commission considered important and that the existing DfT model at that point did not fully meet. These included the need to deal effectively with the inherent uncertainty in any long term forecasts and to take better account of competition between UK and international hub airports. The Commission's interim report detailed the model developments undertaken to meet these requirements.[14] The Commission then used the department's aviation model with its own assumptions to produce, with technical support from the department, its own independent set of forecasts.

1.14 The forecasts presented by the Commission were considered by the department as part of the evidence base used in their final report.[15] The department's *Further Review and Sensitivities Report* concluded that the Commission's report was a sound and robust piece of evidence.[16] However, this did not mean that the department owned or adopted the forecasts used in the Commission's analysis. Hence this

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[12] Amsterdam (Schiphol), Paris (Charles de Gaulle), Frankfurt and Dubai International.
[13] UK and foreign GDP, oil prices, carbon prices, total fuel costs and levels of market maturity.
[14] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/271231/airports-commission-interim-report.pdf
[15] For the Airports Commission final report, see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/440316/airports-commission-final-report.pdf and for the Commission's final forecasts themselves, see the report *Strategic Fit: Forecasts* at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439687/strategic-fit-updated-forecasts.pdf
[16] *Further review and sensitivities report*: airport capacity in the south-east, DfT, 2016, https://www.gov.uk/government/publications/airport-expansion-further-review-and-sensitivities-report.

document sets out the first official DfT forecasts since 2013. Developments to the model since 2013 are described in Chapter 2 of this report.

Uncertainty in forecasting

1.15 The forecasts are presented as demand growth scenarios to reflect the inherent uncertainty in forecasting to 2050. There are also supporting sensitivity tests on the key economic inputs. The growth scenarios have been informed by evidence on the potential variability around the economic inputs expected to drive future air passenger growth. The assumptions around the market maturity inputs also allow for past relationships between economic inputs and aviation activity to change, and variations on this relationship are considered among the sensitivity tests.

1.16 This document mainly presents unrounded forecasts. This is primarily to give transparency to modelling outputs - the use of unrounded figures does not reflect the underlying level of certainty around individual results.

This document

1.17 The rest of this report is set out in the following way:

- **Chapter 2** describes the models and methodology used to produce these forecasts and explains how these have changed since forecasts were last published.
- **Chapter 3** describes how the CO_2 emissions forecasts are produced and how the underlying models have been updated.
- **Chapter 4** examines how the UK aviation market has changed in the past five years, and the validation of the model.
- **Chapter 5** sets out the input assumptions used to produce these forecasts.
- **Chapter 6** describes the range of forecasts for underlying demand growth, unconstrained by any limits on UK airport capacity.
- **Chapter 7** describes the range of forecasts where demand is constrained by capacity considerations; four sets of capacity constraints are considered: the 'do minimum' baseline and the three capacity options shortlisted by the Airports Commission.
- **Chapter 8** presents the CO_2 emissions forecasts associated with the demand growth scenarios and the baseline and three capacity options.
- **Chapter 9** reports a number of sensitivity tests carried out to investigate the effect of key demand input assumptions.

1.18 A series of data annexes provide a breakdown of results in a more detailed form which are supplemented by a separate spreadsheet file of many of the tables that appear in this document. And, in addition to the data presented in this report, data files are available which provide fully disaggregated passenger and ATM outputs for the forecast years of 2030, 2040 and 2050.

2. The aviation forecasting model

Overview of model structure

2.1 This chapter describes the methodology and assumptions used to produce forecasts of UK air passengers and air transport movements (ATMs).

2.2 The complete model forecasts passenger demand from UK ground origin/destination to domestic and international zones, including information on which UK airport(s) or overseas hubs passengers use. Passengers are divided into two journey purpose groupings – business and leisure – and also whether they are UK or overseas residents.

2.3 The modelling is split into three main phases. First, demand is forecast nationally on a capacity unconstrained basis. Next, this demand is allocated to UK airports and overseas hubs using the relative total cost of travel associated with each route option including the effects of capacity constraints. It simultaneously calculates the frequency of ATMs needed to meet that demand. Finally, the allocation of passengers and ATMs is used to generate a series of downstream outputs including disaggregate information about passenger movements and costs as well as more detailed forecasting of aircraft and CO_2 emissions.

2.4 The modelling framework consists of a number of sub-models as shown in Figure 2.1. Each key model which determines the passenger and ATM forecasts is summarised in this chapter.

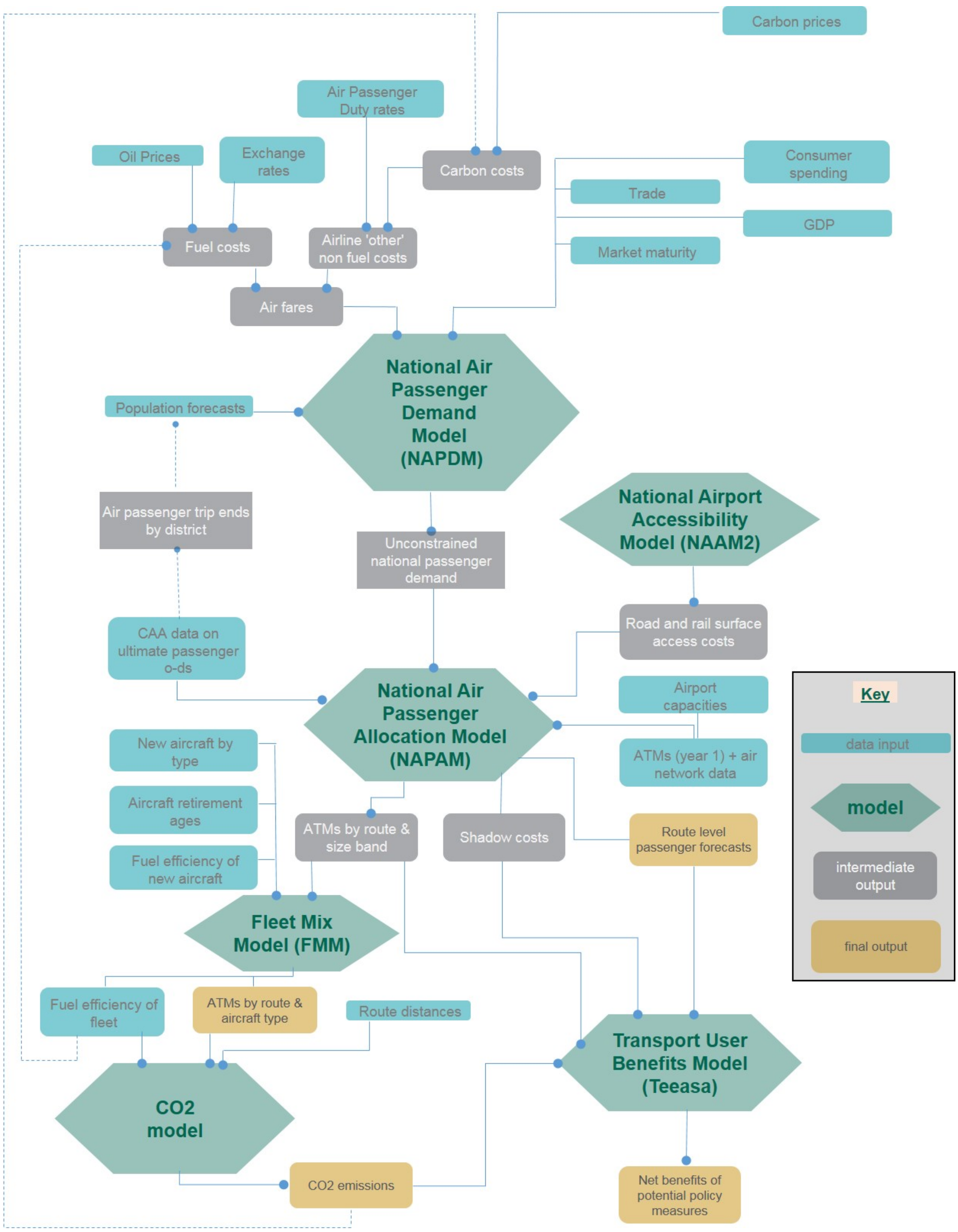


Figure 2.1 Aviation forecasting model

Forecasting aviation

Terminal passengers and air transport movements

2.5 The model forecasts the number of passengers passing through UK airports ('terminal passengers') and four competing overseas hubs each year. This covers UK and foreign residents travelling to, from or within the UK and those passengers passing through the UK and transferring at a UK or major competing overseas hubs. As part of the process to account for the impacts of airport capacity on passenger demand, the number of air transport movements (ATMs) and destinations served are also forecast.

2.6 The primary units of the forecasts are terminal passengers and ATMs. The Civil Aviation Authority (CAA) records the number of passengers and the number of aircraft take-offs and landings at UK airports each year.

2.7 The CAA defines an ATM as a landing or take-off of an aircraft engaged in the transport of passengers, cargo or mail on commercial terms (excluding 'air taxi' movements, and empty positioning flights). As it does not include non-commercial movements, it also excludes private, aero-club and military movements. These forecasts are consistent with the department's definition.

2.8 The CAA defines a 'terminal passenger' as a person joining or leaving an aircraft at a reporting airport, as part of an ATM. This includes passengers 'interlining' (transferring between connecting services), but excludes those 'transiting' (arriving and departing on the same aircraft without entering the terminal) at a reporting UK airport.

2.9 The number of terminal passengers is related to, but not the same as, the number of trips by air to and from the UK. For example, a passenger making:

- a direct, one way trip from the UK to an overseas destination would count as one terminal passenger
- a domestic, direct, one way trip would count as two terminal passengers (one departing from an airport and one arriving at an airport)
- a one way trip from the UK to an overseas destination via a UK connection (or hub transfer) would count as three terminal passengers (one departing from the 'ground origin' airport, one arriving at the hub airport and one departing the hub airport)
- a one way trip between two overseas countries via a connection in the UK would count as two terminal passengers (one arriving at the hub and one departing the hub on a different connecting flight)

2.10 Terminal passengers and ATMs reported here refer to those attributable to modelled UK airports. They are two-way so a round trip would involve double the terminal passengers of the one-way trips given as examples above. The full definitions of terminal passengers and air transport movements and the way that the statistical data is assembled are available on the CAA website.[17]

National Air Passenger Demand Model (NAPDM)

Overview

2.11 The NAPDM forecasts demand that is unconstrained by airport capacity at the national level. It consists of a series of econometric models modified to take account of market maturity assumptions. These econometric models, combined with forecast data of the key inputs taken from external sources, provide aggregate passenger demand forecasts by NAPDM market. The key drivers are incomes and associated economic activity and air fares - NAPDM includes a module which forecasts fares. The markets are split by:

- whether a passenger has an international or domestic destination

[17] http://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Data_and_analysis/Datasets/Airport_stats/Airport_data_2016_annual/Foreword.pdf

- the global region an international passenger is travelling to or from
- whether the passenger is a UK or foreign resident
- the journey purpose (leisure or business)
- whether the passenger is coming to the UK or just passing through the UK (or a modelled competing overseas hubs) to connect between international flights

NAPDM markets

Four global regions representing international passengers are included.

Market (abbreviation)	Name	Note
WE	Western Europe	Excludes the UK itself but in addition to the EU-27 includes non-EU countries in Europe, the Channel Islands, Iceland and all of eastern Europe including Russia
OECD	OECD	Long-haul OECD countries outside Europe: primarily USA, Canada, Mexico, Japan and Australasia
NIC	Newly industrialised countries	The definition has been broadened to include more long-haul emerging economies such as the Indian, sub-continent, south America, and Indonesia*
LDC	Less developed countries	Primarily Saharan and sub-Saharan Africa (excluding South Africa).

* The wider definition of NIC adopted by the Airports Commission is, retained, which also impacts other markets, particularly LDC.

International markets of passengers who have an origin or destination in the UK make up 16 markets with international-international transfers and internal two domestic markets bringing the total of econometrically modelled markets to 19.

International passengers				
UK residents	Business WE	Business OECD	Business NIC	Business LDC
	Leisure WE	Leisure OECD	Leisure NIC	Leisure LDC
Foreign residents	Business WE	Business OECD	Business NIC	Business LDC
	Leisure WE	Leisure OECD	Leisure NIC	Leisure LDC
Transfer passengers	WE, OECD, NIC, LDC international - international combined			
Domestic passengers	Business UK	Leisure UK		

Econometric models

2.12 Econometric analysis is used to derive estimated relationships between passenger demand and their key drivers, with a different econometric model estimated for each market. The equations derived are then applied to projections of the explanatory variables to produce national level forecasts for each market.

2.13 The econometric models use analysis of a continuous time series from 1984-2008 drawn mainly from the International Passenger Survey (IPS) to estimate the 19 models. These model were peer reviewed, successfully explained past demand movements, have intuitive explanatory variables, and parameter values in line with economic theory.[18]

2.14 This analysis, along with independent academic research[19] highlighted that the key drivers for long term aviation demand have been the changes in incomes and associated economic activity, and the changes in air fares.

2.15 Figure 2.2 shows the long term growth in passengers at UK airports over the past 26 in the context of key world events which had a major impact on economic activity and air fares.

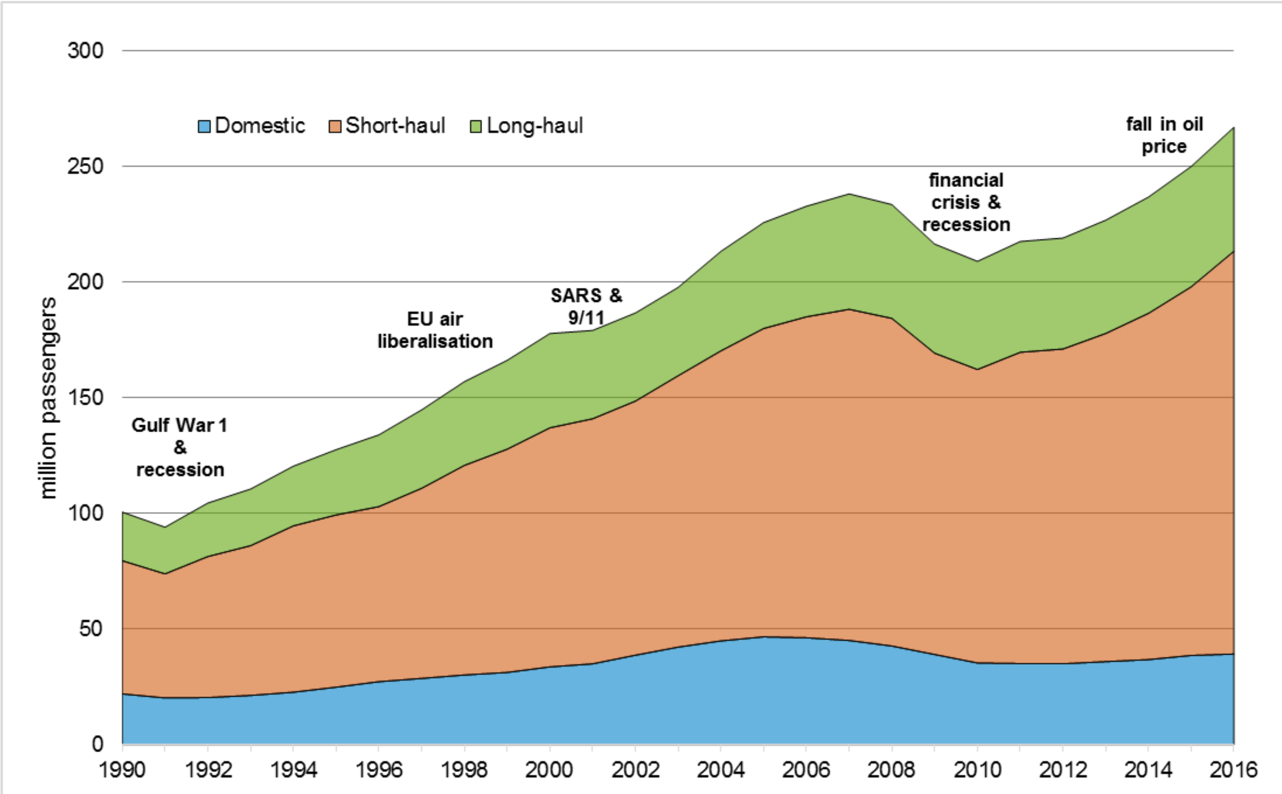


Figure 2.2 Historic UK passenger demand and key political and economic events

2.16 NAPDM starts with passenger outturns in the 2016 base year. The econometric equations are then applied to the projections of the explanatory variables, described in Chapter 5, to produce national forecasts for each of the 19 market sectors. Chapter 9 reports 'market maturity' sensitivity tests which test the impact of these relationships changing in different ways to the central case considered in this document.

2.17 Details of the econometric techniques used are set out in both the 2011 and 2013 forecast publications. These documents give details of the underlying datasets, model forms, modelling methodology, model performance and the peer review process. The 2011 forecasts additionally include supporting technical papers and

[18] The peer review is available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4508/peer-review-econometrics.pdf.
[19] The academic research into the drivers of air demand and comparisons of income and fares elasticities is included on page 19 of the 2013 forecasts, https://www.gov.uk/government/publications/uk-aviation-forecasts-2013.

provide notes on instances where elasticities were imposed instead of being taken from the econometric analysis.[20]

2.18 Table 1 summarises the starting level of the elasticities of air passengers with respect to income and fare used in the forecasts[21]. It shows that income (which in the form of the GDP forecasts includes a measure of population growth) is a strong driver of demand across the sectors. More disaggregate elasticities are provided in Chapter 9.

		Elasticity with respect to	
Sector	**Share of base year demand**	**Income**	**Air fares**
UK business	7%	1.2	-0.2
UK leisure	47%	1.4	-0.7
Foreign business	6%	1.0	-0.2
Foreign leisure	19%	1.0	-0.7
International to international transfers	9%	0.5	-0.5
Domestic	12%	1.1	-0.5
Total	100%	1.2	-0.6

The Airports Commission change to the international to international transfer fares elasticity has been retained. The elasticity changed from -0.7 to -0.5, reflecting that it now relates to a broader market, following the inclusion of overseas hubs.

Table 1 Starting level of income and price elasticities of demand

2.19 That air fare elasticities are relatively low is to be expected. Air fares are often only a relatively small proportion of the overall journey cost: duration of stay, costs of getting to the airport, convenience and many other factors all influence choice. It is intuitive that fare responsiveness is some way below unity, because passengers may also have other options besides not travelling in their response to an increase in fare. For example, passengers might reduce the cost of their trip by travelling to a less expensive destination, or by using a less expensive class of travel or airline. This overall fare elasticity is also in keeping with the findings for other modes that UK transport demand is price inelastic (i.e. it has a price elasticity below unity).

Market maturity

2.20 The econometrics is supplemented by a number of assumptions relating to 'market maturity'. This term is often used to refer to the process by which the demand for a product becomes less responsive to its key drivers through time. Air travel demand has shown very strong growth for several decades and while it would seem reasonable to start from the premise that the drivers of demand in the past will continue to drive demand in a similar way in the future, this can only be the starting point. Any exercise to forecast the future must also consider how the relationships observed in the past might change in the future.

2.21 In the NAPDM, market maturity is reflected by assuming that income elasticities decline over time. The central demand assumption is that the elasticities decline linearly to no more than 0.6 by the end of the maturity process which is assumed to

[20] In particular, see *Re-estimating the National Air Passenger Demand Model Econometric Equations*, August 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4512/re-estimating-napdmee.pdf
[21] For the market maturity sensitivities, these values sometimes differ as set out in set out in Chapter 9.

span 70 years.[22] Sensitivity tests have been conducted (see Chapter 9) recognising the degree of uncertainty around these assumptions.

2.22 In defining the range of assumptions, the 19 market segments for which separate econometric models have been estimated are split into 3 groups. Broadly, the groups bring together markets on the basis of how soon they are expected to show signs of market maturity. These are set out in Table 2.

Maturity of markets	Markets included	Maturity starts
Most mature	DMB, DML	2010
Fairly mature	UBW, UBO, ULW, ULO, FBW, FBO, FLW, FLO, ULN, ULL	2015
Least mature	UBN, UBL, FBN, FBL, FLN, FLL	2025

Domestic journeys within the UK: DMB: Domestic business; DML: Domestic leisure.
Journeys between the UK and other countries: First letter denotes UK resident (U), or Foreign resident (F).
Second letter denotes Business (B), or Leisure (L).
Third letter denotes foreign origin or destination:W: Western Europe; O: OECD excluding Western Europe;
N: Newly Industrialised Countries (NICs); L: Less Developed Countries (LDCs).

Table 2 Maturity of different forecasting markets

2.23 The market maturity process is assumed to extend over 70 years while the demand forecasts used in the passenger to airport allocation and ATM modelling cover the period 2016-2050. Therefore by 2050 the declining of income elasticity in the maturity process is assumed to be incomplete. Table 3 sets out the income elasticities at the start and end of the forecasting period in the central demand case.

Market sector	Income elasticity in 2016	Income elasticity in 2050
UK business	1.2	0.9
UK leisure	1.4	1.0
Foreign business	1.0	0.8
Foreign leisure	1.0	0.8
International to international transfers	0.5	0.5
Domestic	1.1	0.8
Total	1.2	0.9

Table 3 Change in income elasticities over time

Updated fares module

2.24 A major component of the NAPDM is the fares module, which forecasts air fares by NAPDM market. It is a significant part of the model as changes in air fares are a key driver of changes in demand. It breaks out the components of fare into:

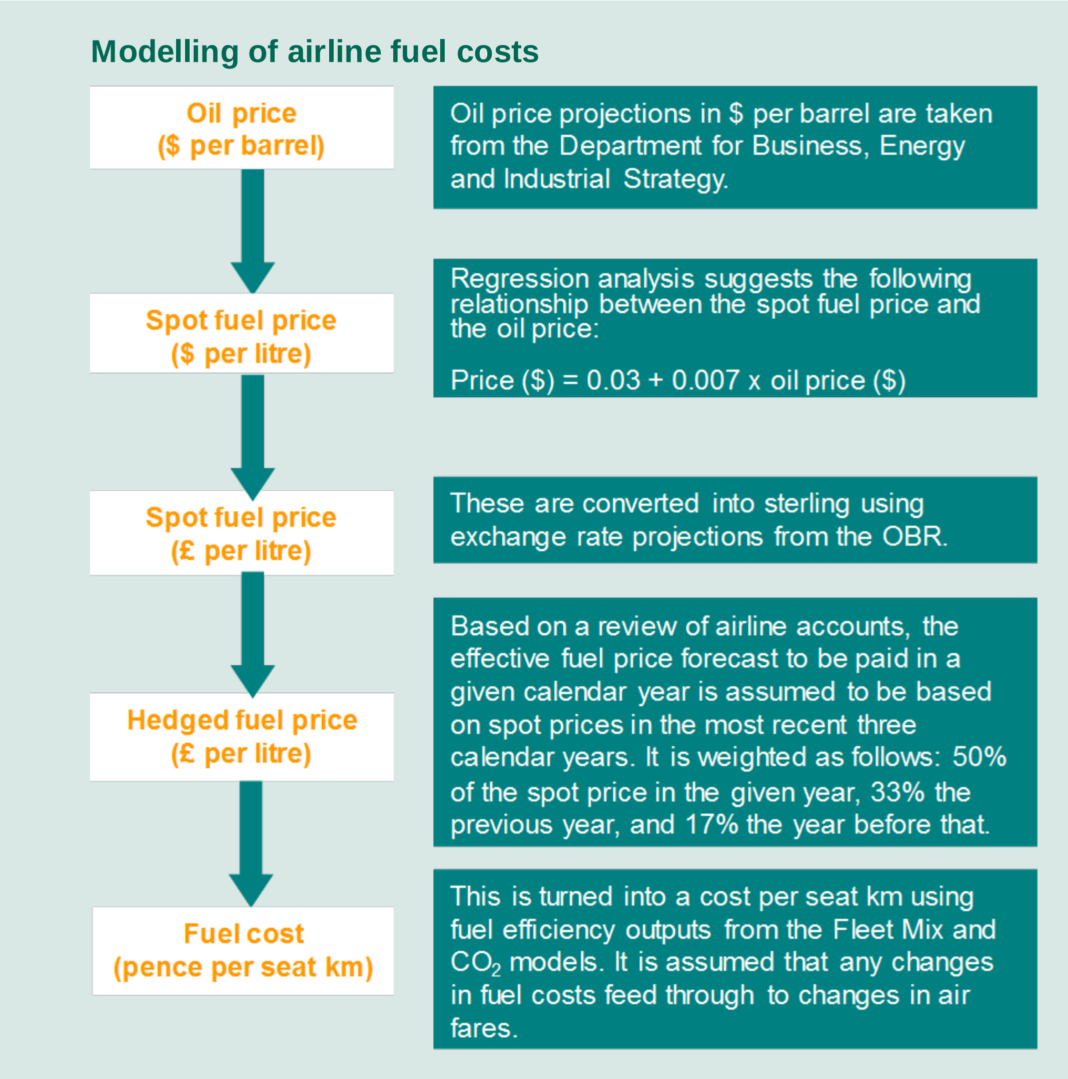
- fuel costs
- carbon costs
- Air Passenger Duty (APD)

[22] Unless the starting elasticity is already below 0.6 in which case the elasticity is unchanged throughout the modelled period. In contrast to the version used in the previous DfT publication, the fares elasticity is no longer assumed to decline in line with the income elasticity.

- airline 'other' costs

2.25 All fare inputs, except Air Passenger Duty (APD), are estimated on a per seat-kilometre basis. This is because the primary driver of airline costs, and ultimately fares, relate to aircraft usage and its associated costs rather than to the passengers carried. These seat-kilometre cost components are then multiplied by distance (on a geographical market basis) and finally APD is added to derive a total fare. As the forecast components change over time, so does the forecast fare.

2.26 An overview of the bottom-up methodology for forecasting fuel costs in every year is set out in the box below.



2.27 This approach revises the methodology underpinning the fuels cost modelling used in previous forecast publications. Previous forecasts used CAA airline account data to determine the base year level of fuel costs per seat-kilometre. This approach has been revised to bring it into line with the modelling of carbon costs, with base year fuel consumption driven by outputs from the CO_2 model.

2.28 This revised approach has two main advantages. It:

- allows fuel consumption rates to vary by NAPDM market, taking into account the different fleet mix (and therefore fuel efficiency) associated with different markets
- ensures consistency with the way carbon costs are modelled

2.29 The result is a lower estimate of fuel costs than in previous model versions, even before taking account of the reduction in oil prices. This change of approach does not affect the methodology of forecasting changes in fuel costs over time, and so overall has relatively little impact on forecast demand growth.

2.30 Previous forecasts made no allowance for the practice of airline hedging strategies. Following the large movements in oil prices towards the end of 2014, the department undertook an analysis of such strategies, using airlines' published annual reports. This confirmed that, as is well known, many airlines hedge a proportion of their fuel costs, so such costs often do not change simultaneously with the price of oil. Strategies vary by airline, with the common aim of protecting themselves against sudden changes in fuel prices. Airlines do this through a variety of mechanisms which determine the price of fuel in advance. As the model does not include specific airlines within it, it is necessary to assume a representative hedging strategy across the sector. The analysis of airline annual reports concluded that the effective fuel price that airlines would be predicted to pay in a given calendar year should be based on:

- 50% of the spot jet fuel price in the given year
- 33% of the spot price in the previous calendar year and
- 17% of the spot price in the calendar year before that

2.31 This change has the advantage of better reflecting airline practices, resulting in a profile of fuel cost forecast changes that are more robust. The impact on demand growth depends on the profile of fuel prices in the two years preceding the base year. Under the fuel and oil price assumptions used in these forecasts, this revised methodology results in higher forecast demand growth, although its impact is very small. The resulting fuel cost estimates are set out in Chapter 5.

2.32 Airline 'other' (non-fuel) costs are calculated as the difference between the quantified components of airline costs and the air fare. More detail on the data used, and resulting estimated costs, is provided in Chapter 5.

Geographical composition of demand

2.33 The data and approach taken to estimate the distribution of passenger traffic growth across UK districts has been revised since the last DfT and Airports Commission forecasts using the model. This affects the geographical composition of a given level of demand growth across UK districts, but not the total demand by NAPDM market. In tandem with these changes, as Figure 2.1 illustrates, this part of the model has become subsumed in the NAPDM.

2.34 In previous versions of the department's model, changes in the local district composition of demand over time were driven by a series of regressions, with the most important drivers being forecast population and local income growth. The revised approach has been simplified so that the sole driver is each district's projected share of population growth. Trip rates grow by the same percentage as the population in each district within each NAPDM market. This ensures that districts with faster forecast population growth receive a higher share of each market's forecast demand growth.

2.35 Previous model versions also assumed each district's share of non-UK resident traffic (by NAPDM market) was fixed over time. This has been revised such that the same assumptions on demand distribution apply to foreign residents as well, implicitly assuming that foreign residents are more likely to visit areas that have a fast-growing population. This assumption is supported by the growing significance of the visiting friends and relatives (VFR) market for the aviation industry.

2.36 The department has taken this approach because of the absence of official local or regional Gross Value Added (GVA) forecasts. There is also tentative empirical evidence suggesting that regional GVA variations do not play a particularly significant role in determining the composition of aviation passenger demand. Furthermore, the revised approach helps to simplify the modelling and update process, improving model transparency and usability.

2.37 These changes do not affect the level of overall national trip growth forecasts, but they do lead to a greater concentration of passenger traffic growth in London and the South East.

National Air Passenger Allocation Model (NAPAM)

2.38 The National Air Passenger Allocation Model (NAPAM) forecasts passenger demand at 31 UK airports plus four competing overseas hubs.[23] It forecasts how passengers might choose between the airports in reaction to their relative estimated attractiveness. As part of this process, it forecasts ATM demand by airport and the fare premia (often termed 'shadow costs') for passengers wishing to use airports operating at capacity. The NAPAM takes as an input the demand growth over time by market forecast by the NAPDM.[24]

2.39 The box below shows the airports in the model (with IATA codes) arranged by forecasting region.

[23] Blackpool and Coventry airports are included in this total but at present and in the forecasts are now effectively closed to passenger traffic, so there are currently only 29 mainland UK airports, plus the four overseas hubs in the model. A 32nd UK slot reserved for new airport sites is unused in these forecasts.
[24] The way in which this is done has changed from the last DfT forecast publication, with the developments made while the Airports Commission was using the model retained. See *Airports Commission: Interim Report, Appendix 3, Technical Appendix*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/266670/airports-commission-interim-report-appendix-3.pdf, pages 49-51, for more details.

Airports in the National Air Passenger Allocation Model

London	South West and Wales	Scotland
Gatwick (LGW)	Bournemouth (BOH)	Aberdeen (ABZ)
Heathrow (LHR)	Bristol (BRS)	Edinburgh (EDI)
London City (LCY)	Cardiff (CWL)	Glasgow (GLA)
Luton (LTN)	Exeter (EXT)	Inverness (INV)
Stansted (STN)	Newquay (NQY)	Prestwick (PIK)
Other South East and East	**North**	**Northern Ireland**
Southampton (SOU)	Doncaster-Sheffield (DCS)	Belfast City (BHD)
Southend (SEN)	Durham Tees Valley (MME)	Belfast International (BFS)
Norwich (NWI)	Humberside (HUY)	
Midlands	Leeds-Bradford (LBA)	**Overseas hubs**
Birmingham (BHX)	Liverpool (LPL)	Amsterdam Schiphol (AMS)
East Midlands (EMA)	Manchester (MAN)	Dubai (DBX)
(Coventry - closed)	Newcastle (NCL)	Frankfurt (FRA)
	(Blackpool - closed)	Paris Charles de Gaulle (CDG)

Modelling the passenger's choice of airport

2.40 NAPAM generates the forecast passenger demand at each modelled UK airport. The airport allocation model has been built to explain and reproduce passengers' current choice of airport, as recorded in CAA passenger interview surveys.

2.41 A passenger flight is usually one part of a journey, comprising several stages and modes, between different parts of the world. To understand how passengers choose between UK airports it is therefore necessary to consider not just the airports they are flying between, but the initial origin or ultimate destination of their journey in the UK. For example, a passenger leaving Gatwick airport might have an initial origin at their home in Kent, and a passenger arriving at Leeds-Bradford airport might have a destination in York.

2.42 A traveller's choice of airport will therefore be determined by a number of factors, including:

- the initial origin (for outbound) or ultimate destination (for inbound) in the UK of their trip
- the final destination in the UK or overseas
- the location of airports in the UK
- the availability of flights offered at each airport
- the possibilities of transferring and making onward connections at UK and overseas airports
- the travel time and other costs for accessing each airport by road and public transport
- the traveller's preference for services offered at each airport and their value of time

Allocating passengers between airports

Modelling and forecasting how people choose between a set of discrete options is an established practice in statistics and transport modelling. NAPAM contains an application of the standard multinomial logit formulation commonly used in this context. The model estimates the proportion P of passengers with journey purpose p travelling to/from UK zone i to foreign destination j, that use airport A, can be represented by the following flexible functional form (the example is the simplest form):

$$P_{(i,j,A,p)} = \frac{e^{-\beta_1 \times Cost_{(i,j,A)}}}{\sum_{R \in all\ available\ Routes} e^{-\beta_1 \times Cost_{(i,j,R)}}}$$

where

i = zone of origin

j = zone of destination

p = journey purpose

A = airport

R = route

Cost(i,j,A) = generalised cost of travelling from zone i to zone j using airport A

β = parameter to be estimated during calibration

The process of model calibration involves using statistical data to select the set of values for the unknown parameters which lead to the model's predictions best fitting the data.

The strength of different drivers of passengers' airport choice is likely to vary between passenger groups - for example, business passengers may be more affected by the frequency of flights offered. Therefore separate allocation models are estimated for the following markets:

- international scheduled[25] and charter (package holiday) passengers
- domestic passengers beginning and ending their journeys in the UK
- transfer passengers 'interlining' by changing planes at a hub airport[26]
- UK and foreign passengers
- business and leisure passengers
- short-haul and long-haul passengers

Some of these markets have more complicated functional forms than the generic equation shown in this box.

[25] A further distinction is currently drawn between conventional scheduled and Low Cost Carriers (LCC) in the allocation as the calibration results showed a difference in parameter estimates. However, these markets have become less clearly differentiated over time, and this distinction is not made at all parts of the forecasting (e.g. the econometric models of unconstrained demand). The distinction has also been withdrawn in the model of internal domestic flights.

2.43 The strength of each factor in driving an airport's share of demand is determined by calibrating logit models with data on passenger airport choices drawn from CAA passenger interview surveys.[27] This involves using techniques by which the weighting on each factor is estimated so as to maximise the model's accuracy in predicting current choices. This means that the model aims to represent passengers' actual, observed, airport choice behaviour.[28] The current model uses the choice parameters which were calibrated and documented at the time of the independent peer review undertaken in 2010. A variety of other parameters including aircraft size graphs and route level generalised cost constants are adjusted to validate route level forecasts against actual route level passenger allocations in the base year of 2016.

2.44 The model splits the UK into 455 zones (see Figure 2.3). It assumes that the share of travellers originating in, or destined for, each zone potentially travelling via each of the up to 32 modelled airports[29] depends on:

- the time and money costs of accessing that airport by road or public transport based on the network of road and rail services (illustrated in Figure 2.6); this uses the standard transport modelling approach of combining journey time, including waiting and interchanging, and money costs into a single 'generalised cost' measure
- flight duration and the frequency of the service at each airport
- travellers' preferences for particular airports
- travellers' value of time (which varies by journey purpose)

2.45 The ultimate destination of internal UK passengers is one of the 455 zones illustrated in Figure 2.3. The zoning follows 1991 census geography rather than current administrative boundaries. This is deliberate to retain sufficient granularity in regions such as Scotland, Durham, Northumberland, Shropshire and Wiltshire where current unitary administrative boundaries are now too broad to allow accurate passenger allocation between neighbouring airports.

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[26] These include passengers with UK origins or destinations changing at a UK hub airport ('domestic interliners'); passengers with UK origins or destinations changing at an overseas hub airport such as Amsterdam Schiphol; or, passengers with no ground origin or destination within the UK but who use a UK hub airport to interchange ('international to international interliners').

[27] Passengers are interviewed by the CAA at Heathrow, Gatwick, Stansted, Luton and Manchester every year with all but the smallest regional airports in the model being rotated on an annual basis normally on a 3-5 year cycle. The 2008 choice data used in the estimation exercise included the nine airports surveyed by the CAA in 2008 with data from other airports not surveyed during that period taken from the most recent survey and updated to 2008 traffic levels from published CAA activity statistics.

[28] The Peer Review report (*Peer Review of NAPALM*, John Bates Services, October 2010) (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4506/review-napalm.pdf) provides a useful introduction to the re-estimation. Note that NAPAM used to be called 'NAPALM'.

[29] The 31 airports were selected when NAPAM was first developed in 2000 and were the busiest 27 mainland UK airports for passenger activity plus the two Belfast airports. In 2006 Coventry and Blackpool were added and Doncaster-Sheffield replaced Sheffield City to reflect then current activity. In the 2013 version Southend replaced Plymouth which closed in 2011. In these forecasts Coventry and Blackpool have now ceased regular passenger operations, but remain in the model without any traffic. Two airports now busier than the smallest of the current modelled set, Isle of Man and Derry, are both 'offshore'. The 32nd airport slot was reserved for assessing new airport sites.

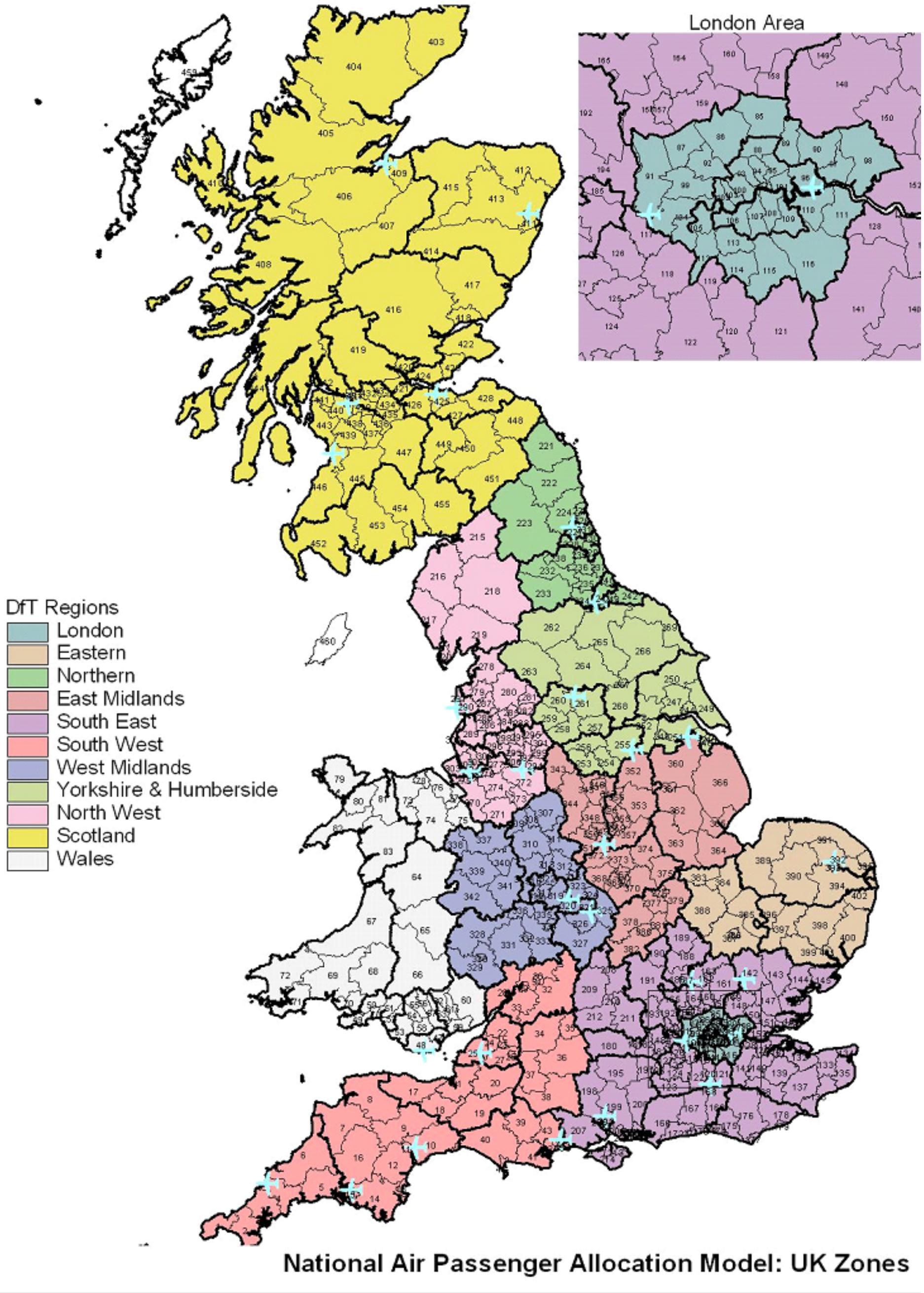


Figure 2.3 NAPAM UK district zones

2.46 International passengers are defined as those that travel to one of 27 international route group zones or one of the 21 largest European airports (which are modelled as separate destinations) as their ultimate destination.. The model explicitly includes the option for passengers to transfer at a hub airport either in the UK or abroad, including Amsterdam, Frankfurt, Dubai or Paris Charles de Gaulle.

2.47 The definition of 'route group zones' and the identity of separately modelled European airports are shown in Figure 2.4 and listed in the next text box.

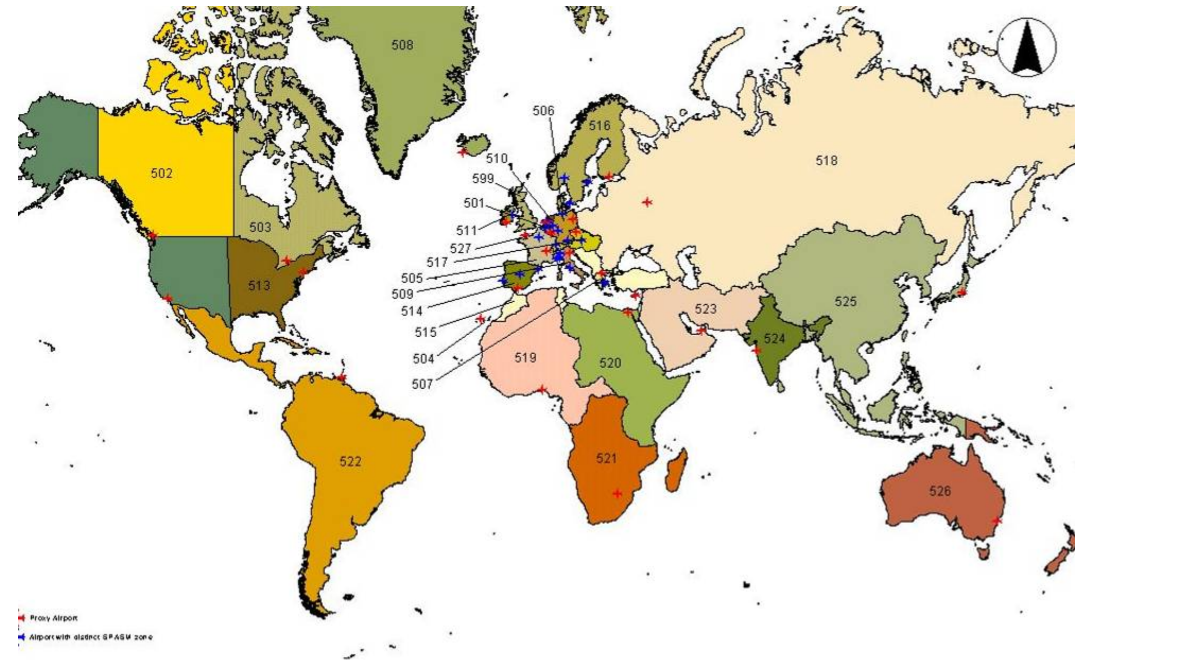


Figure 2.4 NAPAM international destination zones

2.48 The share of a zone's demand an airport will attract will be greater the lower the time and money costs of accessing and using that airport is, and the greater the frequency of service is.

2.49 Air fares are an important part of forecasting aviation growth in the national demand model (NAPDM). However, it has not been possible to include fares in the list of factors driving choice between individual airports. An extensive exercise to re-estimate the factors driving airport choice failed to find a statistically significant relationship between fares for particular routes and passengers' choice of airport. This is partly attributable to the difficulty in deriving reliable mean fares with the increasingly wide spread of fares for each route available with web based ticketing and modern yield management systems. It is also likely to be because the variability of the aggregated fares data between different airports in the same market is often low.

2.50 The decision to omit fares as an airport choice variable was supported by the peer review process in 2010.[30] However, as the previous section has described, fares remain a key driver of the underlying unconstrained demand forecasts and play a part in determining the overall decision on whether to travel by air. At the personal level, at particular times and for particular journeys, it is to be expected that comparison of fares play a key part in individual choices of airport (especially for those which are geographically close), even though statistically robust relationships cannot be derived for the whole market.

2.51 Summing forecast demand for each airport across all the zones and passenger markets gives the total forecast demand for each airport, unconstrained by airport capacity.

[30] *Peer Review of NAPALM*, John Bates Services, October 2010, pp. 25-26. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4506/review-napalm.pdf

NAPAM international zones and route groups

Route group zones, length of haul, NAPDM region			Route group zones, length of haul, NAPDM region	
1.Belgium/Luxembourg	S	WE	15.Other Mediterranean states	WE
2. Canada (west)	L	OECD	16.Scandinavia/Baltics	WE
3. Canada (east)	L	OECD	17.Central Europe	WE
4. Canary Islands	S	WE	18.Eastern Europe	WE
5. France	S	WE	19.West Africa	LDC
6. Germany	S	WE	20.East Africa	LDC
7. Greece	S	WE	21.South Africa	NIC
8. Iceland	S	WE	22.Caribbean & South America	NIC
9. Italy	S	WE	23.Middle East	NIC
10.Netherlands	S	WE	24.India Sub-Continent	NIC
11.Ireland	S	WE	25.Far East	NIC
12.United States (west)	L	OECD	26. Australasia	OECD
13.United States (east)	L	OECD	27.Channel Isles	WE
14.Iberian Peninsula	S	WE		
Individual airports, all short-haul and WE				
28. Paris Charles de Gaulle (CDG)			39. Milan Linate (LIN)	
29. Dublin (DUB)			40. Stockholm Arlanda (ARN)	
30. Amsterdam (AMS)			41. Vienna (VIE)	
31. Frankfurt (FRA)			42. Oslo (OSL)	
32. Brussels (BRU)			43. Barcelona (BCN)	
33. Zurich (ZRH)			44. Athens (ATH)	
34. Dusseldorf (DUS)			45. Hamburg (HAM)	
35. Copenhagen (CPH)			46. Lisbon (LIS)	
36. Madrid (MAD)			47. Geneva (GVA)	
37. Munich (MUC)			48. Nice (NCE)	
38. Rome Fiumicino (FCO)				

Some international zones do not map exactly to one of the four NAPDM regions; in such cases, the NAPDM region with the most traffic within the zone is used.

The 27 'route group zones' are each further subdivided into up to 20 possible destinations. NAPAM analyses the level of demand between a UK airport and a route group zone to forecast how many destinations within the zone are served by a particular UK airport. This facility is calibrated to provide accurate baseline forecasts of the number of individual destinations served by each UK airport and is included in the model validation process.

Modelling ATMs

2.52 The ATM model forecasts the number of ATMs by aircraft size band and route for each airport. It is important to understand the demand in terms of numbers of aircraft flights (ATMs) as well as the number passengers for four reasons:

1 A key determinant of passenger choices is the frequency of service provided at different airport options. As such the projection of the number of flights influences passenger decisions.

2 As demand is forecast to grow, forecast demand exceeds capacity at some airports. The limiting capacity could be the airport terminal, runway, or planning constraint. Runway capacity is measured not by passenger numbers, but by the number of ATMs. The ATM model within NAPAM translates passenger demand into ATM demand at each airport, to allow comparison of demand with both passenger and ATM capacity constraints.

3 It is important to predict when new routes will become available at particular airports, creating a new option for passengers to consider.

4 Finally, predictions of ATMs and aircraft-kilometres by aircraft type on each route are required for estimating future aviation carbon emissions.

2.53 The ATM model in NAPAM simulates the introduction of new routes by testing in each forecast year whether sufficient demand exists to make new routes viable from each airport. Effectively this assumes that supply of routes will respond to demand, subject to airport capacity and a minimum passenger threshold to make a new route commercially viable. The test is two-way, so routes can be both opened and withdrawn year by year. Airports are tested jointly for new routes, allowing them to compete with each other.

2.54 For each route from each airport, the ATM model in NAPAM then forecasts the size of aircraft, load factor, and frequency of operation used to meet forecast passenger demand based on relationships between these factors derived statistically from historical data. The box on page 35 provides further detail on the modelled relationship between capacity, demand, aircraft size and how this is affected by capacity constraints.

2.55 Forecasts of CO_2 emissions and environmental assessments require more detailed assumptions to be made about the specific aircraft types that make up the stock of aircraft in each forecast year. These are generated in the Fleet Mix Model (FMM), which is explained in the next chapter.

Freight ATMs

2.56 Freight is not modelled in detail. An assumption about the number of freighter ATMs is nevertheless required in the model as freighters potentially affect the space for passenger ATMs available where capacity constraints exist and, as discussed in Chapter 3, CO_2 emissions.[31] At the airport level the number of freighter movements has been volatile with some evidence of overall national decline in recent decades. In the absence of clear trends for individual airports, the modelling now assumes that the number of such movements will remain unchanged from 2016 levels at airport level across the system.

[31] For capacity constraints in the London area, this mainly affects Stansted as freighter numbers are insignificant elsewhere. At Heathrow, freighters now represent under 0.5% of ATMs.

Shadow costs and constraining passengers and ATMs to airport capacity

2.57 As illustrated in Figure 2.5, NAPAM forecasts both passenger and ATM demand at each airport with ATM demand being a function of passenger demand, load factors and the modelled size of the aircraft on individual routes. Aircraft sizes in seats and load factors evolve over time as the model rolls forward.

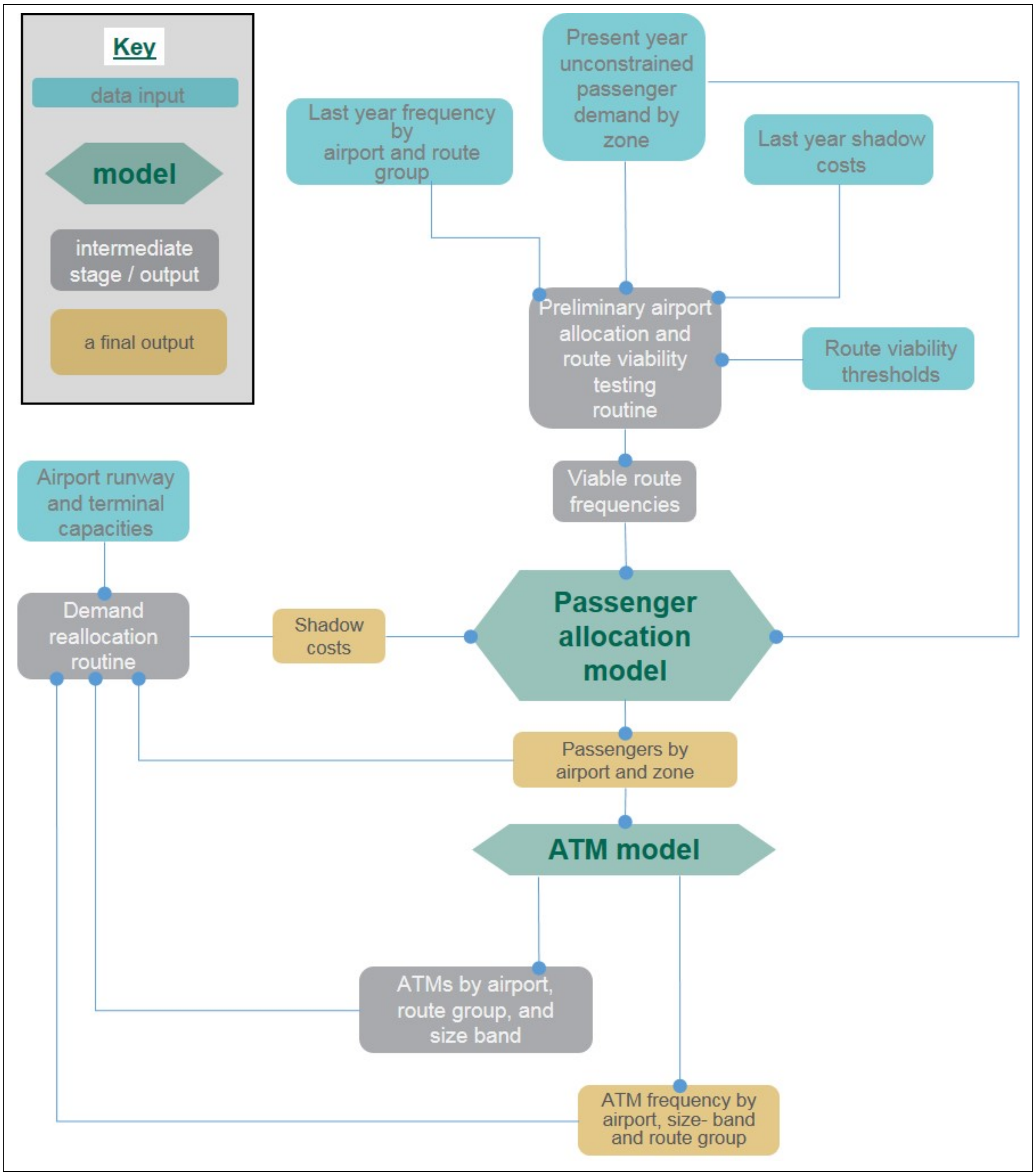


Figure 2.5 NAPAM internal allocation, ATM and shadow cost models

2.58 The demand allocation components of NAPAM iteratively model the impact and interactions of capacity constraints on the numbers of air passengers, ATM numbers and their passenger loads at each UK airport. Where unconstrained passenger demand wanting to use an airport exceeds capacity, the demand reallocation process increases the cost of using the airport until its demand falls to within its maximum capacity. This cost is known as a ‘shadow cost’, or ‘congestion premium’ and performs the function of limiting the number of passengers to capacity.

2.59 As discussed in the box below, one of two types of shadow cost may be applied when an airport becomes congested. It may be a runway slot shadow cost, representing a charge per aircraft, which is shared between all the passengers, with its value depending on the average aircraft size for each route in a given year. Alternatively, a terminal shadow cost represents a charge levied equally on every passenger passing through the airport and not varying by route. Shadow costs can also be seen as representing the value a marginal passenger would place on flying to/from that airport, if extra capacity were available. It is therefore a key input to the appraisal of potential additional capacity.

Relationship between capacity, demand and aircraft size

The relationship between aircraft size and airport capacity is complex. The historical relationship between aircraft size and passenger demand at the route level shows a well-established correlation between increasing aircraft size and rising passenger demand. When this relationship is extended into the future, adding new capacity accommodates increased route level demand and aircraft sizes can grow.

However, a shortage of runway capacity can also favour the use of larger aircraft, to maximise the number of passengers using scarce slots. In the model this is represented when a runway shadow cost rather than terminal shadow cost is applied. The Demand Reallocation Routine tests for breaches of both runway and terminal capacity with runway constraints regarded as more 'binding' than terminal where both are becoming overloaded. All shadow costs are ultimately added to the individual passenger's overall cost of travel. But a runway constraint will stimulate the use of larger aircraft and higher passenger loads because airlines can better meet demand with larger more fully loaded aircraft and because the charge levied on the use of the runway is lower on a per passenger basis for more fully loaded aircraft. Conversely a terminal shadow cost will not penalise the use of smaller aircraft, usually found on shorter haul routes.

The range of business models adopted by different airlines will play a part - the full extent of which is hard to replicate exactly in this type of model. For example, some airlines may place greater emphasis on frequency and having services conveniently timed throughout the working day and may maximise profits on certain routes with more frequent services operated by smaller aircraft.

Overall, the most prevalent effect in the ATM Demand Model is in line with the underlying historic data of aircraft loads tending to increase as demand rises. However, the capacity response effect also occurs, and in practice the response to capacity limits varies between airlines depending on their differing business models and commercial objectives.

2.60 In the iterative demand reallocation process, the shadow cost is added to the other costs of using each over-capacity airport, before repeating the passenger allocation element. When a shadow cost solution is found which fits all airports within user specified bounds of their input runway and terminal capacities, the ATM models are re-calculated to check ATM numbers still fit runway constraints. If they do the model is said to have converged for that year, if not the iterative process continues until a solution is found in which both types of capacity are not exceeded at any airport, or in practice not allowed to exceed the user input tolerances allowed to ensure model convergence is achieved.

2.61 This process means that forecasts of passenger numbers at airports under capacity constraints takes into account capacity at all airports. These forecasts are also based on passengers' observed airport choice behaviour.

2.62 Shadow costs have two significant effects on the allocation of demand:

a. some passengers in the model will be re-allocated to an alternative, less-congested airport but such 'less-preferred' airports may also in turn experience changes in shadow costs and affect further airports; and

b. some passengers in the model will decide not to fly, reducing the total amount of passenger traffic travelling through UK airports - this is discussed further below.[32]

2.63 Higher shadow costs increase the total cost of travel, leading some passengers to decide not to travel by air at all: this process is known as 'suppression'. The modelling reflects this by adding shadow costs to the generalised cost and applying the NAPDM fare elasticities described earlier in this chapter.

2.64 This version of the model uses a refined suppression process introduced in the model used by the Airports Commission. This involves a revised functional form (relative to that used in the last set of published DfT forecasts) in line with the 2011 peer review recommendations.[33] It ensures a more rigorous set of elasticities are used, as well as providing greater consistency between NAPDM and NAPAM. The impact has been to slightly increase the extent of the suppression, but the overall impact on the forecasts is small, particularly when compared to the impact of allowing reallocation from UK airports to the overseas hubs now included in NAPAM.

[32] In the latest version of the model total volumes of international-international transfers may have been significantly reduced because of shadow costs at the UK hub airports. Despite appearances at the UK airport level, this is usually not trip suppression but re-allocation to overseas hubs which are now fully incorporated into the modelling following the Airports Commission's required improvements - see the box on page 37.

[33] *Peer Review of NAPALM*, John Bates Services, This change was incorporated in the Airports Commission forecasts, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4506/review-napalm.pdf

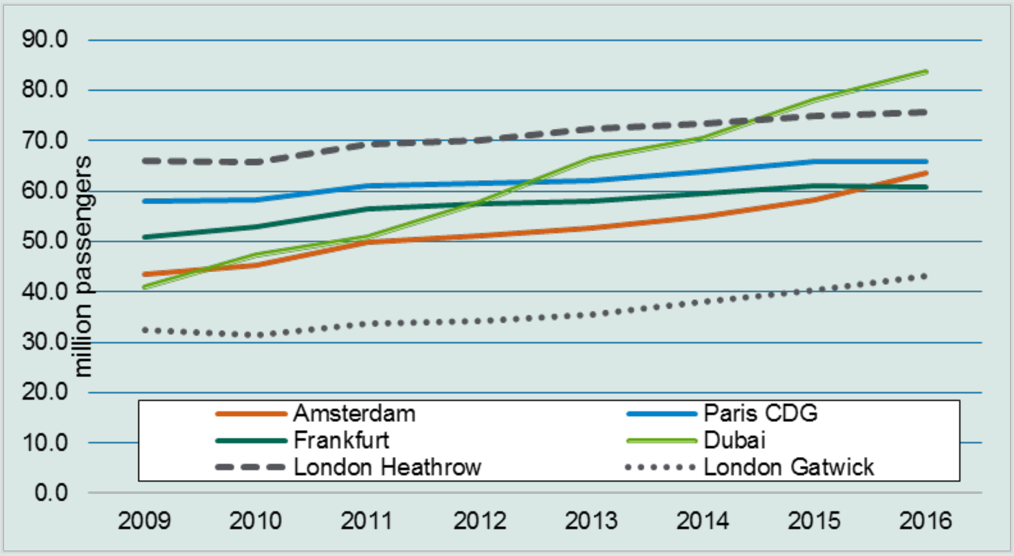
The overseas hub airports in the UK aviation model

Previous DfT versions of NAPAM had allowed passengers with origins and destinations in the UK to reach their destinations by making transfers at either a UK hub airport (principally Heathrow, Gatwick or Manchester) or routeing via an overseas hub airport (Amsterdam, Paris Charles de Gaulle, Frankfurt or Dubai). However, while the UK hubs potentially had capacity constraints and shadow costs together with dynamically modelled route networks, the costs of using competing overseas hubs was relatively fixed.

The Airports Commission wanted to examine this issue. Connected to this, they also wished to look at the potential for demand for currently deterred international-international transfers from UK hubs to be attracted by expanded capacity in UK.

Demand at some competing hubs, notably Dubai, has been growing strongly which makes them relatively more attractive to passengers.

Growth at hub airports competing for international transfer passengers



Amsterdam, Paris Charles de Gaulle, Frankfurt and Dubai were consequently fully integrated into NAPAM, using a methodology consistent with that used for UK airports. This meant:

- full capacity constraint modelling and the potential for shadow costs at the overseas hubs
- collecting data on current international-international transfers at all these airports and allocating this combined demand pool around all the modelled hub airports
- filling in and forecasting the rest of each airport's non-transfer (local) demand
- allowing the dynamic modelling of ATMs and route networks

All these features have been retained in the department's current version of NAPAM.

Demand data

2.65 This new model version and forecast replaces all previous international demand data, rebuilding the base demand matrix with a new CAA passenger interview set for 2011-2016. The data is controlled at route level (scheduled/charter/LCC) to 2016 passenger flows on individual routes. In total over 1.1m interviews collected at 81 separate CAA surveys over the period have been processed and used to build the origin-destination base demand matrices by airline type and journey purpose.[34] The average sample rate across all 81 surveys was 1 in every 1200 passengers. Table 4 shows when the surveys were undertaken and the number of interviews collected at each survey.

		2011	2012	2013	2014	2015	2016	Total
ABZ	Aberdeen	0	0	6,619	0	0	0	6,619
BHX	Birmingham	11,575	10,323	11,395	14,102	8,326	9,113	64,834
BRS	Bristol	0	9,585	0	0	9,126	0	18,711
CWL	Cardiff	0	6,611	0	0	7,863	0	14,474
EMA	East Midlands	6,739	7,030	6,616	7,537	7,132	8,217	43,271
EDI	Edinburgh	0	0	13,817	0	0	0	13,817
EXT	Exeter	0	6,253	0	0	0	0	6,253
LGW	Gatwick	24,695	29,524	28,747	28,442	26,640	25,495	163,543
GLA	Glasgow	0	0	15,138	0	0	0	15,138
LHR	Heathrow	53,351	67,868	60,036	60,240	62,916	55,859	360,270
INV	Inverness	0	0	3,662	0	0	0	3,662
LBA	Leeds/Bradford	0	0	0	6,423	0	0	6,423
LPL	Liverpool	0	0	0	7,406	6,117	5,558	19,081
LCY	London City	0	9,470	10,592	8,104	8,956	6,998	44,120
LTN	Luton	7,769	7,935	8,393	8,460	9,432	9,531	51,520
MAN	Manchester	27,904	30,348	30,158	30,466	32,238	25,927	177,041
NCL	Newcastle	0	0	15,432	0	0	0	15,432
STN	Stansted	24,225	28,134	27,395	25,263	25,888	23,176	154,081
DSA	Doncaster Sheffield	0	0	0	3,267	0	0	3,267
		156,258	213,081	238,000	199,710	204,634	169,874	1,181,557

Table 4 Number of CAA survey interviews feeding into model's base year demand

2.66 Earlier model versions had used the CAA's coding to district ground origins. But the CAA district definition now follows more aggregate current administrative district boundaries which are not compatible with the 1991 census based boundaries used in the allocation model. As a result, the new demand data is coded with GIS to the original NAPAM district zones by using postcodes and OSGR centroids.

2.67 Prior to assignment to airports a preload is undertaken to reflect the assumption that the presence in the 2016 base of capacity constraints is now deterring some demand and CAA surveys and statistics can only capture demand that has not been priced off by congestion costs at the London airports. The base year model calibration and validation process now involves the model applying shadow costs in the base year to suppress sufficient traffic to accurately represent observed 2016 national total traffic, as reported later in Chapter 4.

[34] Time constraints required the use of a pre-release version of the CAA 2016 survey (the summation of the four quarterly data sets) but this does not affect the process as all the interview sample weightings were recalculated and controlled to finalised 2016 route level statistics.

Surface access inputs

2.68 Surface access costs from each district (zone) to each airport in the model are a key part of predicting future airport usage. Passengers, when choosing their preferred airport within NAPAM, take into account the time and money costs of accessing each airport.[35] The detailed road and rail transport networks used to extract travel costs connecting all zones to all to airports are now more fully integrated into the department's aviation modelling suite; this new tool is called the National Airport Accessibility Model (NAAM2).

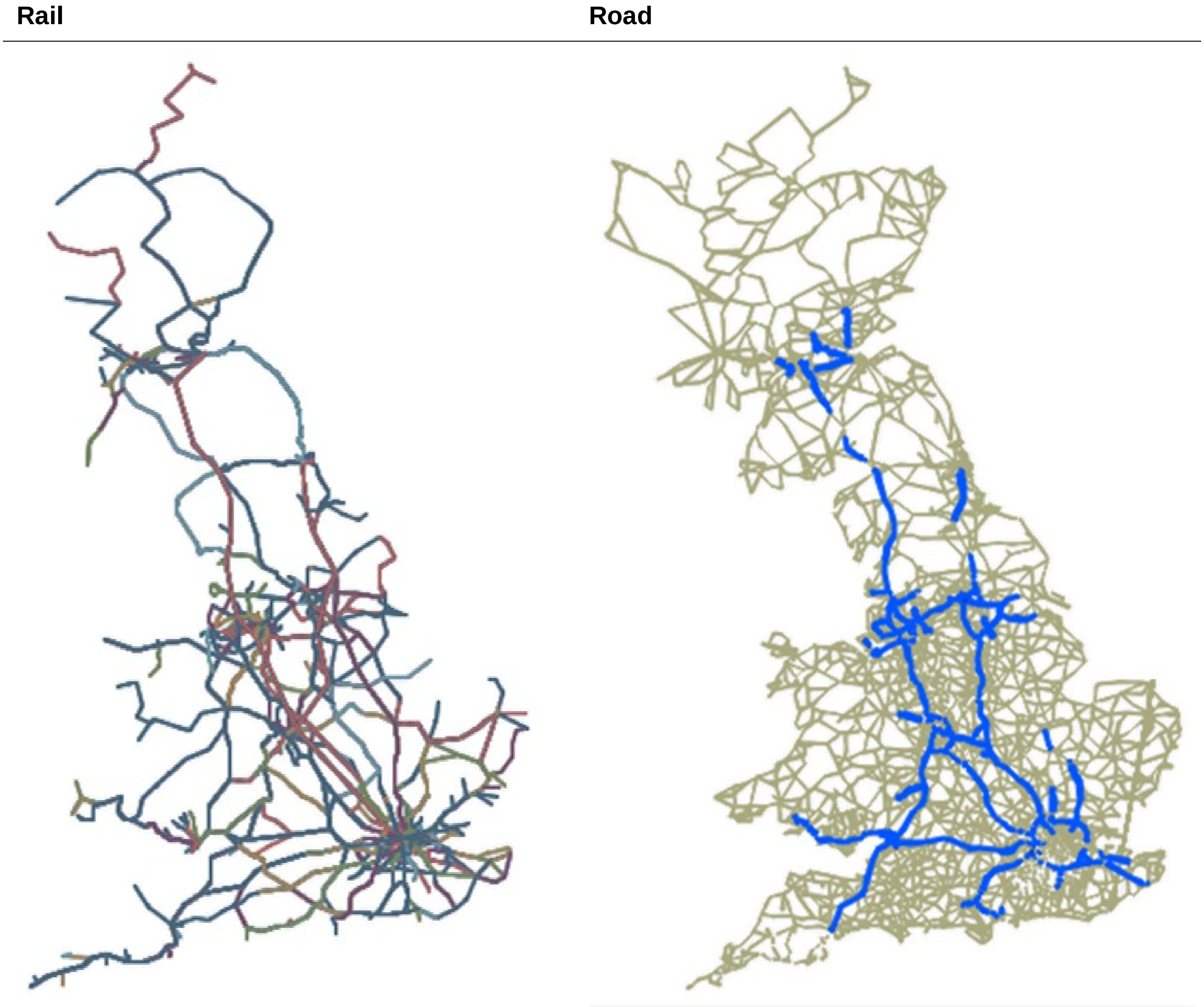


Figure 2.6 NAAM2 rail and road networks

2.69 The most significant development relating to surface access since the department's last forecasts has been modernising NAAM2's software platform.[36] This has improved the usability and transparency of the modelling and provided outputs for other separate analyses.

2.70 There has been improved disaggregation in some regions, particularly in Scotland, which allows for a better representation of how passengers access both the road and rail networks and improves the allocation of passengers to Scotland's airports.

[35] The travel costs represent inter-peak conditions.
[36] NAAM2 now uses EMME transport modelling software.

Model changes made on behalf of the Airports Commission

2.71 The Airports Commission instigated a number of changes to the department's model prior to preparing their own forecasts. These followed a consultation on aviation forecasting which received submissions from airport operators, industry groups, the CAA and environmental and other groups.[37] The most significant of the changes introduced that have been retained in the department's current version of the aviation model are:

- modelling of overseas hubs (Amsterdam, Paris Charles de Gaulle, Frankfurt and Dubai) in the same detail as the principal UK airports
- new definitions of Newly Industrialised Countries (NIC) in NAPDM to include countries such as Brazil and Indonesia which had previously been classified as Less Developed countries (LDC)
- improved modelling of trips suppression - see the description earlier in this chapter
- improved modelling of aircraft loads - initial load factors could be entered for every route rather than groups of routes
- updating of the distribution of traffic within the 27 zones which contained groups of routes
- mode shifts of passengers on internal domestic journeys consistent with HS2 Ltd's forecasts
- development of the NAAM2 surface access model - as described in the preceding section

2.72 Full details of the modelling changes instigated by the Airports Commission can be found in their document *Strategic Fit Forecasts*.[38]

Summary of modelling changes since the Airports Commission

2.73 The department adopts a policy of continuous improvement to its analytical models, and this new model version builds on the changes instigated at the request of the Airports Commission. The updated model essentially follows the overall methodology outlined in the last DfT forecasts from 2013[39] combined with changes outlined above and reported in the final Airports Commission forecasts. In addition to routine software and model maintenance the most significant changes are:

- base demand data has been updated to 2016 with more accurate geographical coding of UK ground origin districts - this process has been described earlier in this chapter
- the information on passengers and transfers at the main competing overseas hubs (Amsterdam, Paris Charles de Gaulle, Frankfurt and Dubai) has been updated with ticket data from these airports from 2014, replacing the 2011 dataset used in the Airports Commission forecasts

[37] *Aviation Demand Forecasting discussion paper*, Airports Commission, February 2013, https://www.gov.uk/government/publications/discussion-paper-on-aviation-demand-forecasting.
[38] *Strategic Fit: Updated Forecasts*, Airports Commission, July 2015, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439687/strategic-fit-updated-forecasts.pdf.
[39] DfT, *UK Aviation Forecasts, 2013* https://www.gov.uk/government/publications/uk-aviation-forecasts-2013

- the model validation year has been moved forward from 2011 (used in both the department's last and the Airports Commission's forecasts) to 2016, with a new detailed validation check against CAA reported actuals for 2016 - these updates are described in full in Chapter 4
- macroeconomic inputs to the demand model (NAPDM) have been brought fully up to date with the latest available inputs - these updates are described in full in Chapter 5
- improved modelling of fuel costs - as described earlier in this chapter
- a simplified approach to modelling local district level UK variation within the national growth forecasts – as described earlier in this chapter
- values of time and surface access generalised costs have been updated in line with the latest WebTAG data book values[40]
- the forecast scheduled/LCC/charter market shares have been reviewed and updated - these updates are described further in Chapter 5
- baseline airport capacities have been reviewed and updated - these updates are described further in Chapter 5
- the modelling of future aircraft fleet turnovers and the introduction of new types in the FMM has been significantly updated and reviewed with the fleet composition base year moved forward from 2008 to 2015 - this update is described further in Chapter 3
- the CO_2 emissions modelling has been significantly updated using new reported aircraft fuel-burn rates for a wider range of current aircraft and the emissions modelling re-calibrated to 2015 BEIS reported outturn ('bunker fuel') - this update is described further in Chapter 3

[40] https://www.gov.uk/government/publications/webtag-tag-data-book-july-2017

3. CO_2 emissions modelling

Introduction

3.1 This chapter comprises three parts. These set out:

1 the nature, purpose, context and interpretation of the forecasts of carbon dioxide (CO_2) emissions from UK aviation, including information on the methodology and assumptions used in forecasting UK aviation CO_2 emissions;

2 the department's Fleet Mix Model and

3 the department's aviation CO_2 model

Nature and purpose of the CO_2 forecasts

3.2 There is currently no internationally agreed way of allocating international aviation CO_2 emissions to individual countries. However, the United Nations Framework Convention on Climate Change (the UNFCCC) do provide a recommended approach which these forecasts follow. This means that DfT forecast CO_2 emissions produced by all flights departing UK airports from the aviation model base year of 2016 out to 2050. The modelling covers passenger and freighter ATMs departing all the UK airports in the department's model, but does not quantify CO_2 emissions at overseas hubs or flights to the UK. The forecasts therefore include CO_2 emitted from all domestic flights within the UK, and all international flights which depart UK airports, irrespective of the nationality of passengers or carriers. Emissions from UK airports not included in the model are unlikely to be significant as they are small and offer only short range services.

3.3 The scope of aviation CO_2 could cover many possible sources of emissions. For example, some might argue that emissions from journeys to and from an airport are 'generated' by the existence of the airport and its services. However, this would cause double-counting of emissions in different parts of the UK national inventory where surface transport emissions are accounted separately.[41]

3.4 The sources of emissions covered in the forecasts in this chapter are set out in Table 5. The approach used is consistent with the BEIS outturn estimates and the UNFCCC recommended approach for reporting on CO_2 emissions from international aviation, assuming the quantity of aviation fuel consumed from UK bunkers is a reasonable approximation to amount of fuel used on flights within and departing the UK.[42]

[41] The CO_2 forecasts in this report relate specifically to aircraft both on the ground and in the air. However, in appraising potential policy measures affecting capacity/level of activity at specific airports the DfT also considers the potential for significant impacts on CO_2 emissions from airport surface access, construction and operations. See *Updated Appraisal Report*, DfT, 2017.for more details.

[42] In *BEIS GHG Emission National Statistics* UK domestic aviation CO_2 emissions are reported in the UK total and international aviation emissions are reported as a memo item. See https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015.

Emissions source	Included in the forecasts?
All domestic passenger flights within the UK	✓
All international passenger flights departing UK airports	✓
All passenger aircraft while on the ground in the UK e.g. taxiing	✓
All domestic freighter aircraft departing UK airports	✓
All international freighter aircraft departing UK airports[43]	✓
All freighter aircraft while on the ground in the UK e.g. taxiing	✓
General aviation (non-commercial flights) in UK airspace	×
Surface access, i.e. passenger and freight journeys to and from a UK airport	×
Non-aircraft airport sources, e.g. terminal lighting and airfield vehicles	×
UK registered aircraft flying from airports not in the UK	×
International flights arriving in the UK	×
Overflights passing through UK airspace	×

Table 5 Definitions and sources of carbon emissions included in the forecasts

3.5 It is important to recognise that actions or events that reduce UK inventory aviation CO_2 emissions do not necessarily reduce global aviation CO_2 emissions (and *vice versa*), as the scope of the CO_2 emissions modelling reported relates to aircraft departing UK airports. For example, constraining activity at UK hub airports could result in some passengers making transfers via neighbouring continental hub airports instead of the UK, thereby offsetting the reduction in the UK emissions inventory with increases in emissions elsewhere.

3.6 The department's UK aviation CO_2 emission forecasts are used to help monitor and inform long term strategic UK aviation and climate change policy. The updated forecasts have been central to carbon abatement analysis that the department recently commissioned external experts to undertake. This analysis has formed the baselines against which a range of policy options for reducing CO_2 emissions from UK aviation have been assessed. These forecasts will also inform the development of the Government's forthcoming Aviation Strategy.

Aviation carbon emissions in the context of global CO_2 reduction

3.7 This section sets out how aviation's greenhouse gas (GHG) emissions have grown historically, and how they currently compare to total greenhouse gas emissions, at the national and global level.

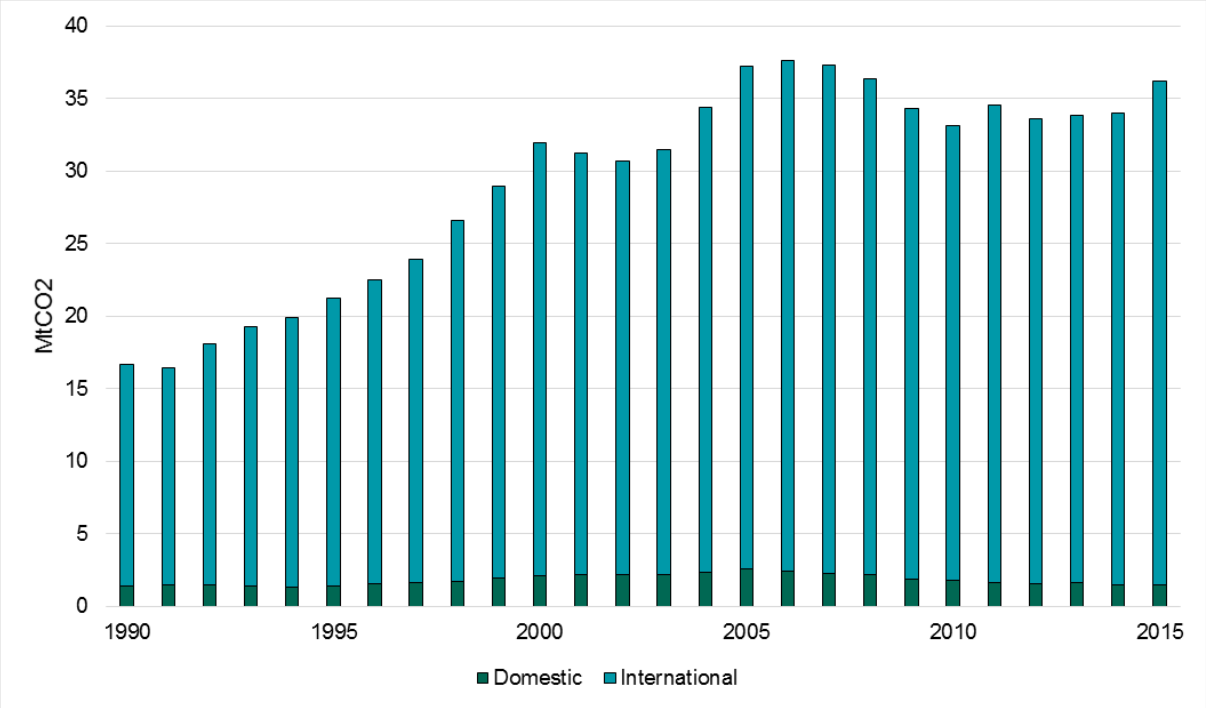
3.8 CO_2 makes up about 99 per cent of the Kyoto greenhouse gas emissions from UK aviation, with the other 1% coming from Nitrous Oxide (N_2O).[44]

3.9 Figure 3.1 shows UK aviation emissions since 1970 and demonstrates that in keeping with the global growth in demand for air travel in that time, CO_2 emissions have tended to grow strongly. Some deviations from the trend are evident, and these are explained by demand variations, such as those resulting from the oil price shocks in the 1970s, recessions, terrorism threats or fears of global pandemics. The

[43] Emissions from freight carried in the bellyhold of aircraft are captured in the passenger aircraft emissions.
44 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015

reduction in aviation CO_2 emissions following the financial crisis and economic recession is clearly visible.

3.10 Figure 3.1 also shows that international travel from the UK, as opposed to domestic flights, has been the main source of emissions growth, consistently accounting for over 90% of aviation emissions.



Source: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015

Figure 3.1 Historic aviation CO_2 emissions from UK departing aircraft

3.11 While aviation at present remains a relatively small contributor to total greenhouse gas emissions (both at the UK and global levels), aviation's proportional contribution is likely to increase significantly in the coming decades as other sectors decarbonise more quickly over time.

3.12 Available evidence indicates that the aviation sector is responsible for approximately one to two per cent of global greenhouse gas emissions.[45] At the UK level, Table 6 shows that domestic aviation accounts for 0.3% of UK greenhouse gas emissions. If internal shipping and aviation emissions are added to the total in 2015, UK aviation (domestic and international) accounted for 6.5% of UK GHG emissions and total transport accounted for 30%.

[45] See *Reducing Transport Greenhouse Gas Emissions: Trends & Data*, International Transport Forum, 2010, https://www.itf-oecd.org/sites/default/files/docs/10ghgtrends.pdf and *Greenhouse Gas Emissions from Aviation and Marine Transportation: Mitigation Potential and Policies*, Prepared for the Pew Center on Global Climate Change by David McCollum, Gregory Gould and David Greene, 2009, http://www.c2es.org/docUploads/aviation-and-marine-report-2009.pdf.

BEIS UK greenhouse gas (GHG) statistics 2015	million tonnes of CO2e equivalent	% of total UK greenhouse emissions
Total UK emissions excluding international aviation and shipping	495.7	92.4%
Total UK emissions including international aviation and shipping	536.4	100.0%
Total UK transport emissions including international aviation and shipping	160.7	30.0%
Of which		
• road	111.5	20.8%
• rail	1.9	0.4%
• shipping	9.9	1.8%
• aviation	34.8	6.5%
– domestic	1.5	0.3%
– international	33.3	6.2%

Table 6 UK greenhouse gas emissions in 2015[46]

Interpreting the forecasts

3.13 The forecasts of UK aviation CO_2 emissions should be interpreted within the context of broader UK and international climate change policy. The Climate Change Act (2008) commits the UK government by law to reducing greenhouse gas emissions by at least 80% of 1990 levels by 2050.[47] The UK has also signed up to the Paris Agreement that aims to hold the increase in global average temperature to well below 2°C of pre-industrial levels.[48] In addition, aviation's entry into the EU ETS in 2012 and the forthcoming implementation of the Carbon Offsetting and Reduction Scheme for International Aviation agreed at the International Civil Aviation Organisation mean that any growth of the CO_2 emissions in scope of these schemes above the level of the caps set under these schemes will be exactly offset by emission reductions from other sectors, paid for by the aviation sector.[49] [50] These schemes are accounted for in the modelling through the inclusion of carbon price in air fares in the demand forecasts. For more information see Chapters 2 and 5.

3.14 The forecasts are intended to capture the long term trend in UK aviation CO_2 emissions. While they can capture some short term effects to the extent that the factors driving changes in aviation (e.g. economic growth) can be accurately forecast, they are not primarily intended to predict short term deviations from the trend, as could be caused by an unforeseen recession or other external shock.

3.15 There are significant uncertainties about the future path of the factors driving changes in aviation CO_2 emissions. As with the air passenger forecasts, this uncertainty is reflected by presenting the CO_2 forecasts as a set of demand growth

[46] UK Greenhouse Gas Emissions, BEIS, https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015
[47] https://www.theccc.org.uk/tackling-climate-change/the-legal-landscape/the-climate-change-act/
[48] http://unfccc.int/paris_agreement/items/9485.php
[49] See https://ec.europa.eu/clima/policies/transport/aviation_en for more details.
[50] See https://www.icao.int/environmental-protection/Pages/market-based-measures.aspx for more details.

scenarios and by performing sensitivity tests to illustrate the sensitivity of the forecasts to changes in key drivers. The assumptions underpinning the overall demand growth scenarios and sensitivity tests are set out in Chapters 5 and 9.

3.16 A further uncertainty is that the total climate change impacts of aviation are greater than its CO_2 emissions alone. This issue is discussed further in the box below.

Non-CO_2 climate effects

Although aviation does not emit significant quantities of any other Kyoto greenhouse gases, it results in other emissions that have both cooling and warming effects on the climate. These effects come about as a direct result of the atmospheric conditions in which they are emitted. Non-CO_2 emissions with climate impacts include water vapour and nitrogen oxides (NOx). Emissions of NOx result in the production of ozone, an air pollutant with harmful health and ecosystem effects and a greenhouse gas. But ozone in the atmosphere has benefits as it reduces ambient methane and has a cooling effect. However, the current understanding is that the overall balance of NOx is warming.

The last major international assessment of these impacts was made by the Intergovernmental Panel on Climate Change (IPCC) in 1999. A comprehensive updated assessment of aviation emissions was undertaken by Lee et al in 2009.[1] The Committee on Climate Change (CCC) report on aviation in 2009 summarised the findings of Lee et al (2009), including its estimates of the different climate effects of aviation.[2] For example, the estimated 100-year Global Warming Potentials from Lee et al (2009) indicate that, once the non-CO_2 climate effects of aviation are taken into account, aviation's overall climate effects could be up to double the climate effect of its CO_2 emissions alone. However, as this work recognises, the magnitude of the impacts are unclear.

So while scientific advances since the 1999 assessment have reduced key uncertainties, considerable scientific uncertainty still remains and the view of the 2009 CCC report about non-CO_2 climate effects has not been revised.

[1] Lee et al. (2009) Aviation and global climate in the 21st century, Atmospheric Environment.
[2] Committee on Climate Change (2009) Meeting the UK aviation target – options for reducing emissions to 2050
See also:
Lee, D. et al., 2010. Transport impacts on atmosphere and climate: Aviation. Atmospheric Environment,
Brasseur, G. p. et al., 2016. Impact of Aviation on Climate: FAA's Aviation Climate Change Research Initiative (ACCRI) Phase II. American Meteorological Society

Methodology and assumptions

3.17 Aviation CO_2 emissions are directly related to the amount and type of aviation fuel consumed. There are therefore three key drivers of aviation CO_2 emissions:

- **Total distance flown**: this comprises the volume and average distance of flights from the UK, in turn driven by passenger and freight demand after accounting for airport capacity constraints.
- **Fuel efficiency of aircraft**: the fuel required to fly a given total distance will fall as aircraft efficiency driven by technological and operational improvements improves.
- **Type of fuel used by aircraft**: the CO_2 emissions are associated with a given amount of fossil fuel burn by aircraft; they will fall as the penetration of alternative fuels increases.

3.18 Chapter 2 explains how the passenger demand forecasts are obtained, and how they are converted into a forecast of air transport movements (ATMs) from each airport in the UK to destinations around the world. This section sets out how the ATM forecasts are converted into CO_2 forecasts. Figure 3.2 provides an overview of the modelling components and key assumptions that together produce the forecast of CO_2 emissions to 2050. Below each step is explained in more detail.

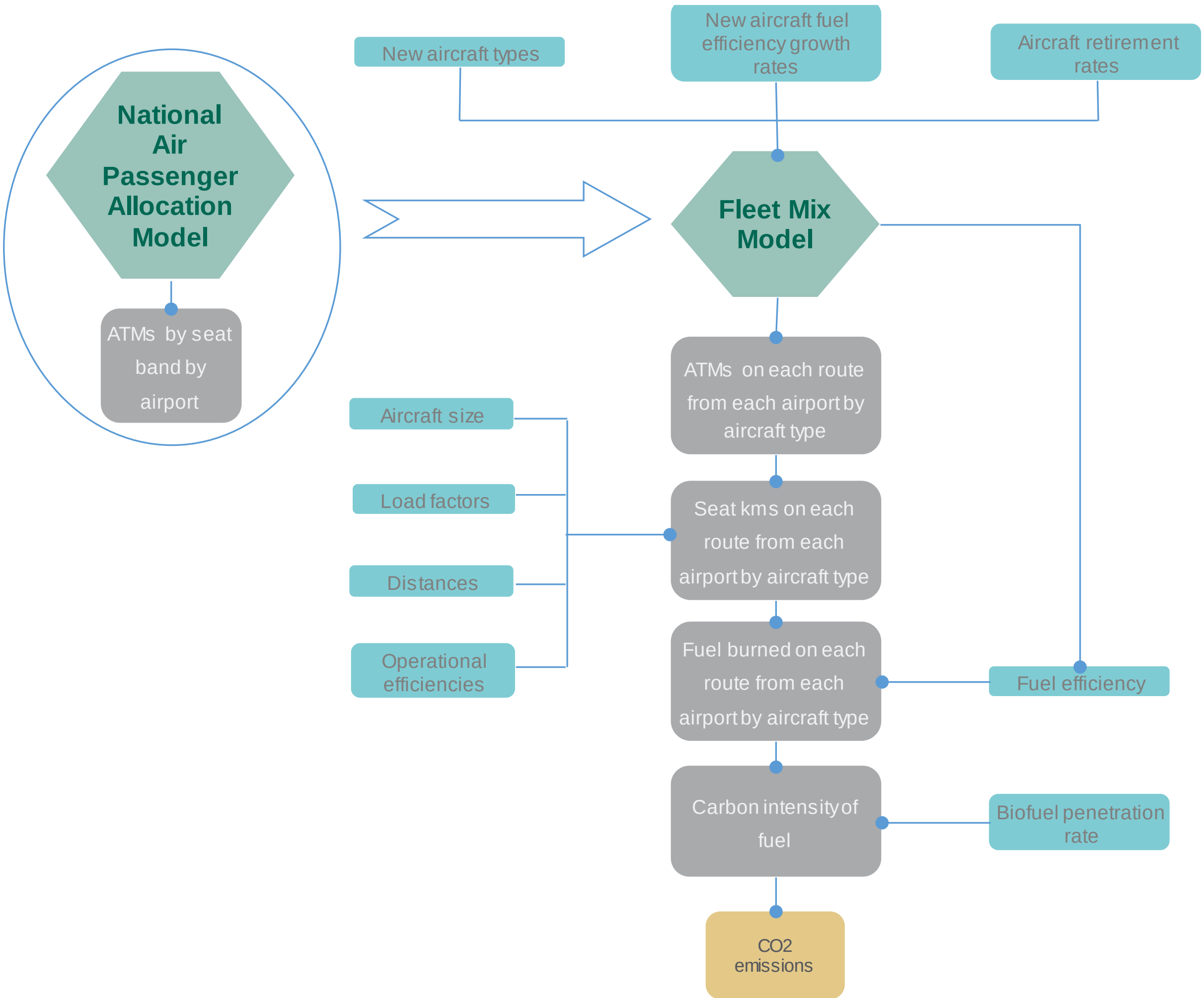


Figure 3.2 Forecasting aviation CO_2 emissions

3.19 Details of the Fleet Mix Model (FMM) and CO_2 models are given below. These were recently reviewed by Ricardo Energy & Environment as part of their work, commissioned by the department, to produce cost and carbon abatement data for use in developing MACCs (marginal abatement cost curves) for the UK aviation sector.[51] Any changes since the department last produced forecasts in 2013 are highlighted in the relevant section and the box below.

[51] *A Review of the DfT Aviation Fleet Mix Model*, and *Carbon abatement in UK aviation*, both Ricardo Energy & Environment, 2017.

Key developments in the department's modelling of CO_2 emissions

The following three key aspects of the department's CO_2 emissions modelling parameters have been updated to reflect the latest evidence:

- fuel burn rates for a range of flight distances and a range of different aircraft types using the EMEP/EEA air pollutant emission inventory guidebook - 2016 (previously referred to as EMEP/CORINAIR emissions inventory)
- revised adjustment to great circle flight distance to 5% for short-haul and 6% for long-haul to reflect the latest evidence in inherent inefficiencies in air traffic control, flight paths and airspace
- update to base year fuel consumption estimates for UK departing aircraft in line with the most recent NAEI bunker CO_2 return (2015) and published by BEIS

The Fleet Mix Model

3.20 The Fleet Mix Model (FMM), shown in Figure 3.2 is downstream of NAPAM in the aviation model structure and predicts the types of aircraft that will be used to meet future demand. The FMM does this by taking base year age distributions of ATMs by specific aircraft type operating at all the main UK airports and then forecasts the future changes to that composition, with assumptions about:

- the typical retirement age of each aircraft type
- the split of new aircraft entering the fleet each year

3.21 These forecast compositions are made across six seat classes and three carrier types which are output by NAPAM as shown in Table 7:

Seat class	Carrier type
C1 – 0-70 seats	Scheduled (Sch)
C2 – 71-150 seats	Chartered (Ch)
C3 – 151-250 seats	Low Cost Carriers (LCC)
C4 – 251-350 seats	
C5 – 351-500 seats	
C6 – 500+ seats	

Table 7 FMM segmentations

3.22 The FMM retires aircraft from the UK fleet as they reach a certain age, assumed to be 22 years for scheduled and low cost carriers (LCC) airlines and 25 years for charter aircraft, and replaces them with new aircraft. When an aircraft retires from the UK fleet it is assumed to be replaced by one of the three types present in the following year's supply pool:

a. a new aircraft of the same type;

b. a new aircraft of an existing but different type; or

c. a new aircraft of a new type

3.23 The evolution of the composition of future UK fleets of ATMs is governed by assumptions in the supply pool. The supply pool is composed of existing and future aircraft types expected to come online and form part of the fleet of ATMs using UK airports and is also informed in the near term by current manufacturer order books. These supply pool types include:

- named types currently being manufactured
- named types expected to be in production within the next few years
- generic types (not associated with specific manufacturers or models) expected in two future waves in 2030 ('new G2') and 2040 ('new G3')

3.24 These assumptions reflect the variation in business models in the aviation industry with the different fleet replacement strategies used in different sectors of the market, i.e. scheduled, charter and low cost airlines.

3.25 The methodology involves calculating the number of ATMs for each sub model that have reached retirement age in any forecast year, advancing the age of the distribution of ATMs by one year, calculating the number of retirements and replacing with new aircraft types from the supply pool. [52] So, for example, the first forecast year's number of ATMs, in each segmentation and for each aircraft type, is calculated as: base year ATMs – retired ATMs + replacement ATMs. Fleet mix forecasts for subsequent years are then calculated by the same process, taking the previous forecast year as the base year. Lastly, fleet mix forecasts are presented as percentage splits to apply to aircraft by size bands output by the NAPAM passenger to airport and ATM allocation model (see Figure 3.2). This then feeds into subsequent modelling steps for the purpose of emissions and noise assessments.

3.26 The department has recently refreshed and rebased the FMM to a 2015 aircraft fleet base year. This exercise included:

- updating the base year age distribution using age data on all ATMs using UK airports in 2015
- analysing current airline order books and aircraft production status and manufacturing cycles to provide latest evidence to the supply pool
- reviewing aircraft replacement trends on what future aircraft types now replace existing types
- harmonising retirement age assumptions across all carrier types to ensure consistency

3.27 The methodology underpinning the FMM had been peer reviewed in 2010. The updated version of the FMM has now been independently peer reviewed for a second time. The review by Ricardo Energy & Environment[53] considered three main aspects of the modelling:

- the level of assurance that could be attached to changes made to inputs and parameter assumptions
- the appropriateness or fitness for purpose of the existing methodology
- further suggestions for overall improvement or future development

[52] This is first described in detail in Chapter 2 of *Future Aircraft Fuel Efficiencies – Final Report*, QinetiQ, 2010, https://pdfs.semanticscholar.org/b8e2/1ee0191ee64bf71e7e8e6b87b8c37a71b1cb.pdf
[53] *A Review of the DfT Aviation Fleet Mix Model*, Ricardo Energy & Environment, 2017

3.28 The outcome of the review was that the expert peer reviewer found the model to be fit for purpose with the following recommendations for immediate update:[54]

- amendment of production duration and out-of-production years for certain aircraft types based on the best available evidence at the time
- revisions to the entry into service for some new aircraft types revised in light of recent developments

3.29 These changes were incorporated into the FMM that is used in the production of these CO_2 forecasts. Their recommendations for future development will be considered in forthcoming versions of the model.

Modelling fuel burn and CO_2

Passenger ATMs and seat-kilometres

3.30 The key input to the fuel burn and subsequent CO_2 forecasts are NAPAM forecasts of annual ATMs for each airport, by route and by carrier type. These outputs are processed and allocated specific aircraft types by year in the FMM.

3.31 The forecast number of ATMs by specific aircraft types at each airport are converted into seat-kilometres at the same level of detail by applying projections of aircraft size (i.e. the number of seats per ATM), and the distance flown on each airport route. Distances are 'great circle' distances, a common metric for aviation purposes, representing the shortest air travel distance between two airports taking account of the curvature of the earth. The actual distance flown is longer than the great circle distance because of sub-optimal airspace routeing and other en route air traffic control inefficiencies and stacking for landing at airports during periods of congestion. An adjustment factor is therefore applied to uplift the distance flown by 5% for short-haul, and 6% for long-haul destinations.[55] This has been amended since the department's last forecasts in line with advice from the review by Ricardo Energy & Environment.

Freighter distances flown

3.32 Passenger aircraft ATMs account for most of the emissions from freight as 70% (by weight) of freight carried is in the bellyhold of passenger aircraft.[56] However, dedicated freight aircraft (freighters) do produce a material amount of carbon emissions. It is therefore necessary to make an assumption about the number of freighter ATMs separately. As set out in Chapter 2, it is assumed that the number of freighter ATMs does not change over the forecast period.

Modelling aircraft fuel burn

3.33 Current fuel burn rates by aircraft type are initially taken from the European Environment Agency's (EEA) air pollutant emissions inventory guidebook 2016.[57] Fuel burn is measured in kilograms of fuel per aircraft and is specific to bands of

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[54] For further details see *A Review of the DfT Aviation Fleet Mix Model,* Ricardo Energy & Environment, 2017

[55] Evidence from a study by Ricardo Energy & Environment (for the European Commission, DG MOVE) indicates that average extra distance flown (above Great Circle Distance) is between 4.5% and 5% for flights in Europe (https://ec.europa.eu/transport/sites/transport/files/2017-03-06-study-on-options-to-improve-atm-service-continuity-in-the-event-of-strikes.pdf). Another study (Reynolds, 2009) indicated that the extra distance flown on North Atlantic routes was 5%, while the extra distance on typical Europe – SE Asia routes was 7%.

[56] Source: DfT analysis of CAA statistics.

[57] https://www.eea.europa.eu//publications/emep-eea-guidebook-2016

flight distances and the different stages of the flight (e.g. the landing and take-off cycles and cruise stage).

3.34 The new inventory guide book represents an update to the department's 2013 forecasts which used the 2006 version of the emissions inventory ('Corinair') guidebook. The EEA inventory is an established and authoritative source of data on aircraft fuel burn rates, and has been significantly enhanced recently with many more aircraft types and anonymised actual operational data provided by airlines.[58] It is used for general reference and for use by parties such as the Convention on Long Range Transboundary Air Pollution (LRTAP) for reporting to the UNECE Secretariat in Geneva. And it is widely used by ICAO-CAEP in setting environmental policies and standards.[59]

3.35 Within the model, aircraft types' output are mapped to types for which data is provided in the EEA guidebook. Where data for the specific plane type is not available, it is mapped to a similar 'proxy' type and, where needed, an adjustment made to account for higher/lower fuel efficiency. As part of their review, Ricardo Energy & Environment provided advice on mapping aircraft types to those in the EEA guidebook. The review also advised on adapting guidebook fuel burn models for generic future aircraft types, mapping them to existing types but with an adjustment to account for anticipated performance improvements.

[58] It is assumed that fuel burn on a 100% loaded jet aircraft will be 5% higher than on a 70% loaded aircraft, due to the increased weight. See *An evaluation of aircraft emissions inventory methodology by comparisons with reported airline data*. Daggett, D. L., D. J. Sutkus Jr., D. P. DuPois, and S. L. Baughcum, 1999: NASA/CR-1999-209480.

[59] https://www.icao.int/ENVIRONMENTAL-PROTECTION/Pages/CAEP.aspx

Fuel burn for future generic aircraft types

Data in the EMEP/EEA air pollutant emission inventory guidebook 2016 has been used to derive rates for fuel burn/distance (in kg/Nm) as a function of flight distance for most currently available aircraft types.

Fuel burn rates for future aircraft types, not contained in the guidebook, have been related to rates of existing aircraft types on the advice of Ricardo Energy & Environment as shown in the examples below.

Future aircraft type	Fuel burn
AIRBUS A319NEO*	A319 -15.0%
AIRBUS A330-900NEO	A333 -10.0%
BOEING 737 MAX 8*	B738 -15.0%
BOEING 777-9X*	B77W -13.0%
BOMBARDIER CS300	A319 -15.0%
EMBRAER E190-E2	E190 -15.0%
New G2 Post 2030 c1 1-70 seats*	ATR42 -24.5%
New G2 Post 2030 c2 71-150 seats*	B734 -24.5%
New G2 Post 2030 c3 151-250 seats*	B734 -24.5%
New G2 Post 2030 c4 251-350 seats*	B772 -27.5%
New G2 Post 2030 c5 351-500 seats*	A343B772 -27.5%
New G2 Post 2030 c6 500+ seats*	A380 -27.5%
New G3 Post 2030 c1 1-70 seats*	ATR42 -31.5%
New G3 Post 2030 c2 71-150 seats*	B734 -31.5%
New G3 Post 2030 c3 151-250 seats*	B734 -31.5%
New G3 Post 2030 c4 251-350 seats*	B772 -29.5%
New G3 Post 2030 c5 351-500 seats*	A343/B772 -29.5%
New G3 Post 2030 c6 500+ seats*	A380 -29.5%

* New future type developed from type in the guidebook with advice from Ricardo Energy & Environment

3.36 A key development in the 2016 version of the EEA guidebook from its 'Corinair' predecessor is the use of the EUROCONTROL Advanced Emission Model (AEM) to estimate the fuel burnt by each aircraft type over specific distance bands. The 2006 version used the older Piano model.[60] The 2016 version has a wider range of aircraft types which reduces the need for modelling using proxy aircraft. To match the guidebook distance fuel burn bands, the department's CO_2 model calculates the fuel burn of different aircraft types using a set of fifth-order polynomial curves for fuel burn/distance (in kg/Nm) as a function of flight distance (in Nm). The review from Ricardo Energy & Environment agreed that this approach produced a better model fit than alternative linear or other model specifications.

[60] Piano is a tool for the analysis of commercial aircraft. It is used in preliminary design, competitor evaluation, performance studies, environmental emissions assessments and other developmental tasks by airframe and engine manufacturers, aviation research establishments and governmental or decision-making institutions. http://www.piano.aero/

Fuel efficiency

3.37 Seat-kilometres per mass of fuel (i.e. seat-kilometres per tonne or kg of fuel) is the department's preferred metric for measuring aviation fuel efficiency. It was widely used by the IPCC and the research on which the IPCC study drew, although there is in practice a number of alternative fuel efficiency measures. [61] The value of the chosen metric is that it is essentially unaffected by the assumed or modelled load factors.

3.38 Gains in the fuel efficiency of air travel on the metric of seat-kilometres delivered per tonne of fuel can be split into two sources:[62]

- **Air traffic management and operational efficiencies**: better co-ordination and control of air transport movements, elimination of non-essential weight, optimisation of aircraft speed, limits to the use of auxiliary power etc, will result in less fuel being needed for each seat-kilometre flown.
- **Aircraft efficiency**: as new, more efficient aircraft replace older aircraft, the average efficiency of the fleet will rise. Improvements in new aircraft efficiency can be driven by better engine or airframe technology. These gains could take the form of new types of aircraft entering production (e.g. Boeing 787, Airbus A380 and A350) or incremental improvements to existing types of aircraft (e.g. new engine options on the Airbus A320 or Boeing 737 aircraft families). It is also possible for certain existing aircraft to become more efficient through retrofitting of the latest engine technology or the fitting of aerodynamic devices such as winglets and riblets.

Air traffic management and operational efficiencies

3.39 The route distances flown by class of aircraft output by NAPAM can be adjusted in response to assumptions about operational changes. The baseline input assumptions in the model on the potential gains from air traffic management are conservative. The forecasts are based on the assumption that future net gains in traffic management fuel efficiency from EUROCONTROL's Single European Sky ATM Research (SESAR) programme and other improvements are offset by an increase in traffic and load on the system. In effect these improvements are required to keep pace with rising demand while maintaining acceptable operational standards.

3.40 The baseline assumption is also that no improvement or gains in fuel efficiency result from changes in airline operational practices (e.g. optimised payloads, flying speeds and altitudes) to deliver fuel efficiency gains.

Aircraft efficiencies

3.41 The primary source of fuel efficiency gains is expected to come from the retirement of less efficient current aircraft types and their replacement by newer more fuel efficient types. As explained above, the FMM forecasts the distribution of the future fleet by aircraft type based on the retirement of old aircraft and the entry into the fleet of new aircraft. To project gains in the fleet's efficiency due to fleet turnover, it is therefore necessary to project the efficiency of the aircraft that will enter service in the years to 2050 and to feed that into the FMM. The box below presents some of the available evidence on fuel efficiency improvements seen over recent years and expectations over what might be expected in the future.

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[61] *Aviation and the Global Atmosphere*, Inter-governmental Panel on Climate Change, 1999

[62] Fuel efficiency is defined in department's modelling as seat-kilometre per tonne of fuel. It is therefore independent of load factors, which are accounted for elsewhere in the forecasting. A key issue is that a specific load factor can then be assumed, so a seat-km implies a certain tonne-km. This is helpful for making assumptions transparent when defining industry standards.

Trends in aircraft fuel efficiency

Jet aircraft in service today are well over 80% more fuel efficient per seat kilometre than the first jets in the 1960s. A range of estimates exist for the improvements in fuel efficiency in the aviation sector over recent years. Some studies have also set out their estimates of expected future improvements in efficiency.

To represent the range of evidence, the summaries below give a broad idea of the changes seen and forecast.

The IPCC (1999) reported that historical improvements in fuel efficiency have averaged at 1-2% per annum (measured as fuel burn per seat-kilometre) for new production aircraft. This has been achieved through new engine and airframe technology. A similar trend is assumed when projecting forward to 2050.

The IPCC drew on the research by Greene (1992) which looked at fuel efficiency (seat-kilometre per kg of fuel) to 2000 and extrapolated this forward to forecast annual fuel efficiency improvements over time.

	Annual fuel efficiency improvement
1990-2010	1.3%
2011-2020	1.0%
2021-2050	0.5%

IPCC, Aviation and the Global Atmosphere, 1999

Peeters et al (2005) extended this work to explore the impact of applying a fitted curve (instead of a linear trend) to the IPCC data and to that of Lee (2001) with the following fuel efficiency improvements per annum (all expressed in fuel used per available seat-kilometres)

	IPCC	**Peeters et al (2005)**
1960-1980	2.6%	2.2%
1980-2000	1.2%	0.9%
2000-2040	0.6%	0.5%

Peeters, P, Middel J, Hoolhorst A, Fuel efficiency of commercial aircraft. An overview of historical and future trends, 2005.

Lee et al (2001) looked at the efficiency changes in the US only and suggested that annual improvements in energy intensity (fuel use per seat-kilometre and per passenger-kilometre) were relatively strong in the past but were set to slow.

	Gain in efficiency per annum including load factor effects (fuel per passenger km)	**Gain in efficiency per annum excluding load factor effects (fuel per seat-kilometre)**
1971-1985	4.6	2.7
1985-1998	2.2	1.2
1998 to 2025	1.3-2.5	0.7-1.3

Formulated using Lee, J, Lukatchko S, Waitz I and Scafer A (2001) 'Historical and future trends in aircraft performance, cost and emissions. Annual Review of Energy and the Environment 17 p537-573.

The **ATAG** consortium of industry experts (2016) set a target of a 1.5% improvement in fuel efficiency per annum until 2020. Beyond that point, net carbon emissions from aviation are planned to be capped through carbon neutral growth. By 2050, ATAG aim to halve net aviation emissions compared to 2005 levels.[63]

The **IATA (2013) Technology Roadmap** predicts a 30% or more fuel efficiency improvement after 2020 that could be realised only if suitable aircraft development programmes are launched in the respective time frame. The greatest efficiency improvement of around 2% per annum until 2030 is forecast for the regional aircraft category. Aircraft between 100 and 400 seats are expected to improve by 1.2 to 1.5% pa. In the category above 400 seats, the expected improvement is expected to be relatively low and in the order to 1% pa after 2020.

3.42 The forecasts generally assume that there will be gradual improvements relative to conventional aircraft technologies. These improvements are expected to reduce the weight of the engines and airframe through the increased use of new materials, improve various airframe efficiency metrics such as the reduction of aero-dynamic drag and increase both the thermo-dynamic and propulsive efficiency of engines. The forecasts do not reflect more radical departures such as the blended wing body aircraft or open rotor engines.

3.43 Fuel efficiency in the model baseline is driven primarily by increased aircraft efficiency through the turnover of the fleet and the gradual introduction of new aircraft types over time. Air traffic management and operational efficiencies have neutral assumptions - i.e. they are assumed to keep pace with air traffic growth so provide no further efficiencies in the baseline.

3.44 Table 8 shows the range of annual average fuel efficiency improvements underpinning the updated forecasts across the three scenarios. It shows that under the central forecasts average fleet fuel efficiency improves by 10% between 2016 and 2030, equivalent to 0.6% per annum, with efficiency gains accelerating in the 2020s as the current fleet is largely replaced by the next generation.

	Low demand	**Central demand**	**High demand**
2016-2030 (average annual)	0.63%	0.62%	0.50%
2030-2040 (average annual)	1.29%	1.31%	1.40%
2040-2050 (average annual)	1.46%	1.45%	1.38%
2016-2030 (aggregate)	9.94%	9.68%	7.81%
2016-2040 (aggregate)	26.56%	26.58%	25.67%
2016-2050 (aggregate)	48.37%	48.31%	46.13%

Table 8 Fuel efficiency improvements to 2050

Alternative fuels

3.45 The use of biofuels does not in itself increase fuel efficiency (the amount of fuel burnt per distance flown), but it will increase CO_2 efficiency (the amount of CO_2 emissions per distance flown) and so is considered in the baseline emission forecasting. As with

[63] http://www.atag.org

the department's last central CO_2 forecasts, these forecasts assume that biofuels are gradually introduced in the 2020s and make up 1% in 2030 and 5% of all aviation fuel burnt by aircraft departing UK airports in 2050.[64] These assumptions reflect the advice of the independent experts working on the department's earlier MACC analysis in 2010-2011 following a review of the evidence on future biofuels prices. More recently, Ricardo Energy & Environment have also reviewed the biofuel assumptions as part of their review of the CO_2 modelling.[65] Although they made a recommendation to increase the biofuel penetration rate based on recent literature, it was felt this evidence was not sufficiently robust to warrant changing the uptake assumptions for these baseline forecasts.

Fuel burn to CO_2 emissions

3.46 Once the above method has forecast the amount of fuel that is burned on flights departing each airport on each route by aircraft type, this is converted into CO_2 emissions on the basis that 1kg of kerosene emits 3.15 kg of CO_2.[66] Where biofuel uptake is assumed, this average carbon intensity factor is reduced on the assumption that biofuels are accounted for in the transport sector as having zero emissions.[67] For example, in the central forecast in 2050 with 5% biofuel take up, it is assumed that across the entire fleet 1kg of fuel emits 3.07kg of CO_2.

3.47 It should be noted that the metric used for the forecasts is CO_2 not CO_2e. In practice when kerosene is burned, small amounts of other greenhouse gases (included in the Kyoto Protocol[68]) are also emitted including methane (CH_4) and nitrous oxide (N_2O). However the amounts are small - they equate to around 1% of the global warming potential of the CO_2 itself.[69] These gases should not be confused with the impacts from other emissions including contrails and nitrogen oxides (described in the textbox at paragraph 3.16) that fall outside the Kyoto protocol but that nonetheless are likely to have an impact on global warming.

Validation of base year forecasts against bunker fuel outturn

3.48 The new baseline forecasts using the updated FMM and CO_2 models need to be validated, and so a new reconciliation against base year CO_2 actuals has been undertaken.

3.49 Aviation emission forecasts are adjusted to match the Department for Business, Energy and Industrial Strategy (BEIS) estimate of 2015 outturn (i.e. published) aviation CO_2 emissions (using the UNFCCC reporting method),[70] as reported in the National Atmospheric Emissions Inventory (NAEI). The BEIS estimates of outturn CO_2 emissions from aviation are based on the amount of aviation fuel uplifted from bunkers at all UK airports. In the modelling, the adjustment also reflects any difference in definition, including the absence from the modelling of the minor types

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[64] But in practice in the modelling itself biofuel uptake rates are halved to account for lifecycle emissions.
[65] *Carbon abatement in UK aviation*, Ricardo Energy & Environment, 2017.
[66] Each 1 kg of kerosene contains 858 g of carbon and each 1kg of carbon is equivalent to 44/12 or 3.67 kg of CO_2. 0.858 * (44/12) = 3.15
[67] In practice, different biofuel feedstocks have different levels of life-cycle emissions and biofuels use in aviation is expected to result in lower emissions, but not reduce emissions to zero. Following the advice given at the time of the MACC study we assume one lifecycle emissions are taken into account, emissions are reduced by 50%. For modelling purposes, the biofuel uptake rate is halved and therefore equals 2.5% in 2050. The approach taken here is consistent with the accounting of biofuel use in the UK's carbon budget and in the EU ETS, and with the latest guidance from the International Panel for Climate Change (IPCC).
[68] http://unfccc.int/kyoto_protocol/items/3145.php
[69] Global warming potential is the common metric used to compare the global warming impacts of different gases where all gases are measured in terms of their impact relative to CO2, typically over a 100 year period.
[70] The 'forecast' for 2015 is about 1.0MtCO_2 (3%) below the latest revised BEIS estimate for that year. This residual amount is added back into the forecasts. A similar procedure is required by BEIS when converting DUKES air fuel sales data to CO_2 bunker emissions data for domestic and international civil aviation. The adjustment is held constant throughout the model period.

of traffic such as business jets which are difficult to model, or flights from very small airports that are not included in the model.

3.50 The most recent NAEI bunker CO_2 return is for 2015 and published by BEIS.[71] The reconciliation of 2015 modelled estimates against 2015 actuals, and the resulting residual adjustment, is shown in Table 9.

	International	Domestic
Bunker CO_2 actual 2015	32.95	1.52
Model CO_2 2015[72]	31.89	1.24
Difference or 'residual'	1.06	0.28

Table 9 Reconciliation of modelled CO_2 (Mt) with 2015 bunker fuel actuals

3.51 An overall residual of adjustment of around 1MtCO_2 for international is intuitive given that the modelling does not include all types of flights including a significant number of business jets who contribute to fuel usage. A larger proportion of domestic CO_2 is also expected because there will be more un-modelled non-passenger flights and more flights from minor un-modelled airports in this category. The department's new CO_2 model therefore appears to perform very well against bunker outturn actuals. Because it represents an unknown, the residual is held constant throughout the forecasting period in the CO_2 model.

Summary of key CO_2 modelling input assumptions

- future ICAO CO_2 standards are assumed to have minimal effect as future fleet is assumed to be compliant
- retirement ages by airline type of: scheduled - 22 years; charter – 25 years; low cost carrier – 22 years
- no retro-fitting
- first generation future aircraft types (expected by 2020) typically have a 10-15% fuel burn improvement on existing aircraft types, the 2030 second generation having a 24.5-27.5% improvement and the 2040 third generation having a 29.5%-31.5% improvement
- no net air traffic management system gains as improvements from SESAR and other programmes are assumed to accommodate the growth in ATMs without further deterioration in levels of service
- no improvement from airline operational efficiency practices
- 1% biofuel use in 2030 rising to 5% by 2050 (with in practice input uptake rates halved to account for lifecycle emissions)
- base year residual CO_2 adjustment to bunker fuel returns held constant throughout the model period

[71] See table 8 of *BEIS 2015 UK greenhouse gas emissions: final figures - data tables*. https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2015
[72] The 2016 modelled output factored down to 2015 by observed seat-km growth.

4. Past and present: changes in aviation since 2011

Introduction

4.1 This forecast uses a model base year of 2016, the most recent year for which a full annual set of statistical data is available. The department's previous forecasts published in January 2013[73] had been validated to reproduce aviation activity in 2011.[74]

4.2 This chapter is set out in three parts:

- the changes in the UK aviation passenger markets between the two forecasting base years of 2011 and 2016 using detailed statistical and survey data collected by the CAA and analysed by the department
- the capability of the new 2016 based aviation model to reproduce 'actual' aviation activity - the 'base year validation'
- a comparison of the department's recent forecasts against outturn total aviation demand

UK aviation 2011 and 2016

4.3 The box below compares the headline measures of activity at the 30 largest UK airports used elsewhere in the modelling.[75] All the analysis below also uses the department's aviation model definitions of charter and LCC airlines and DfT analysis of bespoke statistics provided to the department by the CAA.[76]

[73] *UK Aviation Forecasts, January 2013,* https://www.gov.uk/government/publications/uk-aviation-forecasts-2013
[74] Technically the 2013 forecasts used an initial demand input of 2008 drawn from CAA surveys conducted 2005-2008. However, this was supplemented and updated with survey data from surveys in 2009-2011 in order that the model could be validated in detail satisfactorily against 2011 observed actuals.
[75] 2011 activity included passenger flights which have now ceased at Blackpool. The 2016 figures include Southend which was not operating significant passenger services in 2011. Of other airports in the model Plymouth closed in 2011 and Coventry ceased operations before 2011.
[76] Charter is as defined in CAA published statistics. LCC airlines in the aviation model are easyJet, Jet2, Ryanair and Thomsonfly (CAA recorded scheduled short-haul services only).

The aviation market 2011 - 2016: key statistics

Since 2011 terminal passengers have grown by almost 50 million (23%) at the 30 modelled UK airports. Throughput in 2016 was at an historic high. Over the 5 years the biggest increases were at Gatwick (+10m), Manchester (+7m), Heathrow and Stansted (+6m) and Luton (+5m).

Passengers mppa	2011	2016	growth	per year
London	134	162	22%	4.0%
Outside London	84	105	25%	4.5%
National	218	267	23%	4.2%

Source: Analysis of DfT version of CAA statistics

The London / outside London totals relate to the location of the chosen airport, not necessarily the ground origin

Capacity in terms of the number of aircraft movements (ATMs) and seats delivered increased by less than the number of passengers because of higher load factors and larger aircraft.

		2011	2016	growth
Average aircraft size	London	177	186	5%
(seats)	National	147	157	6%
Passengers per ATM	London	135	147	9%
(aircraft loads)	National	111	124	12%
Load factor	London	76%	79%	
(passengers/seats)	National	75%	79%	

Source: Analysis of DfT version of CAA statistics

ATMs (000s)	2011	2016	growth	per year
London	991	1107	12%	2.2%
Outside London	971	1042	7%	1.4%
National	1962	2149	10%	1.8%

Seats (million)	2011	2016	growth	per year
London	176	206	17%	3.3%
Outside London	113	131	15%	2.9%
National	289	337	17%	3.1%

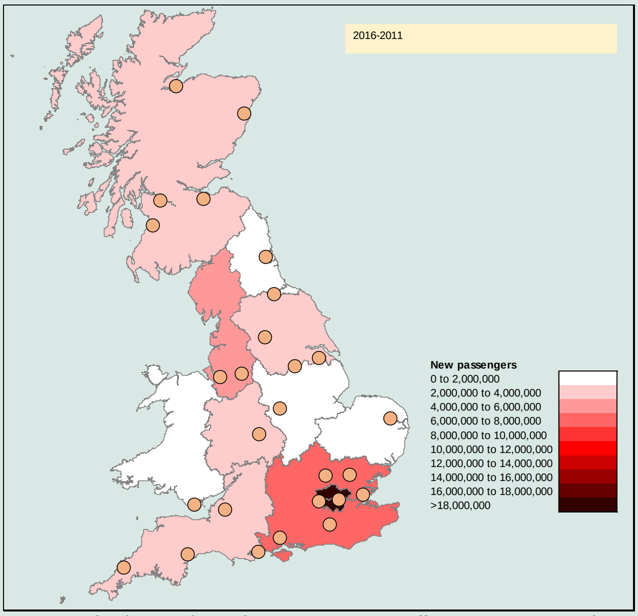
The London / outside London totals relate to the location of the chosen airport, not necessarily the ground origin

The number of short-haul flights has increased significantly. Both 'full service' scheduled and low cost (LCC) flights have grown strongly, in part through the marked drop in charter flights. Overall both domestic and long-haul passenger flights increased by 12% over the 5 year period, compared to a 29% growth in short-haul flights.

	Domestic			Short haul			Long haul		
mppa	2011	2016		2011	2016		2011	2016	
Scheduled	21.5	22.5	*4%*	59.5	83.0	*39%*	43.9	51.5	*17%*
LCC	12.7	16.0	*26%*	57.4	80.3	*40%*	0.3	0.0	*-88%*
Charter	0.8	0.7	*-19%*	17.7	11.0	*-38%*	3.7	2.1	*-44%*
Total	35.1	39.2	*12%*	134.6	174.3	*29%*	47.9	53.6	*12%*

Source: Analysis of DfT version of CAA statistics

In the department's model, domestic scheduled and LCCs are merged as a single category; domestic charter is not separately represented, but may be under 'others', and no long-haul LCC are modelled.
Domestic flights in this table include both internal domestic flights and those passengers travelling to connect onto an international flight.



Source DfT demand matrices 2011 & 2016 (from CAA surveys)

The pattern of ground origins of passengers has shifted significantly, with recent growth concentrated in London. Excluding those transferring at hubs, there were 45m (+25%) more terminal passengers from mainland UK in 2016. The highest growth rate (36%) was in London, the lowest (6%) was in the North East.

Of the 45m new passengers 58% were drawn from London and the South East.

There were 3m more international-international transfers at hubs and just over 1m more passengers originating in Northern Ireland to account for the full passenger increase of 49m.

The proportion of passengers travelling for leisure - both UK and foreign resident - has increased since 2011. Aside from international-international transfers, business passengers dropped from 22% to 19% of all passengers, while the overall proportion of leisure passengers grew from 69% to 72%.

mppa	2011		2016	
UK business	19.6	*9%*	18.8	*7%*
UK leisure	81.2	*37%*	112.4	*42%*
Charter (UK leisure)	20.6	*9%*	12.8	*5%*
Foreign business	13.6	*6%*	16.7	*6%*
Foreign leisure	35.6	*16%*	51.4	*19%*
Domestic business	14.3	*6%*	15.2	*6%*
Domestic leisure	13.5	*6%*	16.2	*6%*
Total business	*47.5*	*22%*	*50.7*	*19%*
Total leisure	*151.0*	*69%*	*192.9*	*72%*
International-international transfer	21.2	*10%*	24.3	*9%*

Source DfT demand matrices 2011 & 2016 (from CAA surveys)

London and regional airport use

- In both 2011 and 2016 the 5 London airports accounted for just over 60% of passengers at the modelled UK airports and just over half the air transport movements (ATMs).
- In 2011 Heathrow accounted for over half the London passengers (and nearly a third of national passengers and nearly a quarter of ATMs), but by 2016 these shares have dropped as capacity constraints have bitten and other airports have been able to grow faster in a competitive environment.
- Growth at almost all airports has picked up since around 2014 to exceed pre-recession numbers of passengers by 2016. Growth has been strong at alternative London airports during the five years with Luton increasing by 54%, London City by 52%, Stansted 35% and Gatwick 28%.

mppa	2011	2012	2013	2014	2015	2016
Gatwick	34	34	35	38	40	43
Heathrow	69	70	72	73	75	76
London City	3	3	3	4	4	5
Luton	10	10	10	10	12	15
Stansted	18	17	18	20	23	24
London total	134	134	139	146	154	162
Birmingham	9	9	9	10	10	12
Bristol	6	6	6	6	7	8
East Midlands	4	4	4	5	4	5
Edinburgh	9	9	10	10	11	12
Glasgow	7	7	7	8	9	9
Liverpool	5	4	4	4	4	5
Manchester	19	20	21	22	23	26
Newcastle	4	4	4	5	5	5
Larger regional airports	63	64	66	69	73	81
Other regional airports	21	21	22	22	23	24
Total outside London	84	85	88	91	96	105
UK Total	**217**	**219**	**227**	**237**	**250**	**267**

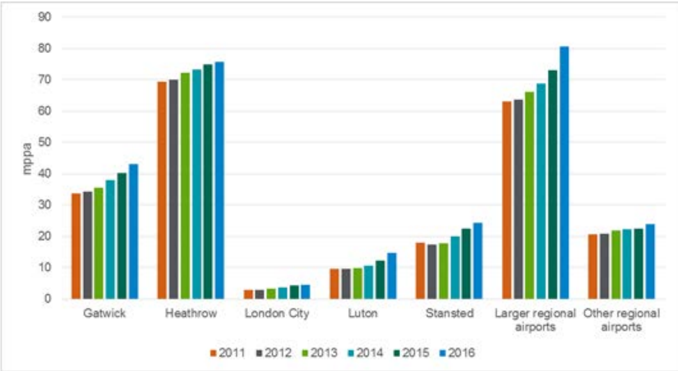


Table 10 Historic number of passengers at large airports

- Manchester is the largest non-London airport in terms of passengers and ATMs and has the strongest growth (36%) of the larger airports with it growing particularly strongly in the last year and its share of national passengers at the airports included in the department's model has increased from 8.7% to 9.6%.
- Glasgow (36%), Birmingham (35%), Bristol (32%) and Edinburgh (32%) also all grew strongly.
- Bigger airports have generally grown faster than the smaller airports. Where national traffic 2011-2016 grew by 23%, London airports by 22% and traffic at the larger airports outside London by 28%, passengers at the other smaller airports only grew by 16% with Manston, Plymouth and Blackpool closing to commercial passenger aviation during the period.

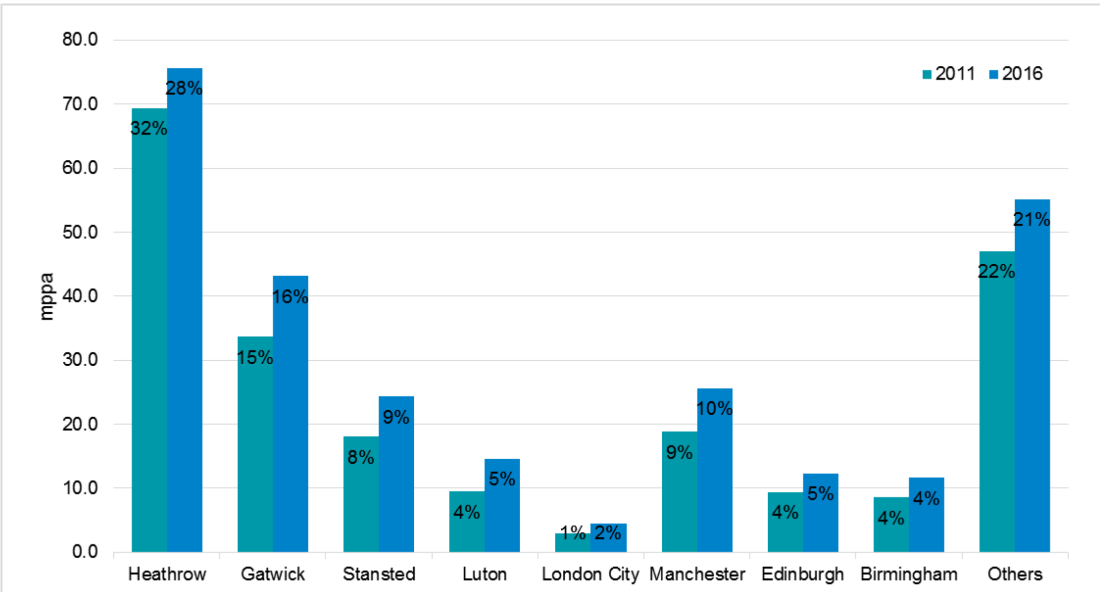


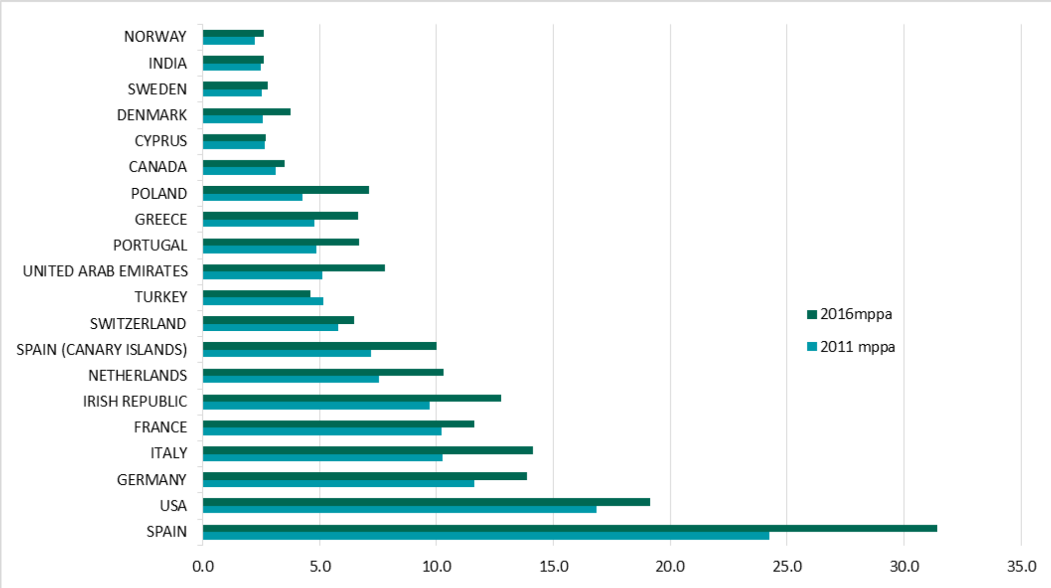
Figure 4.1 Share of national terminal passengers by airport, 2011 and 2016

Range of destinations served / connectivity

- The UK's busiest domestic route in 2011 was between Heathrow and Edinburgh, with close to 1.3 million passengers flying between these airports and with nearly half of them transferring to/from another flight at Heathrow. By 2016 this was still the busiest domestic route, but passenger numbers had dropped to under 1.1 million.

- The majority of international destinations served by UK airports remain within Europe. In 2011 72% of international passengers were on flights bound for Europe, by 2016 this proportion had grown to 75%.

20 most popular international destinations for UK passengers (mppa)



Increase in passengers (between 2011 and 2016) to the 20 most popular destinations (mppa)

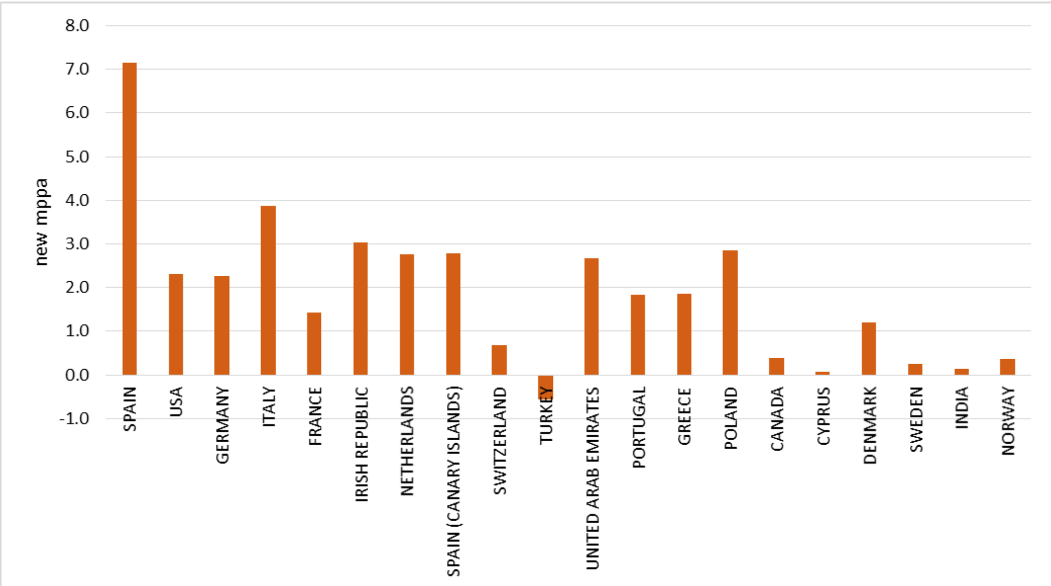


Figure 4.2 Most popular international destinations from UK airports

- The 20 most popular destination countries for UK passenger flights in the CAA statistics were the same in 2011 and 2016 with the most popular country for passengers flying to/from the UK being Spain (including the Canary Islands) which accounted for 17% of international passengers in 2011 rising slightly to 18% in 2016.
- In both years, the USA was the second most popular destination with 9% of all international passengers in 2011 and 8% in 2016. It was the most popular long-haul destination by some way. The UAE (Dubai) is the next most popular, but it is

now outside the top 20 destinations and had around 3% of UK passengers in both years. Overall, long-haul dropped from 29% to 27% in the period 2011-2016.

- The top 20 destination countries contributed 37m of the new passengers 2011-2016 of which Spain (including the Canary Islands) was by far the largest component, contributing close to 10m, followed by Italy (+4m), Ireland and Poland (both +3m).
- In 2011 there were 192 international destinations served with at least daily services and 44 domestic routes from at least one UK airport; by 2016 this had risen to 203 with 45 domestic routes. [77] There were 372 destinations served at least once a week in 2016 compared to 363 in 2011.
- The range of long-haul destinations has been growing nationally and at London airports. Nationally there are now 127 long-haul destinations served with at least one service a week compared to 122 in 2011. Nearly all these are served from London.

	All UK airports				**London airports**			
	Daily		Weekly		Daily		Weekly	
	2011	2016	2011	2016	2011	2016	2011	2016
Europe	128	132	241	245	140	129	233	234
Long-haul	64	71	122	127	67	70	120	126
Total International	192	203	363	372	207	199	353	360
Domestic Routes	44	45	60	56	14	16	17	17

Table 11 Daily and weekly destinations served, 2011 and 2016

- Among the airports, Heathrow serves the most destinations with at least a **daily** service in both 2011 (120 routes) and 2016 (131 routes). The number of routes with at least daily services was only slightly changed at Gatwick (-4 routes), Stansted (+3 routes), but there were larger increases at Manchester (+14 routes) and Luton (+9). Increases at other airports outside London were small.
- Gatwick serves the most destinations with at least a **weekly** service - Gatwick had 187 in 2011 rising to 190 in 2016, while the number of destinations served weekly from Heathrow rose from 163 to 175.
- Stansted is not far behind the largest London airports in both years with 142 at least weekly services in 2011 rising to 159 in 2016. These are predominantly short-haul services.
- Heathrow had the most daily long-haul destinations - 57 in 2011 rising to 63 in 2016.[78] Gatwick had 9 daily long-haul destinations in 2011 and 11 in 2016 and Manchester had 7 in 2011 rising to 8 in 2016. The number of at least weekly long-haul departures rose from 87 to 90 at Heathrow, from 44 to 50 at Gatwick and was held constant at 36 at Manchester.

[77] For this analysis, based on DfT's own version of CAA statistics, daily service is defined as more than 360 departures throughout a calendar year and weekly is defined at more than 51 departures throughout a calendar year.
[78] Long-haul is defined here as inter-continental flights.

Daily destinations served | **Weekly destinations served**

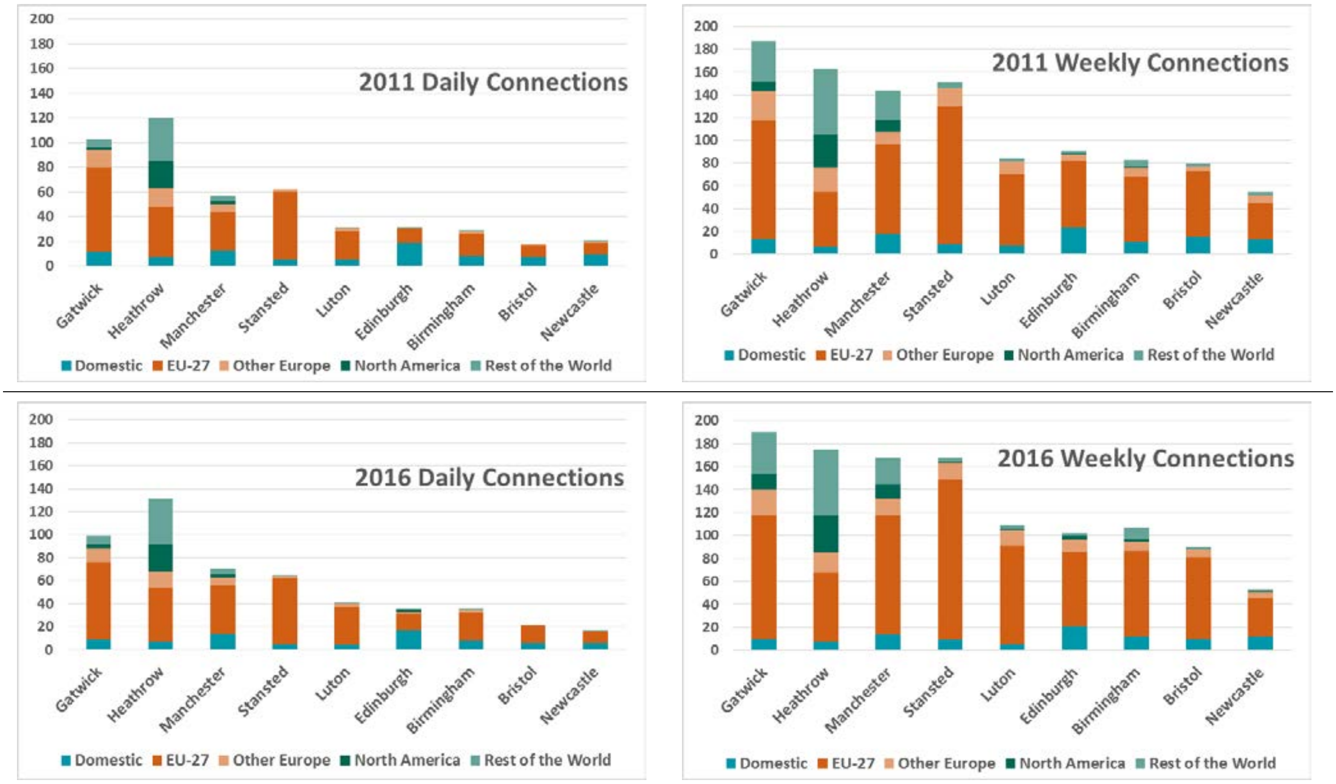


Figure 4.3 Destinations served by at least daily and weekly departures, 2011 and 2016

Airlines

- The top 10 airlines in terms of passengers at UK airports carried 69% of all passengers in 2011 and 72% in 2016.[79] Since 2011, nine of these airlines are unchanged. British Airways remains the carrier serving the most passengers, with easyJet carrying almost the same number and Ryanair a close third. These three airlines carried 46% of passengers in 2011 but now carry slightly more than half (51%).
- BMI and bmibaby in their previous forms have effectively disappeared and been replaced by central and eastern Europe based carrier Wizz. In 2011 nine of the airlines were UK-registered, with this total dropping to eight in 2016.[80]

[79] At all the airports in the department's aviation model.
[80] Ryanair and Wizz are not registered in the UK.

Airline	2011		2016	
	mppa	rank	mppa	rank
British Airways	37.8	1	48.5	1
easyJet	35.6	2	47.2	2
Ryanair	27.2	3	41.8	3
Flybe	10.8	4	10.8	5
Thomsonfly	10.9	5	13.3	4
Thomas Cook	8.0	6	6.6	7
Monarch	5.7	7	5.4	10
Virgin	5.4	8	5.5	9
BMI	4.9	9	0.3	*62*
Jet2	4.3	10	6.7	6
Wizz	2.8	*15*	6.4	8
Total	**150.7**		**192.3**	

Table 12 Ten most used passenger airlines at modelled UK airports, 2011 and 2016

- The top 5 airlines at Heathrow in terms of passengers carried in 2011 were British Airways, Virgin Atlantic, BMI, Lufthansa and Aer Lingus. In 2016 the top 5 airlines were British Airways (BA), Virgin Atlantic, American, Aer Lingus and United. Heathrow is dominated by BA with 40% of passengers in 2011 rising to 48% in 2016 (partly due to their purchase of BMI) and in 2016 it was joined in the top 5 by its IAG partner Aer Lingus and alliance partner American Airlines.

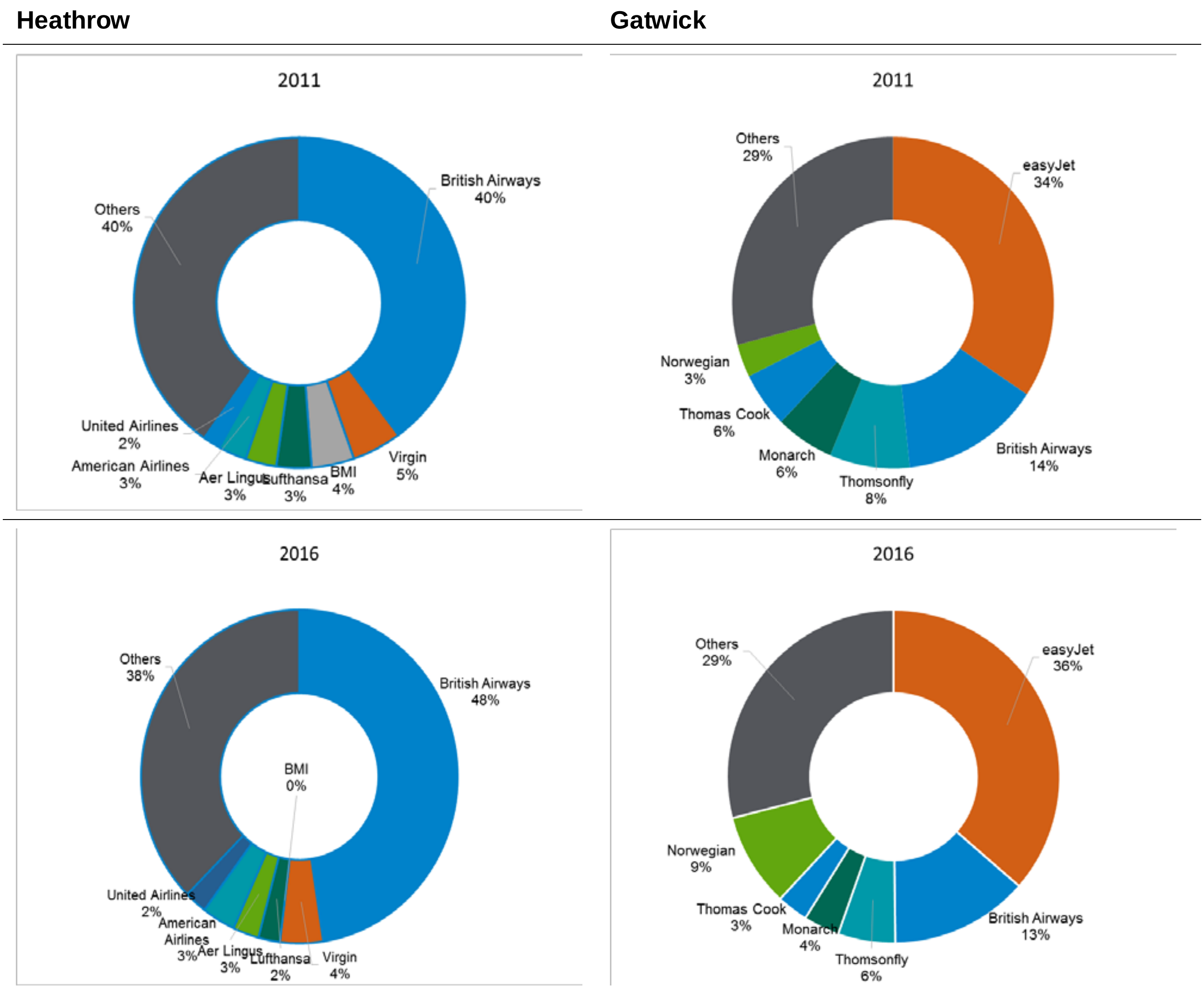


Figure 4.4 Main airlines by passengers carried at Heathrow and Gatwick, 2011 and 2016

- As shown in Figure 4.4, there is a very different pattern of airline use at Gatwick. The only change in the top 5 airlines at Gatwick from 2011 to 2016 was that Norwegian became the third most used airline (from 9th in 2011) replacing Thomas Cook. Apart from Norwegian, the most noticeable feature was the decline of the charter carriers (Thomas Cook, Thomsonfly and Monarch) and the consolidation of easyJet.
- At Manchester, Ryanair has replaced Thomsonfly as the top airline in terms of passengers carried, with easyJet replacing Thomas Cook as the second most used. But no airline dominates with Ryanair carrying just 15% of the passengers in 2016.
- Ryanair continues to dominate at Stansted, carrying 68% of the passengers in 2011 and 82% in 2016. At Luton, easyJet were the main carrier in both 2011 and 2016, but its share of passengers dropped from 45% to 40% while the second carrier, Wizz, increased its passenger share from 24% to 33% during the five years.

Freight

4.4 Freight, in terms of both tonnage and numbers of aircraft movements, has not kept pace with the growth in passenger numbers. In 2011 (70%) and 2016 (69%) most freight by tonnage is carried in the holds of passenger aircraft ('bellyhold'). Total freight carried at the UK airports rose from 2.3 million tonnes in 2011 to 2.4 million tonnes in 2016, with a growth of about 5% in the weight of cargo carried on both freighter and passenger aircraft.[81]

4.5 Figure 4.5 illustrates that the past five years see an extension of trends apparent in the previous decade with modest growth (by weight) of both types of freight. The decline in freighter ATM numbers but relatively constant levels of freight tonnage highlight that air freight has been increasingly carried on bigger freight aircraft.

Freight in passenger and freight aircraft **Freighter ATMs**

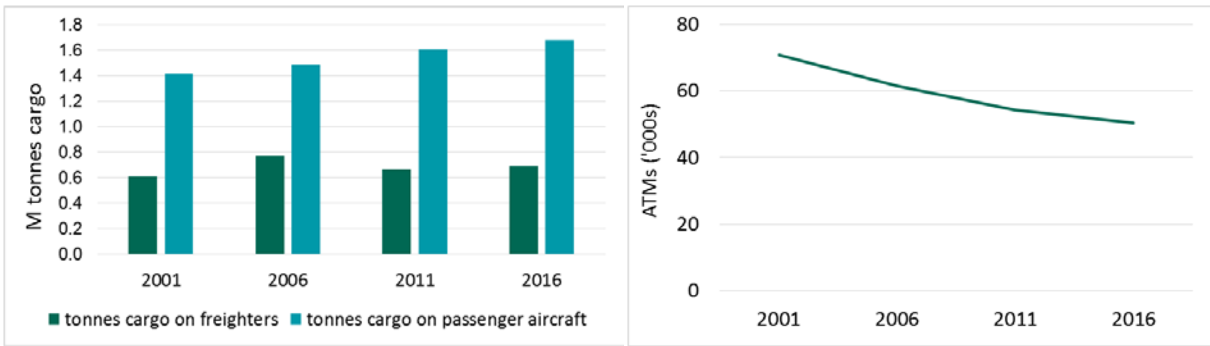


Figure 4.5 Historic freight carried at all modelled airports

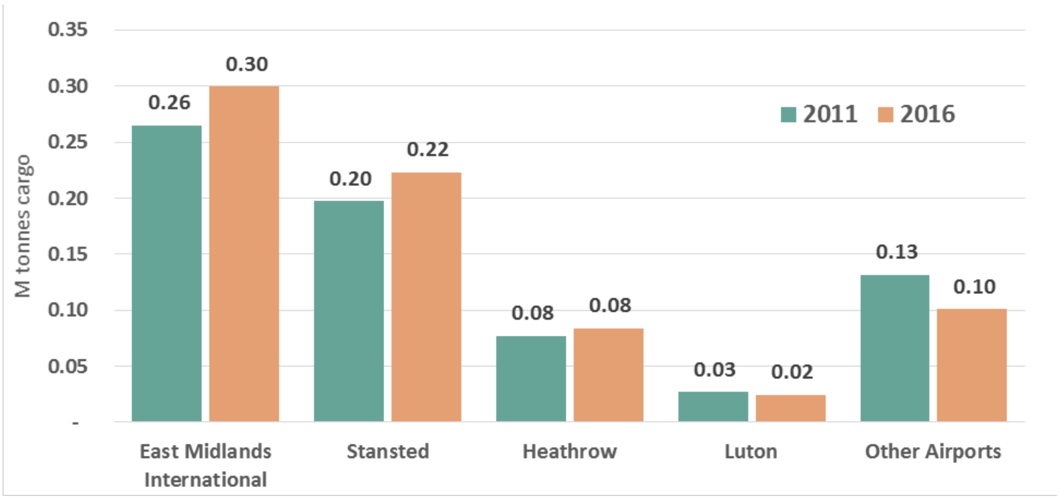
4.6 The top five airports for the tonnage of cargo carried in freight aircraft and for freight carried bellyhold in passenger aircraft have changed relatively little from 2011 to 2016. Cargo carried on freighter aircraft is dominated by East Midlands and Stansted which consolidated their positions together carrying 56% of cargo tonnage in 2011 and 63% in 2016.

4.7 Heathrow remains much the most significant airport in terms of freight tonnage carried on passenger aircraft with around 85% of the UK total in 2016. Much of this freight is carried on long-haul aircraft, and reflect Heathrow's strength in that market.

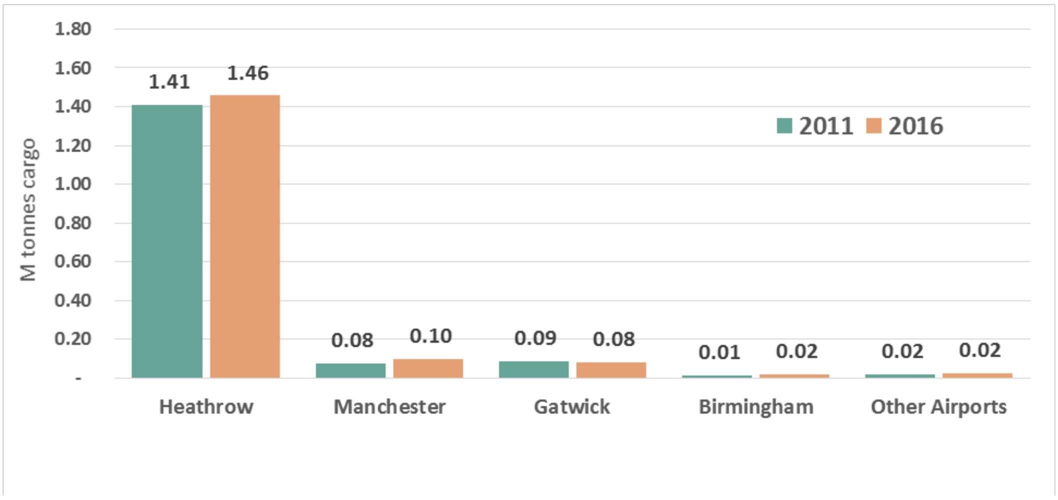
4.8 Figure 4.6 illustrates the top five airports for freight by tonnage for the two types of freight carriage. In both cases it is clear that freight continues to concentrate at a few airports where there are extensive freight handling facilities.

[81] Source: DfT analysis of CAA statistics. This includes an adjustment made to the total relating to Belfast International, following advice from CAA.

On freighter aircraft



On passenger aircraft ('bellyhold')



Belfast International freight data had data supply issues in 2016; so, for this airport the split between freight and bellyhold freight has been estimated using the overall total for 2016 and the previous year split.

Figure 4.6 Freight tonnage by airport, 2011 and 2016

Base year model validation

4.9 An important factor determining the confidence that can be placed in a calibrated model is its ability to replicate independent observed data of the type presented above in this chapter. The process of comparing modelled or 'predicted' output against independent 'actual' or observed data is known as 'validation'. In the passenger to airport allocation model, this assessment is undertaken at various levels of detail:

- overall airport throughput (passengers and aircraft)
- passengers and aircraft travelling between individual airports and destination areas (zones)
- loadings on aircraft
- numbers of specific routes operating at individual airports.

4.10 These assessments are an important part of the quality assurance of the forecast results.

4.11 The full set of validation exercises undertaken which are made at the individual route level for the 2016 base year are:

- international passengers on all routes with > 10,000 passengers per annum separately in the scheduled, LCC and charter market segments (almost 1,000 routes)
- modelled ATMs on all routes with > 10,000 passengers per annum separately in the scheduled, LCC and charter market segments (almost 1,000 routes)
- modelled aircraft loadings on all routes with > 10,000 passengers per annum separately in the scheduled, LCC and charter market segments (almost 1,000 routes)
- modelled passengers, ATMs and aircraft loading on domestic flights
- numbers of destinations served by routes with >5,000 passengers at all UK airports separately for scheduled, LCC and charter market segments
- surface ground origins of passengers at major CAA surveyed airports in 2015
- transfer passengers at UK hubs (Heathrow, Gatwick & Manchester) and 4 modelled overseas hubs
- all passengers at Amsterdam, Frankfurt, Paris and Dubai

4.12 Model validation is a data intensive exercise and is only possible here to provide sufficient summary of the results of this detail as evidence of the suitability of the model base for forecasting in this report.

4.13 The process involves obtaining full sets of passenger demand for all UK passengers from CAA interviews covering the period 2011-2016 and assembling matching statistics. The initial passenger demand and supply networks (the airports and the routes they offer) are input for 2016 which is also the most recent year for which the full CAA statistical returns data are available. This CAA data is used as the independent check data (the 'actual' heading in the tables below).

4.14 The 2016 model validation exercise assumes that both Heathrow and Gatwick have become ATM capacity constrained by 2016-2017.[82]

[82] Capacity constraints at one or other in the initial two years, the model then stabilises with constraints at both in subsequent years.

Airport level passenger and ATM validation

	2016 Passengers (mppa)				2016 ATMs (1000s)				2016 Aircraft loads (passengers)		
	Actuals	Modelled	Difference		**Actuals**	Modelled	Difference		**Actuals**	Modelled	Difference
Gatwick	**43.1**	43.4	0.3	1%	**278.9**	277.2	-1.7	-1%	**155**	157	2
Heathrow	**75.7**	76.0	0.3	0%	**480.6**	476.4	-4.2	-1%	**157**	159	2
London City	**4.5**	4.0	-0.5	-11%	**80.5**	73.7	-6.7	-8%	**56**	55	-2
Luton	**14.6**	14.5	-0.1	-1%	**103.0**	101.2	-1.7	-2%	**142**	143	1
Stansted	**24.3**	24.5	0.2	1%	**164.5**	172.8	8.4	5%	**148**	142	-6
London	**162.3**	162.5	0.1	0%	**1107.4**	1101.4	-6.1	-1%	**147**	148	1
Aberdeen	**2.9**	2.6	-0.4	-13%	**78.6**	72.7	-5.9	-7%	**37**	35	-2
Belfast International	**5.1**	5.1	-0.1	-1%	**38.1**	41.6	3.4	9%	**135**	122	-13
Belfast City	**2.7**	2.7	0.0	1%	**41.5**	42.7	1.2	3%	**64**	63	-1
Birmingham	**11.6**	12.3	0.6	5%	**105.2**	103.9	-1.3	-1%	**111**	118	7
Bournemouth	**0.7**	0.6	-0.1		**4.3**	3.4	-0.9	-21%	**155**	165	10
Bristol	**7.6**	7.6	0.0	0%	**61.1**	58.2	-2.9	-5%	**124**	131	6
Cardiff	**1.3**	1.4	0.0	3%	**16.2**	17.5	1.3	8%	**83**	79	-4
East Midlands	**4.7**	4.8	0.1	2%	**55.6**	57.6	2.0	4%	**84**	83	-1
Edinburgh	**12.3**	11.8	-0.5	-4%	**116.5**	109.1	-7.4	-6%	**106**	108	2
Exeter	**0.8**	0.8	0.0		**14.8**	12.0	-2.9	-19%	**57**	67	10
Glasgow	**9.3**	8.2	-1.2	-12%	**84.4**	76.3	-8.2	-10%	**110**	107	-3
Humberside	**0.2**	0.2	0.0		**9.2**	8.6	-0.6	-7%	**22**	25	3
Inverness	**0.8**	0.7	-0.1		**11.2**	11.5	0.3	2%	**70**	61	-9
Leeds-Bradford	**3.6**	3.4	-0.2	-6%	**31.7**	27.6	-4.1	-13%	**114**	123	9
Liverpool	**4.8**	4.8	0.1	1%	**38.3**	40.1	1.8	5%	**125**	121	-4
Manchester	**25.6**	26.8	1.2	5%	**185.0**	195.7	10.6	6%	**138**	137	-1
Newcastle	**4.8**	4.7	-0.1	-2%	**42.5**	40.8	-1.7	-4%	**113**	115	2
Newquay	**0.4**	0.4	0.0		**7.1**	7.8	0.7	9%	**52**	51	-1
Norwich	**0.5**	0.5	0.0		**28.7**	24.2	-4.5	-16%	**18**	21	4
Southend	**0.9**	0.7	-0.2		**8.3**	7.5	-0.8	-10%	**106**	96	-10
Southampton	**1.9**	2.0	0.1	5%	**37.9**	42.1	4.2	11%	**51**	49	-3
Durham Tees Valley	**0.1**	0.1	0.0		**3.7**	3.4	-0.3	-8%	**36**	44	8
Blackpool	**0.0**	0.0	0.0		**6.7**	.0	-6.7	-100%	**5**		-5
Doncaster Sheffield	**1.3**	1.2	-0.1	-7%	**10.2**	8.5	-1.6	-16%	**124**	137	13
Prestwick	**0.7**	0.8	0.1		**4.7**	5.0	0.3	7%	**143**	151	8
	104.8	104.2	-0.6	-1%	**1041.6**	1017.7	-23.8	-2%	**101**	102	2
Total	**267.1**	266.6	-0.4	0%	**2149.0**	2119.1	-29.9	-1%	**124**	126	2

Percentages only shown for airports > 1mppa

For consistency with other ATM tables, freighters are included, this means that passenger ATM loads will be understated at those airports with significant freighter movements - principally East Midlands and Stansted (over 60% of freight ATMs)

Blackpool has been closed in the model, but there have been some ad hoc commercial services operated in 2016 recorded in the CAA statistics (hence the 100% ATM error). But given the demolition of terminal facilities it is assumed that continuation of such activities will be at very low levels

Table 13 Validation of baseline modelled outputs against actuals, passengers, ATMs and aircraft loads, 2016

4.15 Table 13 reports the accuracy of the model in predicting passenger demand, ATMs and numbers of passengers on passenger aircraft at all modelled airports. It shows that the model is successful in predicting the number of passengers travelling through each UK airport with low percentage variations at the biggest airports.

4.16 The London area total fitted value is highly accurate. Demand is predicted to within +/-1% at the four largest London airports and for the London airports as a group. At all the larger airports outside the London area the model is accurate to within +/-10%. The national total for all 29 currently active airports in the model is also accurate. The largest differences are at Manchester (+1.2m) and Glasgow (-1.2m).

4.17 The ATM forecasts are in large part driven by the passenger to airport demand forecasts and are important because of the role of ATM numbers in forecasting runway shadow costs and CO_2 emissions. ATM forecasting is as demanding as passenger forecasting because it is the output of both the passenger allocation forecasts and then the ATM Demand Model.

4.18 At all the larger airports, including those in London, the model performs well in reproducing 2016 actuals - Heathrow and Gatwick are both within 1% of their 2016 actual throughputs. The larger percentage errors in ATM prediction generally occur at airports with less than 5mppa. Flights at these airports are almost all domestic and international short-haul, and usually on smaller aircraft, so error here has minimal impact on either the runway capacity or CO_2 emissions forecasting.

4.19 Aircraft passenger loads are a result of both the passenger allocation and ATM modelling. Therefore given the standard achieved in both, the model performs well at getting close to the actual reported loads at the most significant airports. As the box on recent trends in the previous section has illustrated (see page 59), rising aircraft loads have been an important explanation for the growth in airport usage in the past few years. The model is picking up this effect well.

4.20 More detailed analysis of the model's calibration and validation at all airports for passengers, ATMs and aircraft loads for different airline markets is set out in Table 47 to Table 50 of the data annexes.

Ground origins of passengers - validation checks

4.21 The pattern of ground origins/destinations of passengers at the major airports has been monitored during the validation process. The modelled UK regional distributions of passenger origins at the largest London airports and Manchester have been checked against the most suitable recent CAA passenger interview survey (2015) where it has been possible to robustly code UK originating passengers to the model's district zones.[83]

4.22 Although the fit is generally good, it should be noted that:

- The pattern of ground origins/destinations in the model is drawn from the ground origins of passengers for 6 years of survey data for the 6 years 2011-2016 and not just 2015.
- The model is less good at representing very long trips to the London airports (e.g. there are no Scottish ground originating passengers in the modelled distributions), but the numbers from such remote origins in the actuals are very small.

4.23 Table 14 compares modelled against actual percentage shares of all ground of traffic with modelled ground. Given the difference in absolute passenger numbers between the 2015 survey and the 2016 model, these percentage shares provide a more useful indicator of the goodness of the model fit than absolute numbers.

[83] At the time of model validation the 2016 passenger interview dataset was only available in quarterly instalments and had not been geo-coded to the level of earlier years so was not used in this validation exercise.

	Gatwick		Heathrow		Luton		Stansted		Manchester	
	CAA2015	model 2016	CAA2015	model 2016	CAA2015	model 2016	CAA2015	model 2016	CAA2015	model 2016
London	43%	49%	54%	53%	35%	40%	53%	51%	0%	0%
South East	43%	42%	27%	29%	40%	36%	23%	27%	0%	0%
Eastern	3%	2%	3%	3%	5%	6%	14%	13%	0%	0%
East Midlands	2%	1%	3%	3%	9%	9%	4%	4%	4%	5%
West Midlands	2%	1%	2%	3%	4%	5%	2%	1%	6%	8%
South West	5%	4%	7%	7%	2%	3%	2%	1%	0%	1%
North	0%	0%	0%	0%	0%	0%	0%	0%	2%	1%
Yorkshire & Humberside	1%	0%	1%	1%	2%	1%	1%	1%	20%	20%
North West	0%	0%	1%	0%	1%	0%	1%	0%	61%	58%
Scotland	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Wales	1%	1%	2%	2%	1%	1%	1%	0%	5%	5%

Table 14 Percentage share comparison of modelled ground origins of passengers and actuals

Destinations validation

4.24 In the model definition (see the box on page 32) the 21 largest European airports in terms of UK traffic are discretely modelled as separate zones. However, all the long-haul airports and the rest of the European airports are members of 27 'route group' zones. The NAPAM passenger to airport allocation model analyses the level of demand between a UK airport and a 'route group zone' to forecast how many members of the zone are served by a particular UK airport. The quality of this aspect of model performance is important in three key respects. It:

- determines the numbers of aircraft movements to a route group
- determines the modelled aircraft sizes to different zones and allows a mix of different aircraft sizes to the different destinations within the route group
- provides a more meaningful measure of connectivity at specific UK airports

4.25 The first two attributes impact on frequency and on the allocation of passengers to routes, the forecasting of numbers of aircraft movements and the validation reported above. However, it is the third aspect that is particularly relevant when using the model as an indicator of future UK connectivity. A base year model validation against actuals exercise has therefore been undertaken on this aspect of model performance to establish the suitability of the model for forecasting and quantifying future UK connectivity.

4.26 Table 15 reports the modelled destinations by airline type on routes with an annual passenger threshold of 5,000 per annum for 2016 with a comparison with actuals taken from department's detailed set of CAA 2016 statistics. Each of the model's 27 route group zones can have from 2-20 destinations associated with the zone in the modelling. Overall the new model reaches a high standard as demonstrated by the r^2 coefficient values, approaching 1.00, illustrating the level of variance between observed and model fitted values. Lower levels in the charter market are less significant in terms of the number of passengers involved - 13m out of 267m passengers in 2016.

	Scheduled		LCC		Charter	
	Actual	Modelled	Actual	Modelled	Actual	Modelled
Aberdeen	**12**	13	**0**	0	**8**	11
Belfast Intl	**3**	3	**28**	21	**17**	15
Belfast City	**6**	6	**0**	0	**0**	0
Birmingham	**86**	86	**29**	27	**50**	51
Bournemouth	**0**	0	**11**	9	**10**	9
Bristol	**33**	36	**73**	70	**36**	32
Cardiff	**12**	13	**1**	2	**21**	26
East Midlands	**23**	24	**49**	49	**28**	26
Edinburgh	**32**	32	**68**	65	**13**	21
Exeter	**9**	9	**0**	0	**13**	16
Gatwick	**159**	159	**106**	105	**81**	73
Glasgow	**37**	37	**46**	50	**31**	30
Heathrow	**180**	179	**0**	0	**0**	0
Humberside	**1**	1	**0**	0	**2**	0
Inverness	**2**	2	**0**	0	**0**	0
Leeds/Bradford	**14**	13	**50**	45	**8**	8
Liverpool	**13**	15	**47**	54	**1**	0
London City	**39**	36	**0**	0	**0**	0
Luton	**62**	57	**64**	63	**22**	24
Manchester	**114**	116	**97**	100	**71**	69
Newcastle	**32**	33	**43**	43	**6**	6
Newquay	**1**	1	**2**	0	**0**	0
Norwich	**3**	5	**0**	0	**10**	6
Southend	**4**	5	**14**	14	**0**	0
Southampton	**23**	23	**0**	0	**0**	1
Stansted	**27**	40	**150**	149	**24**	29
Teesside	**1**	1	**0**	0	**0**	0
Doncaster Sheffield	**19**	19	**0**	0	**18**	17
Prestwick	**0**	0	**16**	13	**0**	0
Total	**947**	964	**894**	879	**470**	470
r2		0.998		0.998		0.991

Only routes with more than 5,000 passengers per annum are included

Table 15 Validation of number of destinations by airport and airline type, 2016

Comparison of recent forecasts against outturn

4.27 The last three DfT aviation forecasts were published in 2009, 2011 and 2013. Figure 4.7 compares their forecasts with outturn.

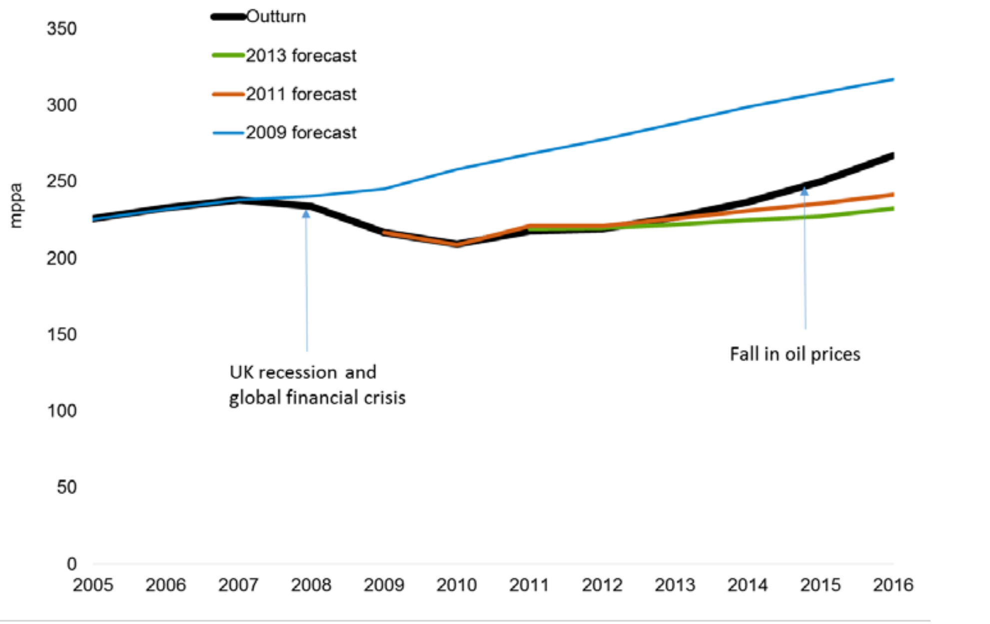


Figure 4.7 Comparison of 2009, 2011 and 2013 baseline central forecasts with outturn

4.28 The 2009 forecast was published early in the year and used economic inputs that pre-dated the recession, so it is unsurprising that its forecast was significantly too high.[84] The 2011 and 2013 forecasts both pre-dated the large fall in oil price which began towards the end of 2014.[85] This is likely to be the main explanation for the under-forecasting of the 2011 and 2013 reports, although some under-forecasting prior to the oil price fall is detectable.

4.29 There is no obvious pattern of systematically under or over-forecasting across these publications, but this exercise highlights the uncertainty around this type of forecasting, particularly in the short term. With respect to demand at a national level, there are three key sources of forecasting inaccuracy:

- the contemporary economic forecast inputs used at time as drivers; for example, those relating to economic activity and oil prices
- the responsiveness of demand in the econometric models to such inputs; for example, relating to market maturity
- industry and regulatory structure; for example, if the sector were to face a change of a similar scale to that which occurred with 'open skies' deregulation and the entry of low-cost carriers into the market

4.30 Although the department's modelling has always attempted to make the best and the most rigorous use of the available evidence base, uncertainty is large and there is no reason to believe such uncertainties will reduce in future years.

4.31 This analysis has considered demand at a national level. At individual airport level, uncertainties are even greater, as individual airport's demand patterns could be further affected significantly by changes in just a small number of airlines' or airports' business models and commercial agreements coming into effect.

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[84] http://webarchive.nationalarchives.gov.uk/+/http:/www.dft.gov.uk/pgr/aviation/atf/co2forecasts09/co2forecasts09.pdf. .
[85] https://www.gov.uk/government/publications/uk-aviation-forecasts-2013 and https://www.gov.uk/government/publications/uk-aviation-forecasts-2011.

5. Input assumptions

Introduction

5.1 This chapter describes how the drivers of demand are projected forwards to produce forecasts of passenger demand and gives more detail about the other key model inputs. It also demonstrates how the model is validated against baseline observed or 'actual' data in readiness for forecasting.

5.2 There is of course inherent uncertainty in projecting any of these variables. To reflect this the forecasts adopt a range of assumptions for many of the key inputs and present these using demand growth scenarios and sensitivity tests.

5.3 This chapter is split into the following sections:

- the main NAPDM inputs to model national unconstrained demand in the central case:
  - economic activity
  - fares
  - population
  - local growth at overseas hubs
  - market maturity assumptions
- definition of the low and high demand growth scenarios
- airline market sectors
- airport capacities
- surface access

5.4 Further detail is provided in Annex B. They are also included in the supplementary tables made available alongside this report.

NAPDM inputs to model underlying demand

5.5 Projections for each of the driving variables are fed into the relationships (introduced in Chapter 2) for each market segment to produce forecasts of aviation demand. It is helpful to group the passenger demand inputs into the two main drivers of aviation demand: economic activity and air fares.

5.6 Growth in incomes is driven by:

- UK GDP growth
- UK consumer spending growth
- foreign GDP growth

Changes in air fares are driven by:

- oil prices, exchanges rates and fuel efficiency
- carbon prices
- Air Passenger Duty (APD)
- airline 'other' costs

Inputs influencing income and economic activity

GDP and consumer expenditure

5.7 The short term (up to 2021) UK GDP and consumer expenditure forecasts are those from the Office of Budget Responsibility (OBR) published alongside the March 2017 budget.[86] For the longer term, the OBR January 2017 Fiscal Sustainability Report is used for GDP forecasts, with consumer expenditure forecast to grow at the same rate.[87]

5.8 Foreign GDP growth projections are split by the four broad NAPDM geographic regions as set out in Chapter 2. Projections for 2017 to 2022 are based on the IMF World Economic Outlook (WEO), April 2017.[88] Beyond 2022, the forecasts are based on the OECD's Economic Outlook.[89] In both cases the projections are then weighted by the proportion of traffic travelling between the UK and the relevant countries comprising the NAPDM forecasting region.

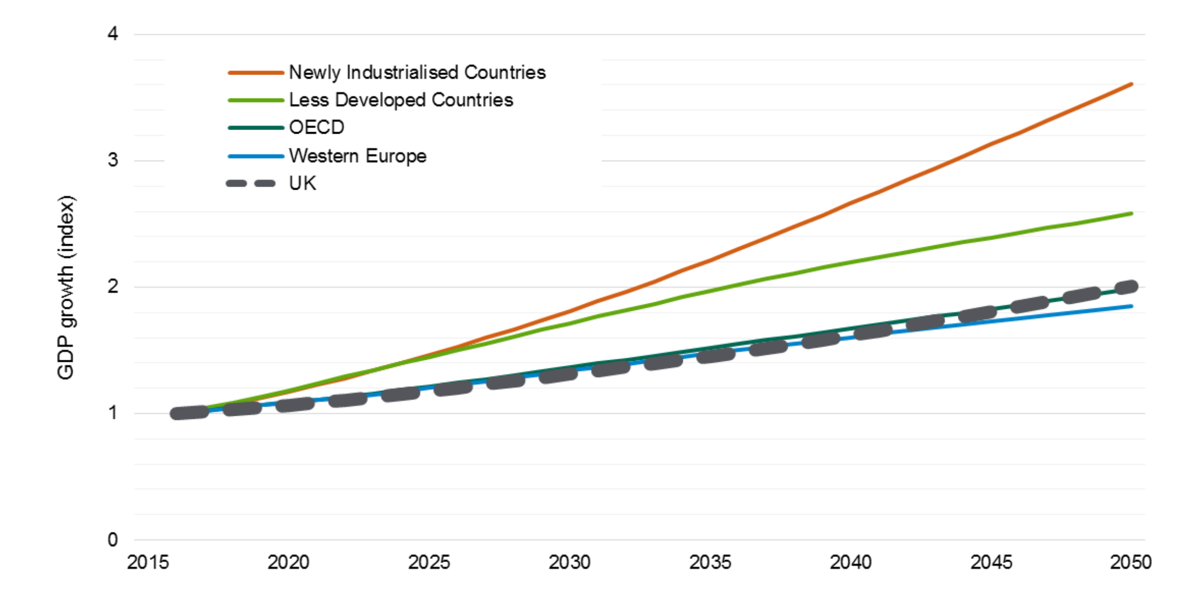

Figure 5.1 Index of real GDP growth forecast by NAPDM region, central case

Trade

5.9 The treatment of trade as a driver of aviation growth has not been changed from previous forecasts. As previous forecasts have shown, visible trade growth tends to be correlated with GDP growth. Analysis of historical data reveals that trade with

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86 *Economic and fiscal outlook – March 2017*, Office of Budget Responsibility, http://budgetresponsibility.org.uk/efo/economic-fiscal-outlook-march-2017

87 *Fiscal Sustainability report – January 2017*, Office for Budget Responsibility, http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-report-january-2017/

88 *World Economic Outlook – April 2017*, International Monetary Fund, https://www.imf.org/external/pubs/ft/weo/2017/01/weodata/index.aspx

89 Economic Outlook No 93 Long term baseline Projections – May 2014, http://stats.oecd.org/

Western Europe and non-European OECD members is more strongly correlated with GDP in those foreign regions. Therefore the growth rate of trade with Western Europe and other OECD members grows at the same rate as the local GDP of those regions. However, trade with NICs and LDCs is found to be more strongly correlated with UK GDP, so the growth rate of trade with NICs and LDCs has been assumed to grow at the same rate as UK GDP.

Fare inputs

5.10 Fares are a key driver of passenger demand, with lower fares driving faster growth and vice versa. NAPDM includes a fares model which breaks out the components of fare into:

- fuel costs
- carbon costs
- Air Passenger Duty (APD)
- airline 'other' costs

5.11 As noted in Chapter 2, all fare inputs, except APD, are estimated on a per seat-kilometre basis with APD is added to derive a total fare. As the forecast components change over time, so does the forecast fare.

Fuel costs

5.12 As set out in Chapter 2, oil price forecasts are a key input into forecast fuel costs. Oil price forecasts are based on BEIS published projections, which forecast the price rising to $80 per barrel by 2030.[90] Historic data relating to the spot fuel price is based on the CIF jet fuel wholesale price series provided by BEIS.[91] The CIF (costs, insurance and freight) series does not include all costs associated with fuel use (e.g. fuel costs incurred within the airport are excluded); these additional costs – which may not vary with the fuel price – are captured within the 'other' costs category.

5.13 The dollar to sterling exchange rate assumption determines the price of oil when expressed in sterling and is based on the average rate over the full calendar year. The outturn figure for 2016 averaged $1.34 per barrel. The short term forecasts of the exchange rate is inferred from the OBR Economic and Fiscal Outlook (March 2017), resulting in an exchange rate of $1.25 in 2017, rising gradually to $1.31 in 2021.[92] This figure is then assumed to remain constant until the end of the modelling period.

5.14 This process results in the costs per seat-kilometre (in 2016) set out in Table 16. Such costs change over time as oil prices and fuel efficiency changes.

[90] https://www.gov.uk/government/publications/fossil-fuel-price-assumptions-2016
[91] CIF stands for cost, insurance, freight price.
[92] They are created by dividing the reported forecast of price of oil in $ per barrel by the price of oil in £ per barrel, provided in table 4.1 of *Economic and Fiscal Outlook*, OBR, March 2017, http://budgetresponsibility.org.uk/efo/economic-fiscal-outlook-march-2017

	Fuel cost (pence per seat-kilometre)
Domestic	**1.2**
Western Europe	**0.8**
OECD	**1.0**
Newly Industrialised Countries	**1.1**
Less Developed Countries	**0.9**

Table 16 Estimated fuel costs in 2016, pence per seat-kilometre by NAPDM region (2016 prices)

5.15 In the forecasts presented here, it is assumed that the airlines' small increased use of biofuels does not affect their overall fuel costs. Because of this the increase in penetration of biofuels has no effect on air fares or on demand; it does, however, affect CO_2 forecasts as set out in Chapter 3.

Carbon prices

5.16 Carbon prices are assumed to grow in line with BEIS's March 2017 appraisal values.[93] In 2016 they were £4 / tCO_2, and they rise to £77 in 2030 and £221 in 2050 (all in 2016 prices). These are converted into fare impacts using annual fuel efficiency outputs from the CO_2 model. They are assumed to be faced by all passengers using any airport within the model.

Fuel efficiency and trip length

5.17 As noted above fuel efficiency influences air fares. Modelling the turnover of the future aircraft fleet changes the fuel and carbon cost elements of air fares, as new generations become increasingly fuel efficient. Aircraft fuel consumption over time is forecast for each destination region using the outputs from the aviation Fleet Mix (FMM) and CO_2 models.

5.18 There have been significant improvements in recorded fuel efficiency in recent years and the FMM and CO_2 models project further improvements which are expected to vary with the different types of aircraft deployed to the main forecasting regions. Indices of these changes are shown in Figure 5.2. They show forecast improvements in fuel efficiency (measured by seat-kilometres divided by fuel consumption) in the range of 14% - 85%. The improvement in fuel efficiency for flights to NICs is particularly large because this destination tends to use the largest aircraft (especially A380s) which are all retired and replaced by the 2040s. More detail on the FMM and CO_2 models are available in Chapters 2 and 8.

93 https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

Indices of fuel efficiency

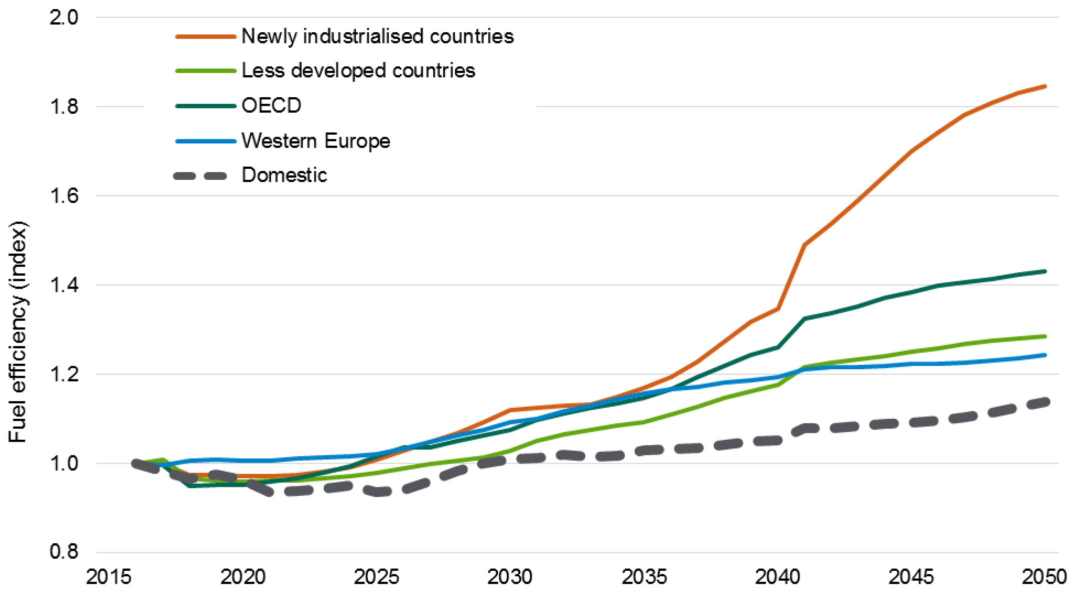

Figure 5.2 Indices of fuel efficiency by NAPDM forecasting region

5.19 Assumed average trip length makes very little difference to changes in fares over time and is therefore not a material driver of changes in demand. But it does affect the absolute levels of fares reported in Table 54 in the data annexes.

Air Passenger Duty (APD)

5.20 Rates are based on HMRC figures set out in April 2017.[94] The rate in each geographic region in the forecast model is aligned with APD geographic bands using CAA passenger survey data and is a weighted average across APD rates for reduced and standard classes. In addition, an adjustment has been made to reflect that those aged under 16 are now exempt. The rates are assumed to be held constant in real terms for the rest of the modelling period and are only applied when departing from a UK airport. Table 17 sets out the average rates used in the forecasts converted from the APD band areas to the NAPDM forecasting regions.

NAPDM region	APD rate, £
Domestic end-end	25
Western Europe	13
OECD	78
Newly Industrialised Countries	81
Less Developed Countries	66

APD is paid when departing a UK airport, and aviation trips entirely within the UK involve doing so twice. The domestic end-end rate is about double the Western Europe rate because of this.

Table 17 2016 weighted average two-way APD rates per passenger by NAPDM region, 2016 prices

94 https://www.gov.uk/government/publications/rates-and-allowances-excise-duty-air-passenger-duty/rates-and-allowances-excise-duty-air-passenger-duty

Airline 'other' (non-fuel) costs

5.21 The other airline costs contributing to fare levels include all costs not attributed to the fuel, carbon and APD group of costs. These are mainly aeronautical charges, fleet, labour and sales and administration costs.

5.22 Such costs are calculated by comparing fare levels against the sum of the other quantified components of fares set out in this chapter – the difference between these two is assumed to be the 'other' costs. Non-fare revenue and airline profits are not included in this calculation – it is effectively assumed that these two elements cancel out.[95]

5.23 Fare data is taken from the 2015 International Passenger Survey (IPS) for international trips and the 2015 CAA passenger survey for domestic trips. These data sources relate only to fares paid by UK residents and so it is assumed that foreign residents pay the same fares as their UK counterparts. All calculations are undertaken per seat-kilometre. Table 18 shows the costs by NAPDM region and journey purpose:

	Business	Leisure
Domestic	7.8	4.1
Western Europe	10.1	3.2
OECD	9.2	2.3
Newly Industrialised Countries	6.4	1.4
Less Developed Countries	8.0	2.3

Table 18 2015 Non-fuel costs by journey purpose and region, pence per seat-km, 2016 prices

5.24 Estimated costs are higher for passengers travelling on business because they are less likely to travel economy class. As such they are more likely to be provided with larger seats and more expensive extras incorporated into the fare such as use of particular lounges etc. As a rule, longer haul flights see lower non-fuel costs per seat-kilometre, as some costs are fixed (and such costs are spread out over a greater distance), although the proportion of passengers flying economy class also plays a role.

5.25 CAA financial data reveal that these costs (per seat-kilometre) have fallen from 1998 to 2014 by on average, by 2.3% a year in real terms.[96] This is shown in Figure 5.3 which also includes a logarithmic fitted trend line.

[95] In practice, these elements are small enough not to affect the calculations significantly as, according to CAA financial data (https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Airlines/Datasets/UK-Airline-financial-tables/Airline-financial-tables-2014-2015), non-fuel costs are almost ten times non-fare revenue. Profits are much more volatile but have normally been smaller than non-fare revenue.

[96] This relates to the four largest UK airlines (measure by distance travelled): British Airways, easyJet, Flybe and Virgin Atlantic. Costs are deflated using the Consumer Price Index (CPI) measure of inflation.

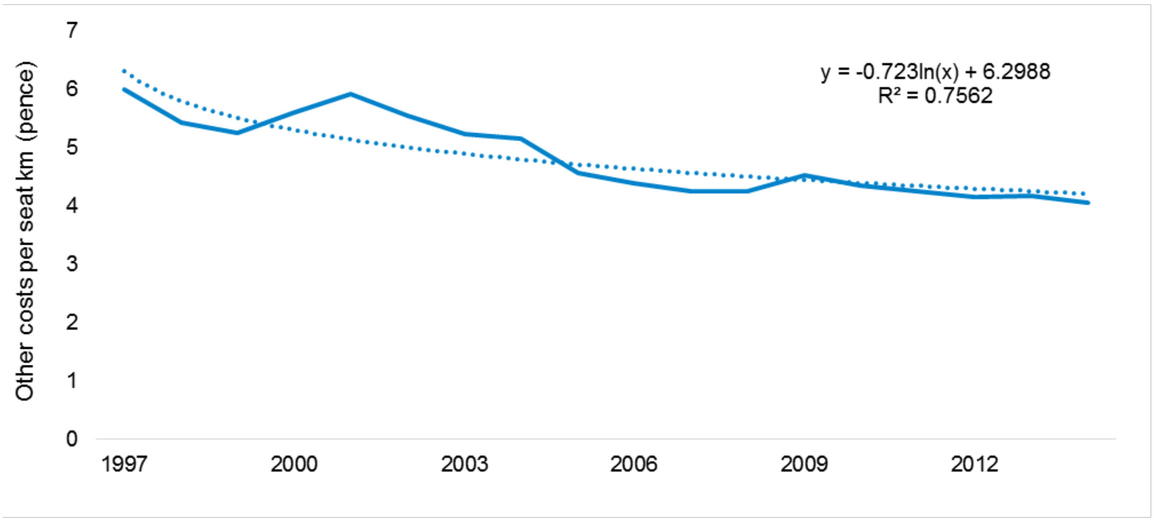

Figure 5.3 Historic non-fuel airline 'other' costs

5.26 It is assumed that such costs continue to fall into the future, although at a slower rate - this logarithmic function is applied for forecasting purposes. This results in the annual rate of decline falling from 0.9% in 2017 to 0.6% in 2030. From 2030 onwards, as with previous forecasts, it is assumed that such costs stop falling. In a slight departure from previous forecasts the same rate of growth is applied to both the short-haul and the long-haul markets. This is because the underlying data is at airline level and some airlines operate both short- and long-haul.

Load factors

5.27 Load factors are another input into the overall fare faced by passengers – the higher the load factor, the greater the number of passengers over which the costs are spread and the lower the fare. They are extracted from model outputs annually and vary by NAPDM market.

Overall change in modelled fares

5.28 Figure 5.4 provides an overview of the modelling of average total fares split by component.

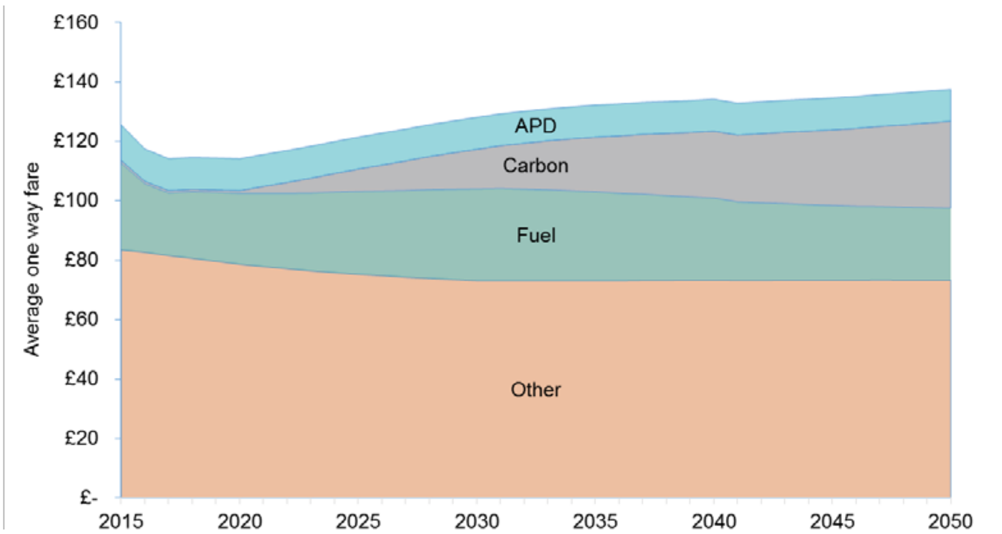

Figure 5.4 Projected composition of future air fares (all flights) weighted by terminal passengers, central demand

Population and distribution of demand across the UK

5.29 The OBR forecasts discussed in paragraph 5.7 incorporate forecasts of UK population into their UK GDP forecast; therefore population growth is not included as a separate driver of national demand. But the geographical distribution of population growth is expected to influence the distribution of demand growth as set out in Chapter 2.

5.30 The population data for UK regions has been updated with the department's latest National Trip End Model (NTEM) 7.2 release updated from NTEM 6.2. NTEM 7.2 shows a slightly higher share of population growth attributable to districts in the London and the South East, further contributing to a concentration of growth in that area, also referred to in Chapter 2.

5.31 The annual population growth rates by aggregated aviation model region is shown in Table 19.

Region	2016-2030	2016-2050
London	0.9%	0.7%
South East	0.7%	0.6%
Eastern	1.1%	0.8%
South West	0.6%	0.5%
Wales	0.3%	0.2%
West Midlands	0.5%	0.4%
East Midlands	0.6%	0.5%
Yorkshire & Humberside	0.4%	0.4%
North West	0.3%	0.3%
North	0.3%	0.3%
Scotland	0.4%	0.3%

Table 19 Population forecasts growth rate by region, per annum (CAGR)

Local demand growth at the overseas hubs

5.32 The inclusion of overseas hubs as capacity constrained modelled airports in NAPAM, as explained in Chapter 2, requires a forecast of 'local' (point-to-point) demand at these airports. This helps to improve the robustness of the demand forecasts for international-international transfers at these airports and ensures overseas capacity constraints at the key hubs are taken into account.

5.33 It is assumed that such local demand at overseas European hubs grows at the same rate as demand from foreign residents travelling to the UK (varying by NAPDM market). At Dubai, demand has in past years grown significantly more quickly than this approach would suggest and so in the short term a blended approach is used. Recent demand growth at Dubai (8% per annum over the past five years) is blended with forecast NAPDM foreign resident demand growth to the NIC region. This results in local demand growth of 7% in 2017, gradually falling to around 1.6% (leisure) and 3.5% (business) in 2021. Post 2021, foreign resident forecast growth to the NIC region is used.

Summary of main NAPDM econometric sources

5.34 Table 20 summarises the sources used to project the key drivers of demand.

Model input	Period	Source
UK GDP and consumption expenditure growth rates	2016 - 2021	OBR, March 2017
	2022 - 2050	OBR, January 2017
Foreign GDP growth rates	2016- 2022	IMF, April 2017
	2023 - 2050	OECD, May 2014
Carbon prices	2016 - 2050	BEIS, March 2017
Oil prices	2016 - 2040	BEIS, November 2016
	2041 - 2050	Held constant in real terms by assumption*
Dollar : sterling exchange rate	2016 - 2021	OBR, March 2017
	2016 - 2050	Held constant by assumption
Air passenger duty	2016 - 2018	HMRC, January 2017
	2019 - 2050	Held constant in real terms by assumption
Load factors	2016 - 2050	NAPAM, July 2017
Fuel efficiency	2016 - 2050	NAPAM, July 2017
Population by district	2016 - 2050	DfT NTEM 7.2
* There is no change in the source oil price forecast between 2030-2040		

Table 20 Summary of NAPDM input assumption sources

Definition of low and high scenarios

5.35 The definition of these scenarios follows similar macroeconomic input assumptions to those used by the Airports Commission in their final report in defining their global fragmentation (low) and global growth/low-cost is king (high) scenarios. The scenarios do not replicate the Airports Commission demand inputs exactly because the input macroeconomic central values have been updated[97] and the airport specific assumptions have not been applied.[98]

5.36 The defining low and high scenario forecast input assumptions are set out in Table 21.

[97] In the case of oil price forecasts the source has been changed from IEA to BEIS in all demand scenarios, including the central.
[98] The Airports Commission used the same global growth macroeconomic inputs to define the global growth and low-cost is king scenarios and the same carbon prices (consistent with a global emissions trading scheme) was common to all scenarios except global fragmentation.

Demand scenario	Description	Specifics
Low	Lower economic growth worldwide with restricted trade, coupled with higher oil prices and failure to agree a global carbon emissions trading scheme. These national demand inputs are based on the Airports Commission's global fragmentation scenario	Twentieth percentile of the OBR GDP forecast range up to 2021, and 0.5% per annum lower than the central forecast for all future years. GDP growth for all other countries 1% per annum lower than the central forecast for all years. A fall in the growth in trade in line with the change in GDP for all world zones International-international transfer traffic falls back to base year (2016) levels by 2040. BEIS high oil prices (rising to $120 by 2030). Carbon price applies only to the leg of the journey that relates to passengers departing UK airports.
High	Higher passenger demand from all world regions, lower operating costs and a global emissions trading scheme These national demand inputs are based on the Airports Commission's global growth and low-cost is king scenarios	GDP growth increased relative to the central forecast by 2% points per annum for NIC and LDC countries, and 0.5% elsewhere Trade increased in line with the change in GDP for all world zones An increase in international-international transfer passenger demand of 1% pa cumulatively over and above that forecast by NAPDM BEIS low oil prices (rising to $55 by 2030).

Table 21 Definition of the low - high demand scenario assumptions

Airline market splits

5.37 A key stage in the forecasting process is to identify if there are distinct markets within which passenger demand can be expected to differ. In line with previous forecasts, passengers and airline markets are split between scheduled, low cost carrier and charter flights and within these markets, passengers are also split by their journey purpose. This split does not affect forecast national underlying demand.

5.38 This split has been reviewed in the light of the new data. Given the recent falls in the share of the market attributable to charter traffic, it is now assumed that the charter share of the UK resident leisure market will decrease from around 10% in 2016 to about 5% in 2030. After 2030, the charter share is held constant.

5.39 In line with analysis of the most recent evidence, forecasts continue to assume that both the low cost carrier and scheduled airline market sectors retain constant shares of the non-charter market from 2016 onwards. This means that both sectors see an increase in overall share, as the charter market is forecast to decline. This assumption is driven by passenger survey data which show that, at a NAPDM market level, the share of the non-charter market has not changed between the scheduled and the low-cost carrier markets.[99]

Airport Capacities

Baseline capacities

5.40 Forecasting the impact of capacity constraints using NAPAM requires assumptions about both the terminal and runway capacities of each airport included in the model.

5.41 The overall principles adopted in these forecasts of defining annual airport capacities have been to:

- retain current planning ATM and terminal caps
- use information from airports' master plans.
- update theoretical capacities in line with observed (reflecting actual throughput) operational limits as appropriate at busy airports, where no formal cap restricts capacity
- continue to treat the two Northern Ireland airports as a special case because of the restricted airport choice for passengers in the model[100]

5.42 The baseline capacity scenario (alternatively known as the Do Minimum) assumes that no new runways are built in the UK, but that incremental improvements in line with developments already in the planning system or in published airport masterplans are implemented. These baseline assumptions include up to a 13% capacity gain (where possible) through operational and technological improvement in areas such as air traffic control and airspace management.

5.43 Where there is an expectation that some baseline capacity improvements beyond those in published sources will still be required, then these are deemed to be implemented (taking a cautious account of physical constraints) after 2030.[101] [102]

5.44 Table 22 shows the runway and terminal passenger capacities assumed for each airport in the airport capacity baseline. The terminal passenger capacity is the maximum number of passengers an airport's terminal and associated passenger handling infrastructure is assumed capable of serving a year. The table shows that in general most of the capacity added after 2016 is provided at regional airports.

5.45 In London, the changes made since previous forecasts are:

- The reduction of longer term ATM capacity from 120k to 111k and terminal capacity from 8mppa to 6.5mppa at London City. This is in line with the planning approval of July 2016. The terminal input capacity rises from 5m to 6.5m and is assumed to be implemented in 2022.
- An increase of Gatwick ATM capacity from 280k to 290k in 2016 to reflect the actual throughput in 2016 and the likelihood of further increase in 2017. The

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[99] The DfT definition of low cost carrier continues to be restricted to easyJet, Jet2, Ryanair and Thomsonfly. This is significant as the scheduled sector in terms of this split is increased by airlines such as Wizz and Norwegian who are often considered LCCs.

[100] Because Northern Ireland is modelled as a closed system consisting of only the two Belfast airports, over-capacity at one of these airports can cause model runs to fail to converge, even though the performance of these two airports has only a minimal impact on mainland UK airports. Therefore Belfast City and Belfast International are given just enough capacity to avoid incurring shadow costs.

[101] An example is Gatwick, where an increase in the assumed capacity beyond the current 45mppa to 50mppa is likely to be required sooner but has been delayed until after 2030 pending a revised masterplan for a single runway airport which the airport have currently held back during the Government draft NPS and Aviation Strategy consultations.

[102] Manchester has published potential post-2030 expansions to terminal and runway capacities in its masterplan and so these have been adopted.

terminal capacity has been increased to 50mppa, but consistent with the principle set out in paragraph 5.43, this increase has been held back until after 2030 pending publication of a new Gatwick masterplan.

- Luton is given its planning cap capacity of 18mppa in 2017 to take account of terminal work completion.

5.46 Outside London, the most significant changes in capacity input assumptions relate to the reduction in Bristol's terminal capacity from 12mppa to 10mppa in line with the current planning cap and the Doncaster Sheffield planning cap being restored throughout the model period for the purpose of consistency with other mainland airports with planning caps - this last change has no impact on any of the forecasts.

5.47 Elsewhere there are a number of smaller changes following a recent review by the department of published airport plans. Many of these reflect airports' more cautious expectations that terminal capacity expansion will most likely delayed until nearer the time demand requires it. A number of increases in capacity after 2030 (where there is no planning restriction) reflect this approach, often where the airport has not stated an aspiration, but with reference to earlier higher growth DfT forecasts.

	Runway ATMs (000s)					Terminal passengers (mppa)				
	2016	2020	2030	2040	2050	2016	2020	2030	2040	2050
Gatwick	290	290	290	290	290	45	45	45	50	50
Heathrow	480	480	480	480	480	90	90	90	90	90
London City	111	111	111	111	111	5	5	7	7	7
Luton	130	160	160	160	160	18	18	18	18	18
Stansted	259	259	259	259	259	35	35	35	35	35
London	1270	1300	1300	1300	1300	193	193	195	200	200
Birmingham	206	206	206	206	206	27	27	37	37	37
Bristol	150	150	226	226	226	10	10	10	10	10
East Midlands	264	264	264	264	264	6	6	10	10	10
Edinburgh	150	150	225	225	225	13	15	20	20	35
Glasgow	226	226	226	226	226	10	10	20	20	20
Liverpool	213	213	213	213	213	7	7	15	15	15
Manchester	324	324	400	500	500	30	30	38	55	55
Newcastle	213	213	226	226	226	9	9	9	9	9
Larger regional	1746	1746	1985	2085	2085	112	114	159	176	191
Aberdeen	175	175	225	225	225	6	6	6	6	6
Blackpool	0	0	0	0	0	0	0	0	0	0
Bournemouth	150	150	150	150	150	3	3	5	5	5
Cardiff	105	105	150	150	150	3	3	8	8	8
Coventry	0	0	0	0	0	0	0	0	0	0
Doncaster Sheffield	57	57	57	57	57	2	2	2	2	2
Exeter	150	150	150	150	150	2	2	4	4	4
Humberside	150	150	150	150	150	1	1	3	3	3
Inverness	150	150	150	150	150	1	1	3	3	3
Leeds-Bradford	150	150	150	150	150	5	5	8	8	8
Newquay	75	75	75	75	75	0	0	1	1	1
Norwich	175	175	175	175	175	2	2	3	3	3
Prestwick	150	150	225	225	225	3	3	3	3	3
Southampton	150	150	150	150	150	3	3	3	7	7
Southend	30	45	53	53	53	5	5	5	5	5
Durham Tees Valley	150	150	150	150	150	1	1	1	1	1
Sub-total	1817	1833	2011	2011	2011	36	36	53	57	57
All regional	3563	3579	3995	4095	4095	148	150	212	233	248
Total	4833	4879	5295	5395	5395	341	343	406	432	447

Table 22 Runway and terminal capacity inputs, mainland UK modelled airports, baseline

5.48 Blackpool and Coventry airports have, for modelling purposes, been treated as closed to passenger traffic, as shown in Table 22. The airport capacities include allowance for freight aircraft and flights to non-UK airports, including oilfield helicopters, which are all included in the ATM modelling.[103]

5.49 In the department's last forecasts the competing overseas hubs in the model were not included as capacity constrained. The current overseas hubs capacity shown in Table 23 are the same as those adopted by the Airports Commission, including that only runway capacity is limited.

	Runway ATMs (000s)					Terminal passengers (mppa)				
	2016	2020	2030	2040	2050	2016	2020	2030	2040	2050
Paris	690	690	690	690	690	Unlimited				
Amsterdam	510	510	630	750	750					
Frankfurt	700	700	700	700	700					
Dubai	560	560	1360	1760	1760					
Total	2460	2460	3380	3900	3900					

Table 23 Baseline runway and terminal capacity inputs at modelled overseas hubs

Airport development options (draft NPS)

5.50 Capacities for the expansion options are the same as those used by the Airports Commission. This is to ensure consistency for the further assessments being undertaken in conjunction with the preparation of the draft Airports National Policy Statement on new runway capacity and infrastructure in the South East (the NPS). The assumed final and incremental extra capacity provided is shown in Table 24:

Option	Abbreviated form	ATM capacity increment	Year implemented	Total ATM capacity
Gatwick Second Runway[104]	LGW 2R	270,000	2025	560,000
Heathrow Extended Northern Runway	LHR ENR	220,000	2026	700,000
Heathrow Northwest Runway	LHR NWR	260,000	2026	740,000

Table 24 Capacity expansion options, ATM capacity inputs

5.51 In common with the Airports Commission assessment, the modelling assumes that runway capacity is the constraint and subject of the proposals. So in each expansion option it is assumed that sufficient terminal capacity is provided so as not to prevent full use of the expanded runway capacity.

[103] An exception to this principle is Stansted. Here the capacity allows for freighters, but the planning cap capacity of 264,000 is reduced to allow for a significant volume of non-commercial jet flights which occur at this airport.
[104] Because the baseline capacity was increased from 280,000 to 290,000 in these forecasts, the capacity increment is now assumed to be 270,000 and not 280,000. This is to maintain the same overall capacity (560,000) following expansion as assumed by the Airports Commission.

Surface access inputs

5.52 The estimated time and money costs of accessing airports by road or rail help to determine passenger airport choice. These forecasts include updates relating to values of time (reflecting changes in WebTAG[105]), rail fares and road costs.

5.53 As well as including a set of surface access networks, NAAM2, as explained in Chapter 2, incorporates potential future changes in rail and road networks ensuring that a representation of large schemes like HS2 is included. For modelling purposes, the scheme assumptions made by the Airports Commission in their demand modelling have been retained, including those associated with the shortlisted capacity options.[106] The department recognises that in some cases such plans have progressed since the Commissions' analysis, and that going forward the plans will continue to evolve; as such, there is significant uncertainty relating to these assumptions.

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[105] https://www.gov.uk/government/publications/webtag-tag-data-book-july-2017

[106] These are set out in *Strategic Fit: updated forecasts*, Airports Commission, July 2015, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439687/strategic-fit-updated-forecasts.pdf. See, in particular, Appendix 2.

6. Unconstrained forecasts

Introduction

6.1 This chapter sets out underlying UK passenger demand in the absence of airport capacity constraints. These forecasts are therefore a hypothetical case independent of any airport development options.

6.2 Unconstrained passengers represent the underlying demand to use UK airports in any year. They include passengers who in the future may be priced out of travelling by capacity constraints as well as those who cannot use their preferred airport. They will also include a number of travellers who do not start or end their journeys in the UK. Such 'international-international interliners' pass through the UK interchanging at a hub airport, such as Heathrow, but could potentially use a competing overseas hub, such as Amsterdam, because of capacity constraints at the UK alternative.

6.3 The unconstrained forecasts are essentially a modelling diagnostic tool. They are very useful in recognising underlying patterns of demand growth and for checking that the linkages between key modelling components, the NAPDM and NAPAM, are functioning correctly. They are also useful to aid understanding of the geographical location of underlying demand and, when combined with capacity information, where in the country capacity constraints are forecast to exist. But they are highly theoretical in that they include input assumptions that could not exist. Because of this, airport specific unconstrained forecasts are not provided and these are not used directly by the department in economic appraisal.

Passenger forecasts

6.4 The forecasts reported here are derived from the National Air Passenger Allocation Model (NAPAM) using the methodologies described in Chapter 2 and the inputs described in Chapter 5. The unconstrained demand presented below is taken from NAPAM passenger allocations so that the units are terminal passengers rather than trips. This is for compatibility with the reporting of constrained passenger allocations elsewhere.

6.5 Terminal passengers[107] per annum (mppa) at the national level for the demand growth scenarios are summarised in Figure 6.1.[108] The definition of the three demand scenarios is given in Chapter 5 of this document. The range is formed in a different way to previous DfT forecasts; they represent three scenarios with the central forecast using the economic variable inputs described in Table 20.

[107] See paragraphs 2.5-2.9 for definition and discussion of the unit of 'terminal passenger'.

[108] These are modelled unconstrained passengers after allocation by the National Air Passenger Allocation Model. These will differ from the unconstrained terminal passenger forecasts produced by the input National Air Passenger Demand Model because the National Air Passenger Allocation Model allocates passengers to indirect routes such as via UK hubs where a single one way journey may be counted as three terminal passengers.

	Low	Central	High
2016	**267**	**267**	**267**
2020	285	300	315
2025	305	325	345
2030	335	355	380
2035	360	385	415
2040	395	420	455
2045	435	460	495
2050	470	495	535

Rounded to nearest 5 mppa

2016 are CAA recorded actuals for UK modelled airports

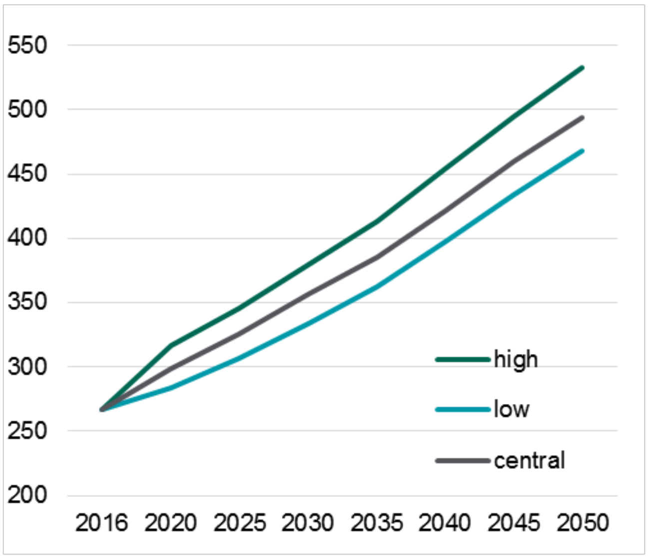


Figure 6.1 National passenger forecast, unconstrained capacity, mppa

6.6 Figure 6.1 shows growth in 5 yearly intervals from the model base year of 2016. The forecast is for underlying demand to increase by 84% from 2016 to 2050 with the forecast ranging between 75% (low) and 99% (high).

6.7 In the central and high demand cases, annual growth rates are higher at the beginning of the modelled period. The impact of lower carbon prices in the low scenario, which partially offsets the impact on demand of slower GDP growth, makes the range narrow. This effects grow stronger later in the forecasting period as carbon prices increase.

	low	central	high
2016 -2020	1.5%	2.8%	4.3%
2020 -2030	1.6%	1.8%	1.8%
2030 -2040	1.8%	1.7%	1.8%
2040 -2050	1.7%	1.6%	1.6%

Table 25 Compound annual growth rate, unconstrained capacity

Air passenger destinations.

6.8 In Table 26 UK passengers destinations are presented in the four international regions used in the NAPDM.[109] The table is compiled from NAPAM allocation model output so that transfer passenger components of the forecast can be separately identified.[110]

[109] A correspondence list between the international NAPDM regions and the 48 international zones used in the allocation model is given on page 32.

[110] But note that international-international transfers between the department's 2013 and 2017 forecasts are treated differently. Unlike the 2013 forecast, the new forecasts include overseas hubs in the airport allocation model and potentially some passengers who are using those hubs who wish to use UK hubs.

NAPDM Regions	2016 mppa	2016 share	2030 mppa	2030 share	2050 mppa	2050 share
WE	165.3	62%	204.0	57%	291.4	59%
OECD	17.9	7%	22.6	6%	31.2	6%
NIC	21.3	8%	27.0	8%	44.0	9%
LDC	1.8	1%	2.2	1%	3.4	1%
International total	206.3	77%	255.9	72%	369.9	75%
Domestic EE	29.0	11%	35.6	10%	48.1	10%
Dom-intl transfer	5.2	2%	19.7	6%	21.0	4%
Others	2.3	1%	2.3	1%	2.3	0%
Domestic Total	36.5	14%	57.7	16%	71.4	14%
II	23.9	9%	42.6	12%	52.7	11%
Total	266.6	100%	356.1	100%	494.0	100%

2016 figures are model outputs from the (constrained) validation forecast
Domestic EE - domestic passengers not leaving the UK
'Others' - normally passengers going from a UK airport in the model to a UK airport not in the model (e.g. oil rig traffic at Aberdeen)
II - international-international transfers at a UK hub airport
NAPDM regions are defined in Chapter 2

Table 26 Breakdown of demand by destination region, central demand, unconstrained capacity, mppa

6.9 Long-haul demand (defined as the NAPDM regions OECD, NIC and LDC) is forecast to be 16% of underlying demand in 2050, approximately the same proportion as today, but a near doubling of the absolute numbers forecast. The international proportion (including long-haul) also includes the international-international transfers, so the proportion of international passengers forecast in total is 86%, approximately the same share as today. OECD long-haul (principally North America) will in time form a slightly smaller proportion as this market is nearer maturity.

6.10 The 2016 total throughput of UK terminal passengers at 267mppa, from which the forecasts are projected, was significantly higher than the 2013 forecasts estimate for that year, due in large part to the sharp fall in oil prices since the last forecast. Nonetheless, primarily because of lower UK and worldwide GDP forecasts, the 2050 forecast of terminal passengers at 494mppa is now only 2.5% higher than the forecast for that year produced in 2013.

6.11 In the low demand scenario international short-haul forms a larger proportion of total traffic and grows by 74% from 2016-2050 compared with 70% growth for long-haul excluding transfers. In the high demand scenario forecast international traffic growth is driven by higher long-haul traffic growth. Long-haul grows by 127% from 2016-2050 compared to the 84% growth in international short-haul. Excluding transfers, the proportion of long-haul traffic in underlying demand rises to 18% in high growth and the proportion of short-haul drops.

6.12 International-international transfers also tend to grow faster with higher long-haul growth as the majority of such journeys have at least one long-haul leg. The cumulative growth over the modelled period in the unconstrained set of demand scenario forecasts are summarised in Table 27.

	low	central	high
Short-haul	74%	76%	85%
Long-haul	70%	92%	127%
All international	73%	79%	93%
All domestic	79%	96%	109%
II transfers	89%	121%	143%
All	76%	85%	100%

Table 27 Demand growth by type of trip, unconstrained capacity, 2016-2050

6.13 Full details of how the traffic by destination varies across the demand growth scenario forecasts can be found in Table 55 in the data annexes.

Air passenger UK ground origins

6.14 With the exception of international-international transfers, the department's aviation model represents the two-way journeys by air passengers from their starting or finishing point in the UK (the ground origin) to a foreign destination and back, or, in the case of internal domestic journeys, to another UK ground origin or destination and back. When forecasting, the ground origins of both UK and foreign resident passengers are varied in line with population projections in the department's National Trip End Model (NTEM 7.2), although each is ultimately controlled to the national forecast for each destination region and journey purpose market. Chapter 2 sets out this process.

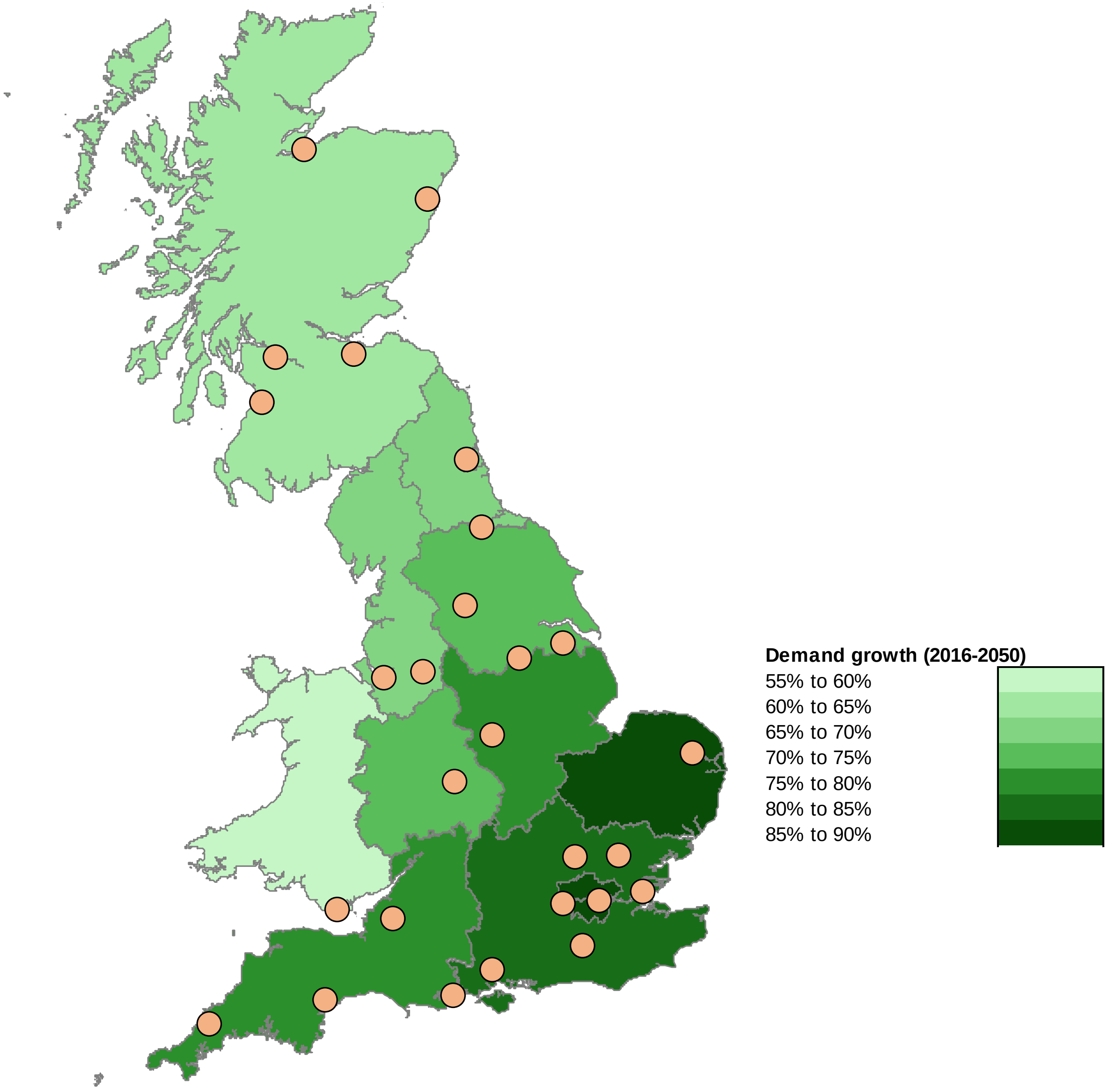
	mppa			Growth from 2016		Market share		
	2016	2030	2050	2030	2050	2016	2030	2050
London	67.7	87.7	127.2	30%	88%	25%	25%	26%
South East	46.5	58.3	83.8	26%	80%	17%	16%	17%
Eastern	7.0	9.0	13.3	29%	90%	3%	3%	3%
East Midlands	10.4	12.5	18.2	21%	75%	4%	4%	4%
West Midlands	12.8	15.2	21.9	19%	71%	5%	4%	4%
South West	14.3	17.3	25.1	21%	76%	5%	5%	5%
North	4.8	5.8	8.1	19%	68%	2%	2%	2%
Yorkshire & Humberside	11.1	13.2	19.1	19%	72%	4%	4%	4%
North West	19.6	23.0	32.9	17%	68%	7%	6%	7%
Scotland	21.7	25.9	35.1	19%	62%	8%	7%	7%
Wales	6.0	6.8	9.3	13%	55%	2%	2%	2%
Northern Ireland (international)	2.1	2.5	3.8	19%	77%	1%	1%	1%
Northern Ireland (domestic)	11.3	14.1	20.1	25%	78%	4%	4%	4%
Domestic-international hub transfer	5.2	19.7	21.0			2%	6%	4%
International-international hub transfer	23.9	42.6	52.7			9%	12%	11%
Other UK airports ("others")	2.3	2.3	2.3			1%	1%	0%
Total	266.6	356.1	494.0	34%	85%	100%	100%	100%

2016 figures are model outputs from the (constrained) validation forecast
'Others' - normally passengers going from a UK airport in the model to a UK airport not in the model (e.g. oil rig traffic at Aberdeen)

Table 28 Regional ground origins of passenger journeys, central demand, unconstrained capacity

6.15 Table 28 shows that over 40% of total terminal passengers start or end their air journeys in London and the South East. Once all transfers at UK hubs are excluded, then London and the South East currently accounts for 51% of the starting or ending point of all mainland UK journeys. This share is forecast to rise to 54% by 2050. Transfers at hub airports cannot be allocated to a region, and domestic international transfers are counted at the region where their journey ultimately starts or finishes.

6.16 Figure 6.2 shows the growth forecasts by region. The highest growth (90%) is projected for the eastern region, but this generates only 3% of UK passengers. London, with 30% of mainland UK ground origins, has the second highest growth (88%). London's dominance reflects its higher than national average growth since the department last produced forecasts, and the increased attractiveness of the capital to overseas visitors.



Circles denote modelled mainland UK airports

Figure 6.2 Growth in air journeys by region of ground origin 2016-2050, central demand, unconstrained capacity

Air passengers by residency and journey purpose

6.17 The department's aviation model splits passengers by their residency, UK or foreign, and their journey purpose, business or leisure. Business can be more narrowly defined as 'employer's business' as commuting by air is insignificant in terms of air passenger volumes.[111] Leisure includes a wide spectrum of purposes of which 'visiting friends and relatives' (VFR) has grown considerably and continues to grow alongside the more traditional holiday and city break markets.[112]

6.18 The international-international transfer category is not split by journey purpose in NAPAM and is kept separate in this analysis for clarity, but it might be noted that the majority of such passengers are on leisure trips and all are assumed to be foreign residents.[113]

6.19 Charter is defined as a separate category in the forecasts for compatibility with CAA statistical reporting. Charter is primarily package holiday traffic on flights not operating to a regular published schedule. For the purposes of further analysis, it is reasonable to treat charter passengers as part of the UK leisure market, as around 97% of charter passengers fall into this category.[114]

6.20 Domestic business and domestic leisure passengers are assumed to be UK residents.[115] This category is for internal UK flights where both the origin and destination are in the UK. Passengers making domestic-international transfers on domestic flights are included in the UK based international categories (UK or foreign residence, business or leisure).

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[111] The CAA have produced a study of current business air passenger available at http://publicapps.caa.co.uk/docs/33/CAP796.pdf

[112] More detailed breakdowns of passenger journey purposes is collected in the CAA passenger surveys - see, for example, http://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/Departing-passenger-survey

[113] Between 2011-2016 the CAA passenger interview surveys show that 76% of international-international transfers were on leisure journeys.

[114] Based on observation in CAA surveys 2011-2016.

[115] CAA surveys 2011-2016 suggest around 94% of such flights are made by UK residents.

mppa	2016		2030		2050	
UK business	18.7	*7%*	25.9	*7%*	38.0	*8%*
UK leisure	112.0	*42%*	156.1	*44%*	224.1	*45%*
Charter (UK leisure)	12.8	*5%*	7.6	*2%*	11.2	*2%*
Foreign business	16.7	*6%*	22.2	*6%*	31.3	*6%*
Foreign leisure	51.2	*19%*	63.8	*18%*	86.3	*17%*
Domestic business	15.1	*6%*	18.5	*5%*	23.6	*5%*
Domestic leisure	16.2	*6%*	19.4	*5%*	26.8	*5%*
International-international transfer	23.9	*9%*	42.6	*12%*	52.7	*11%*
Total	266.6		356.1		494.0	
Business	50.6	*19%*	66.6	*19%*	92.9	*19%*
Leisure	192.2	*72%*	246.9	*69%*	348.4	*71%*
International-international transfer	23.9	*9%*	42.6	*12%*	52.7	*11%*
Total	266.6		356.1		494.0	
UK resident	174.8	*66%*	227.5	*64%*	323.8	*66%*
Foreign resident	91.8	*34%*	128.6	*36%*	170.2	*34%*
Total	266.6		356.1		494.0	
UK resident	174.8	*72%*	227.5	*73%*	323.8	*73%*
Foreign resident (no II transfers)	68.0	*28%*	86.0	*27%*	117.5	*27%*
Total	242.8		313.6		441.3	

2016 figures are model outputs from the (constrained) validation forecast
Domestic 'others' split equally between domestic business and leisure

Table 29 Demand by purpose, central demand, unconstrained capacity

6.21 The full set of growth scenario forecasts of underlying demand for 2030, 2040 and 2050 split by both purpose and destination region (and compatible in format with earlier department forecasts) is shown in Table 58 in the data annexes. Summaries of international demand broken down by short-haul and long-haul and of the composition of domestic traffic are also included in the tables in the data annexes.

7. Capacity constrained forecasts

Introduction

7.1 The previous chapter looked at the underlying passenger demand to use the UK airport system and competing overseas hub airports in the absence of capacity constraints. This chapter looks at the demand once airport constraints come into play. Constrained forecasts are produced by first inputting the underlying demand forecasts produced by the National Air Passenger Demand Model (NAPDM) into the National Air Passenger Allocation Model (NAPAM). Then aircraft (ATM) demand is calculated. Finally, both passenger and ATM demand are constrained to available terminal and runway capacity.

7.2 This chapter presents the forecasts constrained by runway and terminal capacities for the low-central-high set of scenario forecasts. The forecasts are presented for a baseline of no new runways, and for the three capacity expansion options the Government is consulting on in the draft Airports National Policy Statement.[116]

7.3 In addition to the material in this document, separate data files are available relating to fully disaggregated passenger and ATM outputs for 2030, 2040 and 2050.

Passenger forecasts

7.4 Forecast terminal passengers at the modelled UK airports are shown in Figure 7.1.

	Low	Central	High
2016	**267**	**267**	**267**
2020	265	275	290
2025	280	295	310
2030	295	315	330
2035	320	335	355
2040	345	360	380
2045	375	385	410
2050	395	410	435

Rounded to nearest 5 mppa

2016 are CAA recorded actuals for modelled airports

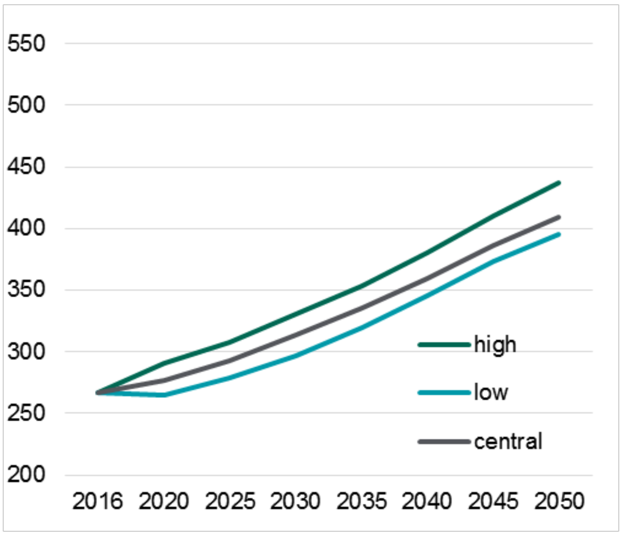


Figure 7.1 National passenger forecast, baseline capacity, mppa

[116] Department for Transport, *Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*, February 2017.

7.5 The figure shows that, after allowing for runway and terminal passenger constraints, passengers at UK airports are forecast to grow to 315mppa in the central case in 2030 with a range of 295mppa to 330mppa. By 2050 the number of passengers are forecast to rise to 410mppa in the central case with a range of 395mppa to 435mppa. More detailed and unrounded constrained forecasts are available in Annex D.

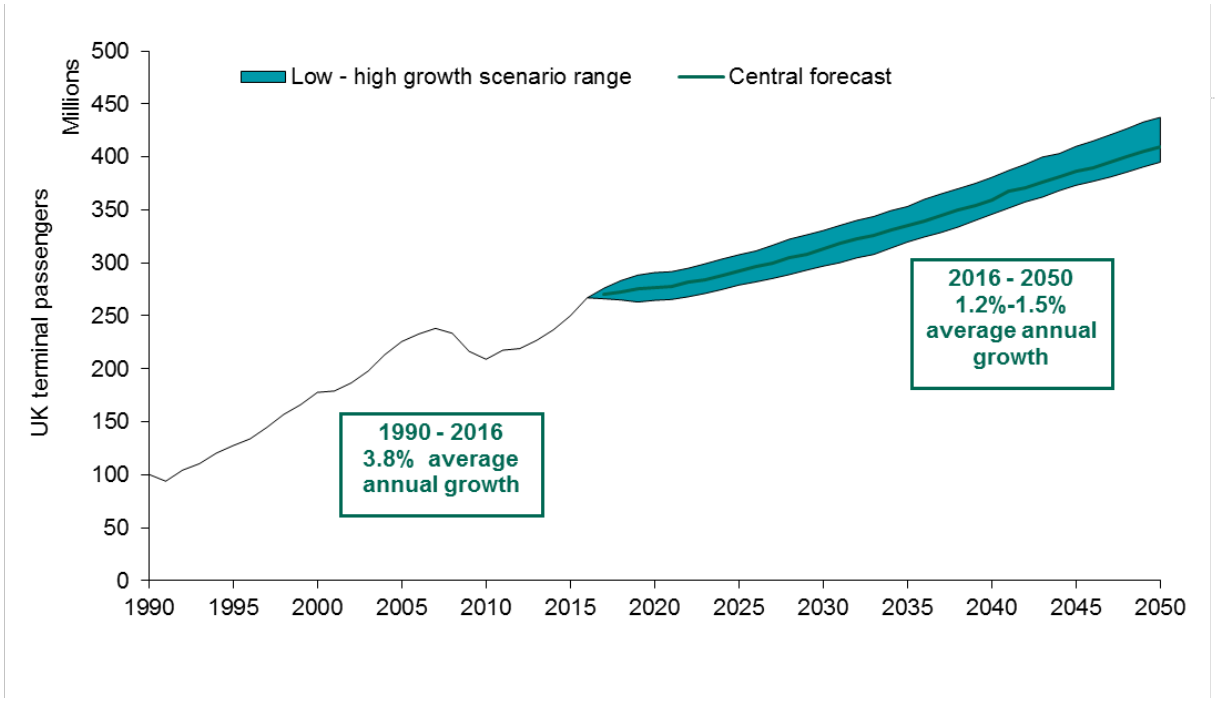


Figure 7.2 Historic and forecast national passenger demand, baseline capacity

7.6 The scenarios reveal a marked slowing of the rate of annual growth. Market maturity, lower economic growth inputs and higher carbon prices combine with capacity constraints to lower the set of central constrained forecasts well below the 445mppa reported in the department's 2013 forecasts.

7.7 A comparison of the unconstrained national forecasts in Figure 6.1 with the constrained forecasts in Figure 7.1 shows that capacity constraints restrict national forecasts and this impacts increases over time. More passengers to and from the UK are deterred from travel, or in the case of international-international transfers switch to competing overseas hubs.

7.8 Table 30 shows the difference between constrained and unconstrained passenger numbers throughout the model period. In the central forecasts airport capacity constraints lower demand by about 45mppa in 2030, rising to about 85mppa by 2050. At the low end of the forecast range, capacity constraints lower constrained demand by about 35mppa in 2030 and 75mppa in 2050. At the high end of the range the number of passengers either not travelling or transferring away from UK hub airports reaches about 95mppa by 2050.

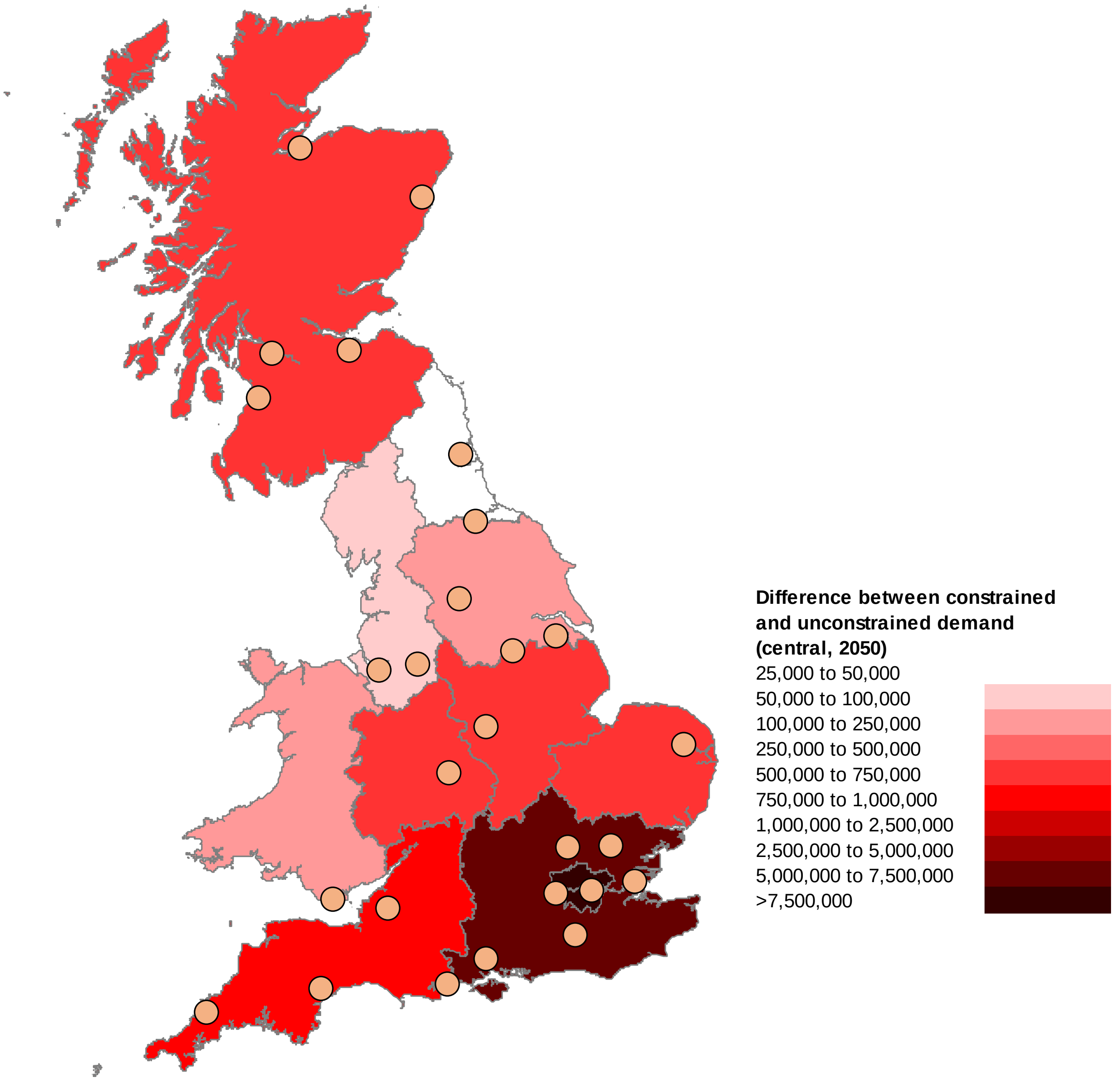
	Low	Central	High
2020	20	20	25
2025	30	35	40
2030	35	45	50
2035	45	50	60
2040	50	60	75
2045	60	75	85
2050	75	85	95

All figures are rounded to the nearest 5mppa

Table 30 Difference between constrained and unconstrained passenger national demand, mppa

7.9 The majority of the passengers lost to the UK terminal passenger total in the baseline are transfers at UK hub airports as such transfers effectively need to use scarce runway slots twice - and so pay 'shadow costs' (the premium for using a constrained airport) twice - to complete a one-way journey. As congestion mounts and shadow costs rise, such passengers are more likely to become displaced. In some cases domestic-international transfers will instead use direct flights after travelling by surface modes to an alternative airport, with some new routes being stimulated at less congested airports. Most of the international-international transfers will switch to competing overseas hubs (see the box on page 37).

7.10 The regional locations of those passengers deterred from travelling to or from mainland UK are mapped in Figure 7.3. Outside of London and the South East the higher levels of lost travel are in Scotland and can be largely attributed to the high demand for interchanges at the congested London airports and the loss of several domestic flights to London.



Circles denote modelled UK airports

Figure 7.3 Difference between unconstrained and constrained passenger demand by region, central demand, 2050, passengers

7.11 Table 31 repeats the analysis in Chapter 6 (in Table 29) for the case when demand is constrained by baseline capacity and it makes the comparison with the unconstrained case.

7.12 Business passengers remain a low proportion of total travellers, but their numbers are little changed from the unconstrained case, continuing to travel mainly because of their willingness to pay higher fares. By 2050 a large number of foreign residents are lost from the constrained forecast, but these are essentially international-international transfers increasingly using overseas hubs. The bottom line of the table shows that, if this element is removed from the analysis, the foreign resident share of the total market remains broadly constant.

	2016		2050 unconstrained		2050 constrained		2050 difference
UK business	19	*7%*	38	*8%*	37	*9%*	1
UK leisure	112	*42%*	224	*45%*	199	*49%*	25
Charter (UK leisure)	13	*5%*	11	*2%*	11	*3%*	1
Foreign business	17	*6%*	31	*6%*	31	*8%*	1
Foreign leisure	51	*19%*	86	*17%*	78	*19%*	8
Domestic business	15	*6%*	24	*5%*	23	*6%*	0
Domestic leisure	16	*6%*	27	*5%*	26	*6%*	1
International-international transfer	24	*9%*	53	*11%*	5	*1%*	48
Total	267		494		410		84
Business	51	*19%*	93	*19%*	91	*22%*	2
Leisure	192	*72%*	348	*71%*	314	*77%*	35
International-international transfer	24	*9%*	53	*11%*	5	*1%*	48
Total	267		494		410		84
UK resident	175	*66%*	324	*66%*	296	*72%*	28
Foreign resident	92	*34%*	170	*34%*	114	*28%*	56
Total	267		494		410		84
UK resident	175	*72%*	324	*73%*	296	*73%*	28
Foreign resident (no II transfers)	68	*28%*	118	*27%*	109	*27%*	9
Total	243		441		405		37

2016 figures are model outputs from the (constrained) validation forecast
Domestic 'others' split equally between domestic business and leisure

Table 31 Passenger demand by journey purpose, central demand

7.13 More detailed breakdowns of these data are also included in Annex D.

Airport level constrained forecasts

7.14 The primary purpose of the passenger forecasts is to inform strategic aviation policy in the longer term. Less emphasis is placed on the role of these forecasts in informing highly detailed predictions of passengers and ATMs at each individual airport in the shorter term. Where there is a particular interest in the short term, there is close competition amongst similar airline types at neighbouring airports and where hard to model commercial factors are important, uncertainties are higher. Consideration may be given to the use of alternative forecasts (for example, sensitivity tests), particularly if they are more recent.

7.15 For both continuity with previous publications and transparency of the forecasting methodology, airport level forecasts continue to be included in this document. But it is recognised that the uncertainty reflected by the demand growth scenarios at the national level is compounded at the level of the individual airport. Where airports individually produce their own forecasts for their own uses, these may differ. Such forecasts may be produced for different purposes as well as being informed by specific commercial and local information. This information may be particularly relevant in the short-term.

7.16 Airport level forecasts are produced by the National Air Passenger Allocation Model (NAPAM). This model forecasts how passengers will be distributed to airports in a system-wide manner after taking account of both runway and terminal passenger constraints. NAPAM also forecasts how many aircraft (ATMs) will be needed to service demand and use the runway on each route at each airport.

7.17 When airports fill, the model allocates passengers to the next most suitable airport. The choice of airport will depend on journey purpose, where the passenger is starting or ending the journey, the level of congestion and the availability of a suitable service (route). This process occurs if either the runway or the terminal exceeds its capacity. In some locations, both can exceed capacity as demand rises over time. In this situation the model assumes that the runway is the harder constraint and terminal capacity can be 'flexed' beyond its capacity within limits. Some throughputs reported in the tables may therefore be slightly higher than their input capacities and it means that there may be no significant difference between low, central and high scenarios for an individual airport once it is full.[117]

Baseline airport forecasts

7.18 Table 32 shows the scenario forecasts under baseline capacity. As the airports become full, the forecast demand range narrows and the annual rates of growth reduce. By around 2040 this effect is evident even in the low growth scenario.

7.19 The range of the demand growth scenarios remains wider outside London. However airports which share some overlaps of catchment areas with the London airports (e.g. Birmingham and Bristol) experience 'spill' of passengers from London seeking alternatives to London airport and in time such airports also near or reach capacity. A full version of this table is in Table 63 in the data annexes.

	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	43	45	45	49	50	50	54	52	52	55
Heathrow	76	87	86	86	89	90	90	91	93	97
London City	4	7	6	7	7	6	6	7	6	7
Luton	15	18	18	18	18	18	18	18	18	18
Stansted	25	24	31	35	35	35	35	35	35	35
London	162	180	187	195	199	199	204	203	205	212
annual growth rate		0.7%	1.0%	1.3%	1.0%	0.6%	0.5%	0.2%	0.3%	0.4%
Birmingham	12	16	18	20	23	27	30	31	33	36
Bristol	8	8	10	10	10	10	10	10	10	10
East Midlands	5	6	6	7	8	9	10	10	10	10
Edinburgh	12	12	13	13	14	15	16	17	18	19
Glasgow	8	11	12	13	12	13	14	14	15	16
Liverpool	5	4	4	5	5	5	6	9	8	12
Manchester	27	29	31	33	37	39	41	46	50	55
Newcastle	5	4	5	5	5	5	5	6	6	6
Larger regional airport total	81	92	98	105	114	123	133	144	151	165
Other regional	23	25	28	31	32	37	43	49	53	61
Total outside London	104	117	126	136	146	160	177	193	204	226
annual growth rate		0.8%	1.4%	1.9%	2.3%	2.4%	2.7%	2.8%	2.4%	2.5%
Total	**267**	**297**	**313**	**331**	**346**	**360**	**381**	**395**	**410**	**437**
annual growth rate		0.8%	1.2%	1.5%	1.5%	1.4%	1.4%	1.3%	1.3%	1.4%

2016 is modelled

Table 32 Passenger demand by airport, baseline capacity, mppa.

[117] A difference of 1 or 2 mppa at large airports such as Heathrow or Gatwick ought not be regarded as materially different once the airport is full (i.e. subject to shadow costs).

7.20 On an annual basis Heathrow and Gatwick runways are full or very close to full in the base year. Heathrow now operates very near to its planning cap of 480,000 ATMs a year. Gatwick handled 43mppa in 2016 and is expected to handle more than that in 2017. But Gatwick, although it has no planning cap, is showing symptoms associated with over-capacity with runway slots at a premium in peak hours and the peak summer season.[118] Both Heathrow and Gatwick can continue to grow passenger numbers at a slower rate through operating with larger aircraft and higher load factors, and in uncapped Gatwick's case potentially through more low-season demand.

	2016	2030	2040	2050
Heathrow	100%	100%	100%	100%
Gatwick	100%	100%	100%	100%
Stansted	70%	88%	100%	100%
Luton	81%	100%	100%	100%
London City	80%	100%	100%	100%
London	93%	98%	100%	100%
Manchester	89%	81%	70%	91%
Birmingham	50%	66%	95%	100%
Bristol	76%	95%	100%	100%
East Midlands	79%	63%	87%	100%
Southampton	82%	99%	100%	100%

2016 is modelled

The proportions shown relate to the higher of the terminal capacity or runway capacity used

The London total proportions relate to a weighted average by number of passengers

Runway capacity is assumed to increase at Manchester; so lower utilisation figures reflect an increase in capacity rather than a decrease in demand

Table 33 Proportion of capacity used by airport, central demand, baseline capacity

7.21 Airports such as Birmingham, Bristol and Southampton are noticeably affected by spill from London during the 2030s, with the effects of spill spreading to East Midlands and Southend in the 2040s. This effect is geographically nuanced. It is not simply a matter of 'London' demand moving to (say) Birmingham. Increasing numbers of passengers who live in areas where catchments overlap (e.g. on the M4 corridor between the M25 and Bristol, or on the M40/HS2 corridor between the M25/Old Oak Common and Birmingham) consider alternatives, and airlines using airports outside London see sufficient new demand to increase frequencies and start new routes. Note that in Table 33 the proportion of capacity used at Manchester drops because of increased capacity provided after 2020.[119]

7.22 The analysis of capacity take up at the London airports and the spill to surrounding airports for the low-high set of scenario forecasts can be found in Table 64 in the data annexes. These tables show that even in the low demand growth scenario all London airports are full by 2040. Under the high demand growth scenario, all the

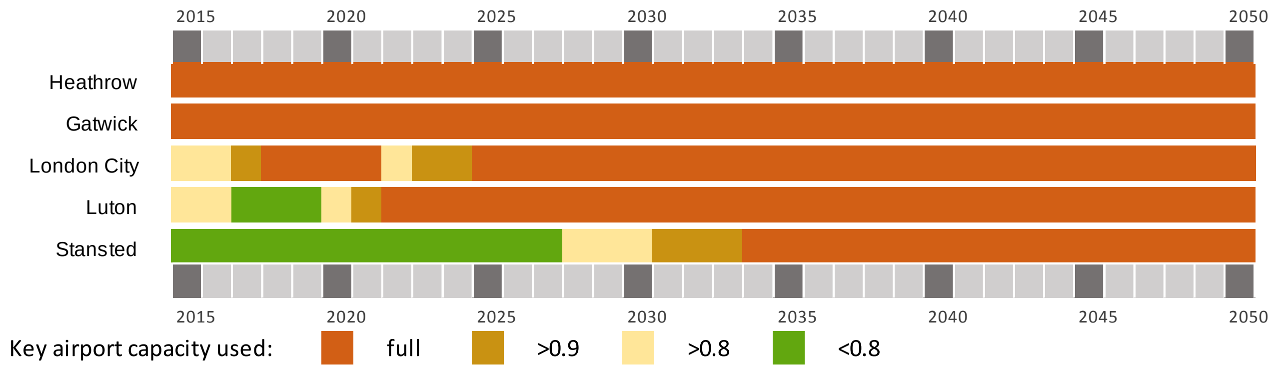
[118] The CAA have recently investigated the growing operational difficulties at Gatwick and published the results of their researches. See http://publicapps.caa.co.uk/docs/33/CAP1516%20Gatwick%20delay%20causation%20study%20-%20Final%20report%20v06_ISSUED.pdf , CAA, May 2017.

[119] A drop in the utilisation proportion also occurs at Southend. This should be treated with caution because the forecast of Southend is more uncertain than others in the model in the absence of a CAA survey being undertaken since opening.

London airports are full by 2030 and the further five airports listed in Table 33 are also all full by 2050.

7.23 The timeline shown in Figure 7.4 gives more detail of London airports filling.

Central growth scenario, no new runways, London airports, timeline of capacity usage



The proportions shown relate to the higher of the terminal capacity or runway capacity used
Luton's capacity increases in 2017
London City's capacity increases in 2022

Figure 7.4 Timeline of London airports' capacity filling, central demand, baseline capacity

7.24 The timeline shows that Luton is expected to reach its 18mppa planning cap soon after 2020, so the relief from congestion after extra capacity is provided around 2017 is short-lived. London City begins to operate close to capacity before the modelling assumes that it implements its planning consent to increase capacity to from 5mppa to 6.5mppa in 2022, providing some relief, but it fills again during the 2020s. Stansted becomes full during the 2030s.

7.25 This timeline analysis of the London airports is provided for the low and high scenario forecasts in Figure D.1 in the data annexes.

Capacity expansion forecasts

7.26 In October 2016 the Government accepted the conclusions of the Airports Commission, confirmed the need for new runway capacity in the South East and announced that its preferred scheme for adding the capacity was a Northwest Runway at Heathrow ('LHR NWR'). A draft Airports National Policy Statement was published in February 2017 and, from February to May 2017, the department consulted on this statement which included assessments of all options for additional capacity in the South East of England shortlisted by the Airports Commission.[120] The department is still considering the responses to the consultation and updating and further consulting on some elements. It is therefore still appropriate to include new forecasts for all the shortlisted capacity options.

7.27 Chapter 5, in particular Table 25, sets out the three capacity options considered. These are:

1 Gatwick Second Runway (LGW 2R)

[120] *Draft National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*, DfT, February 2017.

2 Heathrow Extended Northern Runway (LHR ENR)

3 Heathrow Northwest Runway (LHR NWR)

7.28 The modelling assumes that runway capacity is the primary constraint. Therefore, for each option it is assumed that sufficient terminal capacity is provided so as not to prevent full use of the expanded runway capacity. These are the same final capacity settings as assumed by the Airports Commission.

7.29 Table 34 shows the central forecasts of millions of terminal passengers (mppa) for the baseline and three capacity expansion options. A set of forecasts for the low and high scenarios is included in Table 65 in the data annexes.

7.30 The range of the forecasts in the demand growth scenarios remain wider outside London and at the national level. However airports more accessible to the London area and which share some overlaps of catchment areas with the London airports (e.g. Birmingham and Bristol) experience 'spill' of passengers from London seeking alternatives to London and in time such airports also near or reach capacity even with the expansion in London.

	2030				2040				2050			
	Baseline	LGW 2R	LHR ENR	LHR NWR	Baseline	LGW 2R	LHR ENR	LHR NWR	Baseline	LGW 2R	LHR ENR	LHR NWR
Gatwick	45	58	45	45	50	74	49	50	52	99	51	52
Heathrow	86	85	125	132	90	89	128	135	93	90	128	136
London City	6	7	5	4	6	7	7	7	6	7	7	7
Luton	18	18	18	18	18	18	18	18	18	18	18	18
Stansted	31	25	23	22	35	32	33	32	35	35	35	35
London total	187	192	216	222	199	220	235	241	205	249	239	248
Birmingham	18	18	16	15	27	24	22	21	33	30	32	31
Bristol	10	9	9	9	10	10	10	10	10	10	10	10
East Midlands	6	6	7	7	9	8	8	8	10	10	10	10
Edinburgh	13	13	13	13	15	16	16	16	18	18	19	19
Glasgow	12	12	12	12	13	13	12	12	15	15	14	14
Liverpool	4	4	5	5	5	5	5	5	8	9	8	8
Manchester	31	31	30	29	39	38	38	37	50	44	46	45
Newcastle	5	5	5	5	5	5	5	5	6	6	6	6
Larger regional airport total	98	97	95	94	123	118	117	116	151	142	145	143
Other regional	28	27	27	27	37	32	31	31	53	42	45	44
Total outside London	126	124	122	121	160	150	147	146	204	183	190	187
Total	313	317	337	343	360	370	382	387	410	432	429	435

Table 34 Passenger demand by airport, central demand, mppa

Air Transport Movements

7.31 As described in Chapter 2 (paragraphs 2.52-2.54), air transport movements (ATMs) are generated from the forecast passenger demand for each modelled route using established relationships between seats provided, load factor, airline type, type of aircraft operated and passenger demand. The ATMs output by the model (by size) are used both in the modelling of runway constraints and in the forecasting of CO_2 emissions.

7.32 Figure 7.5 shows the future demand growth range of UK ATMs and the historic growth in UK aircraft movements from 1990. The growth range of ATM forecasts is narrower than for passengers. This is because (a) the modelling adjusts aircraft size to fit demand, so that as passenger numbers grow some of that demand will be met by bigger, rather than more, aircraft and (b) demand is constrained by capacity, limiting the number of aircraft that can be accommodated. Table 35 shows the forecasts for all the capacity options.

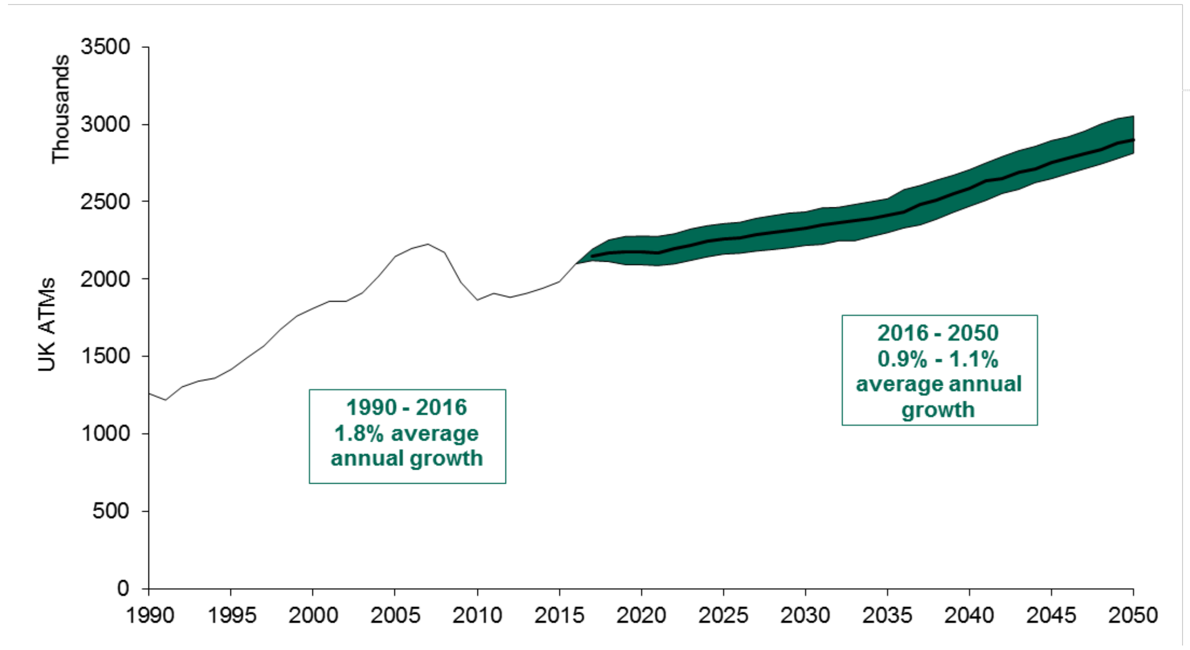


Figure 7.5 UK ATMs, historic data and forecasts

	2030				2040				2050			
	Baseline	LGW 2R	LHR ENR	LHR NWR	Baseline	LGW 2R	LHR ENR	LHR NWR	Baseline	LGW 2R	LHR ENR	LHR NWR
Gatwick	282	350	278	276	292	435	292	295	297	567	290	297
Heathrow	485	482	713	753	489	489	711	752	492	479	706	757
London City	98	99	80	73	96	98	101	102	94	100	105	103
Luton	119	118	116	115	115	114	114	113	115	113	113	112
Stansted	198	162	148	145	212	190	191	184	212	207	203	204
London total	1182	1211	1335	1363	1205	1326	1409	1446	1211	1467	1417	1472
Birmingham	135	131	120	118	195	168	158	150	206	205	208	205
Bristol	67	64	61	60	69	70	69	69	78	73	73	72
East Midlands	79	78	80	80	99	87	93	95	120	113	114	113
Edinburgh	116	119	123	122	130	135	144	147	143	148	162	160
Glasgow	94	93	90	91	96	90	87	86	103	100	95	97
Liverpool	34	34	36	36	37	37	38	39	56	58	54	55
Manchester	211	210	204	200	247	244	243	242	310	273	289	282
Newcastle	40	41	41	41	43	42	44	43	49	48	49	48
Larger regional airport total	777	771	755	747	915	873	876	871	1066	1018	1043	1032
Other regional	371	359	351	350	465	400	384	380	624	493	530	508
Total outside London	1148	1130	1106	1097	1380	1273	1260	1251	1690	1511	1573	1540
Total	2330	2341	2441	2459	2584	2599	2669	2697	2901	2978	2990	3013

Note that to allow the model to converge when constrained, ATMs at airports can exceed input capacity by up to 2.5%

Table 35 ATMs by airport, central demand, thousands

7.33 There are more ATM tables in Annex E:

- Table 66 gives the demand growth scenario ATM forecasts for 2030, 2040 and 2050 for all the modelled airports in the baseline
- Table 67 gives the demand growth scenario forecasts for each of the capacity expansion options for 2030, 2040 and 2050 for the London airports and the larger mainland UK regional airports
- Table 68 gives the demand growth scenario ATM forecasts 2016-2050 at the national level disaggregated by operator type (scheduled, low cost etc)

8. CO_2 emissions forecasts

Introduction

8.1 Chapter 3 describes the methodology and key input assumptions used for forecasting UK aviation CO_2 emissions updating the department's Fleet Mix and CO_2 models. This chapter reports the CO_2 emissions for the four capacity options under the low-high set of demand scenarios over the full model period. It considers only those emissions associated with passenger and freighter aircraft movements while on the ground and in the air. The emissions reported do not include passengers travelling to the airport or the operation of the airport itself.

8.2 No variations on aircraft fleet or carbon emissions assumptions (e.g. biofuels, operational practices, fleet retirements, fleet turnover and performance of new aircraft types) are modelled. The impact and potential to alter emissions forecasts with such variables are being separately assessed in a parallel study on carbon abatement in UK aviation.[121] The forecasts presented here will provide the baseline for the MACC work in developing strategy options for mitigating future CO_2 emissions.

National CO_2 forecasts in the future capacity options

8.3 As with the constrained ATM forecasts, from which these emissions forecasts are developed, the four capacity cases considered are:

1 Baseline (i.e. no new runways)

2 LGW Second Runway (LGW 2R)

3 LHR Extended Northern Runway (LHR ENR)

4 LHR Northwest Runway (LHR NWR)

8.4 Table 36 and Figure 8.1 show that under the central demand forecast in the baseline CO_2 emissions are forecast to be 37.0Mt by 2050. Adding a new runway adds from 2.2MtCO_2 to 2.9MtCO_2 by 2050 under the central growth scenario. With the high growth scenario the additional emissions from the baseline do not exceed 2.2MtCO_2 as in this scenario most of the additional demand accommodated is on shorter haul flights.

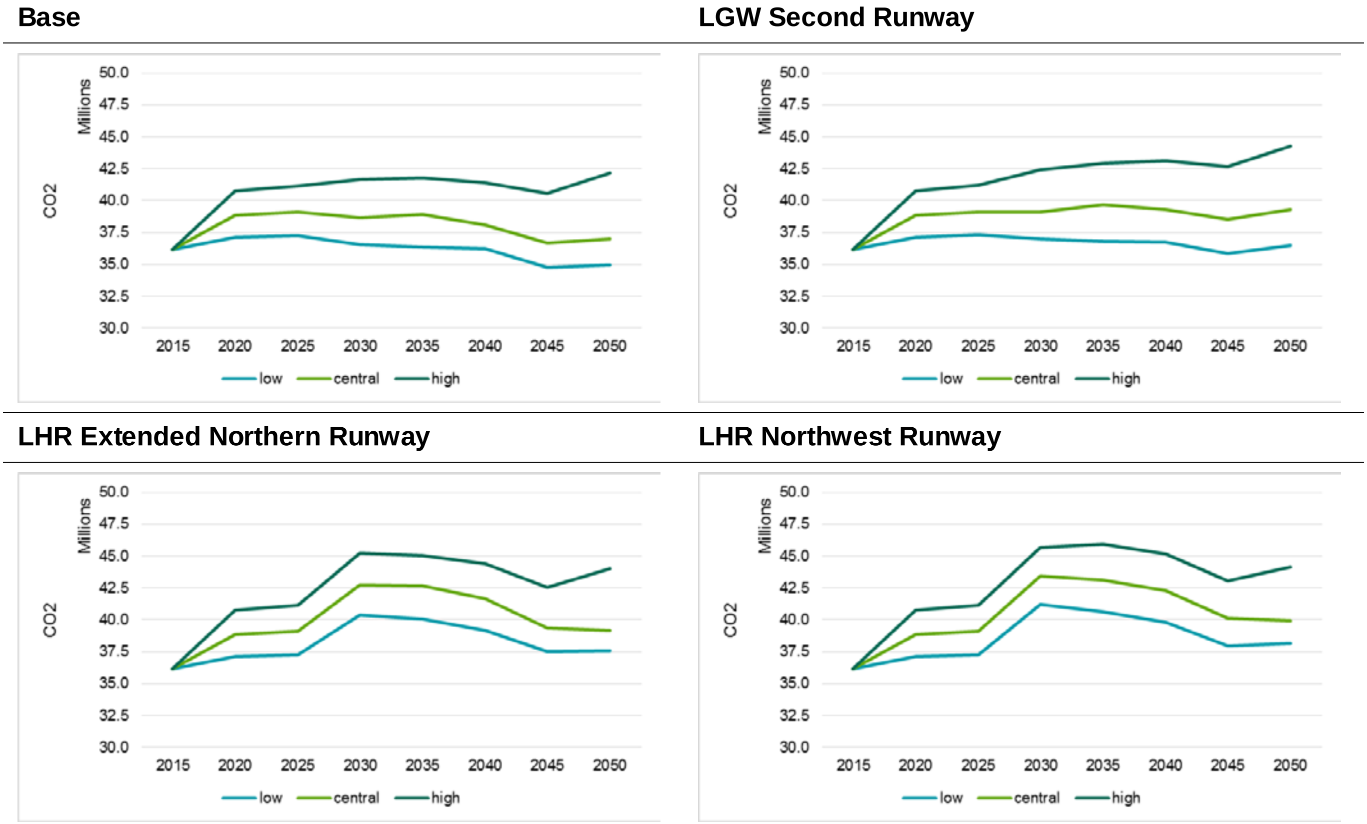
8.5 Future UK departing aircraft emissions will be closely related to the ATM and seat-kilometres being flown. The future size and load factors of aircraft will be a key determinant of the number of aircraft needed to meet future demand. Outputs of aircraft-kilometres, seat-kilometres and passenger-kilometres broken down into domestic, short-haul and long-haul ranges for the new forecasts are given in Table 71 to Table 74 of the data annexes.

[121] *Carbon abatement in UK aviation*, 2017, Ricardo Energy & Environment.

Baseline				LGW Second Runway			
	low	central	high		low	central	high
2015	36.2	36.2	36.2	2015	36.2	36.2	36.2
2020	37.2	38.9	40.7	2020	37.2	38.9	40.7
2030	36.6	38.6	41.6	2030	37.0	39.1	42.4
2040	36.3	38.1	41.4	2040	36.7	39.3	43.1
2050	35.0	37.0	42.1	2050	36.5	39.3	44.3
LHR Extended Northern Runway				**LHR Northwest Runway**			
	low	central	high		low	central	high
2015	36.2	36.2	36.2	2015	36.2	36.2	36.2
2020	37.2	38.9	40.7	2020	37.2	38.9	40.7
2030	40.4	42.8	45.2	2030	41.2	43.5	45.7
2040	39.2	41.7	44.4	2040	39.8	42.3	45.1
2050	37.6	39.2	44.0	2050	38.1	39.9	44.1

$MtCO_2$, departing flights

Table 36 Total UK international and domestic departing aircraft CO_2 forecasts, $MtCO_2$



National $MtCO_2$ emissions, departing flights

Figure 8.1 Total UK international and domestic departing aircraft CO2 forecasts, $MtCO_2$

8.6 For assessing future climate change obligations it is usually necessary to consider international and domestic emissions separately. International emissions are shared between the departing and arriving country while domestic emissions are solely attributable to the UK. Table 37 isolates the domestic component of the emissions forecasts given in Table 36.

Baseline				**LGW Second Runway**			
	low	central	high		low	central	high
2015	1.51	1.51	1.51	2015	1.51	1.51	1.51
2020	1.53	1.56	1.62	2020	1.53	1.56	1.62
2030	1.49	1.58	1.64	2030	1.48	1.63	1.70
2040	1.51	1.61	1.69	2040	1.54	1.68	1.78
2050	1.57	1.67	1.77	2050	1.60	1.75	1.81
LHR Extended Northern Runway				**LHR Northwest Runway**			
	low	central	high		low	central	high
2015	1.51	1.51	1.51	2015	1.51	1.51	1.51
2020	1.53	1.56	1.62	2020	1.53	1.56	1.62
2030	1.69	1.77	1.85	2030	1.79	1.84	1.88
2040	1.62	1.70	1.76	2040	1.66	1.73	1.78
2050	1.62	1.75	1.82	2050	1.63	1.76	1.83

$MtCO_2$, departing domestic flights

Table 37 Total domestic departing aircraft CO2 forecasts, MtCO2

Airport CO_2 emissions forecasts

8.7 Chapter 3 describes how CO_2 emissions are calculated route by route from the NAPAM airport level ATM outputs given at the end of the previous chapter. From this, CO_2 emissions forecasts can be presented at the airport as well as the national level.

8.8 Table 38 shows the contribution of the London airports to the national total of departing aircraft CO_2 emissions. Note that these model outputs only include emissions from departing passenger aircraft - this is the largest source of emissions associated with aviation.[122] However, the model outputs excludes:

- surface access journeys to airports
- airport ground operations
- construction activity

8.9 In the capacity constrained baseline the proportion of emissions attributable to London airports declines from 72% to 58% over the forecast period. This occurs as air traffic spills out to use regional airports and these airports develop more services.[123]

8.10 A full set of growth scenario forecasts for all the modelled airports are set out in Table 68 in the data annexes.

[122] The CO_2 forecasts in this report relate specifically to aircraft both on the ground and in the air. However, in appraising potential policy measures affecting capacity/level of activity at specific airports, elsewhere the department also considers the potential for significant impacts on CO_2 emissions from airport surface access, construction and operations. See *Updated Appraisal Report*, DfT, 2017 for more details.

[123] Note that some elements of the national carbon forecast cannot be robustly attributed to airports in the modelling. These are- emissions from ground auxiliary power units (APUs), freighters or the residual adjustment used to correct to bunker fuel outturn in the base year.

	MtCO2									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	4.5	3.0	3.6	4.7	2.9	3.3	4.5	2.7	3.0	3.9
Heathrow	19.5	19.6	20.0	20.7	17.8	18.2	19.0	15.0	15.9	18.0
London City	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3
Luton	1.0	1.1	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.7
Stansted	1.3	1.2	1.6	1.8	1.5	1.5	1.5	1.4	1.5	1.4
London	26.5	25.1	26.4	28.5	23.4	24.2	26.2	20.1	21.4	24.3
All regional	8.0	8.6	9.4	10.2	10.0	11.1	12.4	12.1	12.8	15.1
Ground (APUs)	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Freighters	1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total	37.3	36.6	38.6	41.6	36.3	38.1	41.4	35.0	37.0	42.1
	Share of national departing CO2									
Gatwick	12%	8%	9%	11%	8%	9%	11%	8%	8%	9%
Heathrow	52%	54%	52%	50%	49%	48%	46%	43%	43%	43%
London City	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Luton	3%	3%	3%	2%	3%	2%	2%	2%	2%	2%
Stansted	4%	3%	4%	4%	4%	4%	4%	4%	4%	3%
London	71%	69%	68%	69%	65%	64%	63%	58%	58%	58%
All regional	22%	23%	24%	25%	28%	29%	30%	34%	35%	36%
Ground (APUs)	1%	1%	1%	1%	1%	1%	1%	2%	2%	1%
Freighters	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%
Residual	4%	4%	3%	3%	4%	4%	3%	4%	4%	3%

Departing commercial passenger flights only
Ground APUs, freighters and the residual correction to baseline bunker fuel outturn cannot robustly be allocated around the airports
All figures are modelled

Table 38 CO_2 emissions from departing aircraft at London airports and nationally, baseline capacity

8.11 Table 39 reproduces the London airport CO_2 emissions analysis above for the central demand case for all the capacity expansion options. It should be emphasised that national totals are the most appropriate metric for assessing emissions because additional aircraft using the new capacity will reduce flights at other airports which had been accommodating some of the overspill traffic. These totals for the low, central and high demand growth scenario forecasts are summarised in Table 36 and Figure 8.1. Table 39 gives more information on how increased emissions at the expanded airport are partially offset by reduced emissions at other airports to give the national level forecast.

8.12 The full set of demand scenario CO_2 emissions forecasts for all the capacity options are set out in Table 70 in the data annexes.

	MtCO2											
	2030				2040				2050			
	Base	LGW 2R	LHR ENR	LHR NWR	Base	LGW 2R	LHR ENR	LHR NWR	Base	LGW 2R	LHR ENR	LHR NWR
Gatwick	3.6	4.9	3.0	2.9	3.3	5.4	2.8	2.8	3.0	6.8	2.7	2.7
Heathrow	20.0	19.6	26.3	27.3	18.2	18.2	23.4	24.3	15.9	15.7	19.3	20.3
London City	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
Luton	1.0	1.1	1.1	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8
Stansted	1.6	1.3	1.1	1.1	1.5	1.4	1.4	1.4	1.5	1.6	1.4	1.5
London	26.4	27.1	31.6	32.5	24.2	26.3	28.8	29.7	21.4	25.1	24.6	25.5
All regional	9.4	9.1	8.2	8.0	11.1	10.2	10.0	9.8	12.8	11.3	11.8	11.6
Ground (APUs)	0.5	0.5	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Freighters	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.8	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total UK	38.6	39.1	42.8	43.5	38.1	39.3	41.7	42.3	37.0	39.3	39.2	39.9

	Share of national departing CO2											
Gatwick	9%	13%	7%	7%	9%	14%	7%	7%	8%	17%	7%	7%
Heathrow	52%	50%	61%	63%	48%	46%	56%	57%	43%	40%	49%	51%
London City	1%	1%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%
Luton	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Stansted	4%	3%	3%	3%	4%	4%	3%	3%	4%	4%	4%	4%
London	68%	69%	74%	75%	64%	67%	69%	70%	58%	64%	63%	64%
All regional	24%	23%	19%	18%	29%	26%	24%	23%	35%	29%	30%	29%
Ground (APUs)	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%	2%
Freighters	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Residual	3%	3%	3%	3%	4%	3%	3%	3%	4%	3%	3%	3%

Departing commercial passenger flights only

Ground APUs, freighters and the residual correction to baseline bunker fuel outturn cannot robustly be allocated around the airports

Table 39 CO_2 emissions from departing aircraft at the London airports and nationally, central demand case

9. Sensitivity tests

Introduction

9.1 As with any forecasting exercise, there is significant uncertainty over the path input assumptions will follow. Therefore sensitivities such assumptions have been considered for the following key variables:

- economic growth
- oil prices
- carbon prices
- market maturity assumptions

9.2 The purpose of the sensitivities is to provide transparency on the relative importance of the drivers of demand in the model. They illustrate the impact on the forecasts of varying the assumptions of these factors within reasonable bounds. The nature of each sensitivity test depends on the uncertainty surrounding the projected variable. The demand growth scenario range differs from these separate sensitivity tests in that the scenarios vary more than one input variable at once.

9.3 All these sensitivity test forecasts are built off a baseline of no new runways and the central demand case.

Economic growth

9.4 There is significant uncertainty about the future rates of economic growth, not least in the light of low productivity growth experienced in the UK over recent years. These sensitivities reflect uncertainties in relation to the direct economic growth drivers, in the UK and internationally. The following inputs are varied:

- UK GDP
- UK consumer expenditure
- GDP and trade projections of the four foreign demand forecasting world areas: Western Europe, other OECD, newly industrialising countries (NICs) and less developed countries (LDCs)

9.5 All the above are increased or decreased by 0.5 percentage points per annum to generate a range.

9.6 The different UK GDP growth assumptions, together with the resulting passenger forecast range, are summarised in Table 40. A comparison of these economic growth tests with the main low and high demand scenarios over the full forecast period is shown in Figure 9.1.

	GDP % change pa			Passengers mppa			Demand change from central	
	Low	Central	High	Low	Central	High	Low	High
2025	1.7%	2.2%	2.7%	279	293	305	-5%	4%
2030	1.6%	2.1%	2.6%	293	313	333	-6%	6%
2035	1.6%	2.1%	2.6%	307	336	363	-8%	8%
2040	1.8%	2.3%	2.8%	324	360	396	-10%	10%
2045	1.7%	2.2%	2.7%	343	386	434	-11%	12%
2050	1.6%	2.1%	2.6%	356	410	455	-13%	11%

Table 40 UK GDP assumptions and outputs of sensitivity tests, baseline capacity

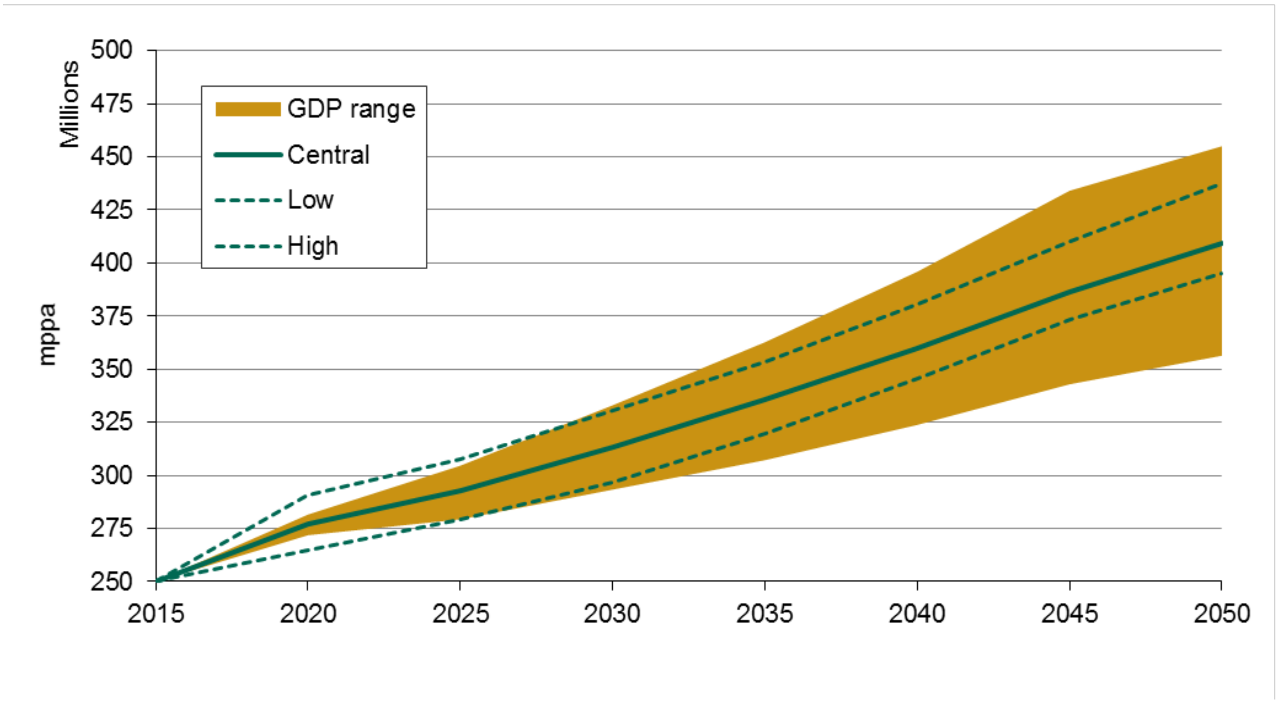


Figure 9.1 Passenger demand under economic growth sensitivity tests, baseline capacity

9.7 After the late 2020s the GDP sensitivity test range is wider than the demand scenario range. This is for two reasons. First, the scenarios vary growth in GDP but not consumer expenditure growth, which is a key driver of demand. Second, the low demand case assumes carbon prices are applied only to the departing leg of international flights, partially offsetting the reduction in demand caused by lower economic growth, narrowing the scenario range. Growth in the high economic growth sensitivity is slower at the end of the modelled period; because congestion levels in the system reduce the growth in demand that can be accommodated.

Carbon prices

9.8 The high and low carbon price assumptions published in BEIS's valuation of energy use and greenhouse gas are used to produce the high and low carbon price sensitivity tests up to 2050. In addition, a zero carbon price assumption has also been tested.

9.9 The assumptions and impacts on air passenger demand of these tests are summarised in Table 41, and a comparison against the demand scenario range is shown in Figure 9.2.

	Carbon price (£ / tCO2)			Passengers mppa				Demand change from central		
	Low	Central	High	Low	Central	High	Zero£	Low	High	Zero£
2025	£19	£41	£63	297	293	288	300	1%	-2%	3%
2030	£39	£77	£116	321	313	305	328	2%	-3%	5%
2035	£57	£113	£170	346	336	325	357	3%	-3%	6%
2040	£75	£149	£224	373	360	347	390	4%	-3%	8%
2045	£93	£185	£278	403	386	372	424	4%	-4%	10%
2050	£111	£221	£332	432	410	392	453	5%	-4%	11%

All financial figures are in 2016 prices

Table 41 Carbon price assumptions and outputs of sensitivity tests, baseline capacity

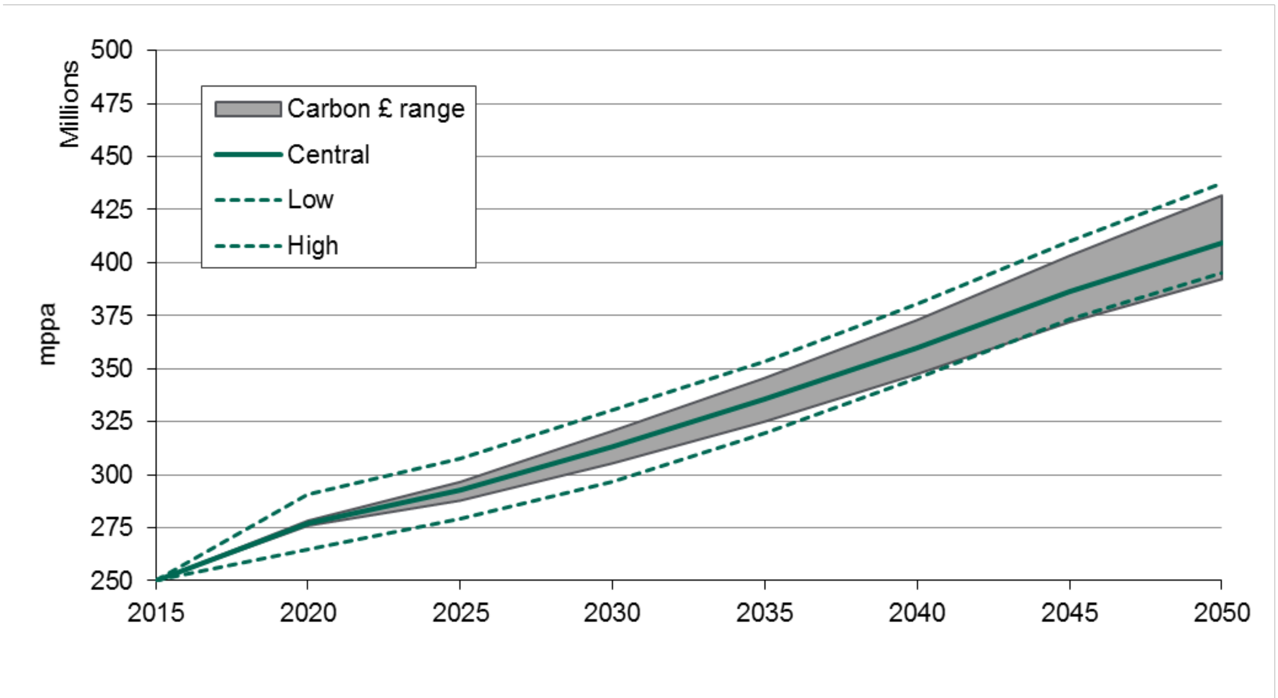


Figure 9.2 Passenger demand under carbon price sensitivity tests, baseline

9.10 The sensitivity range lies within the limits of the main forecast low-high demand scenario range for the majority of the forecast period.

Oil prices

9.11 The high and low oil price per barrel projections published by BEIS are used to produce the oil price sensitivity tests.[124] The assumptions and impacts on air passenger demand are summarised in Table 42, and a comparison with the demand scenario range is shown in Figure 9.3.

	Oil price ($ / barrel)			Passengers mppa			Demand change from central	
	Low	Central	High	Low	Central	High	Low	High
2025	$43	$67	$98	304	293	280	4%	-4%
2030	$55	$80	$120	326	313	297	4%	-5%
2035	$55	$80	$120	346	336	319	3%	-5%
2040	$55	$80	$120	371	360	345	3%	-4%
2045	$55	$80	$120	396	386	373	3%	-3%
2050	$55	$80	$120	419	410	396	2%	-3%

All financial figures are in 2016 prices

Table 42 Oil price assumptions and outputs of sensitivity tests, baseline capacity

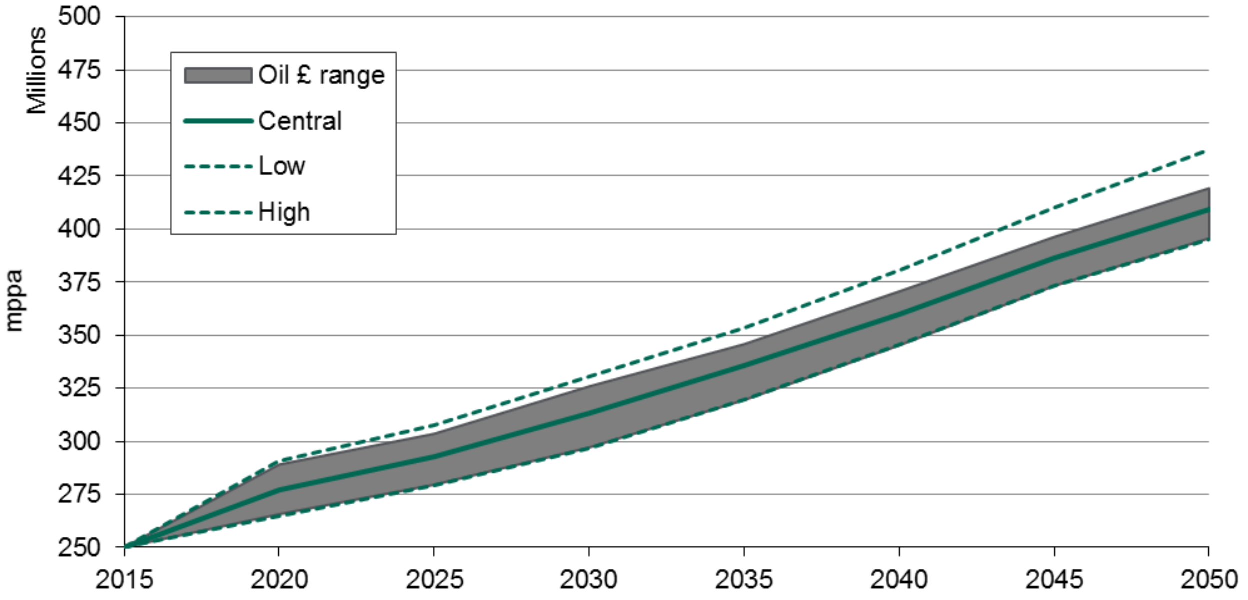


Figure 9.3 Passenger demand under oil price sensitivity test, baseline capacity

9.12 The oil price sensitivity range lies within the main forecast low - high demand scenario range.

[124] The BEIS projections show figures up to 2040. As with the central case, oil prices are assumed to be constant in real terms beyond 2040.

Fuel prices

9.13 This test combines changes to two variables to provide a demand range for use in the carbon abatement study.[125] Assumptions relating to oil and carbon prices are varied and combined to generate two fuel price sensitivities. The values are based on the oil and carbon price sensitivities described above.

9.14 The assumptions and impacts on air passenger demand are summarised in Table 43, and a comparison with the demand scenario range is shown in Figure 9.4.

	Oil price ($ / barrel)			Carbon price (£ / tCO2)			Passengers mppa			Demand change from central	
	Low	Central	High	Low	Central	High	Low	Central	High	Low	High
2025	$43	$67	$98	£19	£41	£63	309	293	277	6%	-5%
2030	$55	$80	$120	£39	£77	£116	333	313	291	6%	-7%
2035	$55	$80	$120	£57	£113	£170	359	336	311	7%	-7%
2040	$55	$80	$120	£75	£149	£224	385	360	334	7%	-7%
2045	$55	$80	$120	£93	£185	£278	416	386	359	8%	-7%
2050	$55	$80	$120	£111	£221	£332	441	410	379	8%	-7%

All financial figures are in 2016 prices

Table 43 Fuel price assumptions and outputs of sensitivity tests, baseline capacity

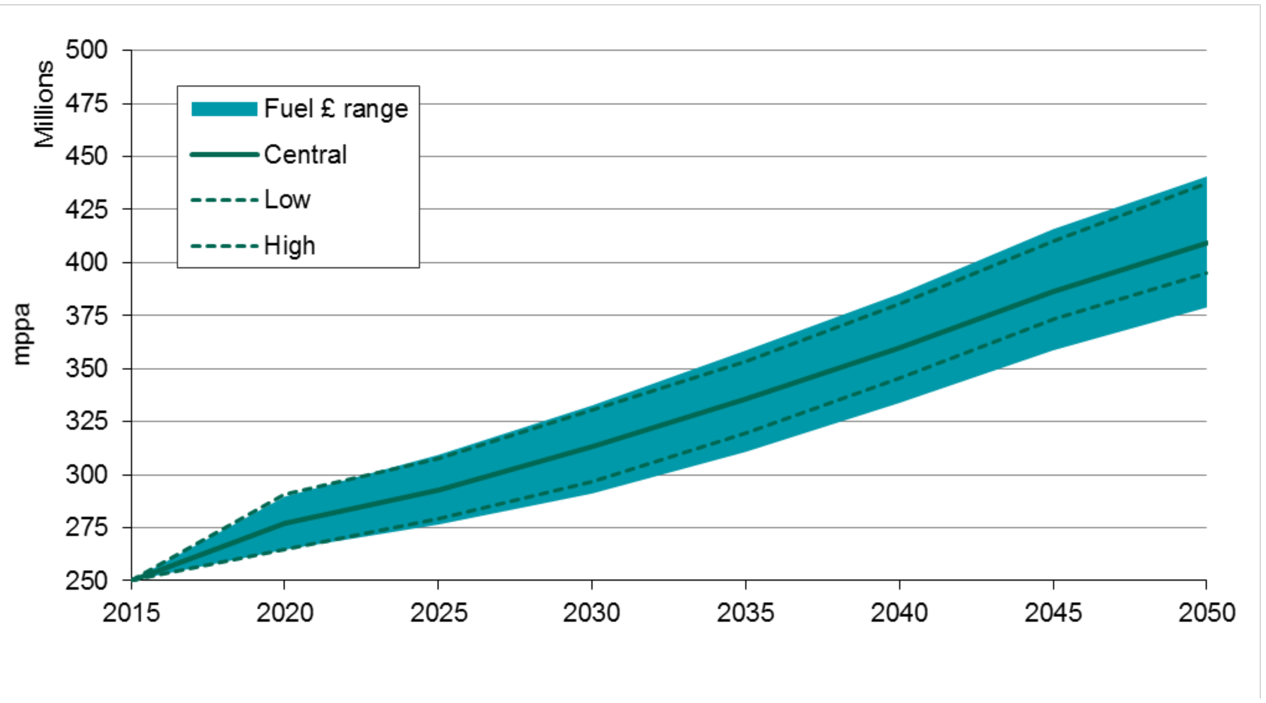


Figure 9.4 Passenger demand under fuel price sensitivity tests, baseline capacity

9.15 By combining both oil and carbon prices, the output passenger throughput lies outside the main forecast scenario demand range. This is because the main demand scenarios do not combine both drivers of fuel prices in this way.

[125] *Carbon abatement in UK aviation*, 2017, Ricardo Energy & Environment.

Market maturity

9.16 As described in Chapter 2, the term market maturity relates to the extent to which future demand is assumed to be sensitive to growing income (that is, the income elasticity of demand). Two tests are considered:

- high market maturity assumptions, resulting in low demand growth
- low market maturity assumptions, resulting in high demand growth

9.17 The tests encompass two sets of related changes. First, the starting income elasticity[126] is modified to reflect the possibility that elasticities have been under or over forecast using assumptions set out in previous analysis published by the department.[127] These assumptions increase incomes elasticities for the NIC and LDC markets in the low maturity case, and decrease income elasticities for the domestic, WE and OECD markets in the high maturity case. Second, and in addition, the rate at which income elasticities decline over time changes. In the low maturity test, elasticities fall to unity over a 70 year period (or remain the same if they started below unity), and in the high market maturity test, elasticities fall to 0.2 over 70 years.[128]

9.18 The impacts of these changes on income elasticities are set out in Table 44.

[126] This refers to the historic elasticities that were estimated to apply in 2008.
[127] *Reflecting changes in the relationship between UK air travel and its key drivers in the National Passenger Demand Model*, DfT, 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/4513/key-drivers-npdm.pdf.
[128] Again this approach draws on the DfT 2011 publication.

		Low market maturity		Central		High market maturity	
	Maturity starts	YED in 2016	YED in 2050	YED in 2016	YED in 2050	YED in 2016	YED in 2050
UK bus WE	2015	1.27	1.14	1.27	0.94	0.99	0.60
UK bus OECD	2015	0.97	0.97	0.97	0.79	0.96	0.59
UK bus NIC	2025	1.30	1.19	1.01	0.86	1.01	0.72
UK bus LDC	2025	1.30	1.19	1.01	0.86	1.01	0.72
UK lei WE	2015	1.33	1.17	1.32	0.97	0.99	0.60
UK lei OECD	2015	1.34	1.17	1.33	0.97	0.99	0.60
UK lei NIC	2015	1.58	1.29	1.57	1.09	1.28	0.75
UK lei LDC	2015	1.84	1.43	1.83	1.23	1.28	0.75
Foreign bus WE	2015	1.11	1.06	1.11	0.86	0.99	0.60
Foreign bus OECD	2015	0.55	0.55	0.55	0.55	0.55	0.38
Foreign bus NIC	2025	1.30	1.19	0.76	0.70	0.76	0.56
Foreign bus LDC	2025	1.30	1.19	0.69	0.66	0.69	0.51
Foreign lei WE	2015	1.20	1.10	1.20	0.90	0.99	0.60
Foreign lei OECD	2015	0.55	0.55	0.55	0.55	0.54	0.37
Foreign lei NIC	2025	1.30	1.19	0.51	0.51	0.51	0.40
Foreign lei LDC	2025	1.30	1.19	0.46	0.46	0.46	0.37
Domestic bus	2010	0.99	0.99	0.96	0.77	0.92	0.54
Domestic lei	2010	1.91	1.43	1.42	0.99	0.93	0.54
International-international transfers	2015	0.47	0.47	0.47	0.47	0.46	0.33

YED refers to income elasticity of demand
The definitions of the various markets are set out in Chapter 2

Table 44 Market maturity sensitivity test - input income elasticities (YED)

9.19 The impacts on air passenger demand are summarised in Table 45, and a comparison with the demand scenario range is shown in Figure 9.5:

	Passengers mppa			Demand change from central	
	Low	Central	High	Low	High
2025	293	293	286	0%	-2%
2030	319	313	298	2%	-5%
2035	346	336	311	3%	-7%
2040	377	360	327	5%	-9%
2045	415	386	342	8%	-11%
2050	445	410	354	9%	-14%

Table 45 Market maturity outputs of sensitivity tests, baseline capacity

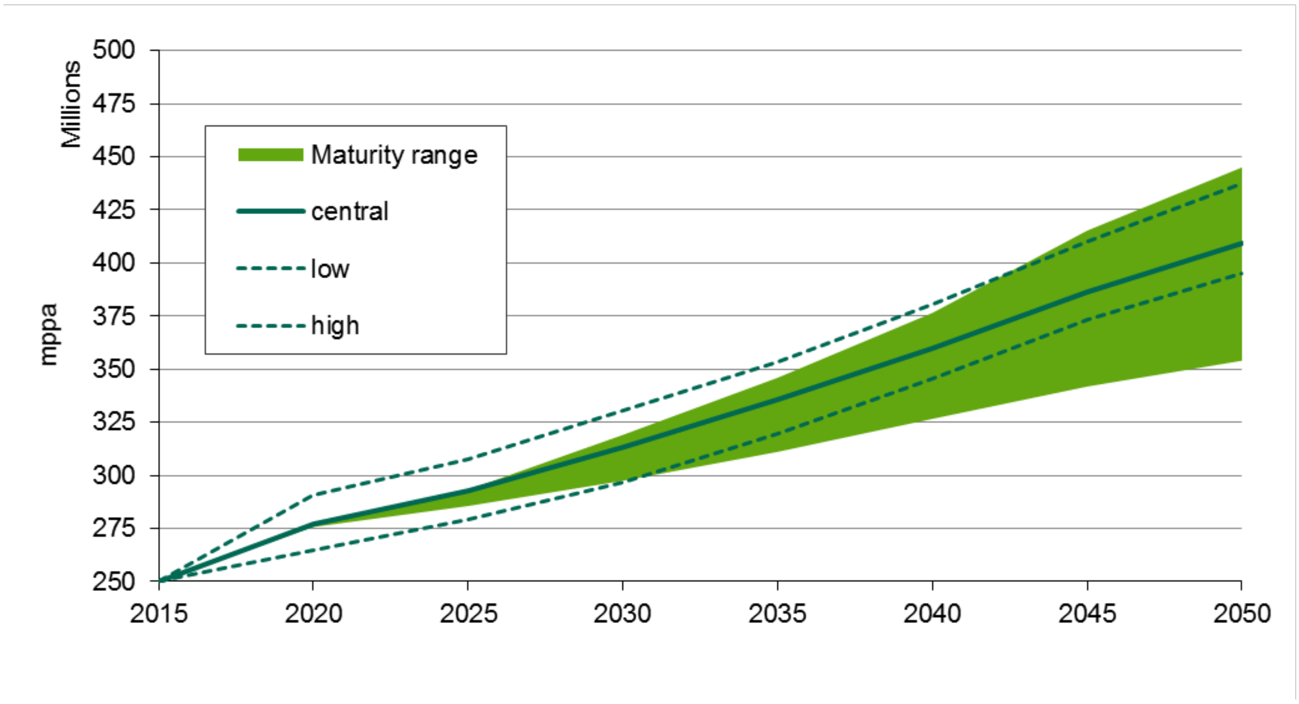


Figure 9.5 Passenger demand under market maturity sensitivity tests, baseline capacity

9.20 The sensitivity range lies within the bounds of the demand scenario range until around 2030. After this point the impacts of declining income elasticities become more significant, widening the sensitivity range. In particular, the low end of the sensitivity range lies well below the bottom of the scenario range. This is because the income elasticities for the largest markets are materially lower than in the central case, and elasticities are not varied in the scenario range. In the high end of the sensitivity range, capacity constraints partially limits the extent to which demand can be above the scenario range.

Summary of all test results

9.21 Table 46 summarises the results of each individual test described in this section and reports the change from the central demand case.

	2030		2040		2050	
mppa	passengers	change from central	passengers	change from central	passengers	change from central
central	**313**	**0**	**360**	**0**	**410**	**0**
low GDP	293	-20	324	-36	356	-53
high oil$	297	-16	345	-15	396	-14
high carbon£	305	-8	347	-12	392	-17
high oil+C£	291	-22	334	-26	379	-31
high maturity	298	-16	327	-33	354	-55
high GDP	333	20	396	36	455	45
low oil$	326	12	371	11	419	10
low carbon£	321	7	373	13	432	22
low oil+C£	333	19	385	25	441	31
low maturity	319	6	377	17	445	36
0 carbon£	328	15	390	30	453	44

Table 46 Results of all sensitivity tests, baseline capacity, mppa

Annex A: Additional validation information

A.1 The tables below show a comparison of the validation of the modelled base year against actual CAA statistical data for passengers, ATMs and passenger loads, broken down by the scheduled, low cost carrier and charter airline types used in the modelling.

Intl Scheduled	2016	Passengers mppa			2016	ATMs 000s			2016	Loads (passengers / ATM)	
mppa	Actuals	Modelled	Difference		Actuals	Modelled	Difference		Actuals	Modelled	Difference
Gatwick	20.0	20.4	0.4	2%	126.4	125.8	-0.6	0%	159	162	4
Heathrow	70.9	71.9	1.0	1%	440.1	440.3	0.2	0%	161	163	2
London City	3.5	3.2	-0.3	-8%	61.3	59.2	-2.1	-3%	57	54	-3
Luton	6.4	6.7	0.2	4%	42.6	45.0	2.4	6%	151	149	-3
Stansted	1.2	2.0	0.8	65%	9.2	17.0	7.8	84%	131	118	-14
London	102.1	104.2	2.2	2%	679.5	687.3	7.7	1%	150	152	1
Aberdeen	0.8	0.9	0.0	2%	14.3	14.3	-0.1	-1%	58	60	2
Belfast International	0.1	0.2	0.0		.9	.6	-0.4		150	276	126
Belfast City	0.3	0.5	0.3	107%	2.5	2.0	-0.4		103	257	155
Birmingham	7.1	7.8	0.6	9%	65.4	66.1	0.7	1%	109	118	9
Bournemouth	0.0	0.0	0.0		.2	.1	-0.2		38	49	10
Bristol	1.1	1.2	0.1	8%	17.1	14.5	-2.6	-15%	63	80	17
Cardiff	0.6	0.5	0.0	-7%	7.8	8.1	0.3	4%	74	67	-8
East Midlands	0.5	0.6	0.1	15%	5.6	8.3	2.7		97	74	-22
Edinburgh	2.6	2.6	-0.1	-2%	23.8	20.5	-3.3	-14%	110	125	15
Exeter	0.3	0.3	0.0	-10%	5.6	3.4	-2.3		49	74	25
Glasgow	2.2	2.2	0.0	2%	15.4	11.9	-3.5	-22%	141	185	44
Humberside	0.1	0.2	0.0		2.3	2.4	0.1		54	64	10
Inverness	0.1	0.1	0.0		1.3	1.3	0.0		51	57	5
Leeds-Bradford	0.6	0.7	0.1	22%	6.3	5.9	-0.4		87	115	28
Liverpool	0.4	0.5	0.1	21%	4.8	6.9	2.1		91	77	-14
Manchester	11.9	12.9	1.1	9%	84.9	91.8	6.9	8%	140	141	1
Newcastle	1.4	1.6	0.2	14%	13.3	12.8	-0.5	-4%	105	125	20
Newquay	0.0	0.2	0.2		.5	.6	0.1		53	340	286
Norwich	0.2	0.2	0.0		3.5	3.3	-0.2		50	60	11
Southend	0.1	0.1	0.0		2.5	2.6	0.1		38	29	-8
Southampton	1.1	1.2	0.1	9%	22.4	25.1	2.8	12%	49	47	-2
Durham Tees Valley	0.1	0.1	0.0		2.0	2.5	0.5		53	53	-1
Blackpool	0.0	0.0	0.0		.0	.0	0.0		0	0	0
Doncaster Sheffield	0.8	0.8	0.0	-6%	7.4	6.3	-1.1		110	121	11
Prestwick	0.0	0.0	0.0		.6	.0	-0.6		0	0	0
Non-London total	32.4	35.2	2.8	9%	310.3	311.2	0.9	0%	104	113	9
Total	134.4	139.4	5.0	4%	989.8	998.4	8.6	1%	136	140	4

Passenger percentages shown only for airports with more than 200,000 passengers
ATM percentages shown only for airports with more than 7,500 ATMs

Table 47 Validation of ('full service') international scheduled services

Intl LCC	**2016**	Passengers mppa			**2016**	ATMs 000s			**2016**	Loads (passengers / ATM)	
mppa	Actuals	Modelled	Difference		Actuals	Modelled	Difference		Actuals	Modelled	Difference
Gatwick	**16.9**	17.0	0.1	0%	**113.4**	113.3	-0.1	0%	**149**	150	1
Heathrow	**0.0**	0.0	0.0		**.0**	.0	0.0		**304**	0	-304
London City	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Luton	**6.7**	6.4	-0.3	-5%	**45.7**	43.7	-2.0	-4%	**147**	147	0
Stansted	**20.6**	20.1	-0.5	-3%	**124.9**	125.1	0.3	0%	**165**	161	-5
London	**44.3**	43.5	-0.8	-2%	**284.0**	282.1	-1.9	-1%	**156**	154	-2
Aberdeen	**0.0**	0.0	0.0		**.0**	.0	0.0		**111**	0	-111
Belfast International	**1.1**	1.1	0.0	-2%	**7.9**	7.9	0.0	1%	**143**	140	-3
Belfast City	**0.0**	0.0	0.0		**.0**	.0	0.0		**146**	0	-146
Birmingham	**2.0**	2.2	0.2	12%	**12.0**	13.6	1.6	13%	**166**	165	-1
Bournemouth	**0.5**	0.4	-0.1	-18%	**2.8**	2.3	-0.5		**166**	168	2
Bristol	**4.6**	4.8	0.1	3%	**29.5**	31.1	1.6	5%	**157**	154	-3
Cardiff	**0.0**	0.0	0.0		**.1**	.2	0.0		**152**	147	-5
East Midlands	**3.2**	3.1	0.0	0%	**19.1**	19.0	-0.1	-1%	**165**	166	0
Edinburgh	**4.3**	4.6	0.3	8%	**27.2**	28.7	1.6	6%	**158**	161	3
Exeter	**0.0**	0.0	0.0		**.0**	.0	0.0		**2**	0	-2
Glasgow	**2.1**	2.0	-0.1	-3%	**13.0**	12.6	-0.5	-3%	**161**	161	0
Humberside	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Inverness	**0.0**	0.0	0.0		**.0**	.0	0.0		**68**	0	-68
Leeds-Bradford	**2.5**	2.3	-0.2	-8%	**15.8**	14.6	-1.2	-8%	**161**	161	0
Liverpool	**3.4**	3.4	0.0	0%	**22.6**	22.4	-0.1	-1%	**152**	154	1
Manchester	**8.6**	9.2	0.6	7%	**52.8**	55.9	3.1	6%	**164**	165	1
Newcastle	**2.1**	2.3	0.1	5%	**13.7**	14.3	0.6	4%	**156**	158	2
Newquay	**0.0**	0.0	0.0		**.2**	.0	-0.2		**153**	0	-153
Norwich	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Southend	**0.8**	0.6	-0.1	-18%	**5.7**	4.9	-0.9		**136**	131	-4
Southampton	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Durham Tees Valley	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Blackpool	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Doncaster Sheffield	**0.0**	0.0	0.0		**.0**	.0	0.0		**151**	0	-151
Prestwick	**0.7**	0.8	0.1	14%	**3.9**	4.4	0.5		**172**	171	0
Non-London total	**36.1**	37.0	0.9	3%	**226.5**	231.8	5.3	2%	**159**	160	0
Total	**80.4**	80.5	0.2	0%	**510.5**	**513.9**	3.5	1%	**157**	157	-1

Passenger percentages only shown for airports with more than 200,000 passengers
ATM percentages only shown for airports with more than 7,500 ATMs

Table 48 Validation of international low cost carrier (LCC) services

Intl Charter mppa	2016 Actuals	Passengers mppa Modelled	Difference		2016 Actuals	ATMs 000s Modelled	Difference		2016 Actuals	Loads (passengers / ATM) Modelled	Difference
Gatwick	**3.3**	3.1	-0.2	-5%	**16.7**	15.8	-0.9	-5%	**197**	198	1
Heathrow	**0.1**	0.0	-0.1		**.8**	.0	-0.8		**166**	0	-166
London City	**0.0**	0.0	0.0		**.0**	.0	0.0		**76**	0	-76
Luton	**0.4**	0.4	0.0	-2%	**4.7**	3.3	-1.4		**96**	135	39
Stansted	**0.4**	0.5	0.1	13%	**2.6**	3.0	0.4		**166**	166	0
London	**4.3**	4.1	-0.2	-5%	**24.8**	22.1	-2.7		**174**	185	11
Aberdeen	**0.1**	0.1	0.0		**.8**	1.0	0.2		**129**	146	17
Belfast International	**0.3**	0.3	0.0	-3%	**1.8**	1.8	0.0		**182**	177	-5
Belfast City	**0.0**	0.0	0.0		**.1**	.1	0.1		**118**	85	-32
Birmingham	**1.3**	1.1	-0.2	-13%	**6.8**	5.8	-1.0		**191**	193	2
Bournemouth	**0.2**	0.2	0.0		**1.1**	1.0	-0.1		**172**	172	0
Bristol	**0.7**	0.5	-0.2	-25%	**4.2**	3.3	-0.9		**158**	151	-7
Cardiff	**0.5**	0.6	0.1	21%	**3.1**	3.5	0.4		**172**	182	10
East Midlands	**0.6**	0.7	0.1	11%	**3.3**	3.6	0.3		**179**	180	1
Edinburgh	**0.2**	0.3	0.1	24%	**1.7**	2.1	0.4		**146**	143	-2
Exeter	**0.2**	0.3	0.0	18%	**1.3**	1.6	0.2		**172**	174	2
Glasgow	**0.8**	0.8	0.0	-3%	**4.3**	4.1	-0.2		**187**	190	2
Humberside	**0.0**	0.0	0.0		**.2**	.1	-0.2		**105**	129	24
Inverness	**0.0**	0.0	0.0		**.0**	.0	0.0		**84**	0	-84
Leeds-Bradford	**0.1**	0.1	0.0		**.8**	.7	-0.1		**163**	167	4
Liverpool	**0.0**	0.0	0.0		**.2**	.0	-0.2		**139**	0	-139
Manchester	**2.9**	3.0	0.1	3%	**14.0**	14.5	0.6	4%	**208**	207	-2
Newcastle	**0.1**	0.1	0.0		**.7**	.7	-0.1		**196**	176	-20
Newquay	**0.0**	0.0	0.0		**.0**	.0	0.0		**87**	0	-87
Norwich	**0.1**	0.1	0.0		**.9**	.7	-0.2		**111**	166	56
Southend	**0.0**	0.0	0.0		**.0**	.0	0.0		**73**	0	-73
Southampton	**0.0**	0.0	0.0		**.1**	.3	0.2		**107**	80	-27
Durham Tees Valley	**0.0**	0.0	0.0		**.0**	.0	0.0		**107**	187	79
Blackpool	**0.0**	0.0	0.0		**.0**	.0	0.0		**0**	0	0
Doncaster Sheffield	**0.4**	0.4	0.0	-7%	**2.5**	2.2	-0.4		**170**	186	16
Prestwick	**0.0**	0.0	0.0		**.0**	.0	0.0		**51**	0	-51
Non-London total	**8.8**	8.7	0.0	-1%	**48.0**	**47.2**	-0.8		**183**	185	2
Total	**13.1**	12.8	-0.3	-2%	**72.8**	**69.3**	-3.5		**180**	185	5

Passenger percentages only shown for airports with more than 200,000 passengers
ATM percentages only shown for airports with more than 7,500 ATMs

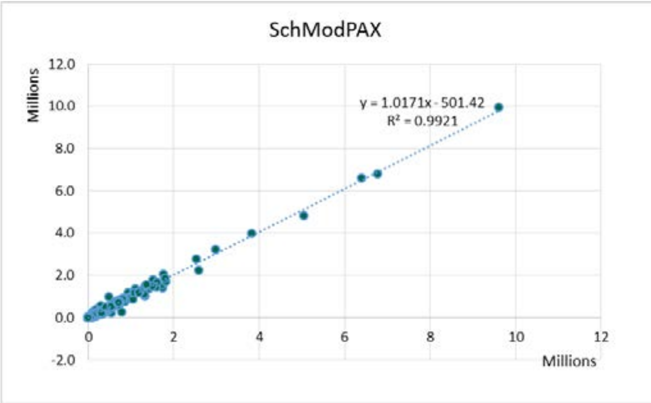
Table 49 Validation of international charter services

All Domestic	**2016**	Passengers mppa			**2016**	ATMs 000s			**2016**	Loads (passengers / ATM)	
mppa	Actuals	Modelled	Difference		Actuals	Modelled	Difference		Actuals	Modelled	Difference
Gatwick	**2.9**	2.9	0.0	-1%	**22.5**	22.3	-0.2	-1%	**129**	128	-1
Heathrow	**4.6**	4.1	-0.6	-12%	**37.2**	33.6	-3.6	-10%	**125**	122	-3
London City	**1.1**	0.8	-0.2	-22%	**19.2**	14.6	-4.6	-24%	**55**	57	2
Luton	**1.0**	0.9	-0.1	-6%	**8.2**	7.4	-0.7	-9%	**123**	127	4
Stansted	**2.0**	1.9	-0.1	-4%	**19.2**	16.1	-3.1	-16%	**105**	120	15
London	**11.6**	10.7	-1.0	-8%	**106.3**	94.0	-12.3		**110**	113	4
Aberdeen	**2.0**	1.7	-0.3	-16%	**63.4**	55.8	-7.6	-12%	**32**	30	-2
Belfast International	**3.5**	3.6	0.0	1%	**27.5**	27.2	-0.3	-1%	**129**	131	2
Belfast City	**2.4**	2.5	0.1	2%	**39.0**	40.5	1.5	4%	**62**	61	-1
Birmingham	**1.2**	1.1	-0.1	-6%	**20.4**	17.2	-3.2	-16%	**60**	66	7
Bournemouth	**0.0**	0.0	0.0		**.2**	.1	-0.1		**37**	39	2
Bristol	**1.2**	1.2	-0.1	-6%	**10.3**	9.3	-1.0	-10%	**119**	124	5
Cardiff	**0.2**	0.2	0.0	-15%	**5.2**	5.7	0.5		**41**	32	-9
East Midlands	**0.4**	0.3	0.0	-4%	**14.5**	6.7	-7.8	-54%	**25**	51	26
Edinburgh	**5.2**	4.7	-0.5	-9%	**62.5**	52.3	-10.1	-16%	**83**	90	7
Exeter	**0.3**	0.3	0.0	-12%	**7.9**	6.5	-1.3	-17%	**43**	46	2
Glasgow	**4.2**	3.8	-0.5	-11%	**51.2**	46.9	-4.2	-8%	**83**	80	-3
Humberside	**0.1**	0.1	0.0		**6.7**	5.8	-0.9		**8**	9	1
Inverness	**0.7**	0.7	-0.1	-9%	**9.9**	10.2	0.3	3%	**72**	64	-8
Leeds-Bradford	**0.4**	0.4	0.0	6%	**8.8**	6.5	-2.3	-27%	**44**	63	19
Liverpool	**0.9**	0.9	0.0	0%	**10.7**	10.7	0.0	0%	**81**	81	0
Manchester	**2.2**	2.1	-0.1	-5%	**32.4**	32.4	0.0	0%	**67**	64	-3
Newcastle	**1.1**	1.0	-0.1	-11%	**14.4**	11.6	-2.8	-19%	**78**	86	8
Newquay	**0.3**	0.4	0.1	20%	**6.4**	7.2	0.8		**48**	51	3
Norwich	**0.2**	0.2	0.0	-15%	**24.3**	20.0	-4.3	-18%	**9**	10	0
Southend	**0.0**	0.0	0.0		**.1**	.0	0.0		**45**	38	-7
Southampton	**0.8**	0.9	0.0	5%	**15.4**	16.7	1.3	8%	**55**	53	-2
Durham Tees Valley	**0.0**	0.0	0.0		**1.7**	.9	-0.8		**13**	17	4
Blackpool	**0.0**	0.0	0.0		**6.7**	.0	-6.7		**5**	0	-5
Doncaster Sheffield	**0.0**	0.0	0.0		**.2**	.0	-0.2		**50**	16	-34
Prestwick	**0.0**	0.0	0.0		**.0**	.0	0.0		**19**	0	-19
Non-London total	**27.6**	25.8	-1.7	-6%	**439.8**	**390.3**	-49.5	-11%	**63**	66	4
Total	**39.2**	36.5	-2.7	-7%	**546.1**	**484.3**	-61.8	-11%	**72**	75	4

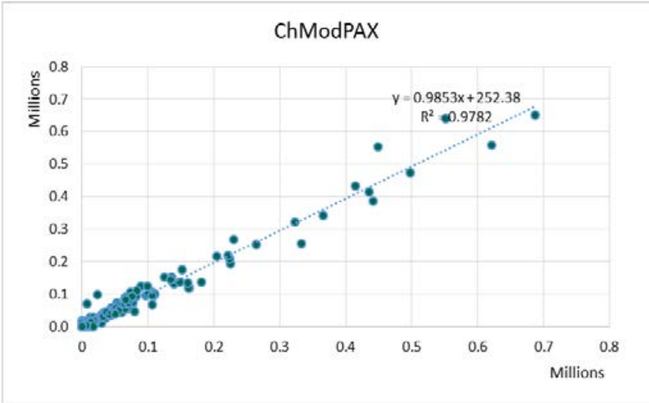
Passenger percentages only shown for airports with more than 200,000 passengers
ATM percentages only shown for airports with more than 7,500 ATMs

Table 50 Validation of all scheduled domestic services

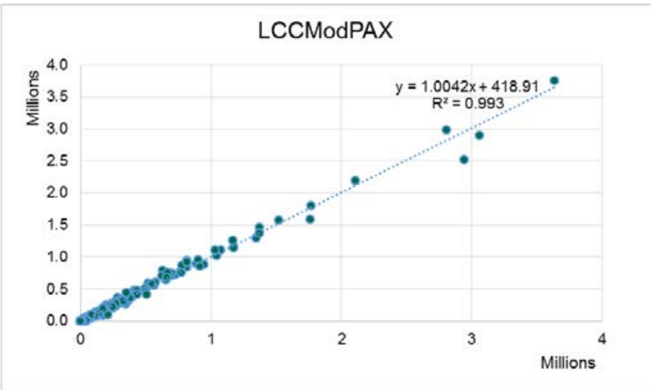
International scheduled passengers



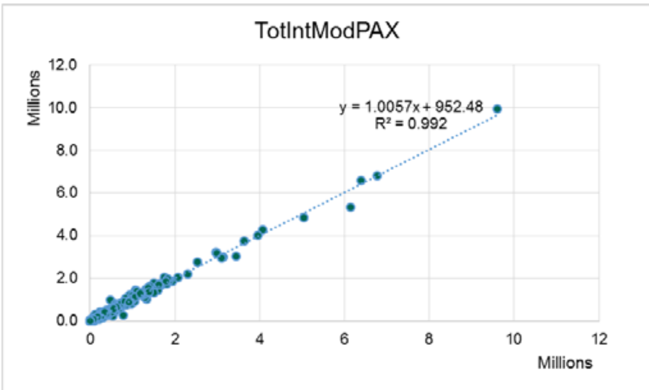
International charter passengers



International LCC passengers



Total International passengers



All Domestic passengers

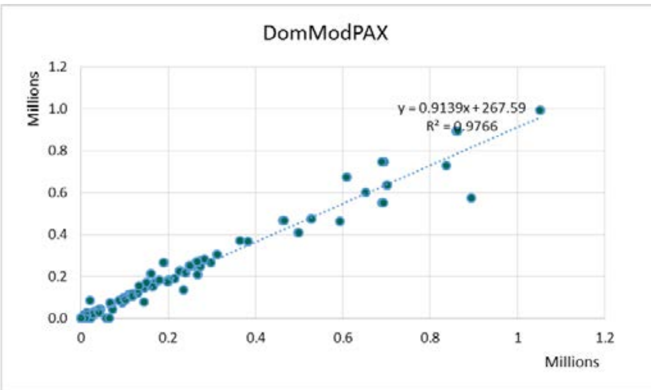
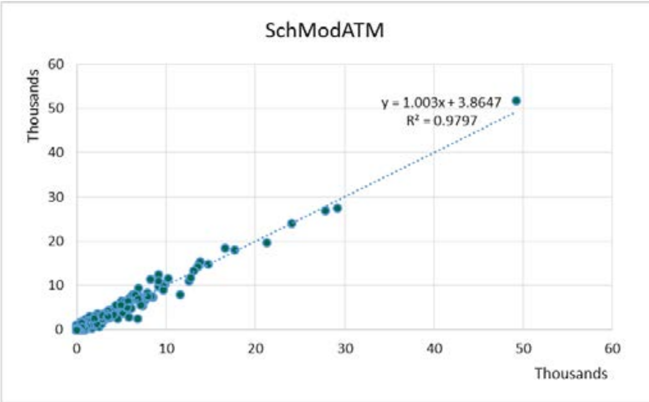
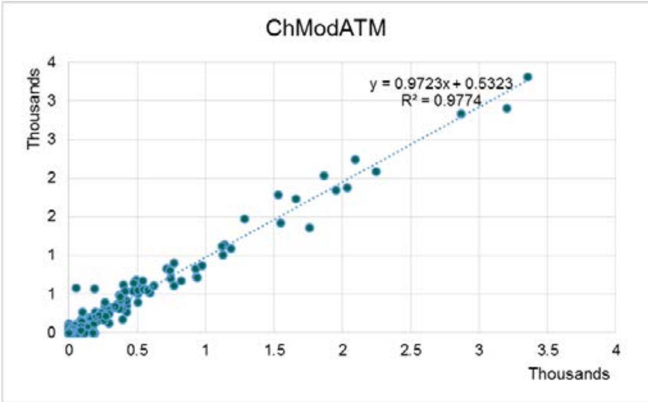


Figure A.1 Observed versus modelled route passengers by airline market type

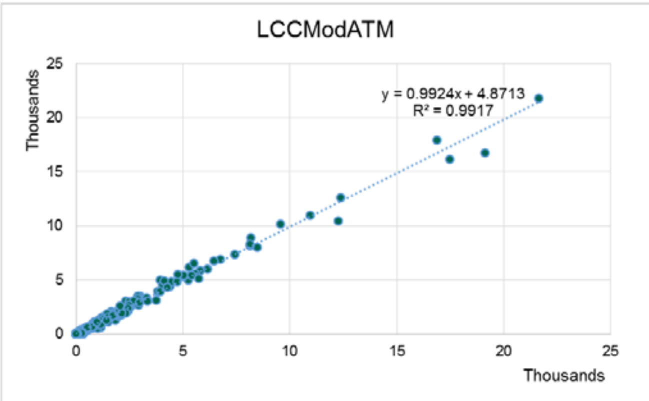
International scheduled ATMs



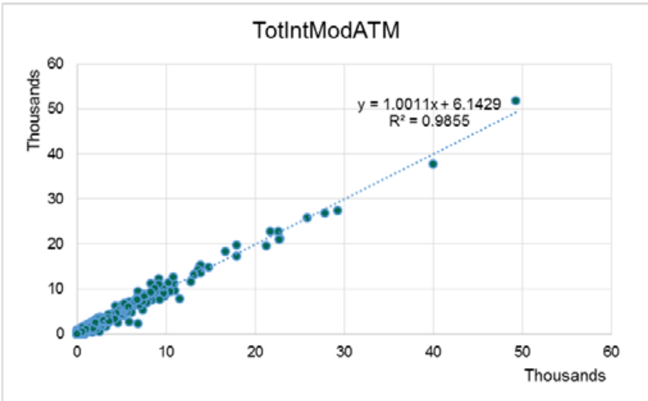
International charter ATMs



International LCC ATMs



Total International ATMs



All Domestic ATMs

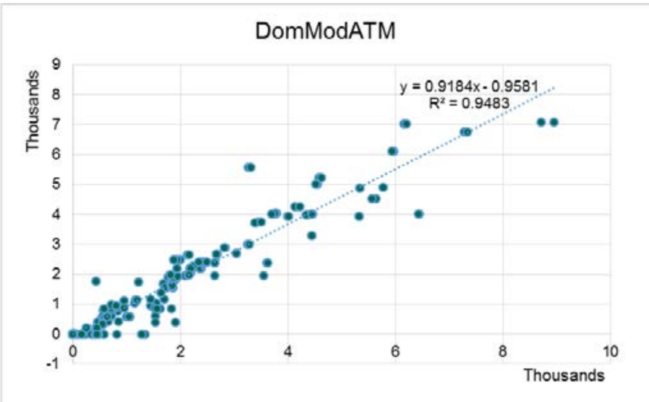


Figure A.2 Observed versus modelled route ATMs by airline market type

Annex B: NAPDM input data

	GDP growth (%)					
	UK	WE	OECD	NIC	LDC	Consumer expenditure growth (%)
2016	1.6	2.4	1.7	3.6	3.2	2.4
2017	1.8	2.2	2.3	3.5	4.3	0.4
2018	1.4	2.1	2.4	4.4	4.1	-0.2
2019	1.5	2.0	2.1	4.4	4.3	0.6
2020	1.7	2.0	1.9	4.4	4.4	0.6
2021	1.8	1.9	1.8	4.4	4.5	0.7
2022	2.0	1.8	1.8	4.4	4.5	2.0
2023	2.0	2.2	2.4	4.6	4.0	2.0
2024	2.1	2.2	2.4	4.6	3.9	2.1
2025	2.2	2.2	2.4	4.5	3.8	2.2
2026	2.2	2.2	2.4	4.4	3.7	2.2
2027	2.2	2.2	2.4	4.4	3.5	2.2
2028	2.2	2.2	2.4	4.3	3.4	2.2
2029	2.2	2.1	2.3	4.3	3.3	2.2
2030	2.1	2.1	2.3	4.2	3.2	2.1
2031	2.1	2.1	2.2	4.2	3.1	2.1
2032	2.1	2.0	2.2	4.1	2.9	2.1
2033	2.1	2.0	2.2	4.1	2.8	2.1
2034	2.1	1.9	2.1	4.0	2.7	2.1
2035	2.1	1.9	2.1	4.0	2.6	2.1
2036	2.1	1.8	2.0	3.9	2.4	2.1
2037	2.1	1.7	2.0	3.8	2.3	2.1
2038	2.2	1.7	2.0	3.7	2.2	2.2
2039	2.2	1.6	1.9	3.7	2.1	2.2
2040	2.3	1.6	1.9	3.6	2.0	2.3
2041	2.3	1.5	1.8	3.5	1.9	2.3
2042	2.2	1.5	1.8	3.4	1.8	2.2
2043	2.2	1.5	1.8	3.3	1.7	2.2
2044	2.2	1.4	1.8	3.2	1.7	2.2
2045	2.2	1.4	1.7	3.1	1.6	2.2
2046	2.1	1.4	1.7	3.0	1.6	2.1
2047	2.1	1.4	1.7	3.0	1.6	2.1
2048	2.1	1.4	1.7	2.9	1.5	2.1
2049	2.1	1.4	1.7	2.8	1.5	2.1
2050	2.1	1.4	1.7	2.8	1.5	2.1

All growth figures are annual and in real terms
As with previous forecasts, figures are adjusted to use an RPI-based deflator to be consistent with the underlying econometrics
WE, NIC, LDC and OECD are defined in Chapter 2

Table 51 Economic forecasts input data, central demand

	Exchange rate (£ / $)	Oil price ($ / barrel)	Carbon price (£ / t CO2)	One-way APD rate (average) Domestic	WE	OECD	NIC	LDC
2016	1.34	45	4	13	6	39	41	33
2017	1.25	45	4	13	6	39	41	33
2018	1.26	48	4	13	6	39	41	33
2019	1.28	50	4	13	6	39	41	33
2020	1.30	53	5	13	6	39	41	33
2021	1.31	56	12	13	6	39	41	33
2022	1.31	58	19	13	6	39	41	33
2023	1.31	61	26	13	6	39	41	33
2024	1.31	64	34	13	6	39	41	33
2025	1.31	67	41	13	6	39	41	33
2026	1.31	69	48	13	6	39	41	33
2027	1.31	72	56	13	6	39	41	33
2028	1.31	75	63	13	6	39	41	33
2029	1.31	77	70	13	6	39	41	33
2030	1.31	80	77	13	6	39	41	33
2031	1.31	80	85	13	6	39	41	33
2032	1.31	80	92	13	6	39	41	33
2033	1.31	80	99	13	6	39	41	33
2034	1.31	80	106	13	6	39	41	33
2035	1.31	80	113	13	6	39	41	33
2036	1.31	80	120	13	6	39	41	33
2037	1.31	80	128	13	6	39	41	33
2038	1.31	80	135	13	6	39	41	33
2039	1.31	80	142	13	6	39	41	33
2040	1.31	80	149	13	6	39	41	33
2041	1.31	80	156	13	6	39	41	33
2042	1.31	80	164	13	6	39	41	33
2043	1.31	80	171	13	6	39	41	33
2044	1.31	80	178	13	6	39	41	33
2045	1.31	80	185	13	6	39	41	33
2046	1.31	80	192	13	6	39	41	33
2047	1.31	80	200	13	6	39	41	33
2048	1.31	80	207	13	6	39	41	33
2049	1.31	80	214	13	6	39	41	33
2050	1.31	80	221	13	6	39	41	33

All figures are in 2016 prices

Exchange rates are used to turn dollar oil prices into pound sterling

APD is paid only when departing a UK airport. As presented here, international rates are halved to show the one-way average. Domestic return passengers pay APD twice, and so such rates are not halved

WE, NIC, LDC and OECD are defined in Chapter 2

Table 52 Oil price, carbon price and APD inputs, central demand

		Fuel efficiency index (seat km / fuel usage), 2016=1				
	Growth in airline "other" costs (%)	Domestic	WE	OECD	NIC	LDC
2016	-0.89	1.00	1.00	1.00	1.00	1.00
2017	-0.85	0.98	1.00	1.00	1.00	1.01
2018	-0.82	0.96	1.01	0.95	0.98	0.97
2019	-0.79	0.97	1.01	0.95	0.97	0.96
2020	-0.76	0.96	1.01	0.95	0.97	0.96
2021	-0.74	0.94	1.01	0.96	0.97	0.96
2022	-0.71	0.94	1.01	0.97	0.97	0.96
2023	-0.69	0.94	1.01	0.98	0.98	0.97
2024	-0.67	0.95	1.02	0.99	0.99	0.97
2025	-0.65	0.94	1.02	1.02	1.01	0.98
2026	-0.63	0.94	1.03	1.04	1.03	0.99
2027	-0.62	0.96	1.05	1.04	1.05	1.00
2028	-0.60	0.98	1.06	1.05	1.07	1.01
2029	-0.59	1.00	1.08	1.06	1.09	1.01
2030	-0.57	1.01	1.09	1.08	1.12	1.03
2031	0.00	1.01	1.10	1.10	1.13	1.05
2032	0.00	1.02	1.12	1.11	1.13	1.07
2033	0.00	1.01	1.13	1.12	1.13	1.08
2034	0.00	1.02	1.14	1.13	1.15	1.08
2035	0.00	1.03	1.16	1.15	1.17	1.09
2036	0.00	1.03	1.17	1.17	1.19	1.11
2037	0.00	1.04	1.17	1.19	1.23	1.13
2038	0.00	1.04	1.18	1.22	1.27	1.15
2039	0.00	1.05	1.19	1.24	1.32	1.16
2040	0.00	1.05	1.19	1.26	1.35	1.18
2041	0.00	1.08	1.21	1.32	1.49	1.22
2042	0.00	1.08	1.22	1.34	1.54	1.23
2043	0.00	1.08	1.22	1.35	1.59	1.23
2044	0.00	1.09	1.22	1.37	1.65	1.24
2045	0.00	1.09	1.22	1.38	1.70	1.25
2046	0.00	1.10	1.22	1.40	1.74	1.26
2047	0.00	1.10	1.23	1.41	1.78	1.27
2048	0.00	1.11	1.23	1.41	1.81	1.28
2049	0.00	1.13	1.24	1.42	1.83	1.28
2050	0.00	1.14	1.24	1.43	1.85	1.29

Growth figures are annual and are in real terms
WE, NIC, LDC and OECD are defined in Chapter 2

Table 53 Fuel efficiency and other airline costs, central demand

	Fuel	Carbon	Other	APD	Total fare
2016	23	1	83	11	117
2017	21	1	81	11	114
2018	22	1	81	11	114
2019	23	1	80	11	114
2020	24	1	79	11	114
2021	25	2	78	11	116
2022	25	4	77	11	117
2023	26	5	76	11	118
2024	27	6	76	11	120
2025	28	8	75	11	121
2026	28	9	75	11	123
2027	29	10	74	11	124
2028	30	11	74	11	126
2029	30	12	73	11	127
2030	31	13	73	11	128
2031	31	14	73	11	129
2032	31	15	73	11	130
2033	31	16	73	11	131
2034	30	17	73	11	132
2035	30	18	73	11	132
2036	29	19	73	11	133
2037	29	20	73	11	133
2038	29	21	73	11	133
2039	28	22	73	11	134
2040	28	22	73	11	134
2041	26	22	73	11	133
2042	26	23	73	11	133
2043	26	24	73	11	134
2044	26	25	73	11	134
2045	25	25	73	11	135
2046	25	26	73	11	135
2047	25	27	73	11	136
2048	25	28	73	11	136
2049	24	28	73	11	137
2050	24	29	73	11	137

All figures are in 2016 prices, and in £ per passenger

Fare are for a single one-way journey; they are national averages weighted by the number of passengers in each market

Table 54 Components of weighted average fare, central demand

Annex C: Unconstrained forecasts

C.1 The unconstrained forecasts represent underlying estimates of demand in the absence of airport capacity constraints.

C.2 For transparency, the numbers presented in this annex are direct unrounded model outputs, although it should be noted that this does not reflect the level of uncertainty around the forecast. While the low-high set of demand scenarios adopted represents a range of outcomes at the national level, there may be additional factors that need to be taken into account when considering the degree of uncertainty at the level of particular airports.

mppa	2016	2020 Unconstrained			2030 Unconstrained			2040 Unconstrained			2050 Unconstrained		
	central	low	central	high	low	central	high	low	central	high	low	central	high
International													
UK business													
WE	15.0	15.7	16.1	16.4	18.9	20.4	21.3	22.3	25.0	26.7	25.5	29.6	32.2
OECD	1.8	1.9	1.9	2.0	2.1	2.4	2.5	2.3	2.8	3.1	2.4	3.2	3.8
NIC	1.8	1.7	2.0	2.1	2.4	2.8	3.4	3.0	3.8	5.1	3.6	4.7	7.3
LDC	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.3	0.4	0.6
All long haul	3.7	3.8	4.1	4.3	4.7	5.5	6.3	5.6	6.9	8.7	6.3	8.4	11.6
UK business total	18.7	19.4	20.2	20.8	23.7	25.9	27.6	27.8	31.9	35.4	31.8	38.0	43.8
UK leisure													
WE	89.7	94.7	99.4	105.4	118.3	123.2	129.3	146.1	147.6	154.1	176.8	173.8	180.6
OECD	9.1	10.1	10.7	11.3	12.4	13.7	14.7	14.7	16.6	18.1	16.9	19.7	21.8
NIC	12.4	13.3	14.3	15.7	16.9	17.9	18.8	21.8	22.1	22.8	28.9	28.5	29.0
LDC	0.8	0.9	1.0	1.2	1.0	1.3	1.6	1.3	1.7	2.2	1.6	2.1	2.9
All scheduled long haul	22.3	24.2	26.0	28.1	30.4	32.9	35.1	37.7	40.4	43.0	47.4	50.4	53.7
Short haul charter	10.7	8.6	9.1	9.6	6.0	6.3	6.6	7.5	7.6	7.9	9.2	9.1	9.4
Long haul charter	2.1	1.7	1.8	2.0	1.2	1.3	1.5	1.5	1.7	1.9	1.9	2.2	2.5
All charter	12.8	10.3	10.9	11.6	7.2	7.6	8.1	9.0	9.3	9.9	11.1	11.2	11.9
All short haul	100.4	103.3	108.5	115.0	124.3	129.5	135.9	153.6	155.2	162.1	186.0	182.8	190.0
All long haul	24.4	25.9	27.8	30.1	31.6	34.2	36.6	39.3	42.1	44.9	49.3	52.5	56.2
UK leisure total	124.8	129.2	136.3	145.1	155.9	163.7	172.5	192.9	197.3	207.0	235.3	235.4	246.1
Foreign business													
WE	13.4	13.9	14.3	14.5	16.4	17.6	18.3	18.9	21.0	22.3	21.4	24.6	26.6
OECD	1.7	1.8	1.8	1.9	1.9	2.1	2.2	2.0	2.3	2.5	2.1	2.6	2.8
NIC	1.5	1.7	1.7	1.8	2.2	2.4	2.9	2.7	3.2	4.3	3.1	3.9	6.2
LDC	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
All long haul	3.3	3.6	3.7	3.8	4.2	4.6	5.2	4.9	5.7	7.0	5.4	6.7	9.2
Foreign business total	16.7	17.5	17.9	18.3	20.6	22.2	23.5	23.8	26.7	29.4	26.8	31.3	35.8
Foreign leisure													
WE	39.5	40.1	42.2	45.0	46.5	48.6	51.3	57.1	57.7	60.4	68.2	67.0	69.9
OECD	6.2	6.5	6.9	7.2	6.8	7.5	8.0	7.1	8.1	8.9	7.4	8.8	9.8
NIC	5.2	5.7	6.0	6.4	6.6	7.2	8.3	7.5	8.5	10.7	8.5	9.9	13.6
LDC	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.5	0.6	0.7	0.5	0.6	0.8
All long haul	11.8	12.7	13.3	14.1	13.9	15.2	16.9	15.2	17.2	20.3	16.4	19.3	24.2
Foreign leisure total	51.2	52.7	55.5	59.1	60.4	63.8	68.2	72.3	74.9	80.7	84.6	86.3	94.1
Intl-intl transfers	23.9	33.2	35.5	38.8	38.4	42.6	47.7	42.0	48.0	55.6	45.2	52.7	57.9
UK resident international	143.5	148.7	156.5	165.9	179.5	189.6	200.1	220.7	229.2	242.4	267.1	273.4	290.0
Foreign resident internatio	91.8	103.4	109.0	116.2	119.4	128.6	139.4	138.1	149.6	165.7	156.6	170.2	187.8
International total	**235.3**	**252.1**	**265.5**	**282.1**	**298.9**	**318.2**	**339.5**	**358.8**	**378.8**	**408.1**	**423.7**	**443.6**	**477.8**
Domestic (Internal "end-to-end")													
Domestic business	14.0	14.0	14.9	15.5	15.2	17.4	18.8	16.0	19.2	21.7	18.1	22.5	26.4
Domestic leisure	15.0	14.9	15.6	16.4	17.0	18.2	19.1	19.8	21.2	22.1	24.1	25.6	26.6
Others	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Domestic total	**31.3**	**31.2**	**32.8**	**34.2**	**34.6**	**38.0**	**40.2**	**38.2**	**42.7**	**46.2**	**44.5**	**50.4**	**55.3**
Total													
Total	**266.6**	**283.3**	**298.4**	**316.3**	**333.5**	**356.1**	**379.7**	**396.9**	**421.5**	**454.3**	**468.2**	**494.0**	**533.2**

Millions of terminal passengers per annum (mppa)

International Tables count domestic-international transfers both at the airport of origin and twice at the hub transfer airport

Scheduled figures include both 'full service' and 'low cost' airlines

The domestic section are only passengers beginning and ending a journey in the UK (excluding Channel Isles) and excludes those passengers using domestic services to connect to international flights

'Others' - normally passengers going from a UK airport in the model to a UK airport not in the model (e.g. oil rig traffic at Aberdeen)

2016 is modelled (constrained) validation version

Table 55 Passenger demand by purpose and world region, unconstrained capacity

	International - Direct								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	160.0	160.0	160.0	36.6	36.6	36.6	196.6	196.6	196.6
2020	158.9	166.1	174.9	36.3	38.6	41.3	195.2	204.8	216.2
2030	187.1	196.2	206.2	42.3	46.5	51.6	229.4	242.7	257.8
2040	231.8	238.6	250.3	52.7	58.9	68.2	284.5	297.4	318.5
2050	280.7	284.3	298.4	64.8	73.3	88.1	345.5	357.6	386.5

	via hubs								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	5.7	5.7	5.7	4.4	4.4	4.4	10.1	10.1	10.1
2020	6.5	6.9	7.4	4.7	5.0	5.4	11.2	11.9	12.8
2030	7.5	7.8	8.1	5.0	5.4	5.6	12.5	13.1	13.7
2040	7.5	7.5	7.9	4.8	5.2	5.1	12.3	12.7	12.9
2050	7.3	7.1	7.3	4.9	5.2	5.1	12.2	12.3	12.4

	International-international transfers								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	10.7	10.7	10.7	13.6	13.6	13.6	24.3	24.3	24.3
2020	15.1	16.2	17.7	18.1	19.3	21.0	33.2	35.5	38.8
2030	17.2	19.1	21.6	21.2	23.4	26.0	38.4	42.6	47.7
2040	18.6	21.3	25.3	23.4	26.7	30.3	42.0	48.0	55.6
2050	20.0	23.3	26.5	25.2	29.3	31.4	45.2	52.7	57.9

	Total international								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	176.4	176.4	176.4	54.6	54.6	54.6	231.0	231.0	231.0
2020	180.6	189.3	200.1	59.0	62.9	67.7	239.6	252.2	267.8
2030	211.8	223.1	236.0	68.5	75.3	83.2	280.3	298.4	319.2
2040	257.9	267.5	283.5	81.0	90.7	103.5	338.8	358.1	387.0
2050	308.0	314.7	332.1	94.9	107.9	124.6	402.9	422.6	456.7

2016 is modelled
'Via hubs' domestic-international transfers: outbound international leg only counted at Heathrow, Gatwick, Manchester or Stansted
'Via hubs' including UK passengers using Paris CDG, Amsterdam, Frankfurt or Dubai
International-international transfers based on destination of outbound leg

Table 56 International terminal passengers by length of haul, unconstrained capacity

	Domestic passengers											
	Internal			*international transfers*			"others"			Total		
	low	central	high	*low*	*central*	*high*	low	central	high	low	central	high
2016	29.0	29.0	29.0	*5.5*	*5.5*	*5.5*	2.3	2.3	2.3	36.8	36.8	36.8
2020	28.8	30.5	31.8	*12.5*	*13.3*	*14.3*	2.3	2.3	2.3	43.7	46.2	48.5
2030	32.2	35.6	37.9	*18.6*	*19.7*	*20.3*	2.3	2.3	2.3	53.2	57.7	60.6
2040	35.9	40.4	43.8	*19.9*	*20.7*	*21.1*	2.3	2.3	2.3	58.1	63.4	67.3
2050	42.2	48.1	53.0	*20.7*	*21.0*	*21.1*	2.3	2.3	2.3	65.3	71.4	76.4

2016 is modelled

Domestic-international transfers: inbound/outbound domestic leg at UK originating airport and domestic hub leg counted at Heathrow, Gatwick, Manchester or Stansted

Domestic-international transfers: are indicative as based on unconstrained assignment and included only to complete national terminal passenger total - see constrained tables for forecasts

'Others' - normally passengers going from a UK airport in the model to a UK airport not in the model (e.g. oil rig traffic at Aberdeen)

Table 57 Breakdown of domestic passenger demand, unconstrained capacity, mppa

mppa	**2016**		2030 Unconstrained						2050 Unconstrained					
NAPDM Regions	**mppa**	**share**	mppa	share	mppa	share	mppa	share	mppa	share	mppa	share	mppa	share
WE	**165.3**	**62%**	194.6	58%	204.0	57%	214.4	56%	288.0	62%	291.4	59%	305.7	57%
OECD	**17.9**	**7%**	20.5	6%	22.6	6%	24.2	6%	26.2	6%	31.2	6%	34.9	7%
NIC	**21.3**	**8%**	25.0	7%	27.0	8%	30.3	8%	40.9	9%	44.0	9%	53.8	10%
LDC	**1.8**	**1%**	1.9	1%	2.2	1%	2.6	1%	2.6	1%	3.4	1%	4.5	1%
International total	**206.3**	**77%**	241.9	73%	255.9	72%	271.5	71%	357.7	76%	369.9	75%	398.8	75%
Domestic EE	***29.0***	***11%***	*32.2*	*10%*	*35.6*	*10%*	*37.9*	*10%*	*42.2*	*9%*	*48.1*	*10%*	*53.0*	*10%*
Dom-intl transfer	***5.2***	***2%***	*18.6*	*6%*	*19.7*	*6%*	*20.3*	*5%*	*20.7*	*4%*	*21.0*	*4%*	*21.1*	*4%*
Others	***2.3***	***1%***	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*0%*	*2.3*	*0%*	*2.3*	*0%*
Domestic Total	***36.5***	***14%***	*53.2*	*16%*	*57.7*	*16%*	*60.6*	*16%*	*65.3*	*14%*	*71.4*	*14%*	*76.4*	*14%*
II	**23.9**	**9%**	38.4	12%	42.6	12%	47.7	13%	45.2	10%	52.7	11%	57.9	11%
Total	**266.6**	**100%**	333.5	100%	356.1	100%	379.7	100%	468.2	100%	494.0	100%	533.2	100%

Table 58 Passenger forecasts by destination, unconstrained capacity, mppa

Annex D: Constrained passenger forecasts

	International - Direct								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	159.5	159.5	159.5	36.6	36.6	36.6	196.2	196.2	196.2
2030	190.5	199.5	208.6	44.8	49.3	54.0	235.3	248.8	262.6
2040	234.0	238.9	247.4	55.7	62.1	70.6	289.7	301.0	318.0
2050	274.2	274.2	279.2	67.8	76.3	89.8	342.0	350.5	369.0

	via hubs								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	5.7	5.7	5.7	4.4	4.4	4.4	10.1	10.1	10.1
2030	2.8	3.0	3.5	2.4	2.4	3.0	5.2	5.5	6.5
2040	2.0	2.1	3.0	1.6	1.6	2.1	3.7	3.6	5.1
2050	2.0	2.3	5.3	1.3	1.5	2.1	3.4	3.8	7.4

	International-international transfers								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	10.5	10.5	10.5	13.4	13.4	13.4	23.9	23.9	23.9
2030	8.0	7.8	7.6	11.5	10.9	10.8	19.4	18.7	18.4
2040	5.2	4.5	4.3	7.9	6.9	6.3	13.1	11.4	10.7
2050	2.0	2.0	2.6	3.2	2.9	3.6	5.3	4.9	6.3

	Total international								
	Short haul mppa			Long haul mppa			Total mppa		
	low	central	high	low	central	high	low	central	high
2016	175.7	175.7	175.7	54.4	54.4	54.4	230.1	230.1	230.1
2030	201.3	210.3	219.8	58.7	62.7	67.7	260.0	273.0	287.5
2040	241.2	245.5	254.7	65.2	70.6	79.1	306.4	316.0	333.8
2050	278.2	278.5	287.2	72.3	80.7	95.5	350.6	359.2	382.7

2016 is modelled
'Via hubs' domestic-international transfers: outbound international leg only counted at Heathrow, Gatwick, Manchester or Stansted
'Via hubs' including UK passengers using Paris CDG, Amsterdam, Frankfurt or Dubai
International-international transfers based on destination of outbound leg

Table 59 International passenger demand by length of haul, baseline capacity

mppa	2016	2030 Base			2040 Base			2050 Base		
	central	low	central	high	low	central	high	low	central	high
International										
UK business										
WE	15.0	18.7	20.1	21.0	21.9	24.4	25.8	24.5	28.3	30.2
OECD	1.8	2.1	2.4	2.5	2.3	2.8	3.1	2.4	3.2	3.7
NIC	1.8	2.4	2.8	3.4	3.0	3.7	5.1	3.6	4.7	7.2
LDC	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.3	0.4	0.6
All long haul	3.7	4.7	5.4	6.3	5.5	6.9	8.7	6.3	8.4	11.6
UK business total	18.7	23.4	25.6	27.2	27.5	31.3	34.5	30.8	36.6	41.8
UK leisure										
WE	89.7	110.0	114.4	120.0	135.6	135.5	139.8	160.0	155.4	157.7
OECD	9.1	10.7	11.8	12.6	12.7	14.4	15.7	14.8	17.3	19.0
NIC	12.4	14.1	14.9	16.0	18.5	18.8	19.9	25.1	24.7	25.8
LDC	0.8	0.9	1.1	1.4	1.1	1.4	1.8	1.3	1.8	2.4
All scheduled long haul	22.3	25.7	27.8	30.0	32.3	34.6	37.4	41.2	43.7	47.2
Short haul charter	10.7	6.0	6.3	6.5	7.5	7.5	7.7	8.9	8.6	8.8
Long haul charter	2.1	1.2	1.3	1.5	1.5	1.7	1.9	1.9	2.1	2.4
All charter	12.8	7.2	7.6	8.0	9.0	9.2	9.6	10.7	10.7	11.2
All short haul	100.4	116.0	120.6	126.6	143.0	142.9	147.5	168.8	164.0	166.5
All long haul	24.4	26.8	29.1	31.4	33.8	36.3	39.3	43.1	45.9	49.6
UK leisure total	124.8	142.8	149.7	158.0	176.8	179.3	186.8	211.9	209.9	216.1
Foreign business										
WE	13.4	16.2	17.4	18.0	18.7	20.8	22.0	21.0	24.1	25.9
OECD	1.7	1.9	2.1	2.2	2.0	2.3	2.5	2.1	2.5	2.8
NIC	1.5	2.2	2.4	2.9	2.7	3.1	4.3	3.1	3.9	6.2
LDC	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
All long haul	3.3	4.2	4.6	5.2	4.8	5.6	7.0	5.4	6.6	9.2
Foreign business total	16.7	20.4	22.0	23.2	23.6	26.4	29.0	26.4	30.7	35.1
Foreign leisure										
WE	39.5	43.9	45.8	48.2	53.1	53.4	55.5	62.3	60.6	62.3
OECD	6.2	6.1	6.8	7.2	6.5	7.4	8.0	6.7	7.9	8.8
NIC	5.2	6.0	6.5	7.6	6.9	7.7	9.9	7.8	9.1	12.8
LDC	0.4	0.4	0.5	0.6	0.5	0.5	0.7	0.5	0.6	0.8
All long haul	11.8	12.5	13.7	15.4	13.8	15.6	18.6	15.0	17.6	22.4
Foreign leisure total	51.2	56.4	59.5	63.6	66.9	69.0	74.1	77.2	78.2	84.7
Intl-intl transfers	23.9	19.4	18.7	18.4	13.1	11.4	10.7	5.3	4.9	6.3
UK resident international	143.5	166.2	175.3	185.2	204.3	210.6	221.3	242.7	246.5	257.9
Foreign resident internatio	91.8	96.2	100.2	105.2	103.5	106.8	113.8	108.9	113.9	126.1
International total	**235.3**	**262.4**	**275.5**	**290.4**	**307.8**	**317.4**	**335.1**	**351.6**	**360.4**	**384.0**
Domestic (Internal "end-to-end")										
Domestic business	14.0	15.2	17.4	18.8	16.0	19.2	21.6	17.9	22.3	26.0
Domestic leisure	15.0	17.0	18.2	19.0	19.7	20.9	21.6	23.3	24.6	25.0
Others	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Domestic total	**31.3**	**34.6**	**37.9**	**40.1**	**38.0**	**42.5**	**45.5**	**43.5**	**49.2**	**53.4**
Total										
Total	**266.6**	**297.0**	**313.4**	**330.5**	**345.8**	**359.8**	**380.7**	**395.2**	**409.5**	**437.4**

Millions of terminal passengers per annum (mppa)

International figures count domestic-international transfers both at the airport of origin and twice at the hub transfer airport

Scheduled figures include both 'full service' and 'low cost' airlines

The domestic section are only passengers beginning and ending a journey in the UK (excluding Channel Isles) and excludes those passengers using domestic services to connect to international flights

'Others' - normally passengers going from a UK airport in the model to a UK airport not in the model (e.g. oil rig traffic at Aberdeen)

2016 is modelled

Table 60 Breakdown of passenger demand by purpose and world region, baseline capacity, mppa

	internal			*international transfers*			'others'			total		
	low	central	high	*low*	*central*	*high*	low	central	high	low	central	high
2016	29.0	29.0	29.0	*5.2*	*5.2*	*5.2*	2.3	2.3	2.3	36.5	36.5	36.5
2030	32.2	35.6	37.8	*2.4*	*2.5*	*2.9*	2.3	2.3	2.3	37.0	40.5	43.0
2040	35.7	40.1	43.2	*1.4*	*1.3*	*1.3*	2.3	2.3	2.3	39.4	43.8	46.9
2050	41.2	46.8	51.1	*1.0*	*1.2*	*1.3*	2.3	2.3	2.3	44.6	50.4	54.7

2016 is modelled

Domestic-international transfers: inbound/outbound domestic leg at UK originating airport and domestic hub leg counted at Heathrow, Gatwick, Manchester or Stansted

'Others' are generally flights between a modelled UK airport and a small UK destination not in the model e.g. oil rig.

Table 61 Breakdown of domestic passenger demand, baseline capacity, mppa

	2016		2030						2050					
			low		central		high		low		central		high	
	mppa	share	mppa	share	mppa	share	mppa	share	mppa	share	mppa	share	mppa	share
WE	165.3	62%	193.3	65%	202.5	65%	212.2	64%	276.2	70%	276.5	68%	284.5	65%
OECD	17.9	7%	20.4	7%	22.6	7%	24.2	7%	26.0	7%	31.0	8%	34.5	8%
NIC	21.3	8%	24.9	8%	26.9	9%	30.2	9%	40.5	10%	43.5	11%	53.1	12%
LDC	1.8	1%	1.9	1%	2.2	1%	2.6	1%	2.6	1%	3.3	1%	4.3	1%
International total	206.3	77%	240.5	81%	254.2	81%	269.1	81%	345.3	87%	354.3	87%	376.4	86%
Domestic EE	*29.0*	*11%*	*32.2*	*11%*	*35.6*	*11%*	*37.8*	*11%*	*41.2*	*10%*	*46.8*	*11%*	*51.1*	*12%*
Dom-intl transfer	*5.2*	*2%*	*2.4*	*1%*	*2.5*	*1%*	*2.9*	*1%*	*1.0*	*0%*	*1.2*	*0%*	*1.3*	*0%*
Others	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*	*2.3*	*1%*
Domestic total	*36.5*	*14%*	*37.0*	*12%*	*40.5*	*13%*	*43.0*	*13%*	*44.6*	*11%*	*50.4*	*12%*	*54.7*	*13%*
II	23.9	9%	19.4	7%	18.7	6%	18.4	6%	5.3	1%	4.9	1%	6.3	1%
Total	266.6	100%	297.0	100%	313.4	100%	330.5	100%	395.2	100%	409.5	100%	437.4	100%

II - international-international transfers at a UK hub airport

Table 62 Passenger demand by destination, baseline capacity

mppa	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	43.4	45.0	45.4	48.8	50.2	49.8	53.8	52.0	52.0	54.7
Heathrow	76.0	86.6	86.2	85.9	89.4	89.6	90.5	90.9	93.4	97.2
London City	4.0	6.7	6.5	6.6	6.6	6.5	6.5	6.5	6.4	6.6
Luton	14.5	17.9	18.0	18.1	18.2	18.2	18.0	17.9	18.1	18.1
Stansted	24.5	23.6	31.0	35.4	35.2	35.4	35.3	35.2	35.5	35.0
London	162.5	179.8	187.1	194.7	199.5	199.4	204.1	202.5	205.4	211.6
Aberdeen	2.6	2.7	2.9	3.1	3.1	3.4	3.5	3.7	4.0	4.3
Belfast International	5.1	5.9	6.4	6.6	7.1	7.8	8.3	8.5	9.2	10.0
Belfast City	2.7	2.9	3.2	3.6	3.4	3.8	4.1	4.1	4.6	5.0
Birmingham	12.3	16.2	18.2	20.2	22.9	27.4	29.9	31.3	32.9	35.8
Bournemouth	0.6	0.1	0.2	1.3	0.5	0.7	4.5	4.4	4.4	4.5
Bristol	7.6	8.3	9.5	9.8	9.9	10.0	10.0	10.1	10.2	10.1
Cardiff	1.4	0.8	0.8	0.9	1.1	1.1	1.4	2.8	3.0	5.8
Durham Tees Valley	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.9
Doncaster Sheffield	1.2	0.3	0.6	1.0	0.3	0.6	0.8	0.4	0.4	1.6
East Midlands	4.8	6.4	6.3	6.9	7.9	8.7	9.9	10.2	10.0	10.0
Edinburgh	11.8	12.1	12.5	13.3	14.5	15.4	16.1	16.7	17.6	19.3
Exeter	0.8	0.6	0.7	0.7	0.8	1.0	1.0	3.4	3.1	3.6
Glasgow	8.2	11.1	12.2	12.9	12.3	13.1	14.3	14.3	15.3	16.0
Humberside	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.6	0.6
Inverness	0.7	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.1	1.1
Leeds-Bradford	3.4	6.9	7.2	7.5	8.1	8.2	7.9	8.0	7.9	8.1
Liverpool	4.8	4.2	4.2	4.5	4.8	5.0	6.0	9.3	8.4	12.4
Manchester	26.8	29.0	30.8	32.5	36.8	38.6	41.5	46.0	50.3	54.7
Newcastle	4.7	4.4	4.7	4.9	4.8	5.0	5.5	5.8	6.0	6.4
Newquay	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.4	0.5	0.5
Norwich	0.5	0.4	0.5	0.5	0.6	0.8	0.9	1.4	2.0	3.2
Prestwick	0.8	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Southampton	2.0	2.5	3.0	3.1	4.8	7.1	7.0	7.1	7.1	6.8
Southend	0.7	0.7	0.8	0.9	0.8	1.1	2.1	2.9	5.1	5.0
Non London Total	104.2	117.1	126.3	135.8	146.4	160.4	176.6	192.6	204.2	225.8
Total	266.6	297.0	313.4	330.5	345.8	359.8	380.7	395.2	409.5	437.4
Paris	65.2	72.1	76.4	85.4	83.4	89.1	109.0	95.9	106.4	118.0
Amsterdam	63.6	69.2	73.5	82.5	80.4	85.8	108.3	93.8	105.1	118.2
Frankfurt	61.3	70.9	82.2	96.3	90.1	102.8	111.2	108.2	110.0	114.2
Dubai	83.6	109.9	118.1	136.1	124.0	139.9	182.4	139.5	164.8	251.1
Overseas Hubs Total	273.8	322.0	350.2	400.3	377.8	417.6	510.9	437.4	486.3	601.5

2016 is modelled

Output terminal capacities may exceed input terminal capacity if runway is also overloaded

Table 63 Passenger demand by airport, baseline capacity, mppa

Low demand scenario

	2016	2030	2040	2050
Heathrow	100%	100%	100%	100%
Gatwick	100%	100%	100%	100%
Stansted	70%	67%	100%	100%
Luton	81%	100%	100%	100%
London City	80%	100%	100%	100%
London	93%	96%	100%	100%
Manchester	89%	76%	67%	84%
Birmingham	50%	59%	79%	100%
Bristol	76%	83%	100%	100%
East Midlands	79%	64%	79%	100%
Southampton	82%	84%	69%	100%

High demand scenario

	2016	2030	2040	2050
Heathrow	100%	100%	100%	100%
Gatwick	100%	100%	100%	100%
Stansted	70%	100%	100%	100%
Luton	81%	100%	100%	100%
London City	80%	100%	100%	100%
London	93%	100%	100%	100%
Manchester	89%	86%	75%	100%
Birmingham	50%	72%	100%	100%
Bristol	76%	100%	100%	100%
East Midlands	79%	69%	100%	100%
Southampton	82%	100%	100%	100%

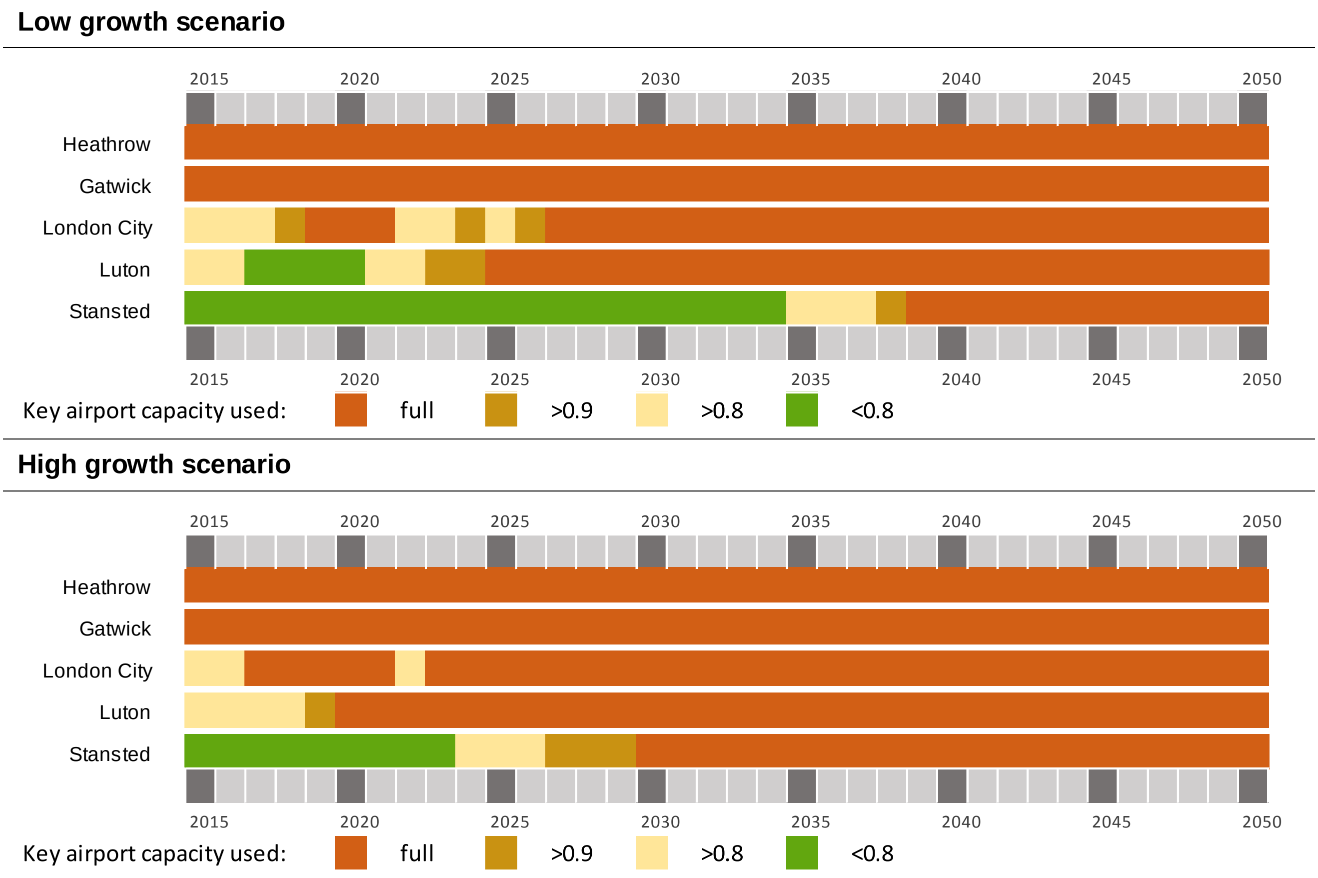
2016 is modelled

The proportions shown relate to the higher of the terminal capacity or runway capacity used

The London total proportions relate to a weighted average by number of passengers

Runway capacity is assumed to increase at Manchester; so lower utilisation figures reflect an increase in capacity rather than a decrease in demand

Table 64 Proportion of capacity used by airport, baseline capacity



The proportions shown relate to the higher of the terminal capacity or runway capacity used

Luton's capacity increases in 2017

London City's capacity increases in 2022

Figure D.1 Timeline of London airports capacity filling, baseline capacity

Gatwick Second Runway

mppa	2016	2030			2040			2050		
	LGW 2R mppa									
	central	low	central	high	low	central	high	low	central	high
Gatwick	43	53	58	62	69	74	86	86	99	103
Heathrow	76	86	85	87	87	89	90	91	90	94
London City	4	7	7	7	7	7	7	7	7	6
Luton	15	18	18	18	18	18	18	18	18	18
Stansted	25	21	25	29	29	32	35	35	35	35
London	162	184	192	202	209	220	235	237	249	256
annual growth rate		0.9%	1.2%	1.6%	1.3%	1.4%	1.5%	1.2%	1.2%	0.9%
Birmingham	12	16	18	19	22	24	25	30	30	32
Bristol	8	8	9	10	10	10	10	10	10	10
East Midlands	5	6	6	7	7	8	9	9	10	10
Edinburgh	12	12	13	13	14	16	17	17	18	20
Glasgow	8	11	12	13	13	13	14	15	15	16
Liverpool	5	4	4	5	5	5	6	8	9	10
Manchester	27	29	31	32	37	38	40	43	44	51
Newcastle	5	4	5	5	5	5	5	6	6	6
Larger regional airport total	81	91	97	103	112	118	126	138	142	155
Other regional	23	25	27	30	29	32	36	38	42	51
Total outside London	104	116	124	133	141	150	162	176	183	206
annual growth rate		0.8%	1.3%	1.8%	2.0%	1.9%	1.9%	2.2%	2.1%	2.4%
Total	**267**	**300**	**317**	**336**	**351**	**370**	**397**	**413**	**432**	**462**
annual growth rate		0.8%	1.2%	1.7%	1.6%	1.6%	1.7%	1.6%	1.6%	1.5%

Heathrow Extended Northern Runway

mppa	2016	2030			2040			2050		
	LHR ENR mppa									
	central	low	central	high	low	central	high	low	central	high
Gatwick	43	43	45	45	50	49	52	52	51	55
Heathrow	76	123	125	125	125	128	128	128	128	132
London City	4	5	5	6	7	7	6	7	7	7
Luton	15	18	18	18	18	18	18	18	18	18
Stansted	25	19	23	30	28	33	35	35	35	35
London	162	207	216	224	228	235	239	240	239	246
annual growth rate		1.7%	2.0%	2.3%	1.0%	0.8%	0.7%	0.5%	0.2%	0.3%
Birmingham	12	15	16	17	18	22	26	29	32	33
Bristol	8	8	9	10	10	10	10	10	10	10
East Midlands	5	6	7	7	9	8	9	10	10	10
Edinburgh	12	12	13	14	15	16	16	17	19	19
Glasgow	8	11	12	13	12	12	14	14	14	16
Liverpool	5	4	5	5	5	5	6	8	8	10
Manchester	27	27	30	32	35	38	40	43	46	53
Newcastle	5	5	5	5	5	5	5	6	6	6
Larger regional airport total	81	88	95	101	109	117	127	137	145	158
Other regional	23	26	27	30	29	31	37	41	45	56
Total outside London	104	113	122	131	138	147	164	178	190	214
annual growth rate		0.6%	1.1%	1.6%	2.0%	1.9%	2.3%	2.6%	2.6%	2.7%
Total	**267**	**320**	**337**	**355**	**366**	**382**	**402**	**418**	**429**	**460**
annual growth rate		1.3%	1.7%	2.1%	1.3%	1.3%	1.3%	1.3%	1.2%	1.4%

Heathrow Northwest Runway

	LHR NWR mppa									
mppa	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	43	42	45	45	50	50	52	51	52	52
Heathrow	76	131	132	130	132	135	136	136	136	142
London City	4	4	4	5	7	7	7	7	7	6
Luton	15	17	18	18	18	18	18	18	18	18
Stansted	25	19	22	28	27	32	35	35	35	35
London	162	214	222	227	234	241	247	246	248	253
annual grow th rate		2.0%	2.2%	2.4%	0.9%	0.8%	0.8%	0.5%	0.3%	0.2%
Birmingham	12	14	15	17	17	21	25	29	31	33
Bristol	8	8	9	10	10	10	10	10	10	10
East Midlands	5	6	7	7	9	8	8	10	10	10
Edinburgh	12	12	13	14	15	16	17	17	19	19
Glasgow	8	11	12	12	12	12	14	14	14	16
Liverpool	5	4	5	5	5	5	6	9	8	9
Manchester	27	28	29	31	35	37	40	42	45	52
Newcastle	5	5	5	5	5	5	6	6	6	6
Larger regional airport total	81	87	94	100	109	116	125	136	143	156
Other regional	23	25	27	30	29	31	36	40	44	54
Total outside London	104	113	121	130	138	146	161	176	187	211
annual grow th rate		0.6%	1.1%	1.6%	2.0%	1.9%	2.1%	2.5%	2.5%	2.7%
Total	**267**	**326**	**343**	**358**	**371**	**387**	**408**	**423**	**435**	**464**
annual grow th rate		1.5%	1.8%	2.1%	1.3%	1.2%	1.3%	1.3%	1.2%	1.3%

2016 is modelled

Output terminal capacities may exceed input terminal capacity if runway is overloaded

Table 65 Passenger demand by airport, mppa

Annex E: Constrained ATM & CO_2 forecasts

ATM 000s	Base ATMs									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	277	278	282	288	294	292	296	296	297	300
Heathrow	476	489	485	482	491	489	490	490	492	484
London City	74	99	98	101	97	96	100	100	94	105
Luton	101	118	119	121	116	115	115	114	115	123
Stansted	173	153	198	223	207	212	211	208	212	210
London	1101	1138	1182	1214	1205	1205	1213	1209	1211	1223
Aberdeen	73	75	78	80	80	84	87	87	92	99
Belfast International	42	43	47	48	48	52	56	57	61	68
Belfast City	43	45	47	50	48	50	52	52	55	58
Birmingham	104	122	135	148	163	195	205	207	206	204
Bournemouth	3	1	4	14	9	10	48	53	52	58
Bristol	58	59	67	69	69	69	70	73	78	75
Cardiff	17	14	14	15	17	19	23	33	38	62
Durham Tees Valley	3	1	1	1	1	1	1	5	5	7
Doncaster Sheffield	9	4	6	11	4	6	9	6	7	17
East Midlands	58	82	79	86	92	99	108	116	120	124
Edinburgh	109	114	116	121	128	130	135	146	143	152
Exeter	12	10	11	12	12	15	14	31	28	32
Glasgow	76	87	94	97	86	96	100	94	103	108
Humberside	9	9	9	9	10	9	9	10	13	15
Inverness	11	13	13	13	13	14	15	15	16	16
Leeds-Bradford	28	42	44	46	46	46	44	46	47	47
Liverpool	40	34	34	36	35	37	42	62	56	78
Manchester	196	200	211	221	237	247	262	282	310	336
Newcastle	41	38	40	42	40	43	46	47	49	52
Newquay	8	8	9	10	9	9	9	8	9	10
Norwich	24	24	24	25	27	29	31	37	45	60
Prestwick	5	1	1	1	1	1	1	1	1	1
Southampton	42	49	57	57	81	108	106	109	106	104
Southend	7	7	7	9	8	11	21	28	49	49
Non London Total	1018	1080	1148	1220	1265	1380	1494	1605	1690	1831
Total	2119	2218	2330	2434	2471	2584	2707	2814	2901	3054
Paris	458	468	490	535	537	562	662	615	659	696
Amsterdam	468	477	501	550	548	575	704	638	695	757
Frankfurt	453	485	550	629	596	668	706	701	702	707
Dubai	420	507	540	608	558	618	782	612	715	1060
Oversea Hub Total	1800	1937	2080	2323	2238	2423	2855	2565	2772	3220

2016 is modelled

Baseline: no new runways

Passenger and freighter ATMs

To allow the model to converge when constrained ATMs at airports can be allowed to exceed input capacity by up to 2.5%

Table 66 ATMs by airport, thousands, baseline capacity

Gatwick Second Runway

ATM 000s	2016	2030			2040			2050		
	LGW 2R ATMs									
	central	low	central	high	low	central	high	low	central	high
Gatwick	277	323	350	374	409	435	494	511	567	576
Heathrow	476	488	482	486	482	489	482	489	479	473
London City	74	99	99	102	99	98	104	98	100	102
Luton	101	118	118	120	115	114	114	112	113	114
Stansted	173	135	162	187	171	190	206	204	207	208
London	1101	1162	1211	1268	1275	1326	1400	1415	1467	1473
annual growth rate		0.4%	0.7%	1.0%	0.9%	0.9%	1.0%	1.0%	1.0%	0.5%
Birmingham	104	118	131	140	155	168	177	206	205	207
Bristol	58	58	64	69	72	70	71	72	73	75
East Midlands	58	81	78	84	87	87	110	106	113	121
Edinburgh	109	112	119	121	123	135	142	140	148	159
Glasgow	76	88	93	99	91	90	95	100	100	102
Liverpool	40	34	34	36	36	37	41	53	58	66
Manchester	196	199	210	220	237	244	255	268	273	311
Newcastle	41	38	41	42	40	42	46	47	48	53
Larger regional airport total	682	729	771	809	840	873	935	993	1018	1095
Other regional	336	339	359	392	373	400	444	461	493	592
Total outside London	1018	1068	1130	1201	1213	1273	1379	1455	1511	1687
Total	**2119**	**2230**	**2341**	**2469**	**2489**	**2599**	**2779**	**2870**	**2978**	**3160**
annual growth rate		0.4%	0.7%	1.1%	1.1%	1.1%	1.2%	1.4%	1.4%	1.3%

Heathrow Extended Northern Runway

ATM 000s	2016	2030			2040			2050		
	LHR ENR ATMs									
	central	low	central	high	low	central	high	low	central	high
Gatwick	277	264	278	275	294	292	300	297	290	308
Heathrow	476	705	713	710	706	711	704	715	706	695
London City	74	77	80	93	101	101	106	102	105	98
Luton	101	115	116	119	114	114	112	112	113	113
Stansted	173	125	148	188	161	191	207	200	203	211
London	1101	1285	1335	1385	1375	1409	1429	1426	1417	1426
annual growth rate		1.1%	1.4%	1.6%	0.7%	0.5%	0.3%	0.4%	0.1%	0.0%
Birmingham	104	112	120	127	132	158	181	196	208	205
Bristol	58	56	61	67	66	69	66	71	73	75
East Midlands	58	76	80	83	97	93	101	108	114	124
Edinburgh	109	114	123	126	133	144	142	154	162	158
Glasgow	76	86	90	95	86	87	97	99	95	108
Liverpool	40	34	36	36	37	38	40	55	54	69
Manchester	196	187	204	218	230	243	256	267	289	324
Newcastle	41	38	41	42	41	44	46	48	49	51
Larger regional airport total	682	705	755	794	824	876	930	997	1043	1114
Other regional	336	335	351	379	361	384	450	475	530	649
Total outside London	1018	1040	1106	1173	1184	1260	1380	1472	1573	1763
Total	**2119**	**2324**	**2441**	**2557**	**2560**	**2669**	**2809**	**2899**	**2990**	**3189**
annual growth rate		0.7%	1.0%	1.4%	1.0%	0.9%	0.9%	1.3%	1.1%	1.3%

2016 is modelled

Passenger and freighter ATMs

To allow the model to converge when constrained ATMs at airports can be allowed to exceed input capacity by up to 2.5%

Heathrow Northwest Runway

ATM 000s	LHR NWR ATMs									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	277	259	276	277	291	295	300	297	297	291
Heathrow	476	754	753	741	748	752	751	755	757	756
London City	74	72	73	86	102	102	108	101	103	105
Luton	101	111	115	116	112	113	113	111	112	110
Stansted	173	125	145	181	157	184	206	199	204	211
London	1101	1321	1363	1401	1410	1446	1479	1464	1472	1473
annual growth rate		1.3%	1.5%	1.7%	0.7%	0.6%	0.5%	0.4%	0.2%	0.0%
Birmingham	104	108	118	126	126	150	173	193	205	207
Bristol	58	56	60	66	70	69	67	70	72	72
East Midlands	58	77	80	80	100	95	96	111	113	115
Edinburgh	109	114	122	126	133	147	144	153	160	161
Glasgow	76	86	91	94	86	86	96	101	97	107
Liverpool	40	33	36	36	37	39	41	58	55	64
Manchester	196	189	200	215	229	242	255	259	282	321
Newcastle	41	39	41	42	42	43	47	47	48	50
Larger regional airport total	682	702	747	788	823	871	918	992	1032	1098
Other regional	336	332	350	381	359	380	435	462	508	625
Total outside London	1018	1034	1097	1169	1182	1251	1353	1455	1540	1722
Total	**2119**	**2356**	**2459**	**2570**	**2592**	**2697**	**2832**	**2919**	**3013**	**3195**
annual growth rate		0.8%	1.1%	1.4%	1.0%	0.9%	1.0%	1.2%	1.1%	1.2%

2016 is modelled

Passenger and freighter ATMs

To allow the model to converge when constrained ATMs at airports can be allowed to exceed input capacity by up to 2.5%

Table 67 ATMs by airport

000s ATMs	International Scheduled	International LCC	International Charter	Domestic	Freighters	Totals
			low			
2016	998	514	69	484	53	2119
2020	985	508	57	520	53	2123
2030	1070	561	40	541	53	2266
2040	1229	637	49	562	53	2531
2050	1385	765	57	626	53	2886
			central			
2016	998	514	69	484	53	2119
2020	1026	533	60	520	53	2191
2030	1124	590	42	541	53	2350
2040	1286	656	49	562	53	2607
2050	1433	771	56	626	53	2939
			high			
2016	998	514	69	484	53	2119
2020	1078	563	63	520	53	2278
2030	1177	618	44	541	53	2434
2040	1358	682	51	562	53	2707
2050	1513	805	57	626	53	3054

Only ATMs at airports in the aviation model
2016 is modelled
ATMs exclude general aviation, air taxis, positional, diplomatic, military and other miscellaneous flights

Table 68 ATMs by operator type, baseline capacity

	Base MtCO2									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	4.5	3.0	3.6	4.7	2.9	3.3	4.5	2.7	3.0	3.9
Heathrow	19.5	19.6	20.0	20.7	17.8	18.2	19.0	15.0	15.9	18.0
London City	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3
Luton	1.0	1.1	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.7
Stansted	1.3	1.2	1.6	1.8	1.5	1.5	1.5	1.4	1.5	1.4
London	26.5	25.1	26.4	28.5	23.4	24.2	26.2	20.1	21.4	24.3
Belfast International	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3
Birmingham	1.2	1.5	1.7	1.9	1.9	2.2	2.5	2.1	2.2	2.7
Bristol	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.4
East Midlands	0.3	0.5	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7
Edinburgh	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8
Glasgow	0.6	0.8	0.9	1.0	0.8	0.9	1.0	0.8	0.9	0.9
Liverpool	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4
Manchester	3.2	3.3	3.7	4.0	3.8	4.2	4.7	4.3	4.8	5.9
Newcastle	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.3
Larger regional	7.2	7.7	8.4	9.1	8.8	9.7	10.7	10.0	10.6	12.5
Aberdeen	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Belfast City	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Blackpool	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bournemouth	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.3	0.3	0.3
Cardiff	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3
Coventry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Doncaster Sheffield	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Exeter	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.2
Humberside	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inverness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Leeds-Bradford	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Newquay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Norwich	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3
Prestwick	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southampton	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.4	0.3	0.3
Southend	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2
Durham Tees Valley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Other airports	0.9	0.9	0.9	1.1	1.2	1.4	1.7	2.0	2.2	2.6
All regional	8.0	8.6	9.4	10.2	10.0	11.1	12.4	12.1	12.8	15.1
Ground (APUs)	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Freighters	1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total UK	37.3	36.6	38.6	41.6	36.3	38.1	41.4	35.0	37.0	42.1

Departing commercial passenger flights only

Ground APUs, freighters and the residual correction to baseline bunker fuel outturn cannot robustly be allocated around the airports

All figures are modelled

Table 69 Carbon emissions by airport, baseline capacity, $MtCO_2$

Gatwick Second Runway

	LGW 2R MtCO2									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	4.5	4.1	4.9	5.6	4.2	5.4	6.6	5.0	6.8	7.7
Heathrow	19.5	19.3	19.6	21.1	17.5	18.2	19.5	15.2	15.7	17.5
London City	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3
Luton	1.0	1.1	1.1	1.1	1.0	0.9	0.9	0.9	0.8	0.8
Stansted	1.3	1.0	1.3	1.5	1.3	1.4	1.6	1.5	1.6	1.5
London	26.5	25.8	27.1	29.6	24.3	26.3	28.9	22.8	25.1	27.8
All regional	8.0	8.4	9.1	9.9	9.6	10.2	11.3	10.9	11.3	13.6
Ground (APUs)	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7
Freighters	1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total UK	37.3	37.0	39.1	42.4	36.7	39.3	43.1	36.5	39.3	44.3

Heathrow Extended Northern Runway

	LHR ENR MtCO2									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	4.5	2.7	3.0	3.5	2.7	2.8	3.5	2.5	2.7	3.2
Heathrow	19.5	25.4	26.3	26.9	22.7	23.4	24.1	19.2	19.3	21.3
London City	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2
Luton	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8
Stansted	1.3	0.9	1.1	1.5	1.1	1.4	1.5	1.4	1.4	1.5
London	26.5	30.2	31.6	33.1	27.8	28.8	30.2	24.3	24.6	27.0
All regional	8.0	7.2	8.2	9.2	8.5	10.0	11.2	10.5	11.8	14.1
Ground (APUs)	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7
Freighters	1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total UK	37.3	40.4	42.8	45.2	39.2	41.7	44.4	37.6	39.2	44.0

Heathrow Northwest Runway

	LHR NWR MtCO2									
	2016	2030			2040			2050		
	central	low	central	high	low	central	high	low	central	high
Gatwick	4.5	2.6	2.9	3.5	2.7	2.8	3.4	2.3	2.7	2.9
Heathrow	19.5	26.4	27.3	27.5	23.6	24.3	25.2	20.1	20.3	22.2
London City	0.2	0.1	0.1	0.2	0.3	0.2	0.3	0.3	0.3	0.2
Luton	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8
Stansted	1.3	0.9	1.1	1.4	1.1	1.4	1.5	1.4	1.5	1.5
London	26.5	31.1	32.5	33.7	28.6	29.7	31.3	25.0	25.5	27.6
All regional	8.0	7.1	8.0	9.0	8.3	9.8	11.0	10.3	11.6	13.7
Ground (APUs)	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7
Freighters	1.0	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.8	0.8
Residual	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Total UK	37.3	41.2	43.5	45.7	39.8	42.3	45.1	38.1	39.9	44.1

Departing commercial passenger flights only
Ground APUs, freighters and the residual correction to baseline bunker fuel outturn cannot robustly be allocated around the airports
All figures are modelled

Table 70 Carbon emissions by airport, MtCO2

Annex F: Aircraft distance flown outputs

		Baseline	LGW 2R	LHR ENR	LHR NWR
2016	Domestic	187	187	187	187
	Short-haul	1,862	1,862	1,862	1,862
	Long-haul	1,597	1,597	1,597	1,597
	Total	3,646	3,646	3,646	3,646
2030	Domestic	207	211	223	226
	Short-haul	2,126	2,129	2,183	2,191
	Long-haul	1,723	1,731	1,931	1,968
	Total	4,056	4,071	4,337	4,385
2040	Domestic	215	219	226	230
	Short-haul	2,468	2,446	2,496	2,509
	Long-haul	1,923	1,983	2,179	2,225
	Total	4,607	4,648	4,901	4,964
2050	Domestic	237	246	253	253
	Short-haul	2,847	2,884	2,894	2,907
	Long-haul	2,157	2,280	2,347	2,416
	Total	5,242	5,410	5,494	5,576

Table 71 Aircraft distance flown, million kilometres

		Baseline	LGW 2R	LHR ENR	LHR NWR
2016	Domestic	22,345	22,345	22,345	22,345
	Short-haul	338,243	338,243	338,243	338,243
	Long-haul	538,431	538,431	538,431	538,431
	Total	899,020	899,020	899,020	899,020
2030	Domestic	24,610	25,173	28,112	29,065
	Short-haul	399,976	401,490	415,875	418,742
	Long-haul	601,264	607,440	687,396	702,033
	Total	1,025,850	1,034,104	1,131,383	1,149,840
2040	Domestic	26,681	27,496	27,811	28,547
	Short-haul	473,205	478,347	489,950	493,213
	Long-haul	680,655	703,020	781,471	799,394
	Total	1,180,540	1,208,863	1,299,232	1,321,153
2050	Domestic	30,675	32,231	31,700	31,879
	Short-haul	542,162	562,318	563,500	568,465
	Long-haul	784,375	818,370	850,709	875,139
	Total	1,357,213	1,412,919	1,445,908	1,475,482

Table 72 Seat distance flown, million kilometres

		Baseline	LGW 2R	LHR ENR	LHR NWR
2016	Domestic	16,805	16,805	16,805	16,805
	Short-haul	283,216	283,216	283,216	283,216
	Long-haul	403,067	403,067	403,067	403,067
	Total	703,088	703,088	703,088	703,088
2030	Domestic	18,792	19,310	21,134	21,815
	Short-haul	340,830	342,080	350,950	352,748
	Long-haul	464,982	471,911	532,532	544,289
	Total	824,605	833,302	904,615	918,851
2040	Domestic	20,253	21,160	20,955	21,445
	Short-haul	401,837	408,874	414,946	417,393
	Long-haul	525,277	546,227	604,178	617,975
	Total	947,367	976,261	1,040,080	1,056,813
2050	Domestic	23,307	24,880	23,749	23,893
	Short-haul	460,238	480,657	476,197	480,291
	Long-haul	604,084	636,159	655,953	674,972
	Total	1,087,629	1,141,695	1,155,899	1,179,156

Table 73 Passenger distance flown, million kilometres

		Baseline	LGW 2R	LHR ENR	LHR NWR
2016	Domestic	119	119	119	119
	Short-haul	182	182	182	182
	Long-haul	337	337	337	337
	Total	247	247	247	247
2030	Domestic	119	119	126	129
	Short-haul	188	189	190	191
	Long-haul	349	351	356	357
	Total	253	254	261	262
2040	Domestic	124	126	123	124
	Short-haul	192	196	196	197
	Long-haul	354	355	359	359
	Total	256	260	265	266
2050	Domestic	129	131	125	126
	Short-haul	190	195	195	196
	Long-haul	364	359	362	362
	Total	259	261	263	265

Table 74 Passenger aircraft sizes, average seats (implied), central demand

Key Findings of York Aviation Report

Is a Nationally Significant Air Freight Hub a realistic prospect at Manston?

York Aviation

York Aviation is a highly experienced specialist air transport consultancy offering a range of services to airports, airlines, governments, economic development organisations, investors and other parties.

We were appointed by SHP in September 2017 to undertake an independent review of the evidence presented by RiverOak Strategic Partners (RSP) in connection with its proposal to redevelop and re-open Manston as a hub for international freight services. A summary of our report's findings is provided here (the full report is available on the Stone Hill Park website:

http://www.stonehillpark.co.uk/images/uploads/documents/SHP-York-Aviation-Summary-Report-Final.pdf)

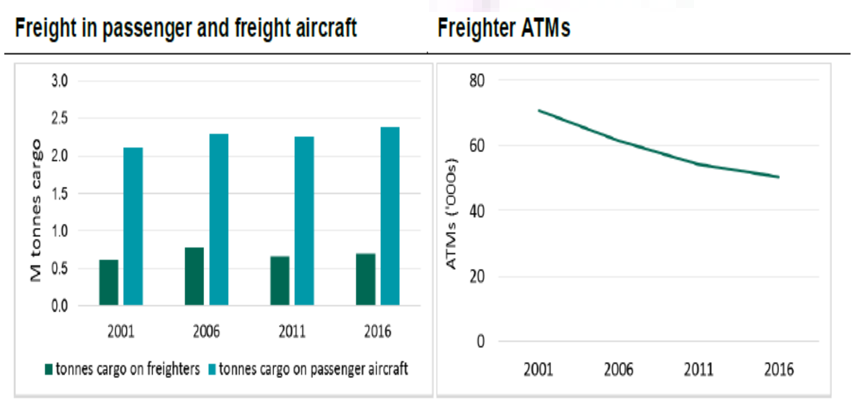


Figure 4.5 Historic freight carried at all modelled airports

Key Findings:

LACK OF UNDERSTANDING OF THE AIR FREIGHT MARKET:

- RSP rely on analysis by Azimuth Aviation of the need for more airport capacity in the South East of England. This analysis relates to the need for more passenger flights offering capacity for passengers and bellyhold freight. It does not relate to the need for more flights by freighter aircraft.
- The only freight forecasts upon which Azimuth seek to rely are those produced by York Aviation for Transport for London and the Freight Trade Association. These have been completely misinterpreted by Azimuth and do not support RSP's case for the re-opening of Manston as a freight hub.

THERE IS NO NEED FOR MORE FREIGHTER FLIGHTS TO/FROM THE UK:

- RSP is targeting the pure freighter market. In the UK, this is a niche and declining market with shippers clearly preferring bellyhold (combined passenger and freight flights) over pure freighters because of cost, flexibility and access to global route networks, even where some trucking is required as part of the journey.
- The official figures show the number of freighter flights to/from the UK has declined by over 20% over the last 15 years (see graphs on the left) and the latest Government (DfT) forecasts (October 2017) project no growth in pure freighter aircraft movements across the UK to 2050. This means that Manston would have to compete with established freight airports, such as East Midlands and Stansted, to attract any traffic at all in what is a declining market.

York Aviation

THE WRONG PLACE FOR A CARGO AIRPORT:

- Manston is in the wrong location to serve the freight market in any event, being located at the far south east at the end of a peninsula, away from the main centres of population and distribution in the UK.
- The key freight forwarders are all heavily concentrated around Heathrow and the main freight distribution hubs are in the Midlands.

SIGNIFICANT SPARE CAPACITY ELSEWHERE:

- There are much more efficient alternatives elsewhere for any air freight that may be displaced due to specific capacity constraints at Heathrow both now and in the future.
- There is also ample spare capacity at East Midlands, Stansted and other airports to accommodate future pure freighter activity. There is no rationale for part of the freight industry to relocate operations to Manston from better located and more efficient alternatives.

RSP'S DEMAND PROJECTIONS ARE NOT TRANSPARENT OR CREDIBLE:

- The demand projections for Manston lack any transparency there can be no confidence that they can be delivered. In the absence of any hard evidence of the need for Manston, the projections are based on information gained from a very small sample of interviewees, dominated mainly by local stakeholders with only ONE cargo airline included.
- It is simply not credible that Manston would be the 3rd busiest airport in the UK for pure freighter activity within 1 year of opening.

LACK OF VIABILITY:

- Airport operations at Manston were never viable despite investment by previous owners (including Wiggins and Infratil). More realistic forecasts of usage are that Manston might re-capture its previous niche perishables and specialist cargo business and might reach up to 2,000 such aircraft movements by 2040 (compared to the >17,000 forecast by RSP) but even growth to this level would mean regular night flights most days of the week. On any realistic projection of demand, Manston Airport is unlikely to ever be viable and would certainly not qualify for the threshold to be a DCO.

LACK OF UNDERSTANDING ON HOW SOCIO-ECONOMIC BENEFITS SHOULD CALCULATED:

- RSP's plans massively overstate the economic benefits for the area, even going so far as including in the calculations global employment where the aeroplanes are made as well as other effects arising well outside Kent or even the UK.
- Even on its own forecasts of cargo and passenger activity (which are neither robust nor credible), Manston is realistically only likely to support around 16% of the employment claimed by RSP. If the airport is not viable then the jobs supported would be zero.

CONCLUSION:

- Like Thanet District Council's own consultants, Aviasolutions, we agree that there is no realistic prospect of the re-opening of Manston Airport being a commercially viable proposition. We do not consider that the case that the re-opening of Manston Airport would constitute a Nationally Significant Infrastructure Project has been robustly made or substantiated.
- RSP's forecasts for the use of Manston lack credibility and the likely outcome would be a repeat of the previous failed attempts to establish viable airport operations.

March 2015

Manston Airport under private ownership:

The story to date and the future prospects

Position statement

Published by Kent County Council

Kent County Council
kent.gov.uk

Introduction

For decades Kent County Council has made great efforts to develop aviation at Manston Airport.

Manston, with its proud history as a front-line Battle of Britain aerodrome, has long been a symbol of Kent's determination in the face of adversity.

But our desire to stimulate and grow Manston was not the result merely of nostalgia or sentimentality.

For decades we have been aware of the commercial potential of Manston's long, 2,700 metre runway. For decades we have championed Manston's proximity to London. For decades we have argued that Manston was a sleeping giant: a regional and national asset.

Our 2012 policy document 'Bold Steps for Aviation' made all this clear and promoted the development of Manston to the the Government as an alternative to building a controversial new runway in the Thames Estuary.

Our support for Manston has not merely consisted of kind words and encouragement. We have invested substantial sums of public money.

We have made substantial investments in both road and rail infrastructure to improve access to Manston and East Kent.

Our record in supporting Manston is plain to see and we are proud of it.

It was disappointing and regrettable to learn that all our hard work and investment, and the hard work of the various companies that had tried to make flying profitable at Manston, had failed.

Manston's story began in 1915 when it was a small grass airfield operated by the Admiralty. Now a new chapter is about to begin that will bring new jobs and new prosperity to East Kent. It will be our duty to encourage, guide and nurture to help ensure this happens.

This document sets out the story of Manston Airport over the last 16 years, from its sale by the Ministry of Defence to the present day. We also consider the future, which we are confident will be bright.

Hansard 28th April 2014

Robert Goodwill, Parliamentary Undersecretary of State at the Department of Transport

'Whatever the result of efforts to secure such a resolution (on Manston), the government are unable to intervene directly, as we believe that UK airports and airlines operate best in a competitve and commercial environment. It is therefore for individual airports to take decisions on matters of future economic viability.'

Chapter one

The last 16 years of private ownership

Since the Ministry of Defence sold RAF Manston in 1998, the airport has never made a profit and has never delivered on its promise of jobs for the area. When the airport closed on 15th May 2014 144 people were employed there.

Since 1998 three companies have tried and failed to run Manston as a viable business. The Wiggins Group, with its start-up low cost carrier EUJet, launched scheduled flights to twenty one destinations in Europe in 2004 but collapsed into administration in the summer of 2005 leaving 5,400 passengers stranded. Its fleet of five 108-seat Fokker 100 jets were repossessed by Debis Air Finance.

Infratil Limited, which bought Manston from the administrators in 2005, lost between £40 - £50 million over the next nine years attempting to achieve passenger numbers of over a million per annum. The highest number of passengers was 50,000. Similarly its ambitious plan to grow freight traffic failed.

Lothian Shelf (417) Limited, a company owned by Mrs Ann Gloag, bought Manston for £1 in November 2014. In the next 4 months the airport made revenue losses of £100,000 per week plus significant capital losses.

Mrs Gloag's decision to sell the airport was based on an assessment that these losses could not be sustained. Mr Trevor Cartner and Mr Chris Musgrave acquired 80 per cent of the company in order to provide space for a wide range of businesses, with a focus on attracting companies in the manufacturing sector, as well as the provision of housing, shops, schools and community facilities.

Chapter two

The Wiggins era 1998-2005

In 1998 Wiggins Group acquired Manston Airport for £4.75 million. Its company accounts show that between 1999 and 2002 the company reported losses of £8.6 million, with a further loss of around £2 million reported over the next two years.

In January 2004 Wiggins Group renamed itself Planestation and later that year Planestation bought 30 per cent of airline company EUJet.

In September 2004 EUJet operated flights to destinations across Europe. That year Planestation's losses were £73 million and the company had to borrow £46 million at an interest rate of 28%. In December Planestation bought the remaining 78 per cent of EUJet.

In its busiest month in early 2005 the airport carried 62,709 passengers. EUJet's aim had been to handle over 750,000 passengers per annum but the company became insolvent and went into administration.

In July 2005 all EUJet operations were suspended along with all non-freight operations.

Mr Tony Freudmann had overseen Manston's transfer from an RAF base to a commercial operation. He was Senior Vice President of Wiggins Group between 1994 and 2005. He was 'let go' by Wiggins in February 2005. He is now the spokesman for the RiverOak consortium.

The Wiggins Group and Planestation failed in their ambition for Manston to become a successful international airport; but even then, more than 10 years ago, they also had ambitions for property development on the airport site, in collaboration with property developers MEPC plc.

Chapter three

INFRATIL 2005-2013

Infratil Limited is a successful company listed on the New Zealand stock exchange with the primary purpose of investing in electricity distribution, public transport and ports. The company was established in 1994 with NZ$50m of capital. At the time it acquired Manston and Prestwick airports it controlled assets worldwide in excess of NZ$ 4.4 billion.

Following Wiggins' demise, Infratil Limited bought Manston Airport from the Administrator for £17 million in August 2005.

In addition to Manston, Infratil also owned Prestwick, Flughafen Lubeck, Wellington and Auckland Airports. Its master plan for Manston (published in November 2009) envisaged building a new passenger terminal to accommodate up to 3 million passengers per annum. It also envisaged building a parallel taxi way to the runway and an increase in the freight and passenger aprons. At the time of publishing its plan the airport was handling 32,000 tonnes of freight per annum. The master plan envisaged freight growth of between 4% and 6% per annum to equate to approximately 167,000 tonnes of freight per annum by 2018. It also planned on developing corporate jet facilities with an executive terminal.

In 2009 the airport was handling fewer than 50,000 passengers per annum. Infratil forecast that by 2014 this figure would rise to 527,000, by 2015 to 1,268,000 and by 2033 to more than 4.7 million passengers per annum. In 2009 the airport employed approximately 100 people, some full time and some part time. Infratil forecast that they would be employing more than 500 staff by 2014, 2,800 by 2018 and 6,150 by 2033.

When the airport closed in May 2014 there were 144 people employed at Manston Airport.

In 2012 Infratil announced that Manston and Prestwick airports were for sale.

In each year that Infratil Limited owned Manston it incurred losses of more than £3 million per annum and wrote off the purchase price of £17 million.

As at 31 March 2013 Infratil's investment in the UK's airports had a book value of $20m and over the year a further $12m was contributed to meet costs. Their sale price crystallised a net economic cost of $32m."

(Infratil financial results 2013-14)

In 2013 KLM started passenger flights to Schiphol Amsterdam. However, over its 12 months of operation its seventy eight seat Fokker planes were less than half full (42 per cent of capacity). KLM operations at Manston made no significant financial contribution to the cost of running the airport.

In November 2013 Infratil Limited sold Manston Airport and the associated liabilities to a company controlled by Mrs Ann Gloag for £1.

Chapter four

Manston Skyport Limited 2013-2014

Mrs Ann Gloag originally approached Infratil with a view to buying both Manston and Prestwick airports, which were being sold as a package. However, Infratil set a deadline for their sale in order to stem their losses. When the Scottish Government bought Prestwick for £1 Mrs Gloag agreed to buy Manston also for £1.

From the discussions that Kent County Council had had with her and her team we believed that she had every intention to maintain and grow the aviation business at Manston Airport.

She gave a press interview with the Isle of Thanet Gazette on 8 August 2014 to dispel the myths and uncertainty that had been widely propagated by campaign groups opposed to the subsequent closure of the airport.

"Can you please outline the reasons behind your decision to close the airport?"

"The prospect of new passenger and freight opportunities failed to materialise and the scale of the losses meant that there was no credible prospect of the airport becoming profitable."

"Would you have bought it if you'd known you would have to close it just months later?"

"I wanted to make it a success and I didn't buy it to close it. Our whole team worked tirelessly to secure new business for the airport but no new operators considered it a viable option. It was only when our aviation team arrived at Manston that we started to discover the scale of the problems."

"Why did you reject RiverOak's offers to buy it?"

"They were introduced to us as a potential buyer and in good faith we entered into discussions with them. However, we had serious concerns from the outset about the way RiverOak conducted their business with us. We are aware of the £7 million figure that has been made public by RiverOak. For clarification, the structure of their offer meant the final amount would have been considerably less. They also failed to provide any business plan to back up their claims of future employment or to reassure us that their bid offered commitment to maintain it as an operational airport."

Prestwick airport made a pre tax loss of £10 million in its final year of ownership under Infratil.

After buying the airport for £1 the Scottish government said it could take a number of years for taxpayers to see a return on public investment in Prestwick.

It announced a £10 million commitment towards 'operating costs, repairs backlog and improvements to the terminal building.'

Prestwick is continuing to lose £1 million a month.

Chapter five

Support given to Manston by Kent County Council over the past 16 years

Kent County Council's support of Manston as an airport over the last 16 years has been unwavering.

Transport infrastructure

Kent County Council has made or enabled substantial transport and infrastructure investment for the benefit of Manston and the surrounding area.

In 1997 Columbus Avenue was constructed on the north side of the airport at a cost of £1.52 million. These infrastructure works were funded through the European Regional Development Fund and the Single Regeneration Budget.

In 1998 Kent County Council completed the A299 Thanet Way extension of the M2 through to Ramsgate.

In 2000 Kent County Council completed the Ramsgate Harbour Approach Road and in 2009 the Euro Kent link road.

The A256 dualling was completed in 2012 and £87 million was invested in the East Kent Access Road in 2013.

Kent County Council is in the planning stage of the £6.7 million Westwood relief scheme to help growing businesses at Westwood and Manston.

Network Rail has just announced the commencement of its £11 million scheme to reduce journey time between Ramsgate and Canterbury; Kent County Council is contributing £4.5 million to the cost of this upgrade. Kent County Council has also committed £12 million to a new Thanet Parkway Station near Manston.

Business premises;

In Spring 2006 Kent County Council acquired the undeveloped area of Manston Business Park, amounting to some 40 acres of developable land, from the Administrator of Planestation plc for £5.35 million.

Manston Business Park and the EuroKent sites subsequently became the key holdings of a joint venture between Kent County Council and Thanet District Council.

By 2015 Manston Business Park has seen the development of industrial units which will be occupied by start-up and small developing businesses.

Support for aviation

In its discussion document Bold Steps for Aviation (May 2012) Kent County Council supported the increased use of Manston Airport and stressed its potential to make a significant contribution to aviation in the UK.

"In Kent, Manston has the potential to make a significant contribution [to the UK's aviation capacity], providing excellent communications to European destinations and reduced flight times.

In addition:

- Over the years Manston has received more than £1million in financial assistance from Kent County Council. When EUJet commenced its flights in 2004 Kent County Council bought a 1.5% shareholding in EUJet Ops Limited.
- In 2007 Kent County Council provided financial assistance to enable the start of charter flights from Manston to Virginia USA, although these flights were discontinued shortly thereafter.
- Between May 2004 and May 2005 when EUJet Ops Limited was acquired by Planestation Limited, Kent County Council acquired options to buy further shares. Planestation Limited was however put into liquidation and the council's investment had no further value.
- When KLM expressed an interest in starting scheduled flights to Amsterdam, Kent County Council provided £100,000 to Visit Kent, the tourist agency which provided marketing and tourism support.

Support offered to investors at the airport

In March 2013, when Infratil were seeking aviation buyers for the airport, Kent County Council distributed a note offering to help new investment at Manston Airport through:

- Financial assistance from the Regional Growth Fund
- Use of land owned by Kent County Council adjacent to the airport
- Expediting the new Thanet Parkway station
- A Route Development Fund to increase the number of passengers
- Working with airlines and train operating companies to achieve integrated ticketing
- Discussing with Ministers to seek assistance from Government. Kent County Council's offer to any investor with a viable business plan remains open, although to date we have received no take up.

Helping to find a new airport operator

Kent County Council met PWC, the agents selling the airport, with a view to helping find a viable new owner/operator. Over 18 months discussions were held with thirty interested parties including low cost airline operators and private investors, many were introduced to PWC by Kent County Council.

In the event, two of the shareholders of Discovery Park Limited made an approach to Mrs Ann Gloag which subsequently led to their purchase of the airport.

Chapter six

What do we know about RiverOak and its proposal for a compulsory purchase order?

RiverOak was introduced to Kent County Council by Mr Tony Freudmann. Subsequently the Leader of Kent County Council invited representatives of RiverOak to meet to discuss their plans for the airport. RiverOak declined, saying that their plans were confidential. The invitation to present their business plan to the council has been repeated on several occasions: RiverOak has always declined to do so.

RiverOak Investment Corp LLC was established in January 2001 in Delaware USA to manage *'niche focussed real estate investments for institutional entities that are strategically driven, including private and public pension funds.'*

Its CEO is Mr Stephen DeNardo.

The RiverOak website states *'within a time frame that spans nearly 4 decades of business experience, Steve DeNardo has successfully been involved in all phases of real estate investment, development and management. His focus and interest has been on the management and turnaround of troubled assets.'*

RiverOak's Chief Investment Officer is Mr George Yerrall. The website says: *'He is in charge of sourcing and analysis of investment opportunities and the execution of investment and asset management strategies.'*

In its statement to the UK Airports Commission (The Davies Commission) RiverOak described its strategy for Manston as handling 250,000 tonnes of cargo per annum by 2030, 500,000 tonnes of cargo per annum by 2040 and 750,000 tonnes by 2050. It also described its long term strategy to include 'aircraft maintenance, repair and teardown operations.'

RiverOak also stated that by summer 2017 at the earliest they would plan to re-open passenger services *'if appropriate contracts can be agreed with suitable carriers.'* They would also re-establish Manston as a key diversion airport, capable of providing emergency resilience to the wider South East airport system.

In an interview on 12 May 2014 with Paul Francis of the KM Group Mr DeNardo was asked *'How did RiverOak become involved in the bid to buy the site from Mrs Gloag?'*

Mr De Nardo replied; *'We have been active in searching for opportunistic transactions in both the UK and Ireland, We have an extensive network of contacts in both and one of our contacts made us aware of the Manston situation.'*

He was also asked *'How did you team up with Annax Aviation whose Chief Executive Tony Freudmann has become spokesman for your bid?'*

Mr DeNardo replied: *'Our contacts put us in direct discussion with Tony Freudmann who we knew had both operational experience at the airport and had made an attempt to purchase the airport.'*

Following Mrs Gloag's refusal to accept an offer from RiverOak to buy Manston Airport, RiverOak then approached Thanet District Council with a view to the council making a Compulsory Purchase Order of the airport in favour of RiverOak. Thanet District Council concluded that a decision on a CPO could not be made until:

- Thanet District Council had commissioned an independent feasibility study on the future viability of a going concern operational airport.
- Any prospective airport owner/operator submit a viable business plan and also enter into an indemnity agreement that would cover any exposure to all costs placed upon Thanet District Council.

Thanet District Council commissioned Falcon Aviation whose report was considered by the Council's cabinet on 31st July 2014. The report identified *'no business plan with a credible investment plan of less than 20 years is likely to provide the commitment necessary to rebuild confidence. From an investor's standpoint, the payback period might be as long as 50 years. The level of investment would have to be significant (£100m's) and there are never any guarantees of success.'*

Throughout Thanet District Council's consideration of a CPO it has been advised by its Section 151 Officer that it appears evident that the airport will not be successful if it reopens and attempts to operate in the same configuration as it has done previously up to its closure.

The advice to Thanet District Council's cabinet was that invitations should be issued to parties willing to enter into an indemnity agreement capable of delivering the twenty year business plan.

During the course of Thanet District Council's processes, on 17 July 2014, Kent County Council unanimously adopted the following motion;

"Kent County Council supports the actions taken so far by Thanet District Council to retain Manston as a regional airport. We recognise the value that a regional airport brings to East Kent and are disappointed at its closure. Kent County Council will explore with Thanet District Council ways in which it can support proposals to retain Manston as an airport." The original Motion proposed by Mr Cowan (Dover Town, LAB) and Mr Truelove (Swale Central, LAB) was replaced by the above, proposed by Mark Dance (Whitstable, CON).

In supporting the amended motion the Leader of Kent County Council said "Thanet District Council's approach is now such that they are going to carry out and have already commissioned, an independent study as to the viability of running the airport as a going concern or not. Nobody knows the conclusion to that, as I said on the radio this morning, after 16, 17, 18 years of Manston, everybody has just lost money. So what is the market telling you? And it will be interesting to see what the independent viability report concludes. And Thanet District Council are absolutely right in doing that. If it does suggest there is viability they will then ask for expressions of interest from people to come forward who have the ambition to do exciting things at Manston in running it as an airport, or not. And if there are some exciting propositions, or if we had an owner that is reluctant to do anything exciting, which again we don't know, we will then make the decision as to whether or not to support the CPO process. And it is premature to have that decision now, which is why we can't support your original motion which was asking for an open ended commitment to support Thanet and their CPO, no matter what. I want to see, and hope, that there are exciting propositions that come forward, with good people, that have got the money to do exciting things. And we will have to wait and see as to whether that's the case, and then we will review our position."

In an endeavour to support Thanet District Council, on 1st September Kent County Council's Director of Governance and Law wrote to Thanet District Council's' Monitoring Officer to remind them of our offer to assist the council. The Monitoring Officer replied: ' We need to do the evaluation of any Expressions of Interest first before we can begin to assess what legal support might be needed moving forward and whether any of that support would need to be commissioned from Kent County Council. We are not in a position to make any decisions until we have the result of this, but I will be more than happy to consider making such an approach at the appropriate time.'

Kent County Council has never been approached by Thanet District Council for the help offered.

Unsuprisingly, **as a result of this**, on 11 December 2014 Thanet District Council recieved a cabinet report detailing the outcome of its excercise to seek an indemnity partner for the compulsory purchase of the airport and a comprehensive and viable business plan. The following was decided:

'That no further action be taken at the present time on a CPO of Manston Airport on the basis that the council has not identified any suitable expressions of interest that fulfil the requirements of the council for a CPO indemnity partner and that it does not have the financial resources to pursue a CPO in its own right.'

The conclusions made by the council's Section151 Officer were that *'The information provided does not provide assurances which would satisfy him that a valid expression has been put forward and he is therefore unable to recommend moving ahead with this proposal. Although the issues here are emotive Members should excercise extreme caution before seeking to move forward with any proposal which is at odds with advice from its officers, particularly where there are likely to be* ***significant risks*** *which would affect the council at a fundamental level.'*

As the Falcon report, Thanet District Council's feasibility study and the advice from the council's 151 Officer show, the financial risks of a compulsory purchase of the airport were unacceptable.

Chapter seven

What do we know about Discovery Park Limited and its directors?

The new owners of Manston, Chris Musgrave and Trevor Cartner, have a strong track record in taking over large difficult sites following the demise of earlier uses and regenerating them to create jobs and bring economic benefits to the wider area.

Ten years ago they acquired Wynyard Park in Billingham after Samsung had announced that it was closing its operations there. They have now created 2000 jobs and have attracted £200million of private investment at Wynyard Park.

Seven years ago they invested in the advanced manufacturing manufacturing park (a joint venture betweeen the University of Sheffield, Boeing, British Aerospace and Rolls Royce) to build seventeen units for local small and medium size enterprises associated with aerospace research and other advanced manufacturing on the site of the former Orgreave colliery. In 2013, when the site was fully occupied, they sold their investment.

In 2012 they acquired Discovery Park from Pfizer after Pfizer had announced that they were closing down all their operations there and were planning to demolish the buildings at the site. When Pfizer made this announcement they employed 2,200 staff all of whom were subject to redundancy notice. By March 2015 700 of the Pfizer jobs have been retained and a further 1,700 jobs have been created by more than 100 new tenants on the site. Currently total job numbers are in excess of 2,400 and Discovery Park is on track to deliver more than 3,000 new jobs.

Trevor Carter and Chris Musgrave plan to transform the 800-acre site at Manston with a £1 billion redevelopment, over a 20-year period, into a mixed-use scheme helping to create more than 4,000 jobs. They will be announcing more details over the next few weeks.

Conclusions

The truth is that Manston has failed over a prolonged period of time to run as a commercially successful airport.

Kent County Council gave strong support to various investors but the reality of commercial aviation at Manston Airport led to very significant losses. In fact, in the 16 years since it was taken into privately ownership it has incurred losses by those who have tried to operate it in excess of £100 million.

The objective now must therefore be to make sure that we have owners who want to do exciting things on the site and that the land is not left abandoned.

Bristow Group had chosen Manston as its location for the regional search and rescue base; when the airport closed the company decided to locate that base at Lydd. Kent County Council is pleased that this vital service will still be located in Kent. Lydd Airport is also starting a substantial investment programme to extend its runway and construct new aviation facilities.

Surely it is now time to look at a B Plan for Manston.

The driver must be to seize the best opportunity to create a significant number of new jobs and bring prosperity into East Kent.

RiverOak has not managed to convince Thanet District Council that there is a viable business plan. We believe the new owners have got a credible plan and the financial ability to create substantial numbers of new jobs which will bring prosperity and economic growth to East Kent.

Paul Carter, Leader of Kent County Council:

"I would like to make it abundantly clear that in my 10 years as Leader of Kent County Council I have done everything in my power to help and support the economy of East Kent. I believe that this document demonstrates and evidences exactly that."

Myth busting questions and answers

1. What is Kent County Council's stance on Manston Airport? At first you supported a CPO process but now you are supporting a business park – is this not inconsistent?

Promoting job creation, supporting business growth and generating economic prosperity for the residents of East Kent is - and always has been - Kent County Council's primary objective. Kent County Council (KCC) has never deviated from this.

The closure of Manston Airport was met with deep disappointment at County Hall. Any viable proposal from an aviation company with sufficient financial backing to run Manston as an airport would have been strongly supported by Kent County Council as our debate at the July council meeting made clear. No viable proposal was presented to Kent County Council or TDC.

The sale of Manston to the Discovery Park Team Musgrave and Cartner in September offers substantial private sector investment to support job creation and economic growth for Thanet. Cartner and Musgrave have a strong track-record at Discovery Park with 1,700 new jobs since 2012.

2. How can you say no viable proposal came forward? Didn't RiverOak say they would pay the full asking price?

Kent County Council asked RiverOak if we could see their business plan. RiverOak has consistently refused to let us see any details on the grounds they are commercially confidential. TDC took a decision that the information supplied by RiverOak to it was insufficient to support a Compulsory Purchase Order.[1] We have therefore concluded that RiverOak's plan is not viable. Representatives of Mrs Ann Gloag explained to the Transport Select Committee why Mrs Gloag refused to accept the offer from RiverOak.[2]

[1] **http://democracy.thanet.gov.uk/documents/b10075/Supplementary%20Agenda%202%2031st-Jul-2014%2019.00%20Cabinet.pdf?T=9**

[2] **http://parliamentlive.tv/Event/Index/d4330491-c83e-4204-a339-28a011b42071**

3. Did you promote Manston to the best of your abilities to attract a new investor when the closure was announced? Is it not true that Manston has unique infrastructure with the longest runway in England and superb transport links?

Kent County Council has taken every opportunity to support and promote the use of regional airports such as Manston. The authority's discussion document Bold Steps for Aviation, written in 2012, makes our position abundantly clear, showing Kent County Council has lobbied central Government to prioritise Manston above other proposals, such as the establishment of a Thames Estuary Airport.

Our support for Manston is evidenced by our substantial investment in transport infrastructure making Manston more accessible to a greater potential customer base, including investing in the East Kent Access Road, a new railway station, and improving the rail infrastructure.
The Regional Growth Fund has been made available to companies with plans to increase employment.

Since the Minister of Defence privatised the airport there have been three private owners of Manston Airport: Wiggins, Infratil, and Ann Gloag. Despite ambitious plans to increase passenger numbers and freight operations, each of these has sustained significant financial losses totalling over £100 million.

When Manston Airport was put up for sale, Kent County Council introduced PWC (the marketing agents for Infratil) to 30 potential buyers from around the world (including RyanAir) none of whom in the event decided that they could make the airport profitable.

Myth busting questions and answers

4. What offers of support were made by Kent County Council to Thanet District Council to assist them with their CPO process?

We very much supported Thanet District Council in the potential for a CPO subject to the outcome of their independent feasibility study and submissions by indemnity partners.

At the Leader's request, Kent County Council's Director of Governance and Law offered to help Thanet District Council in the CPO process. TDC responded in writing saying *"We need to do the evaluation of any Expressions of Interest first before we can begin to assess what legal support might be needed moving forward and whether any of that support would need to be commissioned from KCC. We are not in a position to make any decisions until we have the result of this, but I will be more than happy to consider making such an approach at the appropriate time."*

The offer of support was repeated several times by the Leader at different meetings with Iris Johnston.

5. Who now owns Manston? Is it Mr Cartner, Mr Musgrave, Ann Gloag?

The company that owns Manston Airport has three shareholders; Mr Cartner (40%), Mr Musgrave (40%), and Mrs Gloag (20%). This information has been provided to the Select Committee by solicitors acting for Mr Cartner and Mr Musgrave.

6. How could the Leader of Kent County Council support Mr Cartner and Mr Musgraves' purchase of the site? I have heard Wynyard Park is in debt and promised to supply thousands of jobs and only a proportion have been realised.

Information provided to Kent County Council shows that Wynyard Park is currently debt free. Under Mr Cartner and Mr Musgraves' ownership, Wynyard Park has created more than 2000 jobs and attracted £200million of private investment. Publications which have asserted that this is incorrect have been served with a letter from a firm of solicitors specialising in libel.

(NOTE: It is quite normal for development companies to carry debt/bank borrowings on their balance sheet. The key is sensible debt to value ratios).

7. How can you be excited by the new proposition by Cartner and Musgrave if you have seen no plans? What are the plans?

The new owners issued a press release when they acquired Manston Airport outlining their intention to create more than 4,000 jobs and a £1 billion redevelopment. They will be announcing more details in the next few weeks.

At the time when Mr Cartner and Mr Musgrave outlined these plans to the Leader of Kent County Council, the planning consultants had not yet completed the master plan so no document was handed over. However, a fairly detailed description of what was envisaged was discussed. The plans include a new sports centre and the financial backing of the Spitfire museum, as well as plans to bring advanced manufacturing to the site.

8. How can Kent County Council ignore its democratic mandate? Haven't you seen the petitions showing that the people of Thanet want an airport?

The Save Manston Campaign was invited to County Hall to present its petition. However when representatives of the group arrived they had not brought it with them. All letters and emails from objectors have received replies. We have also received letters of support re the closure.

9. When have you met Ann Gloag or her colleagues and what was the purpose of each meeting? Are the minutes available? Was a change of use discussed?

Elected members and officers of the council met Ann Gloag and her company representatives on a number of occasions before and after she bought the airport. The purpose of the meetings was to establish what were her intentions for bringing jobs and new investment to Kent and to sustain a viable airport.

Myth busting questions and answers

At a meeting on 14 March 2014 when we were expecting an update on progress, much to our suprise we were told confidentially that given the scale of losses it had been decided to notify staff the following week that a redundancy process was necessary.

Subsequently a meeting was held on 3 July 2014 to discuss with Ann Gloag what she intended, and she explained she was discussing a possible sale but that the details were commercially confidential.

10. Why have you appeared to support Ann Gloag when she obviously bought the site to turn it into a housing development and never intended to operate an airport? Have you a vested interest? Did you not say you wanted a housing development last year?

Mrs Gloag told us that it was her intention to run Manston Airport as a commercial venture and that was why she hired aviation specialists to put in place a strong business plan for aviation and support the implementation. She also retained the previous Managing Director of Manston, Mr Charles Buchanan. She told us subsequently that it was only when she was advised that the airport could not be made viable, and that the losses of £100 thousand per week could not be sustained, that she decided that the airport must be closed.

During our discussions, a change of use of the airport was not discussed although we did touch on alternative uses for parts of the airport site such as aviation hangar space, servicing and maintenance. The Leader of the Council has no private business interests in the Manston site and will not benefit personally from any proposal relating to the development.

11. Thanet does not need more business parks. Existing local business parks are struggling to attract businesses and are over 50% empty.

When Pfizer announced closure of its R&D facility at Sandwich it was a common view that all the buildings would need to be demolished and the site could not be redeveloped.

Mr Cartner and Mr Musgrave have successfully applied for planning approval for a multi-use development to include commercial, retail and housing: the site is currently over 50% reoccupied by commercial users and there are now 2,400 jobs. It was their success with Discovery Park that persuaded them of the potential at Manston, and they already have a number of substantial potential tenants.

Manston

Kent International Airport

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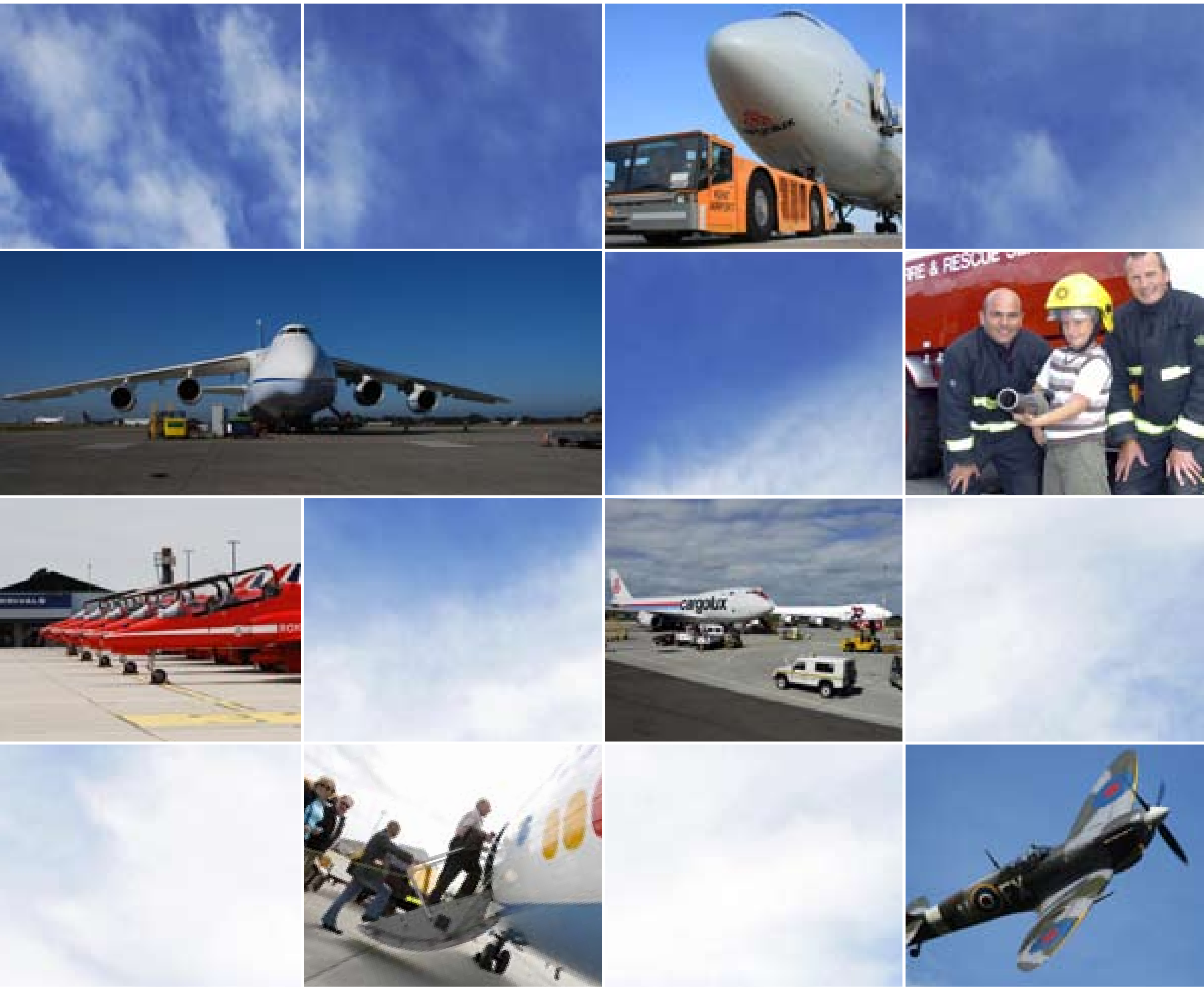

November 2009

MASTER PLAN


KENT INT

Kent International Airport – Manston

Master Plan

November 2009

Foreword from our CEO

Kent International Airport, known to many as Manston Airport, has a rich and important history dating back to 1915. The legacy of location and infrastructure from its former military uses and more recent civilian upgrades provides the platform for a very exciting future. This Master Plan sets out our vision of that exciting future for the consideration of all those with an interest in this significant community asset.

Throughout this Master Plan we will refer to 'our airport'. This terminology acknowledges that the airport is a part of the local environment and that everyone in the community is a stakeholder in the airport.

Kent is the UK's most populous county, with 1.4 million inhabitants. It is also home to some of the UK's best and most popular tourism attractions. Kent is a gateway to mainland Europe and adjacent to London, one of the world's leading large cities. Despite all of this, Kent does not currently have an airport that provides scheduled flights that meet the needs of its population or visitors. The 3.4 million flights taken by Kent residents in 2007 were mostly through the large London airports. It is clear that these airports do not have the capacity to accommodate the growing needs of the South East of England. For this reason, our airport has been identified in local, regional and national planning documents to grow to meet the needs of the local area and to provide an alternative for people in surrounding areas. Around 9 million people live within 2 hours travel time of our airport. Our airport has demonstrated its strength and competitiveness during the current economic recession, achieving growth in cargo volumes during a time described by many as a period of crisis for aviation. We are confident given the advantages of using our airport and the growth constraints on other airports that we will continue to see sustained growth at Manston. We predict that we will serve around 4.7 million passengers and cater for around 400,000 tonnes of freight by 2033. This growth would sustain over 6000 jobs and stimulate and support substantial economic development in Thanet and East Kent. The South East Plan envisages that the our airport could accommodate up to six million passengers within the plan period and Thanet District Council's 2020 vision statement suggested that 10 million passengers could be accommodated by 2020. Support for the vision of our airport is critical to our future and we will continue to work closely with our stakeholders to make this vision a reality.

This growth must occur in an environmentally responsible and sustainable manner. As well as the very positive economic impacts, this Master Plan addresses the potential negative environmental impacts, including noise and emissions. The Department for Transport (DfT) publication, Aviation Emissions Cost Assessment (2008), notes that UK air travellers already pay environmental taxes that could fully offset the production of carbon by aviation, if the taxes were applied for this purpose. Consultation with the local community and other stakeholders has been a key component in the production of this document. We received responses and comments from a range of contributors during our draft Master Plan consultation. Over 300 people made comments either online via the web form, at public meetings, at drop in sessions in the terminal, or through written representations. Feedback was also received from local businesses, organisations and a range of statutory consultees. All the feedback received has been carefully considered during the production of this final Master Plan.

This document will be the blueprint for the future development of our airport and will be reviewed once every five years. I would like to personally thank all those who contributed to the Master Plan process. Together we can look forward to playing a part in these exciting developments as our airport enters the next phase of its dynamic evolution.

Matt Clarke
Chief Executive Officer
Kent International Airport

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1. Introduction to Our Airport

Kent International Airport

We have prepared this Master Plan to identify and substantiate development in and around our airport, and we have received and incorporated our community's and key stakeholders' feedback. This Master Plan sets out our vision for the future of our airport and our plans for achieving that vision.

Our plans are based around a realistic, achievable and sustainable growth scenario. At the national, regional and local levels there is a positive framework and support for growth at our airport. The airport has the ability to grow well beyond the forecast passenger and freight demand considered in the current Master Plan period. Through developing proposals for facilities for our airport, we have kept in mind the long term possibility of further expansion.

Who We Are

Kent International Airport is owned by Infratil Airports Europe Ltd (IAEL), a UK registered company that has already invested over £30 million in the past four years into the development and growth of our airport. IAEL also owns Glasgow Prestwick Airport in Scotland and remains active in seeking out further airport investment opportunities in the UK and throughout Europe.

Our group office provides a range of support functions, which include finance, business development, major commercial projects and property development, operations and project management, airport planning, sustainability and aviation policy management.

IAEL is a wholly owned subsidiary of Infratil Limited, a company listed on the New Zealand Stock Exchange. Infratil was established in 1994 with NZD50 million[1] of capital, which was mainly invested in electricity distribution and ports. The organisation's primary investment focus is now energy (primarily renewable) generation and retailing, public transport and airports. As of March 2008, our parent company had influence or control over assets in excess of NZD4.4 billion[2].

In the airports sector, in addition to IAEL, Infratil has a 66% share of Wellington Airport and has an investment in Auckland Airport, as well as Board representation. It also has a number of listed airport investments and co-invests with the New Zealand Government Superannuation Fund in a range of infrastructure related investments.

1 Approximately £18 million Sterling.
2 Approximately £1.7 billion Sterling.

Background to Our Master Plan

In December 2003, the UK Government published a White Paper, the Future of Air Transport (hereafter referred to in this Master Plan as the White Paper). This was released following a wide-ranging and extensive consultation process across the UK.

The White Paper stressed the importance of air travel in improving the economic competitiveness of UK businesses and attracting investment, as well as serving the main population centres and the more remote communities. Importantly, it identified that under-utilised airports such as ours have an important role to play in meeting local demand and can contribute to regional economic development.

The aspirations of the White Paper are recognised by the South East Plan (published May 2009), which under the new planning system replaces the strategic policy framework previously provided by the Kent and Medway Structure Plan. It recognises that our airport has the potential to become an airport of regional significance.

This Master Plan provides our vision for the future and explains how we propose to meet the aspirations of the White Paper and the South East Plan. The Master Plan process provides an excellent opportunity for us to communicate our vision with a wide range of stakeholders and the community, whilst considering the impact of the developments from an economic, environmental, social and sustainability perspective.

Purpose of Our Master Plan

The purpose of a Master Plan, as outlined by the UK Government, is to:

- Provide an indication of our plans for infrastructure development in the light of the high level strategic policy framework for the airport in the White Paper, and therefore bring greater clarity and certainty for all those affected or with an interest;
- Inform long term resource planning for local and regional planners (especially those charged with the delivery of land transport infrastructure), particularly in the preparation of strategies and plans;
- Provide a useful tool for communicating to a range of stakeholders, including airlines, funding institutions, local authorities and other local interests, to allow them to make well informed investment decisions;
- Help us make clear at an early stage the key milestones of airport development such as the submission of planning applications, construction and operational opening;
- Provide a consistent and publicly recognised vehicle for the UK Government and its agencies, to assess progress being made in delivering the White Paper as it relates to our airport;
- Demonstrate the range of costs and benefits of airport growth; and
- Enable our airport and others to assess local social and environmental impacts and provide an opportunity to develop preliminary proposals on how those impacts could be mitigated.

This Master Plan's primary purpose is to consider the growth at the airport between now and 2018, where airport developments are considered in detail. The Master Plan also identifies developments to 2033 and considers these to a lesser degree of detail [3].

3 The Department for Transport Guidance on the Preparation of Airport Master Plans (2004) indicates that forecast growth for airports should be presented for 2015 and 2030. These growth periods have been applied to this Master Plan but for 10 and 25 year time horizons from the commencement of our process in 2008 (2018 and 2033).

Key Objectives of Our Master Plan

This Master Plan sets out a strategy for the sustained and responsible growth of our airport in line with the White Paper. It outlines key terminal and airfield developments and supporting facilities to the year 2018, with an indicative plan for development to 2033.

Key objectives are to:

- Set out prospects for air traffic growth to 2033;
- Assess facilities required to accommodate growth at our airport, such as passenger terminals, freight handling areas, airport operational buildings and additional taxiways, aprons and car parking;
- Clearly identify areas of land currently outside our airport's boundaries which need to be safeguarded in order to allow our airport to expand with its development proposals;
- Set out approximate timescales for phasing of additional facilities;
- Ensure that development around our airport is consistent with the current and future operations of the airport;
- Identify key improvements to ground access and associated infrastructure provided by us and others;
- Remain fully compliant with Civil Aviation Authority (CAA) requirements and safety objectives;
- Communicate to policy makers changes in policy that will support the development of our airport;
- Inform the Thanet District Council Local Development Framework (LDF); and
- Identify environmental impacts of proposed developments and identify mitigation measures.

Our Master Plan Process

The process that we have followed in the production of the Master Plan is summarised below:

- We have identified key areas of development;
- We have taken account of the guidance contained within the DfT's Guidance on the Preparation of Airport Master Plans;
- We have developed the Master Plan in line with the White Paper, current development plans and corporate objectives;
- We sought the views of key stakeholders and the local community in the preparation of the draft Master Plan and these views have been incorporated into the Master Plan where appropriate;
- We will review the Master Plan, report on its implementation and repeat this process again in 2013.

2. The Legal Framework in Which We Work

The Law

Airports operate in a complex legal and policy environment. Historically, the operation of airports such as ours has been subject to international and national laws and standards and local planning controls. Increasingly, European law is governing airport operations in a wide range of areas from noise to security, although these are still given primary effect via national laws. This section of the Master Plan outlines the principal policies, legislation and controls that apply to our airport's operations and development.

UK Airports Policy

As highlighted previously, the White Paper sets out the strategic framework for the development of airport capacity in the UK over the period to 2030, against the background of wider developments in air transport. This document makes clear that "small airports have an important role to play in the future provision of airport capacity in the South East" (paragraph 11.93). Specifically in respect of Manston, the White Paper considers that our airport "could play a valuable role in meeting local demand and could contribute to regional economic development" and that there could be support for development at our airport "subject to relevant environmental considerations" (paragraph 11.99). The White Paper also makes clear that regional and local planning frameworks should take account of the benefits that development at smaller airports such as ours could provide and consider policies which facilitate the delivery of growth (paragraph 11.95).

The Government reaffirmed its policy stance towards aviation in The Future of Air Transport Progress Report [4] published in December 2006. The report acknowledges the benefits that meeting the demand for air travel brings to businesses and individuals across the UK. It also demonstrates the progress that has been made in delivering a sustainable future for aviation since the White Paper and recognises that "growth and developments at regional airports, without the need for new runways, give people across the country improved access to air travel from modern airports" (paragraph 1.12).

It is acknowledged that demand for air travel is forecast to grow to 490 million passengers passing through UK airports per year by 2030. However, it is evident that "the additional airport development supported by the White Paper would not be sufficient to support all of this unconstrained demand" (paragraph 4.11).

The Progress Report reiterates that pressures on the existing capacity of airports in the South East still stand and that "while making best use of the existing runways in the South East and supporting increased routes and services in other regions could reduce pressure on the major South East airports, this would still fall short of a sustainable long-term solution if trends continued" (paragraph 5.5). Government supports the development of two new runways in the South East to help alleviate this pressure; however, the Progress Report recognises the role of regional development in relieving overcrowded airports and the positive benefits it can have for local economies.

4 Department for Transport, December 2006, The Future of Air Transport Progress Report.

It is clear that other airport development in the South East is taking longer than the White Paper anticipated. This is reflected through the Progress Report and ongoing feedback from the aviation industry in general. Our airport has the potential to become a significant regional airport and to assist in reducing pressures on other South East airports. It also offers a substantial opportunity to have a positive impact on the economy of East Kent and Thanet.

Our Master Plan takes full account of other key national planning policies. The relevant planning policy guidance (PPG) and planning policy statements (PPS) are listed below and addressed in the context of our airport in sections 5 and 6 of this Master Plan:

- Transport (PPG13);
- Planning and Noise (PPG24);
- Planning and the Historic Environment (PPG15);
- Archaeology and Planning (PPG16);
- Delivering Sustainable Development (PPS1);
- Biodiversity and Geological Conservation (PPS9);
- Planning and Pollution Control (PPS23); and
- Industrial Development (PPG4 and draft PPS4).

The Master Plan has been produced having regard to other legislation such as the Civil Aviation Act 2006, the Emissions Trading Scheme, the European Noise Directive and the advice of the European Aviation Safety Agency.

Regional Planning Guidance

Under the Planning and Compulsory Purchase Act 2004, Regional Planning Guidance is being replaced by Regional Spatial Strategies (RSS) that will form part of the statutory development plan framework. The Regional Spatial Strategy for the South East is known as the South East Plan and provides a framework for the region for the time up to 2026.

The South East Plan (published in May 2009) recognises that Kent International Airport could become an airport of regional significance, handling up to six million passengers per annum (mppa). Policy T9 Airports states that the “Relevant regional strategies, Local Development Documents and Local Transport Plans will include policies and proposals that:

i) Support the development of Gatwick and Heathrow airports and safeguarded land at Gatwick for a possible new runway after 2019 as set out in the 2003 Air Transport White Paper and subsequent Government statements;

ii) Encourage Southampton Airport to sustain and enhance its role as an airport of regional significance; and

iii) **Support an enhanced role for Kent International Airport as an airport of regional significance.** [5]

iv) Take account of airport operator masterplans produced in accordance with the Air Transport White Paper.”

5 This text is not in bold in policy T9 and is only highlighted for emphasis in this Master Plan.

Policy T9 also seeks to achieve reductions in the environmental impact of surface access and increased public transport used through Surface Access Strategies.

Policy EKA5 of the South East Plan recognises that gateways such as our airport, serve as catalysts for economic development (including growth associated with freight handling and tourism) and should be supported. It states that "the growth of Kent International Airport as a regional airport with up to six million passengers per annum is supported provided proposals satisfy policy criteria for the environment, transport and amenity."

The growth potential of the airport and the economic benefits that it can bring to the sub-region are recognised by the plan, together with the reserves of land located within, and adjacent to the airport, which could be used for ancillary uses and related activity (paragraph 18.31). When considering development at the airport potential environmental impacts must be addressed.

Regional Transport Strategy

The Regional Transport Strategy is an important component of the South East Plan. Although it does not discuss our airport in detail, it acknowledges the potential for our airport to help meet local demand and that further development is "supported in principle subject to relevant environmental considerations" (paragraph 9.35).

Local Transport Plan (LTP) for Kent 2006-2011

The Kent LTP sets out the transport vision for the county for 2025 and the strategy to take the County towards this vision. Aviation and the role of KIA is a core element of the LTP and policy UKG 5 states that the county council will support the sustainable development of Kent's airports.

The LTP identifies that KIA has the potential to develop into a regional airport and become one of "the largest single generators of economic activity within the county" (paragraph 5.58). It also states that the county council will support the development of KIA with a capacity of up to 6 million passengers by 2021 and that proposals for further expansion should address surface access, noise impact and air quality.

Local Planning Policy

The Planning and Compulsory Purchase Act 2004 introduced Local Development Frameworks (LDF), which will eventually replace Local Plans, while Structure Plans will be phased out. The airport is located within the administrative area of Thanet District Council in the County of Kent. Thanet District Council is in the early stages of preparing its LDF under the new system with consultation on the Core Strategy Development Plan Document expected to commence in late 2009.

The LDF Core Strategy Discussion Document on Issues and Options (May 2005) indicated that future growth at Kent International Airport was supported and asked stakeholders and members of the public whether it struck the right balance between supporting growth at our airport and protecting the environment. The feedback received through this process will be contained within the Core Strategy Preferred Options Document that is scheduled for consultation in Winter 2009.

Following the publication of the South East Plan, the relevant development plan documents are:

- The South East Plan (May 2009); and
- The Thanet District Local Plan, adopted June 2006.

Under Schedule 8 of the Planning and Compulsory Purchase Act 2004, planning policies will be saved for a period of three years from the adoption of the plan. During this period the planning authority must bring forward their Local Development Documents (LDDs) to replace planning policies in accordance with their Local Development Scheme (LDS). If the LDD are not adopted by the end of this three year period the local planning authority must apply to the Secretary of State to save the policies for a further period.

The LDS (revised April 2007) identified that an LDD could be produced specifically for our airport [6], however, this is not included within the third revision of the LDS (February 2009). There is potential for the growth proposals outlined in the Master Plan to be included within a supplementary planning document once the core strategy has been adopted.

In June 2009 policies within the Local Plan expired and, those policies not saved by the Secretary of State, were deleted and are no longer material planning considerations. A number of these policies were relevant to our airport and they included:

- Policy EC3 'Kent International Airport, surface transport issues';
- Policy CC3 'Local landscape features';
- Policy CC4 'Island approach routes';
- Policy HE1 'Listed buildings of special architectural or historic interest';
- Policy HE10 'Protection of scheduled ancient monuments';
- Policy D4 'Design statements';
- Policy NC1 'Habitats'; and
- Policy NC2 'Nature reserves and SSSI'.

Until such time that the Core Strategy is adopted, decisions relating to planning matters formerly covered by these policies will be made in accordance with the relevant policies of the South East Plan and applicable PPG / PPS. The saved Thanet Local Plan policies remain part of the development plan.

Full details of the relevant South East Plan and Local Plan policies are provided as appendix A to the Master Plan.

Both the South East Plan and Local Plan contain policies that support the expansion of aviation activities at our airport. The potential to develop into a regional airport and become one of the largest single generators of economic activity within the county is acknowledged by South East Plan policy T9 and Local Plan policy EC2.

6 The LDS sets out the details of and a programme for the various LDF documents that the council proposes to prepare for its area.

The South East Plan recognises that our airport could handle up to 6 mppa provided proposals satisfy criteria for the environment, transport and amenity. It is also acknowledged that the expansion of our airport will have a significant impact on the regeneration of Kent's economy (the economic impact of the airport is addressed later in this chapter).

The Local Plan estimates that passenger throughput at our airport will be between "500,000 and 5 million passengers per annum by 2011". Freight throughput is estimated to be between "65,000 and 300,000 tonnes per annum" (paragraph 2.64). In light of this range, the council has adopted a cautious approach to planning at our airport stating that it "should plan for 1 million passengers and 250,000 tonnes of freight per annum by the end of the plan period [i.e. 2011]" (paragraph 2.65), albeit that a review of these numbers will be undertaken in 2005-2006 [7].

Our forecasts envisage that there will be a passenger throughput of 100,000 passengers per annum by 2011. The Local Plan envisages that significantly greater passenger numbers (up to 1mppa) could be accommodated at the airport during the same period and that the 1 mppa level stated in the Local Plan should in no way place a ceiling on the development of the airport (paragraph 2.66).

Thanet District Council's 2020 Vision statement (January 2000) suggests that by 2020 our airport could be handling approximately 10 mppa and given the right investment opportunities and market conditions, passenger movements of this order could be achieved (paragraph 2.62). However, the Local Plan only sets policy until 2011 and Kent County Council, as the strategic planning authority, will need to make its own assessments for the implications of growth beyond this period.

The Local Plan recognises that development at Kent International Airport is "likely to have significant implications in terms of surface transport both within the district and in the wider area of East Kent" (paragraph 2.67). A dedicated rail link to our airport, and Green Transport Strategy will encourage more sustainable passenger and freight movements which are identified as key objectives.

These objectives also complement the East Kent Access Study, which involves a number of improvements to the road network near our airport. Consequently, proposals at our airport must demonstrate that measures have been taken to reduce car based travel in favour of sustainable alternatives and provide highway improvements / management to accommodate particular thresholds of development at the airport (former policy EC3).

Land to the north of the runway (including the land north of the B2050) is currently reserved for airside development purposes. Defined uses for this area include passenger handling services, freight operations, aircraft maintenance and manufacturing

7 Conversations with Thanet District Council Strategic Planning Team have confirmed that a review of these numbers was not undertaken by the council in the 2005-2006 period.

and services ancillary to the airport. Currently, other proposals will not generally be permitted in this area; however, we are seeking a greater flexibility of land uses through the planning policy framework review process.

Land to the east of the existing passenger terminal is safeguarded for “terminal-related” activities such as car parking, or the physical expansion of the terminal itself. This allocation also retains a reasonable buffer between our airport and Manston village. The Local Plan establishes that should an airport terminal be built “other airport-related development will be permitted on this allocated site” and that planning conditions and / or a Section 106 agreement will be applied to limit any development granted (policy EC5).

We understand the development, expansion and diversification of our airport must be subject to an assessment of its visual, landscape, noise, air quality and ground water impacts. We recognise that the current section 106 agreement (Local Plan policy EC2) needs to be renegotiated and this document will help further define our development opportunities.

Policy EC2 also states that development, which has the potential to generate significant surface traffic, must meet requirements for surface travel demand in compliance with former policy EC3. Development will also not be permitted in the airport complex to the south of the airside development site unless it has been demonstrated that the development is necessary for air traffic management.

Plan 1 identifies the Local Plan land use designations at our airport.

In summary, both the South East Plan and Local Plan stipulate the following requirements in relation to the growth of Kent International Airport:

- Development must be associated with the operation of the airport;
- Environmental designations must be safeguarded;
- Local amenity should not be adversely impacted upon;
- Appropriate mitigation measures must be proposed to address noise / air / light / water pollution, sewerage disposal, landscape, species and habitat management;
- The local transport network must not be adversely affected (surface access strategy required);
- There must be adequate public transport provision; and
- A direct rail link should be provided when 3 mppa is exceeded.

These requirements have been taken into consideration in the preparation of this Master Plan. The airport is also entitled to undertake various forms of “permitted development” related to its operations, subject to the prior submission of details to, and agreement with, the local planning authority. All airports must operate in accordance with the requirements of the Civil Aviation Authority (CAA), which is responsible for ensuring that safety standards are adhered to. Airports must obtain a licence from the CAA and demonstrate that they are able to continually adhere to a range of safety related standards. CAA publication CAP168 [8] deals specifically with the design of airports, including physical characteristics, assessment and treatment of obstacles, visual aids, rescue and fire fighting services and medical services. Its standards have been taken into account within this Master Plan.

Airport Master Plans

The DfT document Guidance on the Preparation of Airport Master Plans provides guidance for the development of airport master plans. This guidance follows publication of the White Paper in 2003, which recommends that airport operators develop and maintain a master plan for their airport. The guidance suggests any airport expected to be handling 20,000 air transport movements by 2030 should produce a master plan.

An airport master plan should include an indication of the airport operator's plans for infrastructure to support growth at the airport and to inform long term planning policy.

The guidance document recognises that surface access to an airport is likely to be a major issue during the lifetime of an airport master plan and could be a significant consumer of land and finance. Therefore airports should carefully plan the provision of transport and access infrastructure that would be required to deliver the master plan. However, it is recognised by the guidance that forecasting surface access requirements is complex and during the initial master plan stages, would probably be limited to discussing broad principles.

Airport Transport Forum

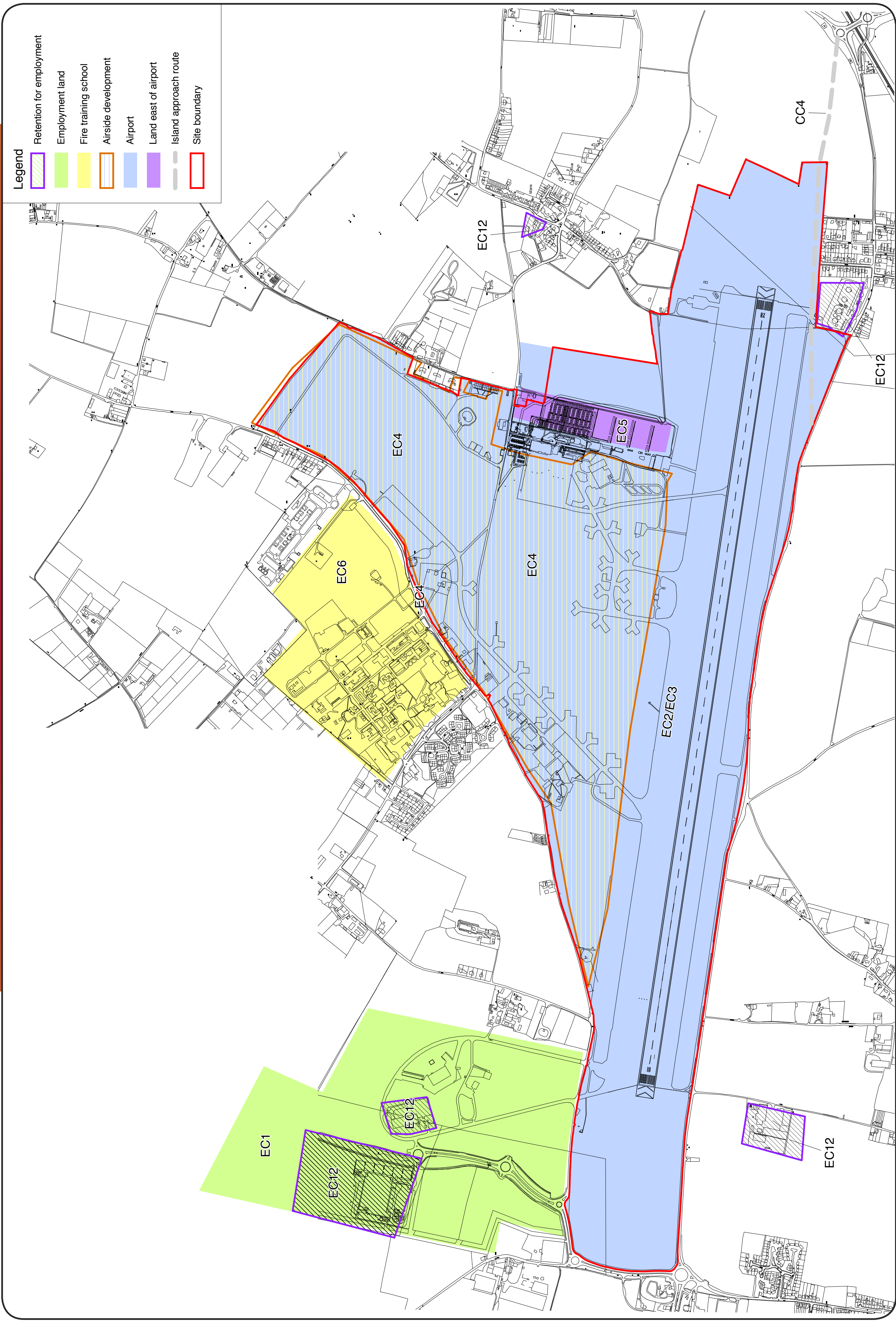
The Transport White Paper A new deal for transport: better for everyone states that all airports in England with scheduled passenger services should establish and lead an Airport Transport Forum (ATF). This has now been revised to apply to airports with greater than 1,000 scheduled and charter passenger air transport movements per annum.

An ATF would encourage partnership between airport operators, local authorities, passenger transport operators, local people and business and other interested parties. The objectives of an ATF would be to agree targets for increasing sustainable travel mode share amongst passengers and employees, a strategy for delivering against these targets, and to oversee the implementation of the strategy.

Operators of qualifying airports are responsible for taking the lead in setting up an ATF and preparing an Airport Surface Access Strategy. As passenger movements increase at our airport it is proposed that an ATF will be established in accordance with the guidance referenced above.

8 Published by the Stationary Office on behalf of the CAA

Plan 1 – Thanet Local Plan Land Use Designations



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Planning Policy – Issue by Issue

Sustainability

In terms of an overarching sustainable aviation growth strategy, we subscribe to the strategy set out in the Strategy Towards Sustainable Development of UK Aviation report published by Sustainable Aviation. It provides a coordinated industry response to the challenges outlined by the UK Government in the ATWP and the joint industry and government report of the Aerospace Innovation and Growth Team (AeIGT). These reports make clear that the long-term sustainable development of the aviation industry is essential to the environmental, economic and social wellbeing of the UK.

The strategy establishes the mechanisms for monitoring and reporting progress towards a series of goals and commitments including improving aircraft fuel efficiency, practical solutions for the inclusion of aircraft CO_2 emissions in the EU Emissions Trading Scheme, plans for community related mitigation of noise, improvements to local air quality and reductions in traffic congestion.

Consistent with the UK Aviation industry's vision for 2020 and beyond, we will seek where possible to meet the needs of society for air travel, while removing or minimising any negative impacts on local and global environments.

At the local level, the future sustainable development of our airport is specifically addressed in the Local Plan, which identifies that Thanet Council and adjoining district councils wish to see our airport develop as a regional airport, as the airport offers very significant economic and employment benefits for Thanet and East Kent.

The Local Plan highlights that development will also have significant transport implications arising from passengers, freight and employees, which will need to be addressed. It states that "in the Council's vision for the future, Thanet remains an attractive place and quality employment, housing and leisure opportunities are accessible to all. Kent International Airport balances economic success with environmental concerns."

Specific sustainability objectives are detailed within the Local Plan's chapter on design. Policy D1 of this section identifies a series of design principles that seek to address the requirements for sustainable building. It states that "all new development is required to provide high quality and inclusive design, sustainability, layout and materials."

Policy D1 states that development proposals will only be permitted if they meet a range of criteria which include:

- Compatibility with local landscape, character and neighbours;
- Public transport and accessibility provisions;
- Biodiversity protection and enhancement; and
- Safety and security measures.

These sustainability principles will be applied to all future development at our airport.

Our approach to sustainable development at the airport will be consistent with the requirements set out by PPS1 Delivering Sustainable Development and is addressed further in section 6.

Surface Transport

The development of a dedicated rail link to our airport with a station near the terminal and a possible freight interchange serving the airport and the Central Island Area is strongly supported by the Local Plan. A series of strategic road improvements near the site are proposed through the East Kent Access major road improvement scheme (EKA). The primary objectives of this scheme are to improve access between the main settlement areas and support the development of our airport as a regional airport.

The improvements are split into two main phases, with Phase 2 expected to commence in 2009 and be complete by 2011. The improvements are necessary for future growth at our airport and the adjacent Manston Park employment area. The EKA has been a key consideration during the development of the Master Plan, together with the need to safeguard land for its construction (Local Plan policy TR4). A framework for a travel plan, which implements Thanet District Council's Green Transport Strategy (June 2002), will be developed to support planning applications at the airport. A traffic impact assessment will also be provided to support future applications. Our approach will be consistent with the requirements set out in PPG13 Transport.

Controls of Aircraft Emissions

Planning policy controls exist to resist proposals that would result in national air quality levels being exceeded (PPG23 Planning and Pollution Control and Thanet Local Plan policy EP5). The Master Plan has been informed by an assessment of air quality impacts. This is explained further in section 6 of the Master Plan.

Control of Aircraft Noise

The development plan generally supports the growth of our airport but adopts a precautionary approach to aircraft noise. It applies the 1996 (dBLAeq 16 hour) contour predictions, but acknowledges that alternative contour scenarios will be considered as the airport grows (Thanet Local Plan policy EP7). The Local Plan also requires a cumulative noise assessment to be produced where aircraft movements are increased (policy EC2). It confirms that where proposals are likely to be affected by aircraft noise, an assessment should be made in relation to the latest accepted prediction of existing and foreseeable ground noise measurement of aircraft noise.

This approach accords with PPG24 Planning and Noise. Noise issues at the airport are considered further in section 6 of this Master Plan.

Public Safety Zones

To safeguard against the risk of injury or death to people on the ground in the event of any aircraft accident on take-off or landing, the DfT has mandated public safety zones (PSZs) at the busiest UK airports.

They are a planning policy tool to control development in the specified risk contour areas. The types and level of development affected are set out in DfT Circular 1 / 2002.

PSZs are areas of land at the end of the runways within which development is restricted in order to control the number of people on the ground at risk of death or injury. The basic policy objective underpinning PSZs is that there should be no increase in the number of people living, working or congregating in PSZs and that, over time the number should be reduced as circumstances allow.

It is the responsibility of the local planning authority to ensure that the directions within the PSZ planning circular are adhered to.

As identified in section 2 of this Master Plan, it is acknowledged by the Local Plan that a PSZ assessment was scheduled for our airport in 2006. The assessment was not undertaken as the anticipated growth of the airport at that time did not occur. The DfT may review this in the future and we will welcome its provision.

Airport Security

The Airport Security Act 1982 and subsequent related legislation sets out requirements for airports. These regulations have influenced the design and layout of the Master Plan and will continue to influence development proposals at our airport.

Airport Health & Safety

Health and safety at our airport is regulated by a number of enforcing authorities including the CAA, Health and Safety Executive, Thanet District Council and the Kent Fire and Rescue Service.

The requirements of these authorities have been adhered to by the Master Plan and will be present in all new development at the airport.

Ground Water & Water Environment

A portion of our aerodrome is located on a freshwater aquifer and the airport is wholly contained in various source protection zone (SPZ) catchments. Groundwater beneath the site is therefore considered to be very sensitive to potential pollution as major aquifers and SPZs represent areas of groundwater resources that are critical to existing or future water supplies.

The Environment Agency (EA) seeks to ensure that new development does not present an unacceptable risk to groundwater resources. New development will meet, where appropriate and feasible, the requirements of the EA to ensure that it will not lead to a material deterioration in the quality of surface or groundwater. Development is not permitted in groundwater protection zones where there would be a risk of contamination of groundwater, unless adequate mitigation measures can be incorporated (Local Plan policy EP13).

A primary objective of the Master Plan process has been to ensure that groundwater is adequately protected. Pollution control measures will be adhered to during the design and construction of all new airport infrastructure and, where necessary, mitigation measures have been proposed to prevent groundwater pollution occurring. Further detailed information on groundwater impacts will be made available in due course.

Landscape Impact

Our airport is located in a Landscape Character Area (LCA) defined as the Central Chalk Plateau. Within this LCA particular care must be taken to avoid skyline intrusion and the loss or interruption of long views of the coast and the sea (Local Plan policy CC2). Although policy CC3 ‘Local landscape features’ has been deleted, consideration should still be given to safeguarding valuable landscape character and features. Where development proposals conflict with these principles it must be demonstrated that it is essential for the economic or social well-being of the area.

Our airport is an existing feature within the Central Chalk Plateau LCA and as such, a certain amount of development is to be expected through the airport’s permitted development rights. Nevertheless, the quantum and form of development proposed is likely to be significant and should be assessed in terms of its impact on the surrounding landscape setting.

It is envisaged that development at our airport will respect the existing landscape character of the area, whilst being sufficient in form, scale and mass to meet our existing and anticipated operational requirements. The layout and design of development will take into consideration the topography of the site and surroundings to minimise any adverse visual impact.

The landscape impacts of development at our airport will be assessed as planning applications are submitted in the future.

Other Planning Policies Related to Our Airport

Island Approach Routes

An Island Approach Route designation runs through the south east section of the our airport, parallel with the A299. While now deleted, planning policy CC4 ‘Island approach route’ sought to protect the visual and environmental quality of major approach routes and generally resist development that was unable to make a positive contribution to the environment of these routes.
The principles of this former policy continue to be considered through the Master Plan.

Built Heritage & Archaeology

There are no listed buildings or scheduled ancient monuments (SAMs) located within our boundary, however, there are both in close proximity. The Laundry Road SAM is located on open agricultural land to the south of Canterbury Road West and an Anglo-Saxon cemetery is located to the east of the roundabout junction between the A299 Canterbury Road West and the A253 Canterbury Road. Six buildings in the village of Manston are listed. There are also a number of military structures located within the airport boundaries that are referred to in the Defence of Britain database. None of the airfield buildings are currently listed.

Although local plan polices HE1 'Listed buildings of special architectural or historic interest' and policy H10 'Protection of scheduled ancient monuments' have been deleted, subject to the requirements of PPG15, PPG16 and the South East Plan, built heritage features must be safeguarded and their special character or setting protected.

The Master Plan has taken into consideration the built heritage environment and development proposals will seek to ensure that they do not have an adverse impact on any protected features. Where necessary, development proposals will provide mitigation measures to safeguard significant below ground archaeological sites within the airport boundary. Measures will be taken to minimise impacts on designated sites beyond the site boundary in terms of vibration and noise. Cultural and built heritage features are considered further in section 6 of our Master Plan.

Wildlife & Natural Habitats

Our airport is not subject to any statutory environmental designations. The nearest area of major environmental significance is Pegwell Bay, which is subject to a number of European designations (Special Protection Area, Site of Scientific Interest, Ramsar site, National Nature Reserve and Important Bird Area). The Thanet Bay Ramsar site, the Thanet Coast and Sandwich Bay Special Protection Area (wild birds and their habitat), the Sandwich Bay Special Area of Conservation (rare and endangered species) and the Sandwich Bay to Hacklinge Marshes Site of Special Scientific Interest are also designations of significance which have been considered.

While there are no statutory designations present at our airport, the impact of development on local biodiversity features and the European designations at Pegwell Bay has been considered in the Master Plan. Development proposals will seek to minimise adverse impact on environmental features of significance and, where necessary, mitigation measures will be proposed to offset any adverse impacts.

This approach is consistent with guidance provided by PPS9 Biodiversity and Geological Conservation. Further information on this issue is provided within section 6 of our Master Plan.

Renewable Energy

PPS22: Renewable Energy identifies that there are opportunities to incorporate small scale renewable energy technologies in new development and existing developments. Potential technologies include solar panels, biomass heating, small scale turbines, photovoltaic cells and combined heat and power schemes. Thanet Local Plan policy EP14 sets a positive policy framework for the development of renewable energy schemes, subject to balancing environmental impacts, however there are no policies requiring a proportion of a new development's energy needs to be meet through on site renewable energy technologies. Despite this, the airport will seek to incorporate onsite renewable energy technologies for new development proposals where feasible and appropriate to do so.

Sustainable Development in Rural Areas

PPS7: Sustainable development in rural areas provides broad support for economic activity in rural areas, such as the growth of the airport and associated development. It seeks to establish a positive policy framework for the future expansion of business premises, to facilitate healthy and diverse economic activity in rural areas. The growth of our airport will act as a catalyst for the growth of the local and sub-regional economy.

Economic Growth

PPG4: Industrial, commercial development and small firms acknowledges that industry and commerce have always sought locational advantage in response to various external factors and that businesses give high priority to "good access to roads, and sometimes rail, airports and ports". Draft PPS4 (December 2007), which will eventually supersede PPG4, identifies that local planning authorities should "encourage economic growth". Transport uses such as airports are included in the list of economic development and both development plans and development proposals should take into consideration the benefit of co-locating these developments.

The development plan recognises that aviation related growth at our airport will bring positive benefits to the local, and wider Kent economy. This is further reflected in the Regional Economic Strategy 2006-2016.

A Framework for Sustainable Prosperity (RES). While the RES does not make specific reference to our airport, it acknowledges that it is both a "gateway" and "regional airport" (RES, p43). It also states that major airports in the South East, such as Southampton, Gatwick and Heathrow, make a major contribution to the region's economy.

Our airport is located within an area broadly defined by the RES as "The Coastal South East". This area is characterised by concentrations of economic inactivity, more traditional industrial activities, a low proportion of employment in the knowledge based sectors and relatively poor infrastructure and connectivity. To maximise the economic potential of The Coastal South East the RES establishes a number of key priorities, which will underpin a coastal strategy in due course. A number of these objectives are listed below:

- To support enterprise and stimulate the creation of a wide variety of business;
- To provide employment land through the redevelopment of brownfield land and refurbishment of existing stock to provide flexible employment space;
- To invest in the long-term sustainable growth of key ports; and
- To improve connectivity along the coast with key hinterlands and London.

The role of the South East regional as a main gateway to Europe and the global economy is further strengthened through the RES Annual Monitoring Report (October 2008), which states that the South East's transport network requires "significant investment in order to maintain the competitiveness of both the regional and national economies" (Box T4: Key Messages).

Growth at our airport will contribute towards meeting these objectives and maximise the economic potential of the Coastal South East. Job opportunities will be created in a range of aviation related sectors, many of which will be available to people living in the surrounding area, or within reasonable commuting distance.

Development proposals will provide new skilled jobs and are well placed to capitalise on the expanding employment linkages located nearby. Significantly, growth at our airport will enhance its role as a key facility and improve road, rail and air connectivity in this part of Kent.

Manston Business Park employment area is located immediately to the north of our airport and has been a consideration in the assessment of the future growth potential of the airport. Kent County Council and Thanet District Council have identified Manston Park as a primary inward investment site for the district where employment uses could provide a focus for retaining skills within Thanet.

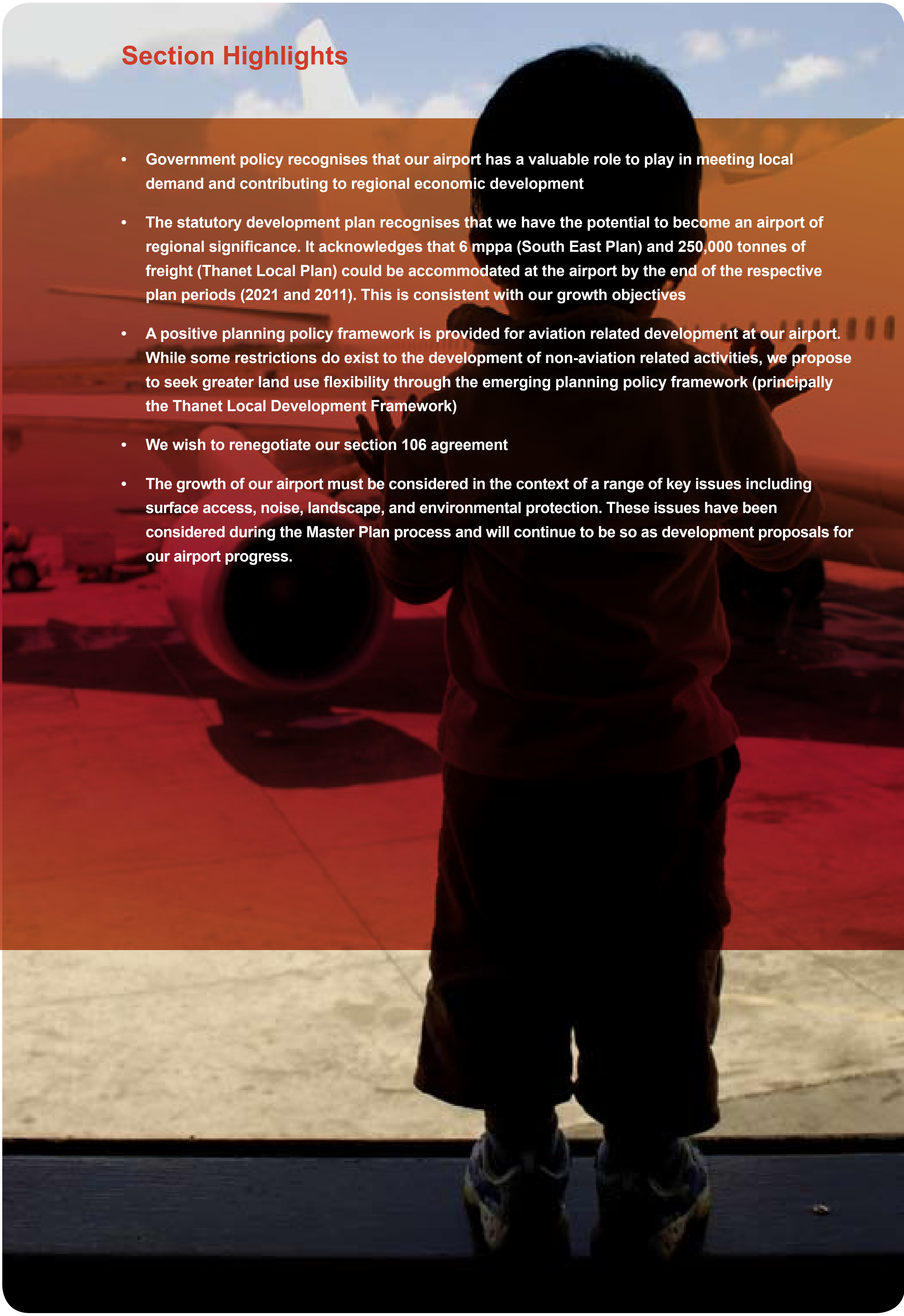
Development at our airport has the potential to stimulate employment growth at Manston Park, particularly through the growth of freight processing, storage and distribution uses.

In March 2008 a planning application (including indicative master plan) was submitted to Thanet District Council by Chinamex and CGP for the development of a significant part of the Manston Park site. The phased proposal, known as China Gateway, includes 325,158m^2 of B1, B2 and B8 commercial floorspace and aims to provide high quality commercial development in a manner that respects the surrounding area whilst providing substantial economic benefits to the local, regional and national economy.

Our airport is a key transport hub in this part of Kent and its role is set to increase as planned growth occurs. It is acknowledged that Manston Park and our airport have the potential to develop at a much more substantial rate than previously envisaged [9] and that synergies between the two uses exist.

Our Master Plan considers these synergies, primarily in terms of new road infrastructure and development layout and recognises that together our airport and Manston Business Park have the potential to form a regional transport hub and significantly stimulate economic growth in the region.

9 Thanet District Adopted Local Plan, adopted 17th June 2006



Section Highlights

- Government policy recognises that our airport has a valuable role to play in meeting local demand and contributing to regional economic development
- The statutory development plan recognises that we have the potential to become an airport of regional significance. It acknowledges that 6 mppa (South East Plan) and 250,000 tonnes of freight (Thanet Local Plan) could be accommodated at the airport by the end of the respective plan periods (2021 and 2011). This is consistent with our growth objectives
- A positive planning policy framework is provided for aviation related development at our airport. While some restrictions do exist to the development of non-aviation related activities, we propose to seek greater land use flexibility through the emerging planning policy framework (principally the Thanet Local Development Framework)
- We wish to renegotiate our section 106 agreement
- The growth of our airport must be considered in the context of a range of key issues including surface access, noise, landscape, and environmental protection. These issues have been considered during the Master Plan process and will continue to be so as development proposals for our airport progress.

3. Our Past and Present

Our History

Aircraft activity began at Manston in 1915 when military aircraft used the site for emergency landings, and shortly after it was established as an Admiralty Aerodrome. Soon after this the Operational War Flight Command and the Handley Page Training School were established.

Our airfield was extensively used during World War II, notably to test bouncing bombs at Reculver and by Hawker Typhoon and Meteor squadrons. The airport was also the set off point for the famous Channel Dash mission. Its location in East Kent meant it was critical during wartime operations as the first airport available for damaged aircraft returning home from Europe.

In the 1950s the United States Air Force (USAF) used Manston as a Strategic Air Command base for its fighter and fighter-bomber units. The USAF withdrew from Manston in 1960 and the airfield became a joint civilian and RAF airport.

From 1989 Manston became known as Kent International Airport and a new terminal was officially opened that year. In 1998 the Ministry of Defence announced plans to sell off RAF Manston.

In 2004 works began to make our airport a low cost airline hub and Irish airline EUJet began scheduled flights in September 2004 to a number of destinations across the UK. EUJet operated flights from Sept 2004 until July 2005 and in their busiest month carried 62,709 passengers. If the airline's operations had been continued, this would have equated to approximately 753,000 passengers per annum. Importantly these relatively high passenger numbers were achieved over the winter period, which is normally quieter than the summer period.

Infrastructure was developed at the airport to support this growth; however, in July 2005 all EUJet operations were suspended along with all non-freight operations because of financial difficulties with the airport and airline's operating company.

The airport was purchased by Infratil in August 2005 and since then we have been actively improving basic infrastructure and facilities. Our airport is now equipped with safe, compliant and reliable systems and equipment.

Our airport is equipped with a range of facilities. Upgrades have been made to a number of these including airfield radar, high and low voltage electricity systems, back-up electricity generators, airfield ground lighting, rescue fire equipment and others. Flight path monitoring and recording is not a requirement but is likely to be introduced as traffic volumes increase.

Current Passenger and Freight Volumes

Our airport has not had significant passenger traffic since EUJet flew over 400,000 passengers from Kent in 2004 / 2005. Flybe, Europe's largest regional airline launched its inaugural service from Manston in 2009 and currently operates scheduled flights between our airport and the channel island of Jersey. Charter flight destinations include Malta, Italy, Austria and Croatia with services to these holiday hotspots offered during the summer months. Passenger numbers have varied in recent years and currently do not exceed 10,000 per annum.

Our airport is a highly specialised freight handler, processing around 32,000 tonnes of freight per year (approximately 435 freight aircraft movements per year). The majority of freight handled consists of imported perishable produce from Nairobi in Kenya and Accra in Ghana. These time sensitive shipments utilise aircraft such as the Boeing 747-400 and the Airbus A300.

This Master Plan explains how we plan to develop our airport to meet the exciting growth opportunities within both freight and passenger markets.

Other Aviation Activities

General aviation aircraft regularly operate from our airport with several privately owned aircraft based at Manston. These offer pilot training, local sightseeing flights and are used for private operations. A range of privately owned larger aircraft and small to medium sized jet aircraft also frequent our airport. The airport provides users of these aircraft with a gateway to Kent and beyond. Commercial airliners also use our airport for crew validation flights, often referred to as training flights.

In addition to regular air freight, we often handle equipment for large concerts and other time critical airfreight consignments. Recent examples include stage equipment for the Spice Girls Reunion Tour, Sting and Bruce Springsteen. Bob Geldof's equipment took off from our airport to help the Band Aid Famine effort in Africa in the mid 1980s.

Our Airport Today

This section outlines the current aspects of the airfield and operational facilities of our airport. The existing layout of our airport is provided in Plan 2.

Runway and Taxiways

Our airport has a single runway. It is 2,752 metres long and 61 metres wide and was recently resurfaced and remarked. It has a general west / east orientation. Our runway has sufficient capacity for the number of aircraft movements anticipated for the duration of this Master Plan.

A total of five taxiways connect to the runway, designated alphabetically as Alpha, Bravo, Charlie, Delta and Echo. Alpha taxiway is incorporated into the northern edge of the runway, taxiways Bravo, Charlie and Delta provide access to / from the passenger apron, and taxiway Echo provides access to / from the runway and the freight apron.

Aprons

There are two main aprons at our airport. The first is the passenger apron, capable of accommodating four Code C aircraft [10] or three Code E aircraft [11]. The freight terminal

10 Examples being Boeing 737 and Airbus A320 type aircraft.
11 Examples being Boeing 747 and Airbus A340 type aircraft.

apron and standing is located adjacent to the B2050 and is capable of holding a number of aircraft in different configurations depending on aircraft type. It is also possible for freight aircraft to share the apron adjacent to the passenger terminal.

Passenger Terminal Facilities

There is one passenger terminal facility at our airport. This is located to the west of the main car park and to the south of the B2050. The terminal contains check-in, security, waiting areas, customs and immigration inspection services and the arriving and departing passenger baggage processing facilities.

Flights to our airport currently occur on an infrequent basis and the existing passenger terminal has capacity to accommodate all of the scheduled flights.

Although our passenger terminal has accommodated over 60,000 passengers per month, as passenger throughput increases it will be necessary to incrementally expand the passenger terminal facilities. The capacity of the existing terminal is around 1mppa subject to the aircraft used and scheduling arrangements.

Aircraft Maintenance

The airport hosts two aircraft maintenance hangars which service MD80, DC10, DC8 and general aviation aircraft. Other aircraft types also use our airport from time to time for ad hoc maintenance activity.

Airspace

Our airspace is outside the London Control Zone, but due to our geographical location, aircraft often pass high over the airport on their way to / from the UK and Europe.

Our airport operates in Class G [12] airspace. As passenger services increase this airspace category will be reviewed and will eventually be designated controlled airspace when appropriate. Controlled airspace will be applied for once scheduled passenger operations become established. The availability of controlled airspace is not an impediment to the proposals outlined in the Master Plan.

We control the airspace 2.5 nautical miles around our airport and up to a height of 3000 feet. As the airport grows we envisage that the controlled airspace area will be extended.

Our air traffic control tower is located on the airfield near the intersection of taxiway Charlie and the runway.

A Category 1 Instrument Landing System (ILS) is installed on Runway 28. Runway 10 is serviced by a localiser facility and non-directional beacon (NDB). There is no minimum requirement for ILS systems. ILS systems will be upgraded on both runways when required.

A Direction Finder (DRDF) [13] operated by the Ministry of Defence is located to the south west of the existing freight facilities and is used by Air Traffic Control as an additional aid to indicate the direction of an aircraft's location relative to the airfield.

12 Class G airspace is uncontrolled airspace. It is the least restrictive and least controlled type of airspace and the pilot has a high degree of responsibility for maintaining aircraft separation.

The Digitally Resolved Direction Finder (DRDF) receives signals in the UHF and VHF frequency band ranges and uses the Doppler effect to determine the bearing of the transmitting station or aircraft relative to the facility position. The calculated bearing is then displayed to the Air Traffic Controller for use in establishing the position of an aircraft.

Aviation Fuel Storage

Our primary aviation fuel depot is located to the north of the passenger terminal and the B2050. The secondary aviation fuel depot is located to the northwest of the B2190.

Fuel is currently transported from the nearby Isle of Grain facility to the airport by road tanker. Fuel is transported to the aircraft by fuelling vehicles from our fuel compounds.

There is not sufficient capacity, nor is there sufficient environmental protection, at our existing fuel compound to accommodate the anticipated fuel storage requirements for our Master Plan period. Upgrade options and alternative sites are being investigated for a new, purpose built, fully bunded facility.

Fire Station

Our airport has a fire station located to the east of the Air Traffic Control Tower.
The requirements for Rescue Fire Fighting capability have been developed and are stipulated by the International Civil Aviation Organisation (ICAO). The required standard is based upon the largest aircraft size operating at the airport and is known as the Aerodrome Rescue and Fire Fighting (RFF) Category.

The airport fire service currently operates up to Category 9 capability (available upon request). Category 9 Rescue Fire cover meets the standard required for the hosting of large wide bodied passenger aircraft such as the Boeing 747-400.

Existing Surface Access

Roads

Strategic highway access to our airport is gained from the A299 corridor which connects the M2 motorway, approximately 30km west of the airport, with Ramsgate, approximately 5km east. The A299 is a dual carriageway with two lanes in each direction to the west of the airport providing a direct link to the M2 / M25, and single carriageway to the east towards Ramsgate.

The M2 provides onwards access to Medway, the M25 and thereafter London via the A2 corridor. It also provides good links to the M20 motorway at Maidstone via the A299 and A249 dual carriageways.

Further links are established between our airport and Canterbury via the A28 which continues to Ashford and the M20, and also to Dover via the A256 bypassing Sandwich en route. The A256 is currently a mix of dual and single carriageway and is the subject of a programmed upgrade in the vicinity of the airport. To the north east the A256 provides access to Broadstairs and Margate.

At a more local level direct access is gained to our existing airport car park and terminal from the B2050 Manston Road. This route

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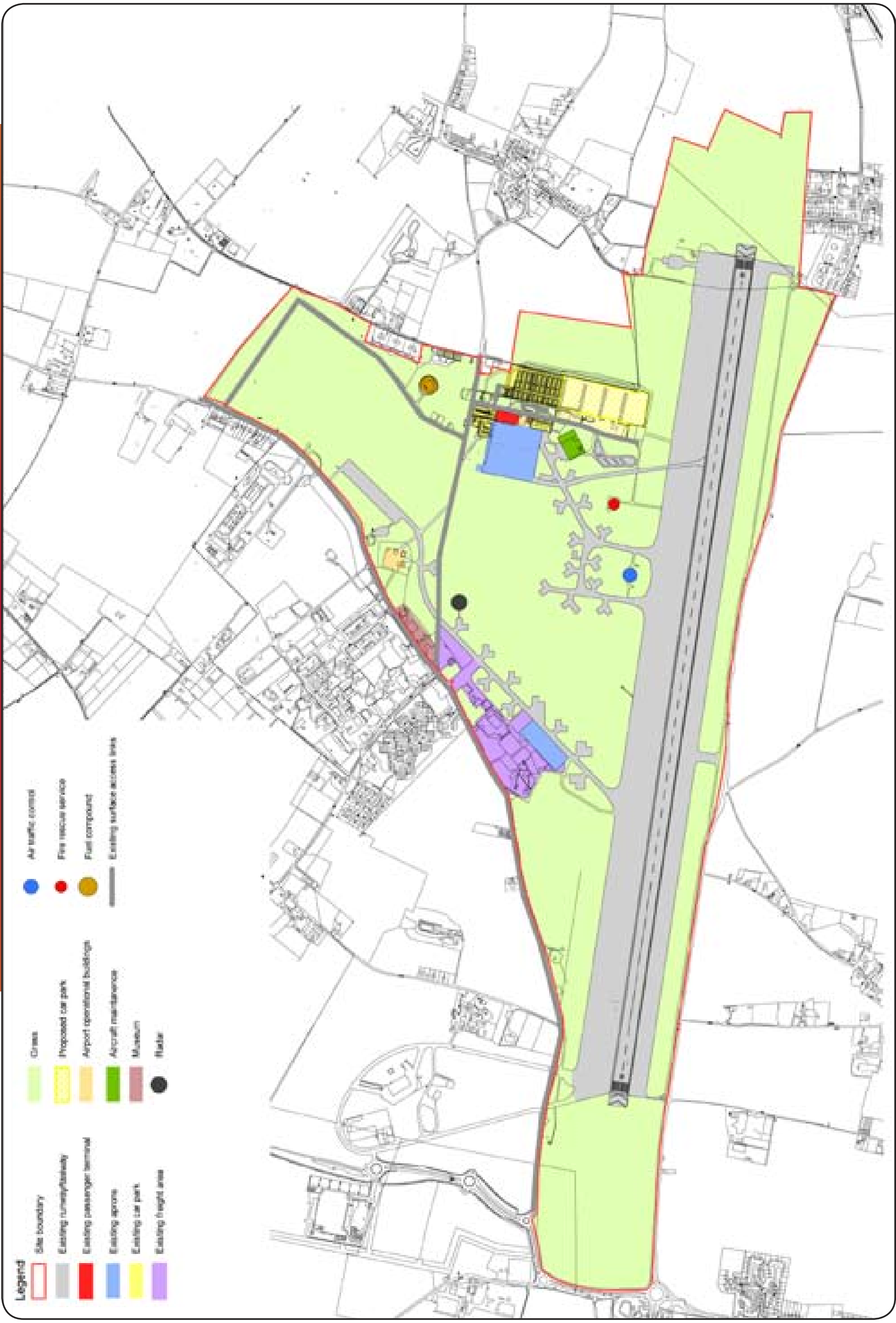
13 The DRDF will need to be relocated in due course as it is close to the location of a safeguarded future parallel taxiway (see plans on page 58 and 59).

Plan 2: Manston Airport Existing Context

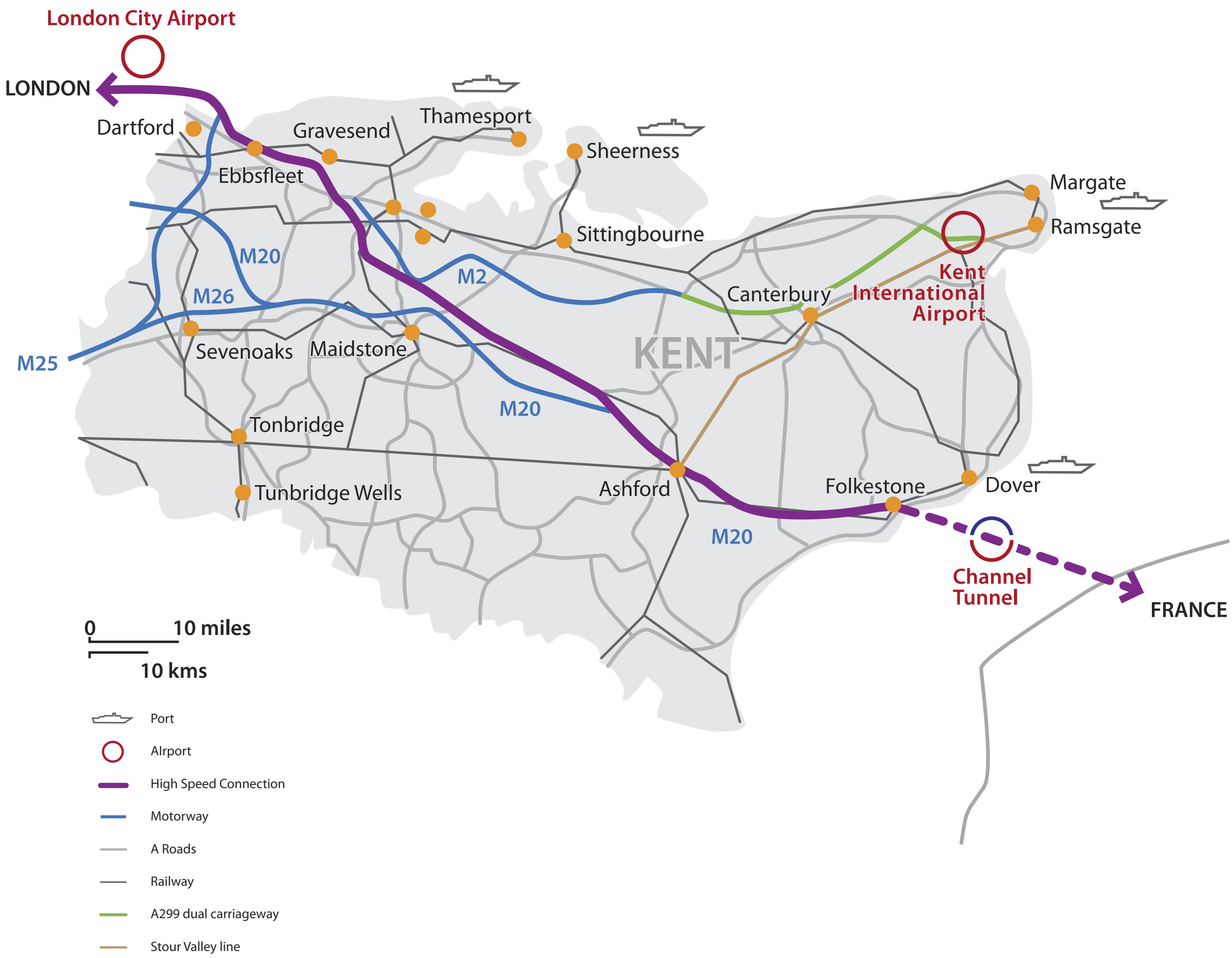


provides a connection to the A299 corridor via the B2048 Minster Road and also serves Manston Business Park.

Whilst access to the airport is possible from the east via Manston Road, this is discouraged through the use of traffic calming features within Manston village. Further local routes provide means of access to the airport although their use would generally rely upon local knowledge.

In summary, our airport has established links with the local and strategic highway network. The airport is highly accessible from local settlements within Thanet using local routes and further afield within Kent and beyond using the strategic links available.

Diagram 1: Local Transport Network Diagram



Car Parking

Existing parking provisions at our airport have been increased in recent years and now approximately 1,100 parking spaces are available to both staff and passengers. The parking area is located to the east of the airport and is directly accessed from the B2050 Manston Road. A second phase of car park expansion for approximately 1,000 spaces is proposed subject to meeting the requirements of the planning permission, which was gained in January 2003.

Buses

Our airport is served directly by bus services operated by Eastonways, which pick up and drop off immediately outside the terminal building. A bus turnaround facility is provided on site.

The number 38 / 38A / 38B bus services call at the airport on an hourly basis between 0700 and 1700 during Monday to Friday.

These services operate between Margate and Birchington and include direct links to Broadstairs and Ramsgate rail station in addition to many of the other settlements en route. On Saturdays the services are hourly between 10am and 2pm.

Taxis

There is currently a dedicated taxi drop off area near to the front of the terminal building and this is provided on the same loop road as the general public drop off point. Our website provides information with respect to local taxi services.

Rail

There are two primary rail routes into Thanet, both terminating at Ramsgate. The first originates from Victoria Station and the second originates from Waterloo East and Charing Cross Stations.

Ramsgate station is located approximately 5km to the east of the airport. This station has two covered platforms and offers approximately 75 parking spaces and covered cycle racks. An Eastonways bus service provides a connection between the station and the airport with a journey time of approximately eight minutes.

Rail services to and from Ramsgate are operated by Southeastern Trains with existing services to London taking approximately 1 hour and 45 minutes. Trains from London arrive at Ramsgate approximately every 15 to 30 minutes during the day.

Further rail stations are located at Minster, approximately 2km to the south, and Birchington, approximately 5km to the north. Services from London to Birchington take approximately 1 hour and 30 minutes and arrive at Birchington approximately every half hour during the day. Train services from London to Minster are less convenient and vary in duration from approximately 1 hour and 45 minutes to 2 hours and 15 minutes. Trains arrive at Minster approximately every half hour throughout the day.

Rail services to our airport will benefit from the commencement of the UK's first high speed domestic rail service by the end of

2009. The new service, dubbed High Speed 1 (HS1) will utilise track improvements and new fast trains to significantly reduce journey times. The HS1 project is primarily targeted at reducing the journey times on the London to Dover route and will benefit services to Ramsgate with track upgrades on the London to Ashford section of the journey. The high speed trains will be maintained overnight at the Ramsgate depot, and this has led to further improvements to Ramsgate services and additional track upgrades on the Ashford to Ramsgate section of track.

The high speed services will reduce journey times by a third, with the Ramsgate to London trip length reduced from an average of 128 minutes to 75 minutes. This service will be a huge step forward and will be significant for the long term development of passenger services from our airport. There is further potential for service improvement on the Ashford – Ramsgate section of track and in time, we expect that the journey from our airport into London by train will be made in less than an hour.

Cycle Access

Our airport is not currently served by dedicated cycle routes and therefore cyclists wishing to access the airport do so using the local highway network. However, the Thanet Cycling Plan identifies a series of proposals to provide cycle links within Thanet that would link our airport with neighbouring settlements.

Our Contribution to the Economy

With some 1.4 million inhabitants, Kent is the UK's most populous county. It is also a prosperous area with a workforce of 780,000 and an unemployment rate of 2% [14]. Its economic success can be attributed to its ability to attract world class companies and also its thriving tourism industry. Kent also has significantly lower office rental costs than London. However, despite these positive attributes, only four of Kent's districts are amongst the top 25% in the UK for average earnings and unfortunately pockets of deprivation do exist [15]. A diverse range of existing businesses provide the county with external economies of scale, which are capable of supporting future business growth.

Policy EKA6 of the South East Plan identifies that local planning authorities should give priority to the completion of major employment sites at locations within Kent, including Thanet and that, while major new employment locations are not currently needed within Thanet, any major investment proposals that come forward should not be ruled out (paragraph 18.38). Our airport has the potential to function as a gateway and catalyst for economic growth, with manufacturing, transport, aviation and marine engineering identified as key sectors for inward investment during the plan period.

Thanet has an unemployment rate of 3.6% [16], which compares poorly with the overall Kent average. In addition 12% of Thanet's Super

14 Locate in Kent, www.locateinkent.com
15 Former Kent and Medway Structure Plan, adopted July 2006.
16 Thanet Economic Growth and Regeneration Strategy, Thanet District Council.

Output Areas [17] fall within the top 10% of the most deprived of such areas in England.

Key economic growth objectives for East Kent and Thanet are set out in the Regional Economic Strategy 2006-2016 A Framework for Sustainable Prosperity. Similar objectives are also contained within the Local Plan. The South East Economic Development Agency (SEEDA), Kent Partnership and the East Kent Partnership, in conjunction with the County and Local Councils, are responsible for delivering these objectives.

As highlighted in section 2 of this Master Plan, the main objectives of the Regional Economic Strategy are to:

- Support enterprise and stimulate the creation of a wide variety of business;
- Provide flexible employment space;
- Invest in the long term sustainable growth of key ports; and
- Improve connectivity within the region and with London.

Similar objectives are promoted through the Kent Partnership and East Kent Partnership. These include:

- Securing infrastructure investment for better road, rail and aviation use;
- Promoting investment, business and job opportunities at Kent's main airports;
- Creating a competitive and diverse economy;
- Attracting high quality business and investment opportunities; and
- Establishing Kent's global and European profile as an international gateway, visitor destination and county of enterprise.[18]

The development plan promotes similar objectives to the Thanet and East Kent Partnerships. There is a specific focus on improving the prosperity of the area, attracting inwards investment and improving connectivity. Capitalising on tourism is also a key objective.

The development plan provides a positive policy framework, recognising that the growth of the airport has the potential to boost the economy [19]. Given this positive framework, the proposals for growth at our airport should balance against the potential impacts on surface access and other local environmental features.

The growth of our airport through the Master Plan period will contribute towards the economic development objectives outlined above primarily in terms of employment generation, enhanced business opportunities and improved connectivity within the region and the wider UK.

17 A geographical hierarchy designed to improve the reporting of small area statistics in England and Wales.
18 Kent Prospects 2007 to 2012, Kent Partnership and East Kent Partnership Strategy 2005-2015.
19 South East Plan policy EKA5 and paragraph 18.31 and Local Plan policy EC2.

Employment Opportunities

When forecasting employment growth that may be generated by the proposals it is necessary to consider four employment categories:

- Direct: employment directly related to the operational airport;
- Indirect: employment resulting from the local chain of suppliers to firms directly involved in the airport's operation;
- Induced: employment arising locally through the personal expenditure of those employed either directly or indirectly; and
- Catalytic: employment created by opportunities for influencing business location decisions and attracting inbound tourism, both businesses and leisure, to the region.

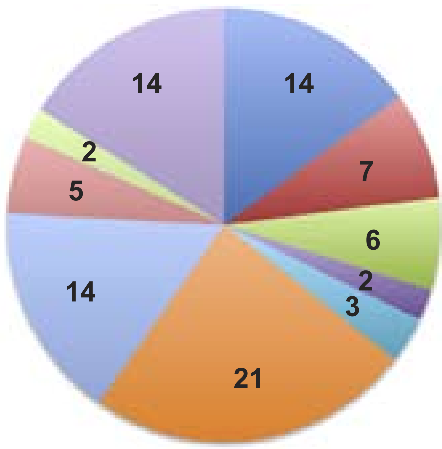
We currently employ around 100 people on a full time (FTE) and part time (PTE) basis to manage and operate our airport. The majority of our employees live in Thanet. The breakdown of employment sectors and employee numbers at our airport is provided in table 1 and chart 1.

Employment opportunities at our airport include a range of highly trained airside staff such as Electrical Engineers, Air Traffic Controllers, Rescue Fire Fighters, Aircraft Ground Handlers and Airport Operations Staff. The business also supports Administrative staff in all areas such as Finance and Human Resources, Customer Services Professionals and the Airport Management Team.

Our total gross payroll is approximately £2,350,000 per annum. The number of people employed at the airport will increase as growth occurs and operations intensify. The following graph shows the general trend between airport passenger numbers and staff employment observed at other UK airports.

Table 1 & Chart 1: Breakdown of existing full time direct employment at KIA

Department	Employees
Air Traffic Control	14
Engineering	7
Airfield Operations	6
Customer Services	2
Management / Administration	3
Fire Service	21
Aircraft Handling	14
Fuel Services	5
Motor Transport	2
Security	14



People are also indirectly employed at our airport. We currently contract services from approximately 120, mostly local, companies. Ten of these are aviation specific and the remainder include services such as coach and taxi firms, general maintenance supplies, administrative and information technology support and accommodation.

We lease land within the airport to both aviation and non-aviation related businesses. The names of these companies and the number of full time and part time employees are provided in table 2. There are some companies that operate at our airport with no full time staff based on site.

A number of these aviation businesses rely on our airport to operate. As the airport grows these businesses may also wish to expand to take advantage of the new opportunities that exist. Other aviation related companies might also wish to establish themselves at our airport.

These companies are likely to employ people who live locally and will potentially offer a range of semi and skilled employment opportunities.

Further employment opportunities at our airport could contribute towards reducing the unemployment rates within East Kent and Thanet.

Table 2: Companies at our airport

Company name	FTE	PTE
Brockmans Travel	3	0
Avman Aircraft Engineering	15	0
HM Revenue and Customs	4	0
RAF History Museum	20*	0
Snax Group	2	1
Special Branch Police	1	0
Spitfire and Hurricane Museum	4	2
T G Aviation Ltd	12	0
Polar Helicopters	2	0
Church Communities	0	0
Kent Ambulance	0	0
Met Office	0	0
Sky Charter UK Ltd	0	0
Taft International Transport	0	0
TOTAL	**79**	**3**

(* voluntary)

Indirect, off-site businesses, such as haulage companies, taxi firms and bus / coach companies will benefit as demand for their services increases in line with forecast passenger and freight growth.

As demand for these services further increases, local employment opportunities will become available and people will move to the area. A significant influx of people will support services and facilities within the nearby settlement areas.

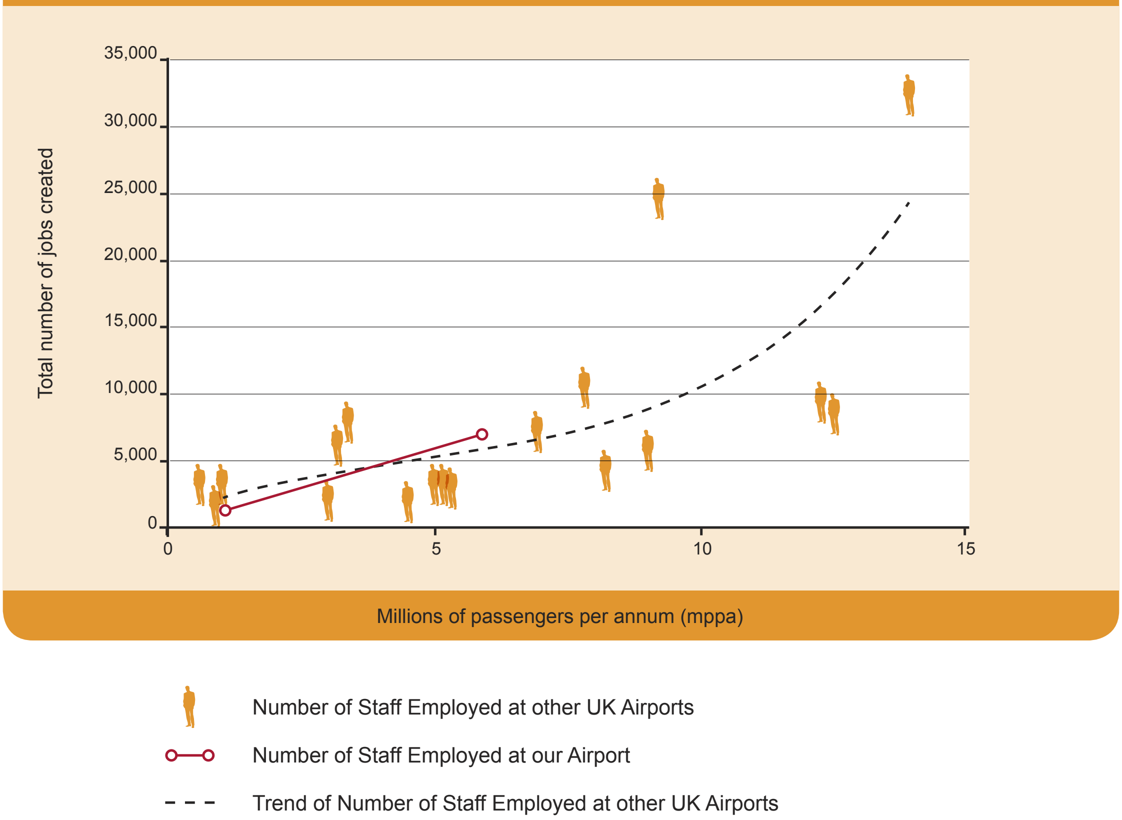
Contribution to the Local Economy

We currently pay typical business rates to the council to operate our airport. These rates contribute towards the cost of local authority services such as the police and fire service.

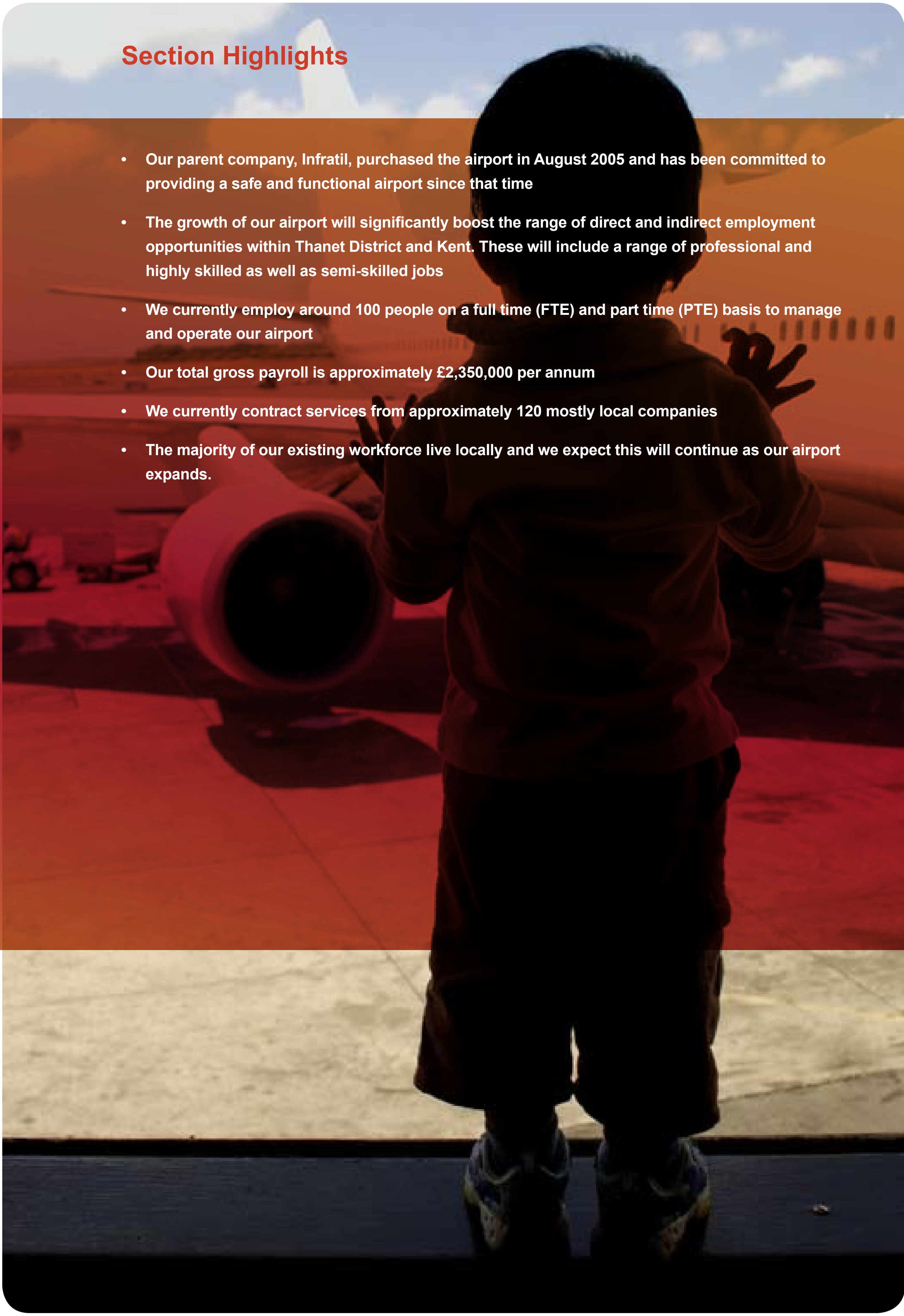
Business rates are calculated in terms of a rateable value. This value is based on factors such as the size of the premises and how they are used. As throughput at our airport grows and the size of our airport facilities increase, we expect to pay higher business rates. These payments contribute towards the provision of essential services within Thanet.

Our airport contributes towards the local economy in terms of Gross Value Added (GVA) [20]. Each business that is directly and indirectly employed by our airport also contributes in terms of GVA. As activity at our airport increases the GVA contribution will also increase.

Number of passengers vs number of jobs created 2002–2030



20 GVA measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom.



Section Highlights

- Our parent company, Infratil, purchased the airport in August 2005 and has been committed to providing a safe and functional airport since that time
- The growth of our airport will significantly boost the range of direct and indirect employment opportunities within Thanet District and Kent. These will include a range of professional and highly skilled as well as semi-skilled jobs
- We currently employ around 100 people on a full time (FTE) and part time (PTE) basis to manage and operate our airport
- Our total gross payroll is approximately £2,350,000 per annum
- We currently contract services from approximately 120 mostly local companies
- The majority of our existing workforce live locally and we expect this will continue as our airport expands.

4. Our Vision for Growth

Our vision for our airport is to develop passenger and freight throughput and to establish the airport as an important regional transport hub within the South East of the UK.

We envisage that the growth of our airport will develop wider economic growth within East Kent and Kent, acting as a key transport hub to destinations across the UK and Europe.

Growth will occur in a planned and environmentally considerate manner and will take into consideration the views of the surrounding community and key stakeholders and decision makers. The Master Plan represents the likely future of the airport having taken the relevant risks and opportunities into account.

This Master Plan seeks to establish the framework for growth at our airport and a number of planning applications will be submitted in due course.

Our Passenger Growth Vision

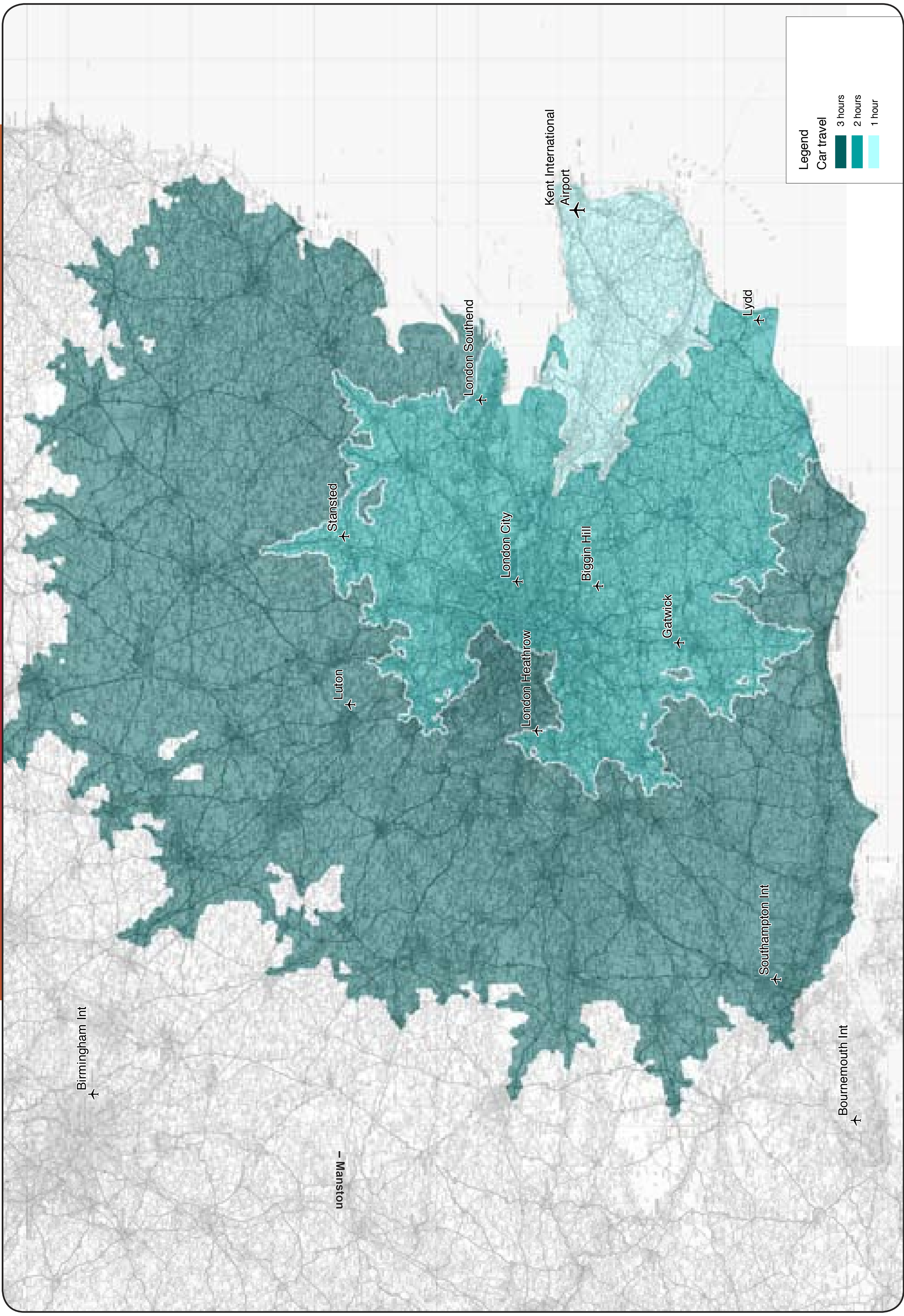
Kent, the most populous county in the UK with 1.4 million inhabitants, does not currently have an airport with regular scheduled passenger services.

Our vision is for our airport to have regular services linking it to key business and leisure markets. A network of services to key destinations will stimulate the growth of Kent businesses, bring tourists directly into the county and enhance the quality of life of residents by providing more convenient connections for business, holidays and for visiting friends and family elsewhere.

Our airport has not been successful to date in attracting airlines to offer year round scheduled services. We have considered, however, the following factors in forming the view that the growth indicated in this Master Plan is realistic and achievable:

- The catchment for our airport is large;
- People within out catchment travel regularly using other airports in the South East;
- The South East has insufficient capacity to accommodate predicted growth over the forecast period;
- Our airport will provide an increasingly attractive alternative for airlines and passengers as congestion increases;
- The predicted growth is similar to demonstrated patterns at other airports serving similar size regions; and
- Although EU Jet was commercially unsuccessful, it provided valuable insight into the potential of the market.

Plan 3 : Manston Airport Catchment Area Plan



Based upon the 2007 Ordnance Survey 1:250000 scale raster map with the permission of the Ordnance Survey on behalf of Her Majesty's Stationery Office, © Crown copyright. Terence O'Rourke Ltd. Licence No. AL100017826.

Catchment Area

The catchment area is the zone or region where an airport's passengers originate, or terminate their journey.

The total catchment area for our airport is based upon an approximate two hour travel time to the airport by car or train. The resultant area includes parts of London, Essex, Hertfordshire and other parts of the South East. It incorporates Gatwick and Stansted airports.

Travel times to our airport either by car or train have been categorised into 30, 60 and 120 minute sectors. Within the 60 minute sector, the catchment area for our airport is broadly the population of Kent. Between 60 and 120 minutes, it expands to cover the South East and north London, which includes Gatwick and Stansted airports.

Approximately 1.3 million people live within a one hour travel zone (car and train) of our airport (Public Census 2001). A further eight million people live within the two hour travel zone, which includes London, Medway, East Sussex and Essex. This would increase to 17.3 million people if London and large parts of the South East were included.

On balance a reasonable catchment figure is deemed to be approximately 9 million people. Plan 3 provides details of the catchment area with travelling times for car and train.

Current Travel Patterns

This very large catchment naturally must be considered in the context of the other airport options for the people within it. Currently, almost all of the potential demand for services from our airport is captured by the other airports in the South East.

CAA data [21] reveals that the people within our immediate catchment made 3.4 million flights in 2006. Not surprisingly, the majority of these flights were taken using Gatwick Airport, followed by Heathrow and Stansted. This data does not capture the demand from inbound visitors whose intended destination was Kent but who entered the UK through other airports, although a similar pattern is likely.

Extrapolating from this data and using the assumption that propensity to travel is similar for people within our immediate and wider catchments, it is likely that around 20 million flights would have been taken during 2006 from residents of our wider catchment. Given that the major South East airports have total traffic of around 136 mppa [22], this number for the wider catchment appears realistic.

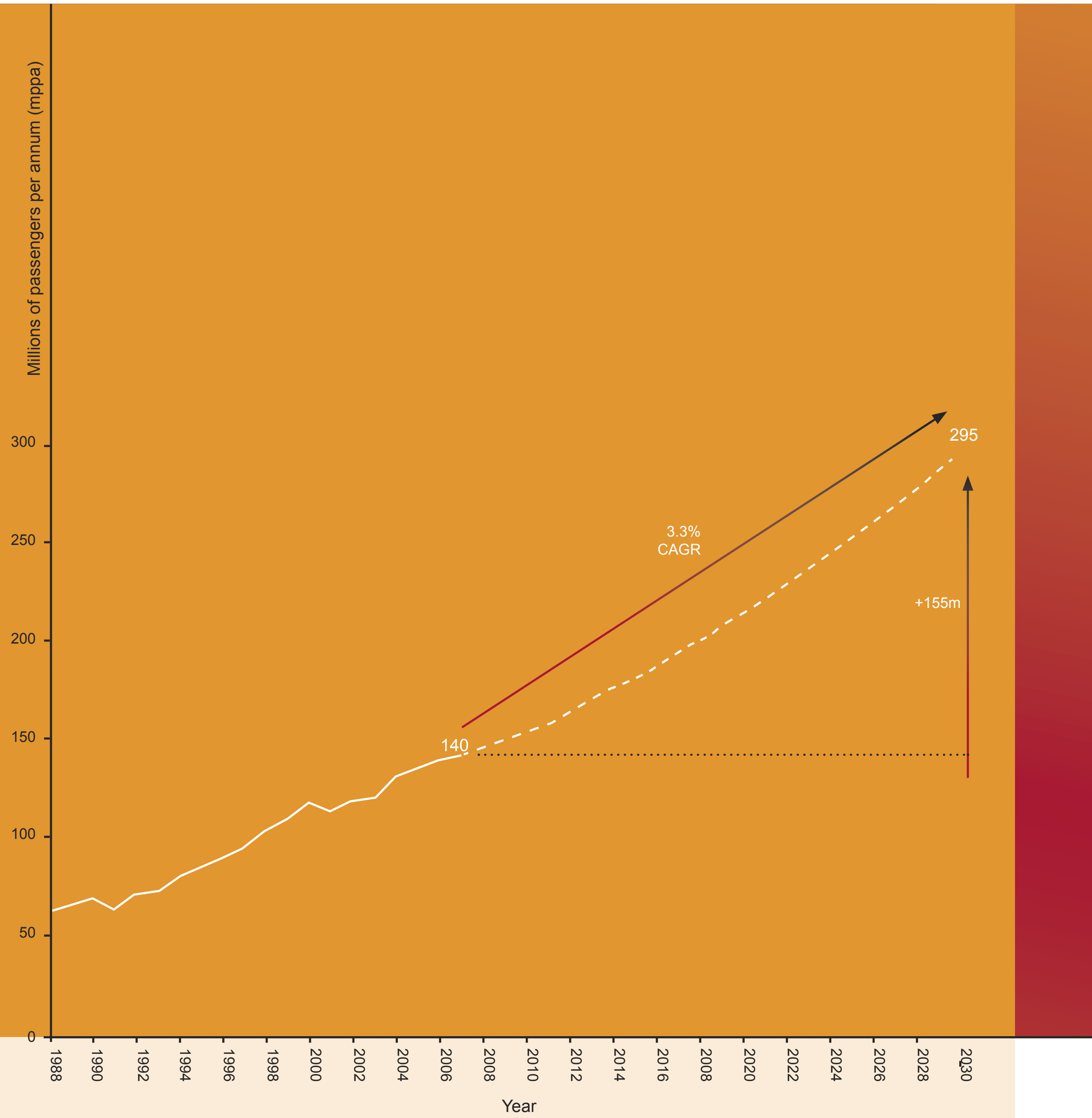
As our airport will never realistically duplicate every destination offered from all South East airports, the ability to draw travellers to our airport has some constraints.

It is clear, however, that travel patterns are relatively strongly concentrated around 20 to 30 destinations, and leisure destinations are often substitutable, so realistic potential to

21 CAA Passenger Survey (2006)

22 CAA Summary of Activity at UK Airports 2006.
Heathrow 67 mppa, Gatwick 34 mppa, Stansted 24 mppa, Luton 9 mppa, London City 2 mppa.

Historic Passenger Volumes and Forecast Demand at London Airports : 1988-2030



Note 1: London Airports defined as LHR, LGW, STN, LTN, LCY. Does not include London market demand captured by other regional airports such as Southampton (which is forecast to grow from 2 mppa to 6 mppa by 2030).

Note 2: Forecast based on DfT 2003 White Paper unconstrained demand forecast for London, adjusted for DfT's 2007 updated UK forecast

Note 3: CAGR – Compound Annual Growth Rate

Source: UK CAA (historical); UK DfT (forecasts) compete remains strong with a modest network. Analysis of flights taken from people within our catchment indicates that the most popular domestic routes are; Edinburgh, Glasgow, Belfast, Newcastle and Manchester. Favoured European leisure destinations are; Dublin, Alicante, Malaga, Palma and Tenerife [23].

Capacity Constraints at other Airports

Using DfT forecast growth rates of 3.3% per annum [24], demand for airport services in the South East region will increase to around 295 million annual passenger journeys by 2030. This is shown in the graph on the following page.

Growth to date has largely been accommodated by the five London airports; Heathrow, Gatwick, Stansted, Luton and London City.

However, this increase of over 150 million passengers on current volumes appears unlikely to be able to be accommodated by current airport infrastructure expansion plans [25].

Plans exist for expansion at a number of South East airports, including potential new runways at Heathrow and Stansted.

Gatwick, however, has an agreement with the West Sussex County Council not to construct a second runway at its airport before 2019 [26].

This is reflected through policy T9 of the South East Plan and there is support to safeguard land for a possible new runway.

Gatwick currently provides most of the travel options for residents of Kent and the people in the close catchment of our airport. As it nears capacity, Gatwick's congestion will make our airport an even more attractive option for airlines and passengers.

Congestion creates costs (both financial and in terms of time) in many areas of a journey [27]:

- Surface access congestion may result in longer travel times to and from an airport (or uncertainty which requires people to allow more time in any event);
- Airport precinct congestion can cost time and, as capacity is often rationed using price, prices for convenient car parking and other travel options can increase;
- Terminal congestion can result in greater time taken for processes including check-in, security, boarding, border processes, baggage etc and also creates a less pleasant environment. Highly complex environments also create costs in terms of communications and transfers often leading to reliability issues such as lost baggage which create costs for airlines and passengers;
- Airfield congestion can create delays on aprons and taxiways, reducing on time performance and / or reducing aircraft utilisation and increasing fuel burn, crew costs etc; and
- Airspace congestion has similar impacts as airfield congestion, although fuel burn costs can be very material for aircraft holding in the air.

23 The CAA Passenger Survey (2006)
24 Extracted from the White Paper.
25 Extracted from the White Paper.
26 Gatwick Airport has noted in its Master Plan that it remains fully committed to the legal agreement precluding the construction of a second runway before August 2019.
27 Competition Commission BAA Airports Market Investigation – Preliminary Findings

The White Paper acknowledges that our airport has an important role to play in meeting local demand and contributing to wider regional economic development objectives. It recognises that the development of our airport will contribute towards the future airport capacity in the South East.

Comparable Airport Growth

As well as the issues of South East capacity, our airport has many of the characteristics of other regional airports that have experienced rapid growth in recent years. These airports, including Glasgow Prestwick, Liverpool, East Midlands, Beauvias, Girona and Bergamo, have grown strongly from the presence of airlines offering low cost point to point services. These airports also have large competitors nearby, but have been successful through offering value for money, attractive destinations and convenient services.

In the South East, Stansted and Luton Airports have sustained compound annual growth rates of 16% and 12%, respectively, over the last 10 years [28]. This has likely been the result of a combination of the growth in popularity of low cost services and the increasing capacity constraints of Heathrow and Gatwick airports.

The launch of EUJet from our airport in 2004 by the then owners of the airport and airline demonstrated a strong belief in the demand for services from the Kent population. Despite its failure on 29 July 2005, the brief existence of EUJet in many ways confirmed that demand exists for services from our airport.

With the benefit of hindsight, it is relatively easy to point out the mistakes made. Without wanting to appear critical of those involved, it is important to recognise the factors that contributed to the failure – as well as the positive response of the market – in order to plan for future sustainable growth.

Key weaknesses of the EUJet approach appear to have been:

- Aircraft size not right for target markets. 108 seat Fokker F100 jets were too large to apply to high frequency business-based routes such as Manchester, Edinburgh, Glasgow, Amsterdam and Belfast. They were also too small to deliver seat cost efficiency on longer leisure routes to Spain and Italy;
- Insufficient marketing to support new brand. Launching a new brand into a competitive market requires substantial marketing. EUJet did not appear to have sufficient financial resources to market strongly in both the local catchment and at each destination;
- Too much capacity too quickly. Given the unknown branding, launching immediately with 30 routes using 5 aircraft may have saturated a market that could have been grown over time; and
- Reputation for reliability. A number of service failures, and later rumours about financial strength, may have resulted in many people becoming wary about using the airline. Despite these apparently fundamental weaknesses, EUJet flew 402,000 passengers in its 9 months of existence. The 30 routes flown included the business routes mentioned above and popular leisure destinations such as Dublin, Zurich, Madrid, Prague and Salzburg.

28 CAA UK Airport Activity Summary 1997 – 2007

Our vision for passenger growth takes into account the learning's from EUJet. The forecasts in this Master Plan assume that the services will be provided by established airlines, with proven systems and reputations for reliability, matching the appropriate aircraft size to selected routes. Routes will be backed by marketing, potentially with a partnership of the airline, airport and local bodies at both ends of routes. Our forecasts assume that services will be phased in over a period of several seasons [29].

Forecast Methodology

Our vision for growth has looked separately at the forecasting for:

- Specific achievable development in the first eight years (2010-2018); and
- Growth rates over the medium to long term (2018 to 2033).

Given the factors discussed earlier in this section, including the current lack of scheduled services in Kent, congestion in the South East and comparable growth of other airports, the initial phase of growth does not lend itself to macro-economic forecasting methods. Because "top down" macro-economic methods are unsuitable, we have used detailed "bottom up" forecasting to estimate traffic growth over the initial eight-year period.

Once a critical mass of initial services is established, which is expected in the first eight years, a more general rate of growth can be logically applied. Accordingly, the forecasts include growth for the medium to long term consistent with macroeconomic air travel forecasts. Consistent with the guidance provided by the DfT for the preparation of Master Plans we have then focussed our planning on cumulative forecasts looking forward eight and 23 years (2018 and 2033).

Stepped changes in activity will occur as the capacity of other London airports is reached and traffic spills into surrounding airports like Manston. This feature of the South East market is likely to result in periods of sudden growth when the percentage increase in passenger and freight movements per annum at our airport exceeds the rate of growth of the general market.

First Eight Years

As airport operators we have gained experience by observing the growth patterns of other developing airports. In line with historical development at other UK airports such as Glasgow Prestwick, Luton and East Midlands, we recognise that our airport will experience step changes in both passenger and freight traffic.

We have based the forecast scenario on the relationships and knowledge that we have developed with airlines, overlaid with the experiences of similar markets and the short term affects of the global economic downturn. We believe that over the long-term time horizon growth will return and stabilise to levels consistent with the long term forecasts. It is realistic to assume that airlines will begin operating daily scheduled services from our airport by 2014 or sooner.

29 Airlines operate a winter and summer schedule to cater for seasonal variations in travel preferences. Changes to capacity are usually aligned with the switchover between schedules.

The eight year forecasts focus specifically on services provided by a regional airline [30] and a low cost airline [31]. These airlines will significantly enhance the accessibility of destinations across the UK and Europe and are likely to appeal to a large proportion of people within our catchment area.

We anticipate that initial growth at our airport will come in steps. Initially, passenger flights will be offered by aircraft based at other airports and operating single daily return flights to various destinations from our airport.

As the market grows, additional services will be offered and aircraft operators will look to base aircraft and crews at our airport. Our airport is not the first to predict growth based on this model and many regional UK and mainland Europe low cost airports have developed in this way.

The Master Plan is a predictive document containing forecasts. Details of the flight numbers and destinations will not be finalised until they are due to commence. The forecasts have been based upon growth patterns experienced at other airports in similar circumstances combined with local catchment analysis.

Low cost passenger airlines tend to operate Code C aircraft carrying between 150 and 189 passengers. Typical aircraft in use are Airbus A320 and Boeing B737. Q300, Q400 and ATR 42 and 72 aircraft types (approximately 50-70 seats) are likely to be used by the regional airline operators serving domestic, common travel and shorter European destinations.

Medium to Long Term Growth

It is very difficult to specifically forecast medium to long term growth for our airport. As well as the usual general economic growth factors, capacity outcomes at other airports as well as road and rail investment are likely to have a material impact on actual outcomes. The market response to the initial five years of development is also highly relevant. The forecasts reflect the impact that the global economic downturn will have on activity at the airport for the next 2-4 years. It is not anticipated that the long term growth aspirations will be affected by the short term economic conditions.

In the absence of any more accurate alternatives, we have applied a growth rate of 5% to the medium to long term in line with average rates of growth previously experienced. The demand for air travel in the UK grew at 5% per annum over the 10 years to 2007 [32]. This organic growth was the result of general population growth and additionally increases in Gross Domestic Product per capita lead to a larger proportion of the population having access to air travel.

These macroeconomic trends are expected to prevail over the long term and throughout the Master Planning period.

Other Factors

The potential for improved surface access to the wider catchment is likely to be an important factor in future growth rates. Road links to our airport are already very good

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30 An operator utilising 50 – 90 seat aircraft well suited to serving smaller markets with convenient high frequency services.

31 A low-cost carrier controls costs by employing a modern fleet, utilising internet booking facilities and minimising aircraft ground time. Savings are passed on to passengers through competitive airfares.

32 CAA Passenger Statistics, 1997 to 2007 Annual Growth Rate 5.005%

and will improve further with plans referred to in this Master Plan. The potential for further development of rail links using the base of the currently planned High Speed 1 rail extension to Ramsgate, could materially improve journey times for residents in the wider catchment and for inbound travellers looking for connections to London and elsewhere in the UK.

Our short-term forecasts have been prepared taking into consideration:

- Market analysis of routes served by other airports;
- Postcode analysis estimating current catchment leakage;
- Charter traffic – looking at the current frequency and destinations operated by the existing charter airlines using our airport;
- Likely routes for low cost and regional airline operations;
- Additional opportunities for leisure based seasonal travel;
- Eastern European routes – destinations and flight times based on frequency and number of non-based flights at the airport which do not conflict with the low cost destinations provided;
- Freight forecasts based on current trends and the likelihood of capturing freight services currently operating at congested airports.

In the longer term as the connectivity of the airport to the broader catchment improves, we anticipate the introduction of long haul flights serving destinations such as New York and Honk Kong. These flights will utilise larger aircraft such as the Boeing 777 or 787 variants or Airbus 330 / 340 / 350 airliners.

Passenger Forecasts

In table 3 annual passenger figures developed for our airport have been shown for 2018 and 2033. In 2018 throughput is forecast to be 2.2 mppa. By 2033 this will increase to 4.7 mppa. All figures have been rounded to the nearest thousand.

Table 3: Annual Passengers

Year	Annual passengers
2010	< 50,000
2011	50,000-100,000
2012	206,000
2013	295,000
2014	527,000
2015	1,268,000
2018	2,286,000
2033	4,752,000

Freight Movement Forecasts

Our airport currently processes around 32,000 tonnes of freight per year. We expect freight movements to remain fairly constant, with tonnage increasing gradually each year (based on a high case forecast this is assumed to be 6%) combined with step changes as existing operators at other airports relocate to our airport to access available capacity. By 2018 freight movements are expected to have reached approximately 167,000 tonnes per annum. In 2033 they are forecast to total approximately 401,000 tonnes per annum. Table 4 provides further details of the forecast figures.

Table 4: Total Forecast Annual Tonnages

Year	Annual Freight Tonnage
2010	31,600
2011	45,200
2012	57,300
2013	62,500
2014	107,000
2015	138,400
2018	167,500
2033	401,200

Other Aircraft Movements

We expect other movements, namely general aviation, or otherwise, to increase gradually from the current level of 17,000 movements annually.

Infrastructure Demands

The growth of passenger and freight operators using our airport will create demand on various components of the airport's infrastructure – runways, aprons, terminals, car parks, as well as the land transport infrastructure supporting the airport.

Air Traffic Movements

As the passenger numbers and freight tonnages increase, there will be an increase from existing levels as shown in table 5.

Table 5: Total Forecast Annual Traffic Movements

Category	2010	2013	2018	2033
Passenger	352	1,003	20,325	31,509
Freight	473	977	2,619	6,251
Other	17,259	20,001	23,195	36,137
TOTAL	**18,084**	**21,488**	**46,139**	**73,897**

Average daily movement figures have been provided for our airport in Table 6.

Table 6: Average Daily Movements

Category	2010	2013	2018	2033
Passenger	1	3	56	97
Freight	2	3	8	18
Other	48	55	64	72
TOTAL	**51**	**61**	**128**	**187**

All figures are based on 365 days a year flying and have been rounded up to the nearest whole number.

Our forecasts assume that the domestic market will grow much more slowly than the European and long haul markets. This is due primarily to the UK Government's Air Passenger Duty and rail connectivity improvements across the UK.

Stand Demand Growth

Peak demand for aircraft parking will be expected to occur in the early morning, around lunchtime and in the late evening.

We expect these aircraft to be predominantly Code C (Boeing 737 or equivalent) aircraft and smaller turbo prop aircraft. When long-haul traffic is introduced larger Code D and E aircraft will frequent the airport (up to Boeing 747 aircraft type). Forecast passenger and freight stand demand during the Master Plan period is provided in table 7.

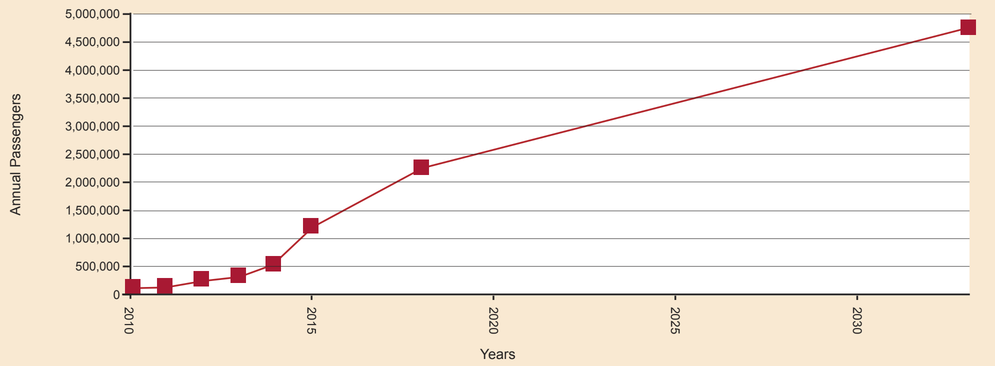
Table 7: Passenger and Freight Aircraft Stand Demand

Year	2010	2018	2033
No. of passenger stands	1	10	14
No. of freighter stands	2	4	7

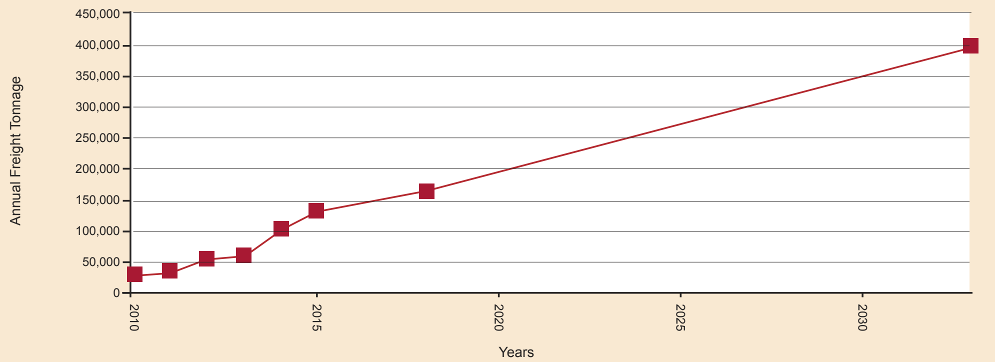
All figures have been rounded up to the nearest whole number.

A graphical representation of the airport activity forecasts is shown below.

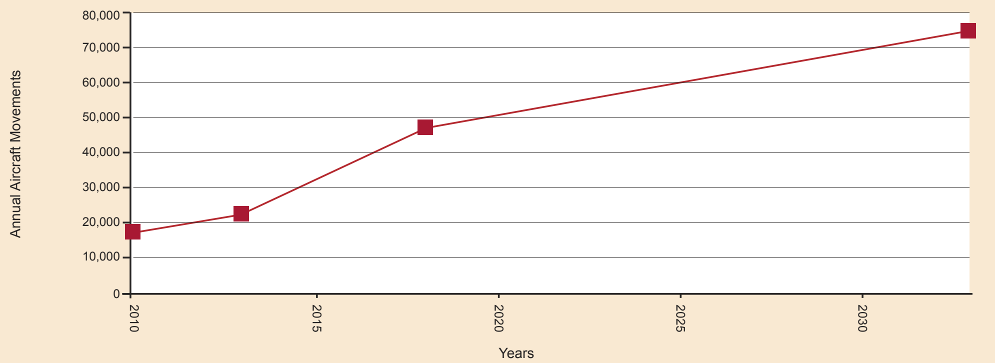
Graph 1 – Annual Passengers



Graph 2 – Annual Freight Tonnage



Graph 3 – Annual Aircraft Movements



Section Highlights

- Our vision is for Kent International Airport to become an important regional transport hub within South East England. The required development will occur gradually as the airport experiences increases in both passenger and freight business
- Approximately nine million people live within a two hour travel zone from our airport and could choose to fly from our airport on a regular basis
- Our airport functions as a transport gateway. As our airport grows the range of services we offer and destinations we service will expand. The improvements in connectivity will attract businesses to locate in the local area and take advantage of the transport infrastructure
- Flights from our airport will service domestic, Irish, European and some long haul destinations by the end of the Master Plan period. Our forecasts are focused primarily on the low cost and regional airline models
- Aircraft using our airport will typically include the Airbus A320, Boeing B737 and the Bombardier Q400. Larger aircraft will be used for long haul passenger and freight flights
- By 2011 up to 100,000 passengers will be accommodated at our airport. This is predicted to rise to approximately 2.2 mppa by 2018 and 4.7 mppa by 2033. Freight movements are forecast to exceed 160,000 tonnes per annum by 2018 and 400,000 tonnes per annum by 2033. Other general aircraft movements (those that are not associated with passengers or freight) are anticipated to increase gradually
- Business, employment and tourism opportunities will act as a catalyst for regeneration. Initial regenerative effects are likely to be focused in the Ramsgate and Margate area, as the two nearest major settlements. As activity intensifies, these effects will spread outwards to more peripheral locations within Kent.

5. Our Plans to Achieve Growth

We are committed to the development of our airport and associated infrastructure to meet the demand for air travel within South East England and the UK over the coming years.

This development will be in line with national policy and we will prepare and develop our airport in an environmentally sustainable manner.

In this section we have set out the changes required at our airport for the period up to 2018 and in principle up to 2033 to meet our growth projections. Table 9 provides a summary of the required infrastructure and the studies that will accompany planning applications up to 2018. This is consistent with the approach to airport master planning set out by the White Paper. What we have established is that we can accommodate our development requirements up to 2033 on land under our control with some small acquisitions for development.

The key land use types shown on the following pages are:

- ***Airfield***
- ***Terminal***
- ***Apron***
- ***Freight***
- ***Fuel facilities***
- ***Surface access***
- ***Car parking***
- ***Other aviation uses / development area***

The requirements for these areas have been assessed and developed as part of this Master Plan.

The forecast passenger throughput for our airport in 2018 is 2.2 mppa, rising to 4.7 mppa in 2033. This is consistent with the positive growth framework set out by the White Paper and the development plan (see Section 2 of this Master Plan for further information). We have developed our 2018 and 2033 Master Plan on the basis of 2.2 mppa and 4.7 mppa accordingly to ensure that appropriate measures are in place for land use and impacts are appropriately assessed.

Key issues for this include developing a land use plan for additional aircraft stands and the relationship with freight and passenger terminal expansion and related surface access. The 2018 and 2033 Master Plan scenarios are shown in plans 4 and 5 on pages 58 and 59 and discussion follows.

Our Development to 2018

Passenger Terminal

The existing passenger facilities are too small for our ultimate growth needs and are not ideally located to facilitate the effective reorganisation and growth of our airport. We intend to develop a new passenger terminal to meet the forecast 2018 passenger growth levels. This will enable us to increase passenger throughput, whilst minimising the cost and impact on the community and maximising the efficiency of our infrastructure.

Our terminal currently has six check-in desks and three passenger departure gates. Up to around 1 mppa, the existing passenger terminal will be extended modestly to accommodate the gradual increase in passenger numbers and better establish passenger operations at our airport.

It is then planned that a new passenger terminal will be constructed to accommodate up to 3 mppa. The new terminal is likely to be approximately 24,000m^2 by 2018.

Any new airport terminal is a system of interconnected operating elements, including:

- Landside Departures – check-in, baggage facilities, waiting areas, retail;
- Aviation Security;
- Airside Departures – seating, retail;
- Departure Gates;
- Arrival Gates;
- Immigration and Border Control;
- Baggage reclaim and Customs;
- Arrival Hall – seating, retail; and
- Offices and storage for airport operations and other services.

The new centrally located passenger terminal will provide adequate space for people waiting to board aircraft, enhanced retail outlets and will generally facilitate the smooth operation of our airport. This will reduce passenger congestion and ensure that passengers have a pleasant experience when using our airport.

The terminal design will include technologies and advancements in operational processes which can increase and enhance the efficiencies of the terminal facilities, provide space for improvements in operational processes and maximise capacity for the expected growth in passenger numbers.

The phased growth of the passenger terminal is illustrated in plan 6 on page 60.

Airfield Improvements

Runway and Taxiway system

We have safeguarded land for an extension to our runway. This may be necessary in the event that demand for longer range maximum payload flights requires it.

An improved parallel taxiway has been indicated on the 2018 and 2033 plans to safeguard land for its use. A full length parallel taxiway is likely to be constructed once sufficient demand exists. This is anticipated to be in the period beyond 2033.

The historic use as a military airfield means there are parts of the airfield taxiway infrastructure which will require modification for passenger aircraft use. These modifications will be carried out as demand requires them to minimise delay to aircraft manoeuvring on the ground.

Aprons

Aprons (the term used to describe aircraft parking areas) are currently located adjacent to the passenger and freight facilities.
In recent years our passenger apron underwent significant improvements and it is currently used for both freight and passenger activities. Our Master Plan has separate areas for dedicated freight and passenger activities so that by 2018 the freight and passenger aprons will be enlarged to accommodate the anticipated increase in passenger and freight throughput.

Fuel Facility

As throughput at the airport increases it will be necessary to improve the fuel facilities.

Land immediately to the north east of the runway has been identified as a potential location for a bulk fuel installation with capacity to accommodate forecast growth up to, and beyond, 2033.

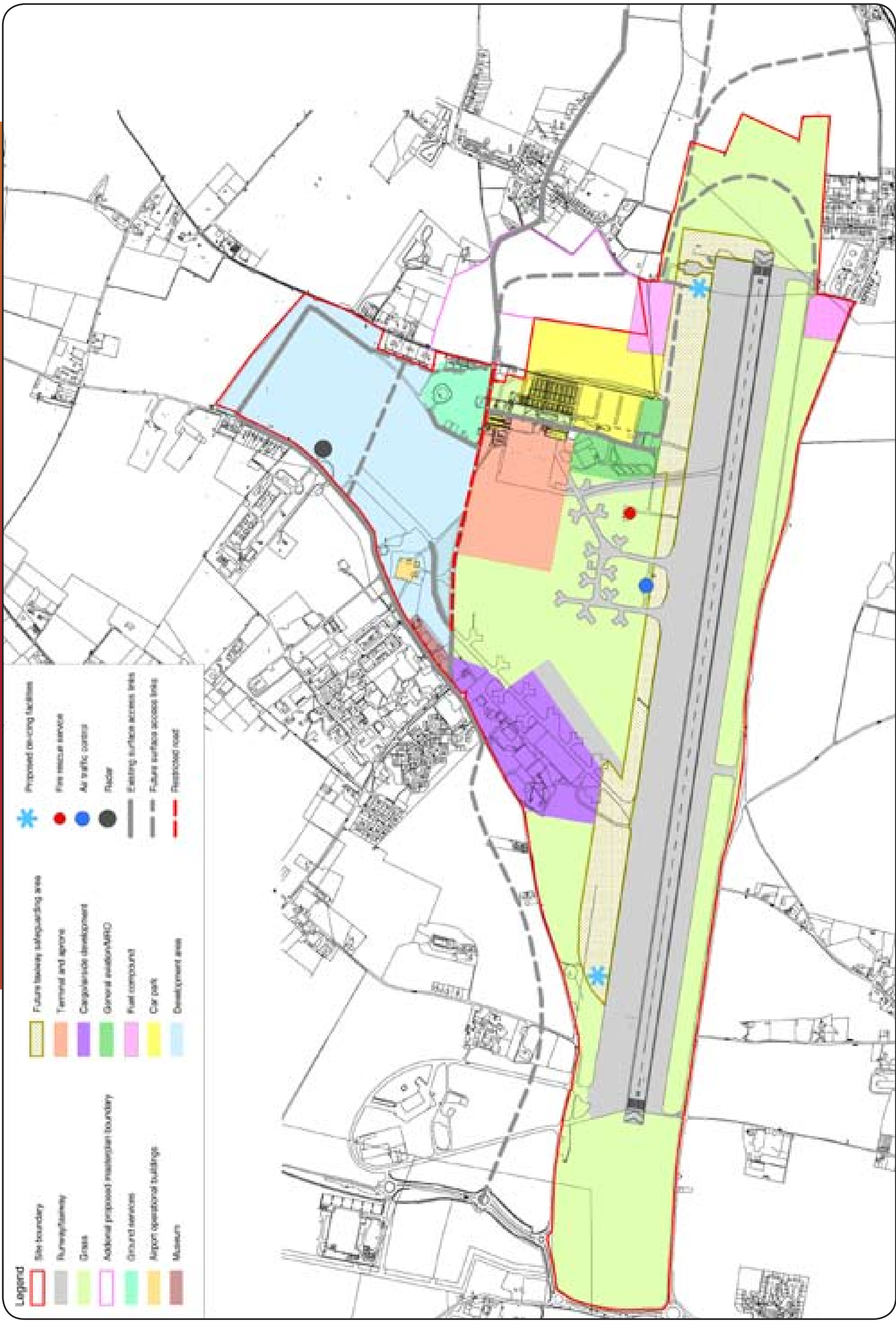
A second option being considered is to investigate developing a compound on the south side of our airport. This site would be adjacent to the end of the runway and the village of Cliffs End.

Both of these locations benefit from airside and landside access and we will investigate these options to determine which fuel storage location is the most feasible and appropriate.

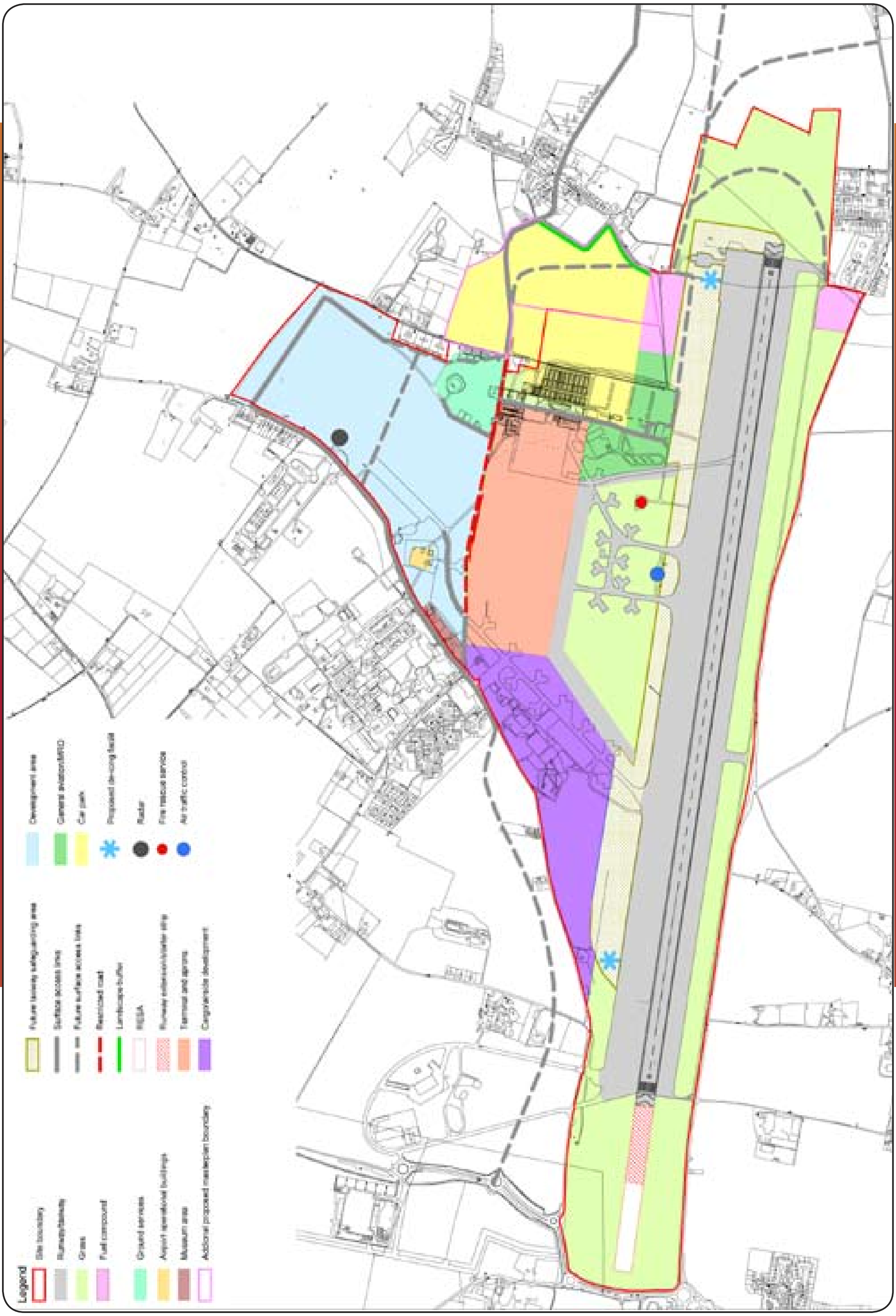
All future fuel storage facilities will conform to the applicable spill containment provisions and will be built in accordance with the relevant regulations.

Car Parking

Efficient and safe access is crucial for the future growth and development of the airport. Government policy encourages the integration of transport systems and seeks to direct new development to sustainable locations that are well served by public transport. Airports are identified as major opportunities to deliver these objectives. Airport operators, with the support of their partners, are expected to take the lead in improving the quality of surface transport access through encouraging use of more

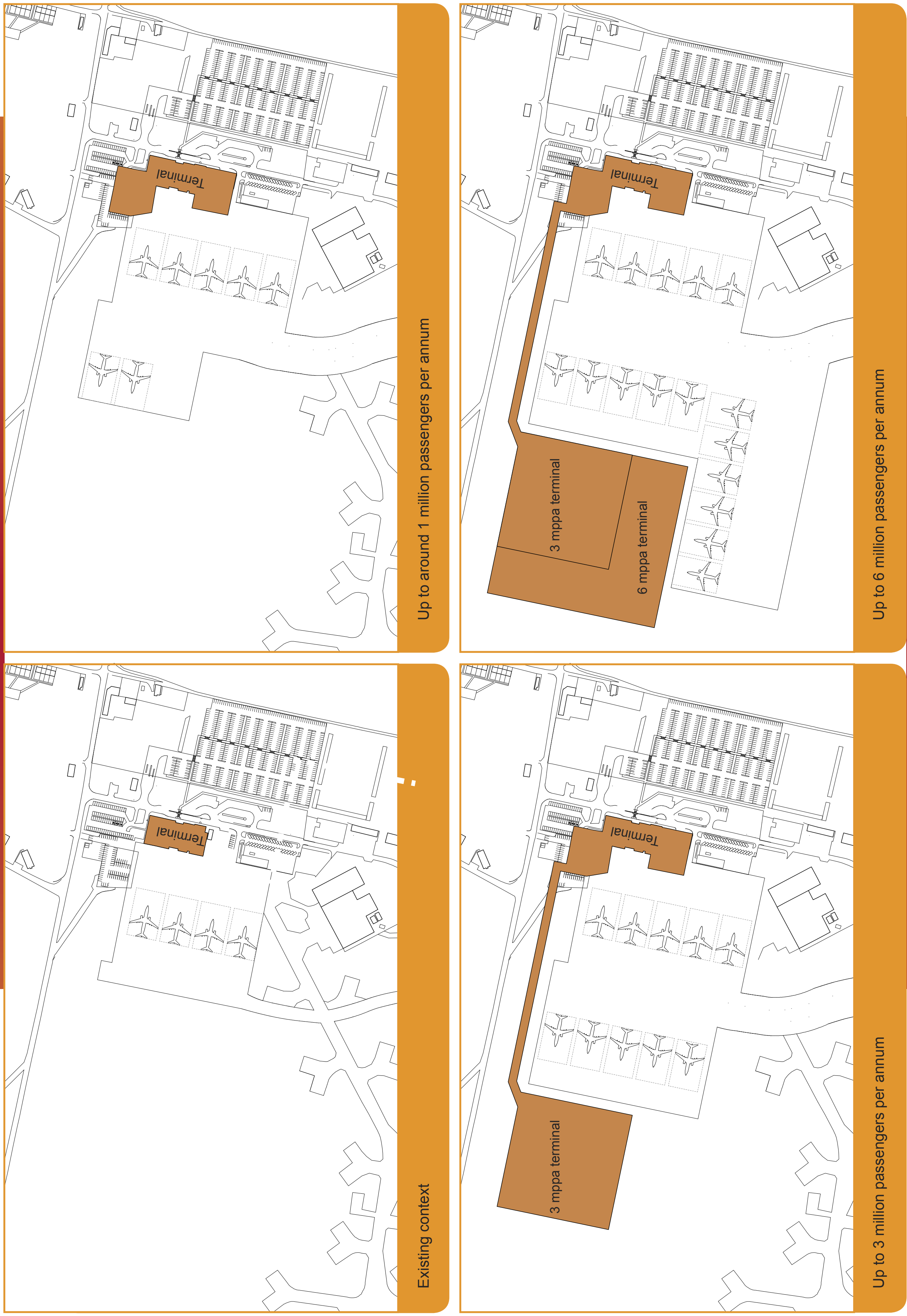


Plan 4 : Manston Airport 2018 Scenario



Plan 5 : Manston Airport 2033 Scenario

Plan 6 : Phasing of Terminal Development



sustainable modes of transport. The key issue is to manage the growth in road traffic associated with the airport's development.

There are currently 1,100 car parking spaces available at our airport (with planning permission for a further 1,000). The spaces were provided when EUJet began operating at the airport and were fully utilised during the peak of EUJet's operations. Despite this, and the measures in place to encourage alternative means of transport to the airport, this level of car parking provision is not sufficient to meet the forecast growth levels at our airport (see table 8). In 2018 additional land for car parking will be provided to the south and east of the existing passenger terminal. Short-term premium parking will be provided on land to the north of the new terminal.

A section of this land will be used as a taxi rank / bus area. As a general rule, approximately 1,400 car parking spaces are required per million passengers at an airport.

Table 8: Car Parking Spaces Required During the Master Plan Period

Year	Passengers per annum	Total no. of spaces
Existing	<10,000	1,100
2010	<50,000	1210
2011	50,000-100,000	1350
2012	206,000	1640
2013	295,000	2053
2018	2,286,000	3200
2033	4,752,000	6653

Freight Handling Facilities

The airport currently handles around 32,000 tonnes of freight per year. The aircraft types used are generally dedicated Boeing 747 and A300 freighter aircraft. Total freight tonnage handled at the airport is expected to grow in steps as our airport attracts services currently using increasingly congested alternate airports. We also predict a high case underlying growth rate of between 4% to 6% over the long term. This growth will equate to approximately 167,000 tonnes of freight per annum in 2018.

A key component of this forecast figure arises from the ability of our airport to receive freight dislocated from congested London airports. As the freight operations demand further facilities, additional freight handling areas will be developed at the airport. Freight facilities are currently located to the north west of the runway alongside the B2050. Development within this area will accommodate approximately the freight volumes anticipated in the Master Plan period.

Other Aviation Facilities

Land to the south of the existing passenger terminal will be developed for general aviation / corporate jet facilities. Subject to demand, the existing terminal could potentially be used as an executive terminal / fixed base operations (FBO) facility once the new passenger terminal is operational.

Ground services operations will have a dedicated area for maintenance, ground handling and catering facilities within the former fuel compound area to the north of the existing passenger terminal. This will be developed once the preferred fuel compound location enters service.

The proposed infrastructure for our airport and the triggers for its provision for the period to 2018 are summarised in table 9.

The precise timing of development is subject to influences outside of Kent International Airport's control, relating primarily to customer demand. The airport recognises the need to liaise with Thanet District Council and the East Kent Spatial Development Company to ensure that utility provisions at the airport are timed to meet the required standards.

Table 9: Infrastructure Summary to 2018

Volume / trigger	Required infrastructure	Studies to accompany applications
> 1mppa (passengers)	Extension to existing passenger terminal and associated works	Environmental impact assessment (EIA), traffic assessment (TA)
	Car park extension	
1mppa - 3mppa (passengers)	New passenger terminal (24,000m^2)	EIA, TA
	Additional car parking	
	Apron expansion and associated airfield works	
> 100,000 Tpa (freight)	Apron expansion, additional warehouse space	EIA
> 200,000 Tpa (freight)	Expansion to cargo handling area and apron Upgrade fuel facility Additional warehouse space Associated airfield works	EIA
Increased Maintenance Repair Overhaul / General Aviation	Hangar developments	Planning applications with accompanying studies dependant on scale
Employment generating development	Commercial buildings and hangars	Planning applications with accompanying studies dependant on scale
> 1000 ATMs	Airport Surface Access Strategy and Air Transport Forum	

Costs will vary according to construction timing, design and scale.

Current approximate costs at time of writing:

Terminal development: £2000 - £2500 / sqm
Apron expansion: £200 - £250 / sqm
Warehouse / Hangar space: £550 - £750/sqm

Specific developments may be required before the volumes listed depending on aircraft sizes, schedules and the timing of peak operations.

Proposals Beyond 2018

Passenger Terminal

In the period 2018 - 2033 the phased extension of the passenger terminal will continue in order to accommodate up to 6 mppa (see plan 6). By 2033 we anticipate that the total floor space of the passenger terminal will be 48,000m^2. New apron space will be provided adjacent to the terminal building.

The existing terminal may continue to be used for passenger terminal activities or as an executive jet and general aviation type core function centre.

Runway & Taxiway System

A runway extension has been provided for in this Master Plan. We have identified that our airport could benefit from a lengthened runway and have set aside land on our Master Plan drawings for its future construction. Construction timing will depend on future customer demand. The land safeguarded is sufficient to include a runway extension, starter strip and runway end safety area (RESA) requirements. We have safeguarded land for future taxiways to enable their development when sufficient demand exists.

Fuel Facility

Between 2018 and 2033 subject to demand and outcomes of further assessment work, one, or both of the fuel facilities may be developed.

Car Parking

In the latter part of the Master Plan period we anticipate that additional car park spaces will be required (see table 8). Extending the parking to the north of the new passenger terminal and to the east and north east of the existing passenger terminal would best provide these spaces.

Freight Facilities

Between 2018 and 2033 freight operations are forecast to reach 401,000 tonnes per annum.

The freight operators using our airport value the ability to load freight directly from the aircraft onto trucks in a secure airside environment. Further aircraft stands will be developed adjacent to the freight area and these stands will be designed to allow continuous tail to truck operations across all of the stands. Potential exists to construct warehouse / stillage areas and truck staging sites as required.

Freight aprons that allow Head of Stand (HOS) and Tail of Stand (TOS) access to aircraft have been allowed for in the Master Plan. These will enable two way access and HGV parking within the freight handling area.

Other Aviation Facilities

Our strategy for activities in the period 2018-2033 is similar to that for the next ten years. The General Aviation / Fixed Base Operators operations will continue to develop to the south of the existing passenger terminal and the existing terminal will be used for General Aviation / Fixed Base Operators passengers as demand increases. Ground services operations will be developed within the former fuel compound once a suitable alternative location for the fuel facilities is created.

Achieving Ground Access Growth

If our airport is to deliver growth in the manner aspired to by the Master Plan there will need to be a corresponding growth in opportunities and capacity to access the airport. Such growth in access provision will need to be delivered in a way that encourages passengers, staff and visitors alike to adopt sustainable travel habits in travelling to and from the airport, whilst also recognising that the car will need to play a continuing role.

Beyond 2018 we will continue to assess the ground access requirements and consider proposals and options to enhance travel opportunities for both passengers and staff getting to and from our airport.

Surface Access Strategy

A Surface Access Strategy should detail the short and long term targets for increasing the proportion of sustainable journeys associated with the airport, the strategy for achieving these targets (including Travel Plans) and a system for implementing the strategy. In developing our Surface Access Strategy it will be necessary to understand the existing opportunities and constraints of accessing an airport and how these may be enhanced and new measures implemented to encourage a greater proportion of sustainable travel. Our Master Plan envisages a significant growth in passenger movements at the airport and will require the development of a Surface Access Strategy.

It is proposed that our Surface Access Strategy will be developed by an Airport Transport Forum comprising representatives from the airport, local authorities, transport providers and local business and community representatives. The Surface Access Strategy will be used to set out the manner in which transport issues raised by airport expansion will be addressed. Depending upon timing factors the surface access strategy will input to a Transport Assessment submitted in support of a planning application for expansion of the airport. Alternatively, the Transport Assessment will detail the manner in which a surface access strategy will be delivered and its broad scope and content.

Mode Share

Our Master Plan looks forward to a scenario when approximately 2.2 million passengers pass through the airport in 2018 and around 4.7 mppa in 2033.

This number of people will require a range of travel mode options and appropriate capacity to access the airport efficiently.

The proportion of passengers and airport employees using sustainable modes of transport at these forecast horizons will of course be dependent upon the level of service offered by walking, cycling and public transport networks. However, it is possible to consider the travel mode shares experience at other airports around the UK to inform the

Table 10: Percentage mode share information from the UK airports for 2006 passenger departures

	Luton**	**Stansted**	**Nottingham**	**Birmingham**	**Gatwick**	**Prestwick****
Passengers >	8.3 mppa*	2.37 mppa	4.7 mppa	9.1 mppa	34.1 mppa	2.5 mppa
Private Car	56.1	46.9	68.6	54.2	48.2	57.2
Hire Car	2.6	3.1	2.8	3.4	2.2	57.2
Taxi / Minicab	12.6	8.8	19.2	23.7	14.0	5.2
Rail	17.9	23.3	4.5	9.6	29.1	20.8
Bus / Coach	10.4	16.3	4.6	8.7	6.3	3.6
Other	0.4	1.5	0.4	0.4	0.3	0.7
Total	**100**	**100**	**100**	**100**	**100**	**100**

Table 11: Summary of mode share that may be aspired to by our airport based upon the average experience at Luton, Nottinghham and Birmingham Airports

Travel Mode	**Mode Share Estimate %**
Private Car	59
Hire Car	3
Taxi / Minicab	18
Rail	11
Bus / Coach	8
Other	1
Total	**100**

target setting process required for our airport. Whilst it is not possible at this stage to predict the likely mode share of travel to and from an expanded Kent International Airport, it is possible to make estimates based upon experience at other airports, and by assuming that the existing level of service offered by public transport will be appropriately upgraded. Table 11 provides a summary of the mode share that may be aspired to by our airport based upon the average experience at Luton, Nottingham East Midlands and Birmingham International Airports.

The CAA Passenger Surveys Report 2006 has been consulted to provide an understanding of travel mode share achieved at a selection of airports across England. Table 10 summarises percentage mode share information from a number of airports for 2006 passenger departures.

This table demonstrates that the private car is the favoured mode of transport for travelling to each airport and this would be expected. However, whilst this table summarises information with respect to a number of airports, this should be considered in the context of the individual airport circumstances and the transport offer available to employees and passengers.

For example, it is noted that Stansted and Gatwick airports show a high proportion of passengers arriving by rail as these airports have their own rail stations at the airport terminal. Luton and Nottingham airports provide a bus shuttle service between the nearest rail station and the airport and this need to transfer is reflected in the lower proportion of passengers arriving by rail.

Birmingham International Airport provides a dedicated shuttle between the city centre and the airport via the Air-Rail Link which is a free shuttle service operating every two minutes with a journey time of 90 seconds. This provision is an intermediate option between an onsite rail station and a bus shuttle link.

Up to around One Million Passengers

The existing terminal will accommodate growth for around 1 mppa with some small expansion works and it is proposed that the existing access route would continue to serve the airport up to this point with relatively modest highway upgrades.

We expect in the region of 1,800 vehicle movements (900 arriving and 900 departing) each day. Of these, we anticipate about 70 movements to occur during the morning peak hour and the same during the evening peak hour. A detailed analysis of traffic generation and impact will be undertaken when the appropriate phases of planning applications are submitted. Parking for the airport would be provided as already discussed.

It is expected that local highway upgrades would be required. These may include the following:

- Upgrade to the Mount Pleasant roundabout which may include enlargement of entry widths, flare lengths or conversion to a signal controlled gyratory;
- Upgrade to the Minster roundabout which may comprise local widening of entries;
- With respect to the Spitfire Corner junction, this may lend itself to conversion to signal control.

The form of network upgrade that would be required, and its funding, would need to be the subject of detailed consideration at an appropriate time.

Up to Three Million Passengers

As already discussed, on reaching around 1 mppa there is likely be a need to provide a new terminal to serve the next stage of passenger growth. At this stage access to the airport would need to be reconfigured and it is proposed to establish a new access route allowing passengers to access a new short term car park in front of the new terminal. The existing car park would become a long stay car park and staff car park.

We expect in the region of 5,400 vehicle movements (2,700 arriving and 2,700 departing) each day. Of these we anticipate about 200 movements to occur during the morning peak hour and the same during the evening peak hour. A detailed analysis of traffic generation and impact will be undertaken when the appropriate phases of planning applications are submitted.

Parking for the airport would be provided as already discussed.

At this stage we propose closing the B2050 to through traffic and restricting its use to airport and emergency vehicles only. A new through road will potentially be constructed through our northern land to provide access into our long stay car park, commercial developments and the village of Manston.

The access route would link with the existing B2190 Manston Road as a new junction. Additional parking would be provided to the east of the existing car park and this would be accessed from the north. There may be a requirement to upgrade the section of Manston Road between the new access route and the car park access.

In terms of offsite highway works further growth may require additional investment at Mount Pleasant roundabout and potentially traffic management schemes on local routes (within Manston village for example) to discourage their use by airport related traffic and encourage use of the new East Kent Access Road. Once again, the form of network upgrade that would be required, and its funding, would need to be the subject of detailed consideration at an appropriate time.

Up to Six Million Passengers

On reaching 3 mppa our Master Plan proposes a further enlargement of the terminal building to serve up to six million passengers. Access will continue from the Mount Pleasant roundabout and towards the Spitfire Corner junction.

At this junction through traffic and a proportion of airport traffic would continue north using Manston Road (which may be upgraded) before heading east through our Northern Lands and thereafter heading south to rejoin the B2050 Manston Road. A proportion of the airport traffic would turn east at Spitfire Corner and enter the short term parking provided in the Northern Lands. During this phase consideration would also be given to opening up a further access route from the east as a bus priority route to link either a new railway station or Ramsgate railway station to the airport. This would be the subject of future investigations, particularly with respect to land, topography and flight path conflict constraints.

We expect in the region of 10,800 vehicle movements (5,400 arriving and 5,400 departing) each day. Of these we anticipate about 400 movements to occur during the morning peak hour and the same during the evening peak hour. A detailed analysis of traffic generation and impact will be undertaken when the appropriate phases of planning applications are submitted.

Parking for the airport would be provided as already discussed.

The East Kent Access Road

Aside from direct highway links we propose to further investigate offsite highway infrastructure capacity and its potential to serve expansion of our airport. Provision of additional highway capacity to support regeneration within Dover and Thanet, including expansion of the airport, has already been considered in delivering the East Kent Access (EKA) scheme. The EKA scheme is split into two phases.

Phase 1 comprised a new link road between the Pfizer roundabout on the A256 Sandwich Bypass to a new roundabout on Ramsgate Road, the improvement of A256 Sandwich Bypass between the Stour viaduct and Ramsgate Road roundabout to dual carriageway standard and the improvement of the A256 between Ramsgate Road roundabout and the old Richborough power station site (Ebbsfleet Lane) to dual carriageway standard.

These improvements have now been completed. Phase 2 involves the improvement of the A253 from Minster roundabout to Lord of the Manor and the A256 from Lord of the Manor back to Ebbsfleet Lane where Phase 1 terminates. Work on Phase 2 is expected to be complete in 2011.

Highways

Whilst the Air Transport Forum and Airport Surface Access Strategy ASAS) will seek to encourage a high proportion of travel by passengers and employees to be via sustainable travel modes, there will also be an increase in private vehicles seeking to access the airport as passenger numbers grow.

It is envisaged that an increase in vehicle movements will give rise to a number of issues with respect to the capacity of the local highway infrastructure which will need to be addressed by our airport and local authorities. During the planning process it will be necessary to undertake detailed calculations and modelling of the existing and proposed highway network to demonstrate that its operation is satisfactory assuming the expansion of passenger numbers. At this stage a number of assumptions have been made with respect to the phased highway upgrades that may be required to serve the Master Plan aspirations. Highway upgrades are likely to be required to serve both the airport and the proposed development at the China Gateway site adjacent to our airport. Upgrades to highway infrastructure could be considered in a coordinated approach between all parties with an interest in the growth of the area.

Car Parking

Car parking to serve the airport will be provided in a staged approach reflecting the expansion of passenger numbers. The early stages of development will comprise an expansion of the existing parking area to serve around one million passengers.

Following this, further expansion of the car parking areas would be provided to the east of the existing parking area and finally to the north east of the existing parking area. Short term parking would be provided to the north of the new terminal building.

Airport car park operations not managed by the airport operator usually work against airport sustainable transport objectives and would normally be discouraged.

Taxis

The existing taxi provision would be relocated to the controlled area inside the airport car park in line with DfT requirements to serve the early phases of development up to around 1 mppa.

On opening the new terminal building there will be a new taxi and bus drop-off zone located on the other side of the then restricted B2050 to access the terminal building. The

Master Plan shows taxi provision to the north of the expanded terminal building and this would be accessed from the B2050.

Buses & Coaches

Our existing airport terminal already provides for bus and coach services with bus stops located immediately adjacent to the terminal building. Given the requirement for vehicles to be no closer than 30m to a terminal, one possible short term solution could be to relocate the bus set down and pick up areas within the existing car park.

The expanded car park design will include dedicated coach stands for passenger pickups and drops offs at a scale that is in accordance with mode share aspirations for the growth levels proposed. These modes will include bus stopping facilities north of the terminal building. In addition, there is an opportunity to link the provision of bus services to the airport with the proposed China Gateway employment area to the west. Success in encouraging the use of coaches and buses will depend upon the reliability and convenience of these modes of transport.

Bus services should be convenient and serve the areas where people want to travel to in as direct a route as possible. Areas of highest passenger demand and greatest employee catchment could be provided at a frequency that allows a turn up and go philosophy to become established. Bus services should be reliable, although achieving reliability of services will often be subject to external influences such as highway congestion.

It is possible to greatly increase the reliability of a bus service by working with bus companies and local authorities to provide dedicated bus priority infrastructure, such as bus lanes, bus gates and bus priority at traffic signal controlled junctions. Our Master Plan has identified the opportunities to provide various bus only links into our airport, either from a new link to the A299, via a link from Mount Pleasant roundabout or from Ramsgate railway station.

We would like bus infrastructure to be of a high quality. This could be achieved through providing good quality shelters that provide real time travel information similar to those used by the Fastrack service recently implemented in North Kent. Bus services should be affordable in relation to other transport modes. Whilst the cost of a bus fare is unlikely to be a determining factor for airport passengers, it will be a significant factor in encouraging staff to use bus services to commute to work on a daily basis.

Rail

At present the nearest rail stations to our airport are located at Ramsgate, Minster and Birchington. These stations lie a distance from the airport that would require an additional mode of travel to be employed – such as a bus link between the stations and our airport.

In late 2009, domestic high speed rail services are scheduled to begin using the Channel Tunnel Rail Link across Kent. This will reduce current journey times between London and Ashford from approximately 1 hour and 15 minutes to approximately 37 minutes. The high speed service will also benefit those rail services between London and Ramsgate that travel via Ashford, thereby significantly reducing the existing journey time between Ramsgate and London from nearly two hours to approximately 75 minutes.

Whilst this will have a positive influence in choice of travel mode to the airport it will also be necessary to invest further in rail services to maximise the potential for passengers and staff to commute to the airport using rail. We have identified several options which would facilitate a greater use of rail travel between the catchment area and our airport.

Broadly these can be split into three groups:

- Provision of a dedicated bus link to existing railway stations;
- Bus link to a new railway station; and
- New dedicated rail spur line into our airport.

The provision of a dedicated bus to a range of existing railway stations has been considered and it has been concluded that Ramsgate will connect passengers to a good rail service of both high speed and regular trains. A direct bus link to Ramsgate services will enhance the ability of rail to attract a higher proportion of passenger and employee patronage. This is shown on Tables 12 and 13.

Ramsgate station is located within an urban area and reliable access between the rail station and airport can often be affected by traffic. Bus priority measures could be implemented to improve the reliability of bus services between the station and our airport.

The provision of a new parkway facility on the existing Ramsgate Stour Valley Rail Line [33] has been explored. This has the potential to attract a higher modal share for passenger access to our airport. This would further enhance the ability of rail to attract a higher proportion of passenger and employee patronage. A typical example of a successful parkway rail station can be observed at London Luton Airport.

The provision of a dedicated rail spur line into our airport has been investigated. It has been concluded that the potential modal share of at least 20% rail patronage could be achieved if an airport station was provided. This would best enable rail to attract the highest proportion of passenger and employee patronage.

There are a number of other airports aside from international hubs with successful rail links and these include London City, Southampton, Bristol and Glasgow Prestwick airports.

Ramsgate Station offers the highest frequency of rail services to and from London and would therefore represent the primary rail facility to serve our airport in lieu of a dedicated station being provided.

33 The railway line from Ashford to Ramsgate is known as the Stour Valley Rail Line.

The frequency of trains will be discussed with rail operators as passenger and staff numbers grow at our airport. Increasing the frequency of trains would not only increase the relative advantages of rail as a travel option but would also increase the capacity of services to carry passengers.

This would certainly become a consideration as passenger numbers at the airport grew in line with the Master Plan aspirations.

An increase in operating hours of rail services at Ramsgate, to coincide with the earliest and latest flights that will be offered by the airport, will be explored with rail operators.

Table 12: Access Times to and from London from our airport via...

Our airport to London via....	Bus to railway station	Rail journey time	Total travel time
Ebbsfleet	68 mins	17 mins	85 mins
Canterbury West	25 mins	60-65 mins	85-90 mins
Ramsgate	7 mins	75 mins	82 mins
Faversham	36 mins	65 mins	101 mins
Sittingbourne	50 mins	55-60 mins	105-110 mins

Cycling & Walking

Whilst it is not expected that airport passengers would walk or cycle to the airport, employees of our airport will generally live locally and this opens up the potential for walking and cycling to play a significant role with respect to their journey to work. Whilst there will be a proportion of people who work shift patterns that make driving to work a practical and safety / security necessity, there will be a proportion of staff who will be targeted for encouraging walking and cycling to work.

This will be assisted by the Thanet Cycling Plan proposals which include a significant expansion of cycle networks within Thanet during the coming years, and the Bike to Work Scheme. Our airport would support the provision of cycle routes where these serve airport employee catchment areas.

The facilities at our airport will include provision for secure cycle storage in areas that are convenient as well as the provision of shower and changing facilities for employees.

Walking and cycling access to the airport and movement within our airport will be designed such that employees and the general public will find this mode convenient where security and safety objectives are not compromised.

Table 13: Connectivity to Railway Stations

Station	Distance from Airport	Journey time	Direct Rail Service (2010)	Comments
Ramsgate	4.2 km	7 mins	High Speed: 2 per hour peak, 1 per hour off peak. Regular: 6 per hour peak, 3 per hour off peak	Interchange with local bus services. Access route through Manston village
Margate	8.0 km	11 mins	High Speed: 3 per hour peak, 1 per hour off peak. Regular: 5 per hour peak, 2 per hour off peak	Interchange with local bus services
Birchington	5.6 km	9 mins	High Speed: 2 per hour peak. Regular: 3 per hour peak, 2 per hour off peak	Very limited forecourt access
Faversham	38.3 km	36 mins	High Speed: 2 per hour peak, 2 per hour off peak. Regular: 5 per hour peak, 2 per hour off peak	
Sittingbourne	49.7 km	50 mins	High Speed: 2 per hour peak, 2 per hour off peak. Regular: 5 per hour peak, 2 per hour off peak	
Ebbsfleet	85.8 km	68 mins	High Speed: 9 per hour peak, 8 per hour off peak. Regular: 4 per hour peak, None per hour off peak	Large Car Parks
Minster	5 km	9 mins	High Speed: (not known). Regular: 2 per hour peak, 1 per hour off peak	Access route through village
Sturry	18.2 km	18 mins	High Speed: (not known). Regular: 2 per hour peak, 1 per hour off peak	
Canterbury West	22.9 km	25 mins	High Speed: 2 per hour peak, 1 per hour off peak. Regular: 2 per hour peak, 2 per hour off peak	Access through Canterbury via A28

Achieving Growth in Other Areas of the Business

Improved Connectivity

Our airport has long been an important transport hub with links across the UK and Europe and its role will be significantly enhanced as growth occurs. Since WWII Manston Airport has played a role in the operation and success of the UK, from our strategic position in relation to Europe during times of war, through to today's flights taking local people away on holidays and bringing in fresh produce for the consumer markets.

As demand for air travel increases over time, the range of destinations available and frequency of flights serving them will increase. We envisage that domestic, European and transatlantic flights will depart from our airport on a regular basis by the end of the Master Plan period.

Development trends across the UK indicate that businesses will locate in, or relocate to, areas with essential linkages to strategic road, rail and air infrastructure. This is particularly relevant for businesses which distribute to foreign destinations, or operate within the aviation industry. Employment land is available at a number of locations within close proximity to the airport (in particular Manston Park and EuroKent Business Park) and it is envisaged that the growth of our airport will act as a catalyst for development.

As companies locate in the area to take advantage of the transport infrastructure linkages, jobs will be created and people will be attracted to live and work in the area. These households will support the local economy in terms of the spend on local services and the rates paid to their council.

The location of the airport will influence business decisions and attract inward investment.

The Thanet Local Plan indicates that the development of existing employment allocations [34] within the district will generate some 6,000 new jobs by 2011. It also envisages that 3,660 additional new jobs will be created at our airport by 2011. The Local Plan assumes that a proportion of these jobs will be taken by unemployed people, employees currently commuting outside the district for work and by people choosing to live outside Thanet.

In total, all of these employment opportunities are expected to generate a housing requirement of some 4,200 homes in the period to 2011. The Local Plan also aims to provide additional housing opportunities to attract people to live and work in the district [35].

Employment opportunities generated by the growth of the airport are likely to increase demand within the district for housing. The South East Plan identifies that some 7,500 homes should be provided in Thanet District in the period 2006-2026 (policy H1). The Thanet LDF will contain a policy framework to ensure sufficient land supply to deliver this target during the plan period and it is not considered that demand will not outstrip supply. Employment growth at our airport in the

34 Including Manston Park, EuroKent, Thanet Reach and land within the Sandwich Corridor.

35 In association with the planned expansion at Pfizer Ltd.

period to 2011 and the impact that this will have on housing supply has been assessed by the Local Plan. Beyond this period, employment opportunities at our airport and the demand for housing are also likely to increase.

It is inevitable that land will be released and windfall sites will come forward for new housing over time. It is therefore not envisaged that employment numbers, and employment activity generated at our airport will increase at a disproportionate rate to housing supply, and the local housing market will not overheat as a result of our airport's growth.

Enhanced connectivity through the improvement of our airport will also enable greater tourist access to this part of East Kent. Tourists travel to East Kent to enjoy the natural scenery and range of tourist destinations and activities within easy travelling distance of the airport.

Our experience at Glasgow Prestwick Airport shows that a significant portion of inbound visitor spending takes place in the home district of the airport even when the majority of inbound passengers are continuing their travel to a city destination [36]. Visitors travelling by air are likely to stay for more than one day and spend money on accommodation and tourism related services.

The growth of our airport and the influx of people to the area in line with direct and indirect employment generation are likely to have significant regeneration benefits for the region. As people move to the area the demand for housing, community facilities [37] and services will increase.

The development industry will respond to this demand and accommodation will be provided. Over time this will encourage greater inward investment by external companies and the local authority, which will enhance the profile of the area and the quality of life for local residents.

The regeneration benefits will spread outwards from the local area and are likely to contribute towards the regeneration of the smaller peripheral coastal locations in East Kent.

In summary, it is evident that the growth of our airport will contribute towards the development of the local economy in terms of business generation and tourism. It also has the potential to act as an important catalyst for the regeneration of local community areas.

Our airport is currently home to a variety of small businesses both aviation and non-aviation related. The rental income derived from these businesses forms an important part of the revenue stream for the entire airport. These businesses are crucial to create a wide range of employment opportunities in the region.

36 Economic Impact of Glasgow Prestwick Airport, SQW Consulting, February 2008

37 Schools, healthcare, childcare, public services etc.

Airports worldwide are increasingly becoming centres of commercial activity over and above direct aviation related enterprises. A combination of superior transport infrastructure, high security and extensive communications infrastructure makes airports attractive to a wide variety of businesses. Development of the land holdings at our airport will bring a range of employment opportunities to an area of Kent with an unemployment rate that compares poorly to the Kent average [38].

Many businesses located at the airport are directly related to the handling of passengers and freight. As passenger and freight traffic grows we expect the demand for the services of these businesses to grow as well.

We are seeking a greater flexibility of land uses for our Northern Lands through the planning policy framework review process and regard the ability to develop both aviation and non-aviation activity in this area as key to successful growth of the airport.

A large employment area, known as Manston Park, is located immediately to the north of our airport and has been subject to recent outline planning permissions for B1 office, B2 general industry and B8 storage and distribution uses (China Gateway proposals).

It is likely that this employment area will be developed for a range of employment uses within the Master Plan time horizon and that the companies locating here will contribute significantly toward the local and regional economy. The proximity of Manston Park to our airport could facilitate its use as a large logistics and trade platform with the potential for excellent air links to the rest of the UK and Europe. Companies are also likely to benefit from its proximity to Dover and Ramsgate shipping ports and the strategic road network.

Our Master Plan anticipates the increase in freight throughput as a result of the capacity and cost pressures on the existing London airports. Associated with the growth in freight volumes there will be an increase in local employment generated by businesses basing at and around our airport. These new ventures will be required to facilitate and support the air freight industry. The businesses will include freight forwarders, logistics providers and other contract service providers.

As a result of our strategic location and excellent transport links, freight is expected to grow significantly during the Master Plan period. The ability to accommodate the growth of freight and ancillary facilities is provided for in the Master Plan. Maintenance, repair and overhaul (MRO) is a large sector of the UK aerospace industry. We expect to develop this activity as demand for maintenance facilities increases as new aircraft enter service. Competition for these facilities is significant from continental Europe, Asia and the Middle East.

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38 Thanet Economic Growth and Regeneration Strategy.

Safeguarding for Growth

In order that our airport may grow as outlined in the earlier sections of this chapter, we need to safeguard our land and surrounding areas along with the airspace so as not to compromise our plans and to ensure that we continue to operate a safe airport in accordance with the terms of our CAA licence.

We would like to move towards being a CAA officially safeguarded aerodrome as it becomes appropriate.

Aviation Security

We will continue to liaise with the DfT and local planning authorities to ensure that aviation security is given careful consideration when assessing development proposals in close proximity to the airport and that the prevailing government guidelines are adhered to. This will involve the continued monitoring of all planning applications in the vicinity of our airport.

Land for Growth

We can realise the plans for our airport largely within the existing airport site and with minimal impact on the community, our neighbours or the environment. Land to the north of the airport site has been identified for possible future employment generating development.

It is common that both aviation and non-aviation related activities find airport environs an attractive commercial location. High quality transport links, communication links and a high security environment ensure that airports are regarded as attractive locations for many businesses. Detailed land use planning will be investigated further and may become the subject of a new master plan in due course.

Whilst there are provisions in legislation for the compulsory acquisition of land necessary to facilitate the growth of the airport, in the first instance, we will enter into normal commercial negotiations with the owners of sites where required.

We will promote future development proposals beyond the current airport boundary, such as road improvements, parking and aviation associated facilities, through the Thanet LDF to reduce uncertainty and long term blight.

Wind Farms

A new and particular area of safeguarding concern for the airport is wind farms. Our airport is located on a ridge line and has clear lines of sight in all directions for some significant distance, including out to sea in the Thames Estuary.

While we are not opposed to wind farms per se, there are places where wind energy developments and aircraft operations cannot co-exist without detriment to the provision of a safe and effective air traffic service, thus significantly constraining the current and future growth opportunities for the airport.

Within our airport’s air traffic approach environment (42 nautical miles from the airport), there are a number of wind farms either operating or which have obtained planning consent. Of particular note, due to their scale, are the offshore wind farms in the Thames Estuary.

The 30-turbine Kentish Flats Wind Farm is already operating and is “seen” by our air traffic control radar. Thanet Offshore Wind Farm (100 turbines) and London Array (up to 341 turbines) have also been granted consent by the Secretary of State for Business, Enterprise and Regulatory Reform (BERR) and will be “seen” by our air traffic control radar once they are built.

Wind turbines generate false returns (also known as “clutter”) on our radar display and require our air traffic controllers to avoid directing aircraft through or near the airspace above the turbines.

As a result, certain areas of airspace formerly used by aircraft become “no go” zones, unless a technical mitigation can be identified and implemented which effectively removes the clutter from our radar displays. The airport can continue to operate safely and grow with the current level of radar clutter from Kentish Flats.

However, in order for Thanet Offshore Wind Farm and London Array to be built, we have had to identify and agree with the CAA, BERR and the developers, a technical mitigation for these wind farms. We are being faced with increasing numbers of development proposals for onshore and offshore wind farms which would be visible to our radar in critical areas of our airspace. We have objected to a number of such developments, where we believe that the construction of a wind farm may compromise the safety, flexibility and capacity of the airport.

We do, however, seek to work with the wind farm developers to identify whether any mitigation may exist which would allow the wind farms and our current and future air traffic operations to co-exist. This is a time consuming and resource intensive task, but we take it seriously as we are committed not only to the future viability of the airport but also to facilitating, where we can, the increased generation of renewable energy.

To this end, we are producing a wind farm safeguarding map to guide developers and local planning authorities as to preferred areas for wind farm development from an aviation perspective. It takes into account our current and likely future radar and navigational aid parameters: planning law allows for future facilities to be safeguarded in advance.

Our airport safeguards navigation aids such as the instrument landing system (ILS) on Runway 28, as well as our primary radar. Our airport is safeguarding for a Secondary Surveillance Radar to be installed as part of the London Array and Thanet Offshore wind farm mitigation.

Our wind farm safeguarding map over time will be more dynamic than our protected surfaces safeguarding map as our analysis of areas acceptable for wind farm development will change in light of the grant of planning approvals. The cumulative impact of wind farm developments on the safety, flexibility and capacity of our airspace requires constant monitoring.

In light of this, we recommend that the local planning authorities take a strategic approach to onshore wind farm site selection, so as to identify preferred areas of search and to apply a sequential approach with regard to wind farm development, namely that developments should first take place in agreed preferred areas of search, rather than the more piecemeal approach which airports find themselves facing today. Such an approach would also assist in the identification and implementation of mitigation.

The difficulty we face with some of the onshore applications to which we have objected is that because of their small scale, they cannot afford to fund possible mitigation. However, the fact that the developments consist of a smaller number of turbines than the offshore schemes does not mean that the clutter these turbines will generate on our radar displays can be ignored.

We will only object where we believe that the turbines will impact on safety, flexibility and capacity of our airport.

Section Highlights

- We can accommodate our growth requirements up to the end of the Master Plan period on land under our control with some small acquisitions for suitable land uses
- With minor extensions our existing passenger terminal is capable of accommodating around 1 mppa
- A new passenger terminal will be developed to accommodate 3 mppa and this will be extended to accommodate 6 mppa
- It is not necessary to extend the runway within the Master Plan period unless required by airline operators
- Our passenger and freight aprons will be enlarged to accommodate the forecast growth in passenger and freight throughput. Taxiways will be enhanced and extended to connect with the improved passenger and freight aprons
- There is currently considerable potential for expanding car parking space at our airport. As additional car parking spaces are required these will be developed, with further provision made by 2033
- As freight demand increases through the Master Plan period the existing freight handling facilities will be improved and additional land for freight handling provided on land adjacent to the main freight area
- General aviation and fixed based operations will continue to develop to the south of the existing passenger terminal throughout the Master Plan period
- A surface access strategy will be produced for our airport to ensure access is achieved in the most sustainable manner. While a large proportion of people will travel by the private car, travel to the airport by rail and bus will be encouraged
- At 1 mppa there are likely to be in the region of 1,800 vehicle movements a day, by 3 mppa 5,500 movements per day and by 6 mppa 11,000 movements per day. Rail patronage will be encouraged initially through the development of links to local stations
- With the increase in ground access vehicle movements upgrades to the local highway network will be required. These upgrades are likely to focus on the Mount Pleasant and Minster roundabouts and Spitfire Corner although these will be assessed formally in due course when planning applications are submitted.

6. Managing the Impacts of Growth

Our vision is to be recognised as a major contributor to the sustainable development of the local area whilst providing a wider positive contribution to the South East Region and the UK as a whole. We have committed to working with local partners and the community to ensure that our airport plays a significant role in the region's future success.

Aviation is a major contributor to UK economic growth and is estimated to directly support 185,900 jobs in the UK economy, whilst generating around £11.2 billion of Gross Value Added (GVA) [39]. When indirect and induced effects are also included these figures rise to nearly 580,000 jobs and £22.2 billion of GVA.

The potential for growth at our airport contributes towards the value of the sector, however it is fully recognised that future growth in passenger numbers will bring additional environmental pressures that will need to be planned for and managed sustainably.

Our expansion will involve a new building programme to accommodate an increase in passenger numbers and the growth in activity at the airport.

We recognise that expansion at our airport could lead to increased pressures on the surrounding environment and local communities, however it is also an opportunity for sustainability features to be thoroughly incorporated throughout the design process.Our approach to future development and management of the airport recognises the objectives of the UK Government's Sustainable Development strategy Securing the Future (March 2005).

This strategy identifies four priority areas as the focus for future action:

- Sustainable consumption and production;
- Climate change and energy;
- Protecting natural resources and enhancing the environment; and
- Creating sustainable communities and a fairer world.

Adopting these principles, this section of the Master Plan outlines our proposals for managing a range of local sustainability impacts which are associated with our airport now and throughout the plan period, including socio-economic aspects, ecology, surface access, noise and air quality, as well as further key impact areas that may have local or wider significance, in particular climate change. Our assumption that provides the basis of this chapter is that our impacts cannot increase in proportion to airport growth.

39 Airport Operators Association (2005) The Economic and Social Impact of Airports.

Our Policies on Sustainability

We see sustainability as a core business area. This is why we have developed a sustainability charter for all of our airports and are now putting in place Environment Strategies. These are to meet the charter commitments whilst having due regard to the individual commercial and environmental circumstances of each location and the legal requirements and community expectations of the jurisdictions they are located in.

Sustainability is as much about attitudes and processes as it is about targets and actions, no matter how important those are. This is why we are working towards implementing a robust Environmental Management System at our airport. The main sustainability commitments proposed during the Master Plan period are summarised in table 14.

Our environmental policy will be regularly reviewed and developed to ensure that it:

- Is appropriate to the nature, scale and environmental impacts of our activities, products and services;
- Leads to continual improvement and prevention of illegal pollution;
- Ensures we comply with applicable legal requirements and with other requirements to which the organisation subscribes which relate to its environmental aspects;
- Provides the framework for setting and reviewing environmental objectives and targets;
- Is documented, implemented and maintained;
- Communicated to all persons working for or on behalf of the organisation; and
- Is available to the public.

In addition to putting sustainability at the core of our business model, we are committed to the following overall actions and targets for our airports:

- Manage carbon dioxide emissions from energy sources through developing and implementing our Energy Plan;
- Investigate opportunities for development of renewable energy generation on the airport site to provide some, if not all, airport energy needs;
- Minimise noise levels as a result of airport development and operations;
- Regularly undertake air quality testing and make the results publicly available;
- Work towards a recycling rate of 50% for all waste generated at the airport from 2011 onwards;
- Uphold compliance to discharge consents and improving the quality of watercourses at our airports;
- Monitor water consumption as the airport grows ensuring that a high level of efficiency is achieved, through the use of appropriate technology;
- Endeavour to ensure all new buildings are neutral consumers of potable water through the use of grey water, rainwater harvesting and waterless systems;
- Carry out regular ecological surveys to identify opportunities to promote suitable wildlife at our airport;
- Ensure that all new developments have a neutral or positive impact on biodiversity; and
- Maintain an open dialogue with local communities and ensure all negative impacts associated with the airport are mitigated.

Table 14: Airport Sustainability Summary Table

Issue	Commitment Target
Renewables	Meet 10% of energy needs through on-site renewable technologies by 2018
Carbon Dioxide / Emission Control	Manage carbon emissions through an energy plan, incorporate best practice aircraft operating procedures to encourage sustainable airline operations (such as continuous decent approach procedures, minimising ground engine use and aircraft holding patterns) and efficient ground operations
Air quality	Maintain the regime of continuous air quality testing to monitor trends
Waste	Recycle 50% of waste generated by the airport by 2011
Water consumption	Monitor water consumption and endeavour to ensure that all new buildings are neutral consumers of potable water
Water quality	Monitor water quality to ensure that there are no adverse impacts on local water courses

Energy and Climate Change

Climate change is one of the most significant challenges facing the globe and as an airport we have the responsibility for reducing our greenhouse gas emissions. According to the United Nations Framework Convention on Climate Change UK domestic and international aviation contributed less than 2% of the global total emissions of carbon dioxide. This is very low in comparison to vehicle emissions, which account for 12% of global total emissions [40].

Aviation contributes to climate change in a number of ways. The burning of fossil fuel, in flight is the industry's biggest contribution, but greenhouse gas emissions are also generated by the production of the energy used in airport buildings. Ground emissions from airport vehicles and the vehicles used by passengers and staff also contribute significantly.

Our aim is in line with the Kent Environmental Strategy which is to be "a place where energy, derived principally from innovative and renewable sources, is cheaply and efficiently available to all and where the impacts of climate change are mitigated by widespread carbon savings".[41]

To support this aim, we are committed to taking a low carbon approach to the way we operate, the emphasis being on the ground level emissions attributable to the operation of airport facilities. Carbon reduction should also be viewed in the regional and national context. The increased choice of routes and services from regional airports outside the South East, not only promotes regional development but also cuts down on the need for long-distance travel to and from airports, thereby reducing emissions.

In addition, we have set a target of making all airport ground operations carbon neutral through new development. We shall endeavour to do this through reducing energy usage, buying green energy, developing on site renewable sources and investing in certified schemes that through off-setting will capture the equivalent amount of CO2 to that generated at the site.

40 World Resources Institute 2006 indicates that aviation contributes 1.6% of an overall 13.5% for, the transportation sector, and compares with 9.9%, for road-related emissions.

41 The Kent Environment Strategy, 2003

We will seek to ensure that passengers are made aware of the opportunity to offset the carbon footprint of their flights via operator websites and notices in our terminal building.

We will also seek to explore any opportunities to establish shared energy generation and distribution systems with other site developers, aiming to minimise the carbon emissions associated with the wider site.

Further to this, we shall continue to set targets for reducing CO2 from energy, sources against 'business as usual' benchmarks. We will achieve this through the following measures:

- Training and awareness
- Providing training to staff to conserve energy; and
- Establishing a company working group to identify opportunities for energy saving initiatives.

Ground Access Improvements

- Developing a green travel plan to target passengers, businesses and staff; and
- Encouraging clean fuel use for onsite vehicle fleets.
- Our carbon reduction aims will be supported by continuous benchmarking and internal auditing to measure and identify opportunities for further improvement in our airport's performance.

Environmental Controls

Currently an agreement exists between Thanet District Council and our airport. The agreement, made in accordance with Section 106 of the Town and Country Planning Act (the s106 agreement) provides a framework in order for the local planning authority to control the operation of the airport so that the substantial benefits of air services can be realised whilst managing the effects of the airport in the community. The issues addressed by the current agreement remain valid, although some conditions are unique to our airport and act as a deterrent to aircraft operators wishing to base operations at Manston. In summary, the s106 agreement addresses the following key issues:

- Night-time flying;
- Noise;
- Preferred departure runway;
- Noise abatement routes;
- Noise monitoring terminals;
- Pollution monitoring;
- Noise monitoring; and
- Engine testing.

The environmental controls relevant to an airport s106 agreement are outlined in the following paragraphs, with the exception of the environmental studies and green travel proposals, which are addressed elsewhere in the Master Plan.

Air Quality Monitoring

A comprehensive system of air quality monitoring in the vicinity of the airport was agreed as a part of the s106 agreement to maintain an accurate record of changes in levels of pollutants around the airport. We anticipate that this regime will continue to operate.

Aircraft Routes

In order to minimise disturbance on adjacent residential areas, aircraft routes are currently controlled by the s106 agreement such that, subject to aircraft separation requirements, aircraft departing to the west turn right after take-off, avoiding Herne Bay. This restriction does not apply to aircraft operating in the training circuit and returning back to the airport. Aircraft undertaking circuit training to the north of the runway should avoid overflying Margate and Broadstairs by keeping their path over the sea until they approach the runway. Due to the orientation of the runway there will always be a requirement for aircraft to approach and depart over residential areas. This is not unusual, with airports traditionally built adjacent to towns and cities for reasons of convenience.

As the airport develops, we will install a radar tracking and recording system. This system will enable residents to monitor the flight paths, providing a clear and accurate record of aircraft routes and detecting off route aircraft.

Airport Operational Hours

With any scheduled aircraft activity, a proportion of flights are affected by unanticipated delays. These delays can relate to weather at a destination / origin airport, loading difficulties, engineering faults, airport congestion or a range of contributing factors. Whilst we would expect this activity to remain proportionally low relative to total movements, it is essential to provide a degree of flexibility to enable aircraft operators to meet the demands placed upon their business.

There has never been a rule in place which bans flights between certain hours at our airport, although the scheduling of regular flights between 11pm and 7am is not presently permitted. The current agreement has within it a system whereby aircraft arriving and departing between 11pm and 7am are allowed, provided a payment is made into a community fund for aircraft movements which exceed a noise quota count rating of 4. The community fund is audited by the KIACC [42] and Thanet District Council, with the funds collected and distributed by a panel to applicant organisations located in the area affected by airport noise.

As the airport grows, the essential requirement to accommodate delayed aircraft will remain. We will propose a system of controls consistent with those in place at our UK and European counterparts. Several options exist, including a Quota Count System, restrictions on noisy aircraft and the adoption of a night time flying policy.

42 The Kent International Airport Consultative Committee consists of elected representatives of Thanet and Canterbury District Councils, Kent County Council, local parish councils and other interested parties. The KIACC meets quarterly with our airport management, including a meeting held in public each calendar year.

Noise Monitoring

Noise emanating from airports can be a key concern and we recognise that airport noise can affect our close neighbours. Noise associated with an airport originates most significantly from aircraft in flight, but also from ground movements, traffic, construction work and equipment.

In line with the s106 agreement, the noise emitted by aircraft using our airport is monitored. Currently noise monitors are installed at either end of the runway and have been interfaced with a flight movement database, which records corresponding aircraft type data and passes this information on to the KIACC in graphical form. The noisiest aircraft movements during the quarterly period are reported. Thanet District Council also uses a mobile noise monitor funded by the airport to take measurements at other locations. This is an advanced system of monitoring, providing useful information for future analysis. We propose to keep this system in operation to allow the noise effects of airport growth to be measured accurately.

It is not possible at this time to predict which types of aircraft will be operating by 2033 and for this reason we do not consider that noise calculations for 2033 will be in any way representative. Further to this, it is likely that by 2033 technological advancements will have reduced the amount of noise produced by aircraft, which will help to mitigate the increase in the number of flights forecast. The noise footprint of a modern jet is 75% smaller than that of a 1960's jet aircraft [43]. 2018 noise contours for our airport are provided later in this section.

Aircraft Noise

Whilst the aviation industry is actively working towards quieter aircraft types, there remain some concerns from residents and communities close to the airport boundaries relating to the increase in noise levels associated with our airport's expansion.

Air noise within the UK is commonly portrayed using Leq noise exposure contours. Noise exposure contours show a set of closed curves on a map with each contour showing places where people experience the same amounts of aircraft noise energy. The Leq is the equivalent continuous sound level and research has indicated that the Leq is an indicator of a community's disturbance from aircraft noise. Conventional noise exposure contours are calculated for an average summer day over the period from 16 June to 15 September inclusive (92 days), for traffic in the busiest 16 hours of the day; between 0700 and 2300 local time. Contours are depicted from 57 decibels to 72 decibels in 3 decibel steps.

For reference, the 57 Leq contour is the point at which the community becomes aware of airport noise, 63 Leq contour is the point at which noise mitigation of some form is recommended for residential dwellings and the 69 Leq contour indicates the area closest to the airport within which residential land use is discouraged.

43 Airport Operators Association, UK Aviation Facts 2007.

Accordingly, air noise modelling has been performed for our airport using INM version 7.0, which is a fully compliant ECAC.CEAC air noise model, for the following situations:

- Current baseline for year 2009 – using the most up to date aircraft dataset; and
- Future activity in 2018.

The aircraft fleet used in our noise modelling was derived from a combination of:

- Forecast scheduled movements for both passenger and freight aircraft; and
- 2007 and 2008 airfield movement logs.

The resultant noise contours are shown on plans 7 and 8 on pages 88 and 89 and indicate the potential requirement for some properties to be noise insulated as our airport grows and develops.

In line with the projected increases in aircraft movements, we will work towards preparing a noise insulation scheme and consult on this in advance of achieving long term growth projections in order to enable early implementation.

Ground Noise

Noise generated by operations other than aircraft in flight or taking off and landing is known as ground noise. The main source of ground noise is aircraft taxiing between runways and stands. This includes all holding, engine start up and shut down procedures, auxiliary power units (APUs) used by aircraft whilst on stand and ground running of aircraft engines during maintenance.

Airport ground noise is potentially audible within a limited radius of the airport boundary particularly at night for towns close to our airport boundary. We will work with airlines to ensure ground noise levels are minimised as the airport develops. We have placed appropriate restrictions on using APUs and will endeavour to introduce additional fixed ground power to limit the need for these. Ground noise at our airport will be controlled in accordance with best practice guidelines.

Engine Testing

From time to time, aircraft are required to test their engines on the ground for maintenance reasons. The s106 agreement contains provisions limiting the times during which aircraft operators are permitted to test engines on the ground. Restrictions will be maintained and reviewed through the s106 agreement.

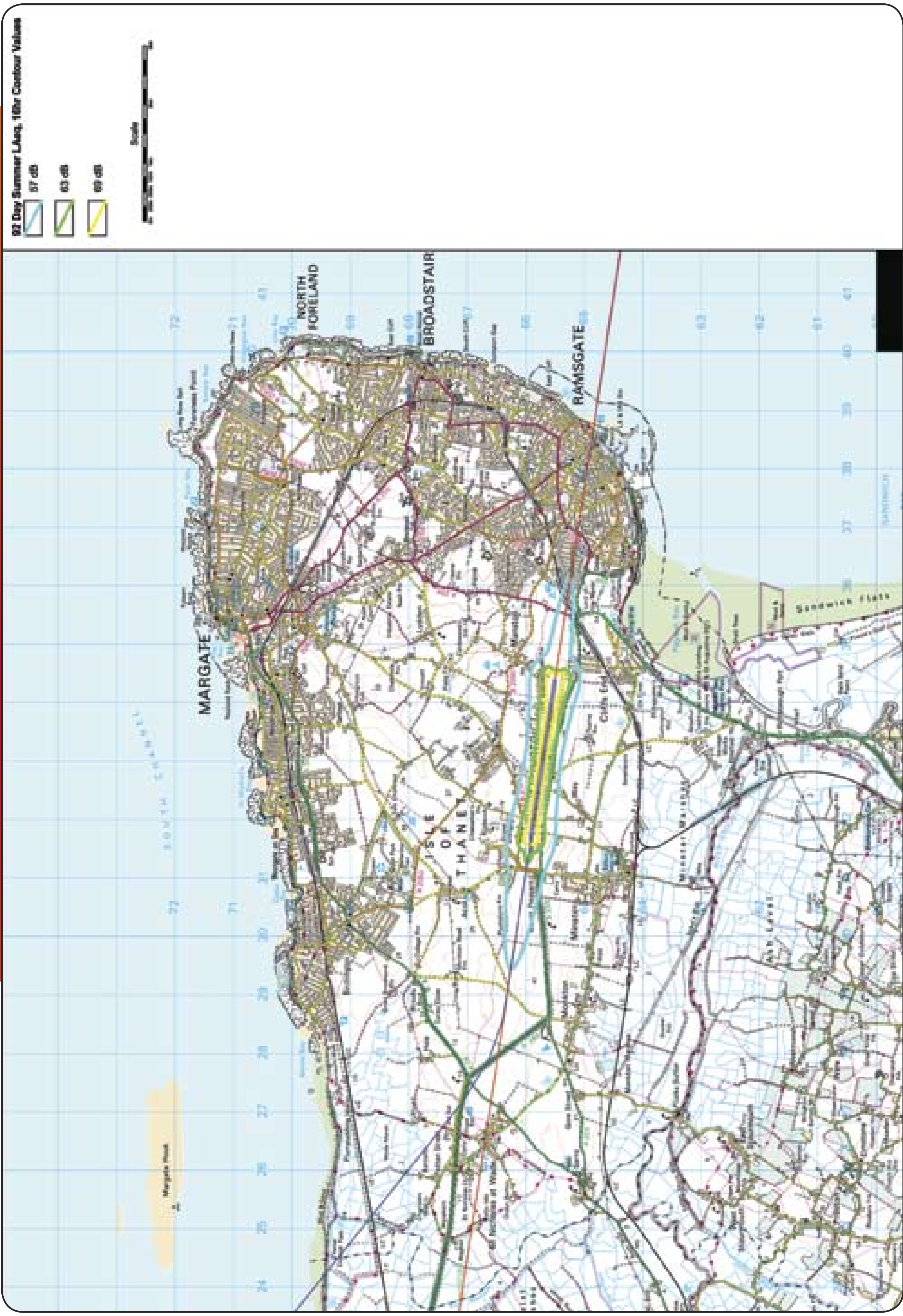
Traffic Noise

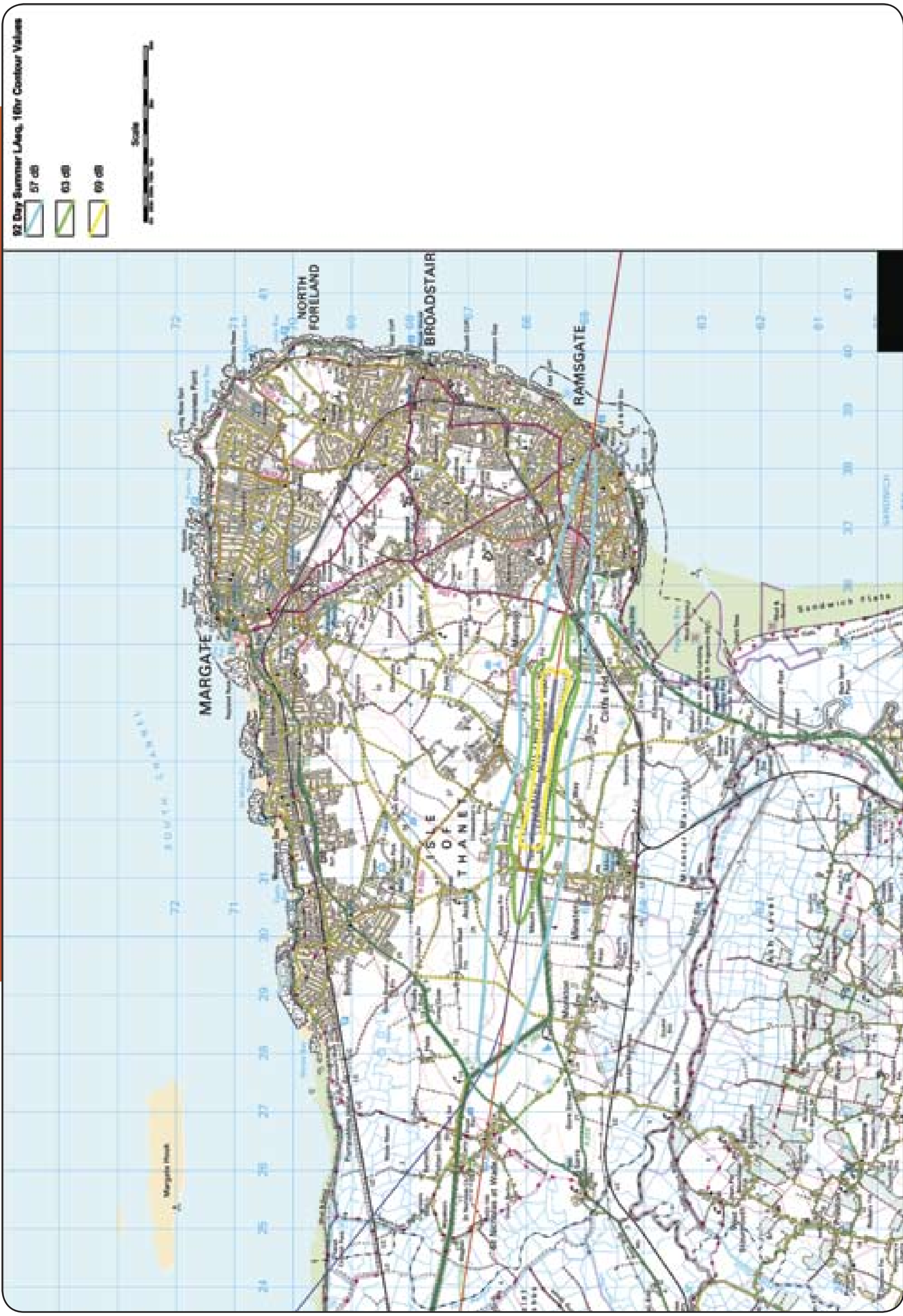
The additional traffic generated by the airport will give rise to an increase in vehicle noise in the car parks and approach routes. To minimise the impact of traffic noise on the village of Manston measures will be introduced to reduce the potential noise impact once the 3 mppa terminal is constructed.

Noise from Construction Work

During the period of this Master Plan there will be a number of construction projects on the airport site. These will occur within the existing boundary of the airport and are not expected to create significant noise

Plan 7 : 2009 92 Day Summer LAeq, 16hr





Plan 8 : 2018 92 Day Summer LAeq, 16hr

problems for local residents and businesses. However, in developing detailed proposals for any major construction projects, we will include assessments of construction noise and the necessary mitigation proposals will be developed.

Facility Noise

Historic noise calculations at our airport have shown that the noise impact due to facilities can be controlled to an appropriate level (in accordance with and defined by government guidance and standards). Based on noise levels it may be necessary to either enclose or screen externally sited plant to mitigate noise propagation.

Environmental Impacts & Mitigation

Details of the environmental constraints covered in this section are provided on plan 9. Table 15 provides a summary of the environmental issues which will be assessed and the broad timescales for undertaking these assessments as development proposals at the airport come forward.

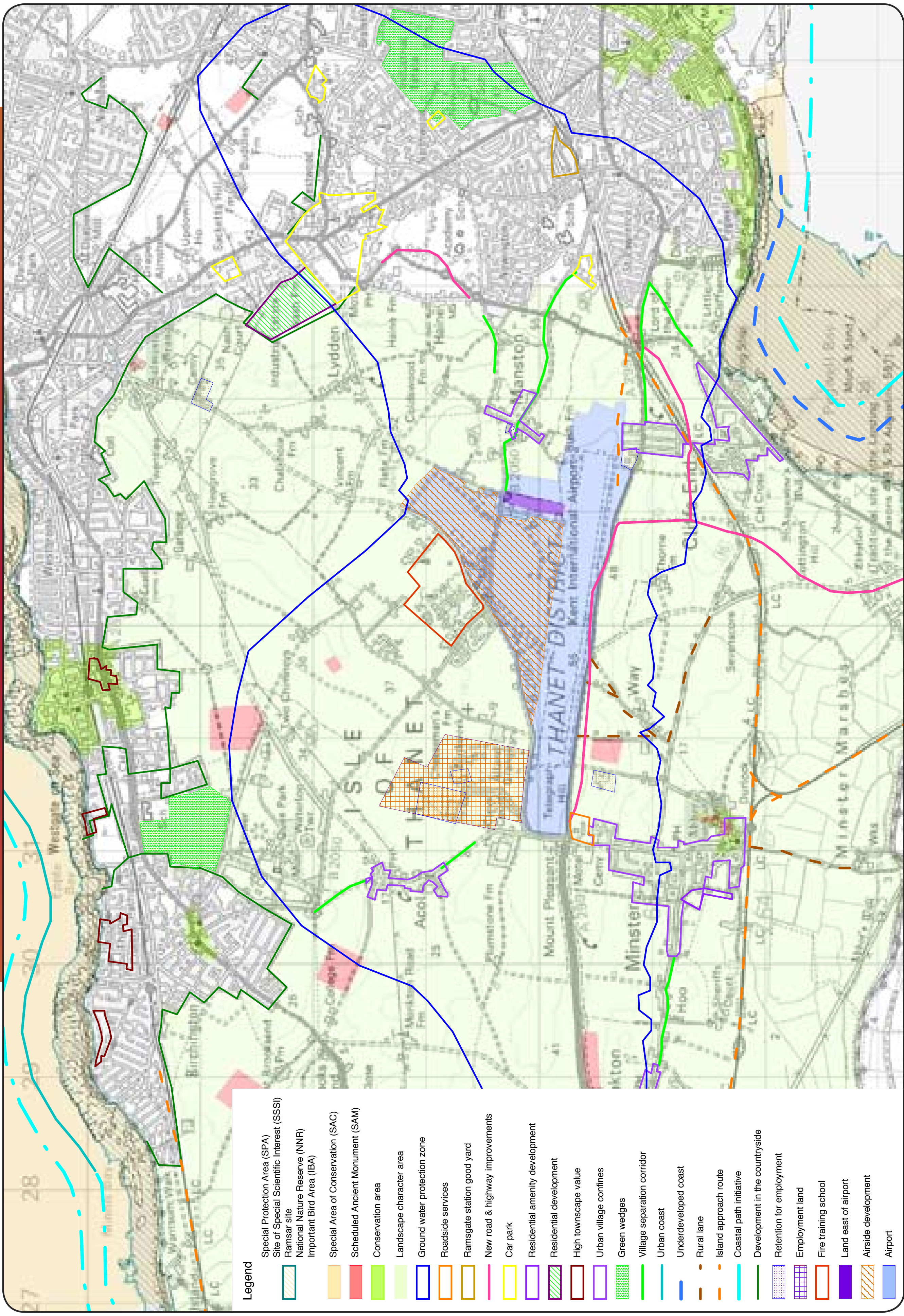
Table 15: Environmental issues assessment timescales

Issue / Assessment	Timescale / threshold
Air quality	Ongoing
Surface access strategy and ATF	> 1000 ATMs
Waste management programme	Ongoing
Water monitoring	Ongoing
Noise monitoring	Ongoing
Biodiversity surveys	Planning application / EIA
Landscape and visual assessment	Planning application / EIA
Land quality	Planning application / EIA
Archaeology	Planning application / EIA

Emissions to Air

The Government has set Air Quality Strategy Objectives to limit the impact of atmospheric pollutants on human health and the environment. Ensuring compliance with the Air Quality Strategy Objectives is the responsibility of local authorities through the Local Air Quality Management (LAQM) system, introduced by the Environment Act 1995.

Local authorities are required periodically to assess current and predicted air quality within their jurisdiction. If an objective is unlikely to be achieved, local authorities must designate the relevant locations as Air Quality Management Areas (AQMAs) and work towards ensuring that the target is met. The local authority has not been required to designate any part of the locality of Kent International Airport as an AQMA.



Plan 9 : Environmental Constraints

Based upon the 2007 Ordnance Survey 1:50000 scale raster map with the permission of the Ordnance Survey on behalf of Her Majesty's Stationery Office, © Crown copyright. Terence O'Rourke Ltd. Licence No. AL100017826. Data provided by Natural England and English Heritage 2007. Masterplan data digitised from Thanet local plan 2006 Copyright Terence O'Rourke Ltd, 2008

Guidance produced by Defra [44] indicates that emissions from large airports can have a detrimental effect on local air quality. A detailed assessment of the effects of nitrogen dioxide is required where more than 5 mppa are predicted; for PM10 the threshold is ten mppa, reflecting the respective significance of each pollutant.

Nevertheless, aircraft, and aircraft support activities, are the principal source of atmospheric emissions at airports. Emissions from sources such as airport buildings are minor by comparison. Aircraft emissions arise from take-off, landing and taxiing; aircraft-support emissions are generated by ground support vehicles, aircraft engine testing and refuelling operations. Road traffic resulting from travel to and from our airport is the other main source of emissions.

Such emissions include nitrogen dioxide (NO2) and fine particulate matters (PM10), which are known to have harmful health effects. Aviation activity is a contributor to ambient concentration of these pollutants, however, road vehicle traffic contributions are significantly higher [45, 46]. Over the Master Plan period there is expected to be an increase in both the average aircraft size and number of flights to and from the airport. Our forecasts predict a significant increase in total aircraft movements over the next 25 years.

Aircraft are becoming more efficient with fewer emissions [47]. This will lead to a significant decline in emissions per aircraft movement.

At Kent, projected passenger throughputs do not exceed 5 mppa until the latter years of the Master Plan period and are not expected to exceed 10 mppa by 2033. It is therefore very unlikely, based upon case studies at other airports processing volumes in this range, that there will be breaches of air quality strategy objectives. As previously discussed, Thanet District Council maintains constant monitoring of the air quality in the area surrounding our airport, which is a requirement of the s106 agreement.

During the Master Plan period, in line with increased flight numbers, vehicle movements will increase around the site not only from passenger vehicles but also from goods vehicles. Improvements in ground access will curb the increase in emissions relative to the increased activity at our airport. The aim is for a proportional decrease in emissions associated with our airport.

Monitoring and Reporting

Thanet District Council monitors air quality around our airport using equipment funded by our airport. Results are reported to the airport consultative committee quarterly in accordance with the s106 agreement. All test results confirm that air quality is well within prescribed limits and the detailed information can be effectively used to monitor changes in future.

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44 Local Air Quality Management. Technical Guidance LAQM. TG(03)
45 World Resources Institute 206 indicates that aviation contributes 1.6% of an overall 13.5% for the transportation sector, and compares with 9.9% for road-related emissions.
46 UK Air Quality Strategy 2007, Volume 2.
47 Boeing notes on its website that the new B787 aircraft will 20% percent improvement in fuel use and an equivalent reduction in carbon dioxide emissions compared to today's similarly-sized aircraft.

Ground Access

At present there are no significant issues regarding airport traffic flow. However, we understand that an increase in airport activity will result in an increase in ground traffic over the next ten years. Therefore infrastructure improvements and behaviour change approaches to ground access are required in order to accommodate this growth. In particular, the following developments shall be considered:

- Improved public transport services direct from our airport to the major urban areas;
- Identification of opportunities for encouraging sustainable alternatives to the car for passengers and staff through a green travel plan; and
- Enhanced highway links in the region.

Our Surface Access Strategy and the establishment of an Air Transport Forum, as confirmed in table 9, will address the growth in traffic. It is envisaged that wider benefits to the community could occur through enhancing the economic efficiency of travel movement, by, for example, providing a greater catchment area for employment.

Waste

Waste is generated from a number of sources at our airport, notably from passengers, catering outlets, offices, shops, construction activity and from vehicle and aircraft maintenance. Waste stream volumes are currently low but will inevitably increase as the airport expands so it is important that this growth is managed carefully and that waste is disposed of sustainably, legally and appropriately.

Typical waste streams generated and disposed of at our airport include:

- Paper (office paper from staff, newspapers and magazines from passengers);
- Cardboard (mostly generated from stores);
- Plastics (the majority being plastic bottles deposited into bins prior to going through security because of liquid restrictions);
- Glass (limited to bottles bought in by passengers and disposed of in the terminal litter bins);
- A minimal amount of wood (timber pallets from freight activity);
- Hazardous wastes (fluorescent tubes, redundant IT equipment, batteries and materials containing oil).

We aim to mitigate the effects of waste to reflect the Government's sustainable waste management strategies. This involves reducing waste at source in the first place and then identifying a disposal option which provides the most benefit or least damage to the environment as a whole, at an acceptable cost.

This can include the reuse of materials wherever possible; making the best use of waste through recycling, composting or energy recovery; and finally disposing of it through appropriate licensed facilities, as near to its place of production as possible (see table 14).

We are re-evaluating our waste management practices and through the staged development of our airport we could implement some or all of the following:

- Programmes for monitoring waste generated from airport activities;
- Appropriate processes and provision of facilities within all buildings to ensure the collection, sorting and storage of waste with a view to optimising reuse, recycling and composting;
- Effective and regular communication with all staff, passengers and tenants to raise awareness of waste issues and encourage best performance;
- Proactive management of the supply chain to minimise waste and maximise the use of reusable and recycled materials; and
- A construction waste strategy for all future development, applied by all staff and contractors.

We have the opportunity to develop an exciting environmentally, friendly airport and, in accordance with this philosophy, we will develop targets for recycling wastes generated by our airport. Our emerging waste management programme will seek improvements aimed at achieving these targets. The programme will be reviewed annually and revised as necessary to take account of business growth and to ensure that expected levels of improvement are achieved.

Water Quality

Whilst our proposed developments and projected growth in passenger numbers will increase the level of activity at our airport, it is important to note that normal airport activities do not generate surface and groundwater pollution to any significant degree.

Our airport has strict operating procedures relating to:

- De-icing of aircraft and airside areas;
- Vehicle and aircraft washing;
- Aircraft and vehicle maintenance;
- Run-off from construction sites;
- Aircraft refuelling (spillages);
- Waste and cargo handling; and
- Fire training activities.

Pegwell Bay is a National Nature Reserve and Site of Special Scientific Interest, which lies 500 metres to the south east of our airport. The Environment Agency works with our airport to ensure that appropriate safeguards are put in place to protect Pegwell Bay as airport activity changes over time.

A project is currently underway which will ensure airport surface water collected from areas of hardstanding is controlled before it leaves the airport boundary and any contaminates are contained onsite. The project will involve the installation of a drainage interceptor placed at the point at which surface runoff from the runway leaves the airport site.

Parts of our airport are located over an aquifer that supplies some of the water utilised by the Thanet region. We are committed to ensuring that the expansion of our airport will have no adverse impact on local watercourses and are mindful of the ecological sensitivity of Pegwell Bay and the aquifer.

We will continue to carry out regular monitoring of compliance with future water discharge consents. We are also committed to ensuring that any spillage of fuel, dangerous goods, fire fighting foam or de-icing products is reported and appropriate action taken to prevent fouling of connected watercourses. We will liaise closely with the EA to ensure that levels of risk mitigation are appropriate.

Naturally, we will continually evaluate any new technologies which could assist in managing water resources at our airport and will endeavour to implement them where possible and practicable.

Surface Water Drainage

The airport has a large impermeable surface area which includes our paved runway and taxiway system, therefore rainwater runs off relatively quickly, rather than gradually sinking into the soil and either recharging groundwater or percolating slowly into rivers and streams. We are committed to controlling and minimising the volume of run-off draining from future airport developments into local watercourses, where technically feasible, for example through the use of sustainable urban drainage systems (SUDS), which will be incorporated into new buildings where feasible.

Water Consumption

Airports are significant consumers of water. Water requirements include water used for aircraft and vehicle washing, aircraft potable water supply / toilets and shower facilities.

Water use at our airport in 2007 was 62,800 m^3. Demand for mains water will increase in line with increased activity at the airport over the next 25 years. This will have both an environmental and economic impact at the airport if unnecessary use is not managed efficiently.

We see this as a challenge we wish to embrace and we will continue to explore technological options to reduce current and future water consumption. We are already evaluating options such as waterless urinals and cistern volume reducers (CVR) which can be fitted into older toilet cisterns and displace a certain volume of water, thus reducing the amount of unnecessary water use for each flush. All new buildings will aim to be neutral consumers of potable water through the use of grey water and waterless systems.

Management of water resources will also rely on awareness programmes for all staff and tenants, in conjunction with enhanced metering, to encourage efficient water use.

Biodiversity

Standing open water, hedgerows, lowland farmland and saltmarsh are features of this area recognised in the Kent Biodiversity Action Plan. These areas support a wide variety of wildlife such as voles, badgers, bats and a variety of reptiles, birds and amphibians. All future airport developments will be assessed to establish their impact on biodiversity and provide appropriate mitigation in consultation with consultees such as Natural England and the relevant approval authorities.

A survey was undertaken across our entire airport property in May 2008 by qualified independent ecologists to identify the ecological constraints on site to guide any proposed expansion of the airport. This involved both a desk based and field survey. During the field survey habitat types were classified using the standard extended Phase 1 methodology [48] and notable features were recorded. Habitats were also assessed in terms of their potential to support protected species or species of principal conservation importance and evidence of the use of the site by such species was recorded.

This habitat identification survey noted the presence of the following features, which have the potential to support a variety of species:

- Areas of scrub, with concrete blocks and mound covered by vegetation which is a potential reptile habitat;
- Balancing pond with grills on top, surrounded by hawthorn shrubs;
- Emergency water tank with a metal holding at back showed the presence of fox earth. Pile of pebbles covered in vegetation have reptile potential;
- Rabbit holes;
- Rubble pile with reptile potential;
- Defunct hedgerow which can support a variety of species including bats and the brown hare;
- World War II bunker with bat potential;
- Decommissioned aircraft with bat potential;
- Derelict buildings and tree with ivy with bat potential; and
- Open area of soil with ephemeral growth.

Species of principal conservation importance and UK Biodiversity Action Plan (BAP) species potentially affected include some species of birds (e.g. skylark) and the brown hare. Our surveys indicate that the site does not contain any evidence of newt activity.

Our airport does not cross any designated nature conservation sites and the nearest of these is over 1 kilometre away. However, designated European sites within close proximity to Kent International Airport include:

- Thanet Coast and Sandwich Bay RAMSAR site;
- Thanet Coast and Sandwich Bay Special Protected Area (SPA);
- Sandwich Bay candidate Special Area of Conservation (SAC);
- Sandwich and Pegwell Bay National Nature Reserve (NNR);
- Pegwell Bay Local Nature Reserve (LNR); and
- Ash Level and South Richborough Pasture Site of Nature Conservation Interest (SNCI);

Given the ecological sensitivity of these sites, Natural England will be consulted when planning applications are submitted.

These surveys have identified that at our airport the overall ecological potential of the site is low. We will however undertake further surveys to identify species which may not have been identified previously due to seasonal constraints, in particular species of principal conservation importance.

We are committed to the sensitive stewardship of the land we own and the

48 Joint Nature Conservation Committee (2003). Handbook for Phase 1 Habitat, Survey: A Technique for Environmental Audit. JNCC, Peterborough.

land surrounding it and where possible new developments will be designed to have no, or a minimal adverse impact on biodiversity and include features that enhance biodiversity where possible.

It should be possible to identify where on the airfield land management practices could be modified to benefit biodiversity without compromising operational functionality.

These measures will be undertaken without compromising aircraft safety through the attraction of birds to the airfield.

Landscape and Visual

The key characteristics of Thanet are described in the Landscape Assessment of Kent as follows:

- Open, large scale arable fields;
- Long views;
- Exposed landscape, historically long denuded;
- Seaside coastal influence with big skies;
- Suburban character to towns; and
- Open cliff tops and bleak, grassy spaces.

The Thanet Local Plan identifies Pegwell Bay as a landscape character area (LCA) (policy CC2). Because it is a relatively small area, it is recognised as being less robust than other LCAs and more vulnerable to development impact. The nearest towns to the airport are Manston, St Lawrence, Cliffs End and Minster. The development options set out in the Master Plan are in line with the characteristics of the existing airport complex landscape character and no key landscape features will be lost as a result of the potential developments.

Soils, Geology and Contamination

A land quality survey has identified low levels of contamination in certain areas around the airport site as a result of past military use. This does not pose a risk to groundwater which was found to be at approximately 50 metres below the surface. However, further surveys will be undertaken in connection with development proposals identified in table 9, and other development as required so that levels of contamination can be closely monitored and contained.

Cultural Heritage and Archaeology

Thanet's geographically exposed location has made it a traditional point of entry into the country for centuries and as a result it is rich in archaeological sites of all periods from the Mesolithic to late medieval. These sites, in the form of earthworks, structures and other remains serve as important records of Thanet's history and heritage.

We recognise that archaeological sites and ancient monuments contribute greatly to the character of the county and are an important education and tourism resource. These sites will be considered in the location and construction of future development. We will also liaise with Kent County Council's Heritage Conservation Group with regard to the potential impact of development on archaeology.

Our airport was once known as RAF Manston, becoming operational in 1915 and playing a very significant role during the Battle of Britain in World War II. There are also three museums on site: the RAF Manston History Museum, the Spitfire and Hurricane Memorial Museum and the Manston Fire Museum. Two of these museums have expressed an interest in being located closer to the runway. This will be considered as other airport development takes shape.

Our Community

The Airport as an Employer

We understand that East Kent is a particular focus and priority for regeneration within the county due to the persistently higher levels of unemployment and pockets of deprivation in evidence.

Based on the employment generation calculations developed for our Master Plan, we envisage that up to 500 people will be directly employed at our airport by 2018 and 1,000 by 2033. Total employment generated by our airport (including direct, indirect, induced and catalytic) is envisaged to reach over 2,800 in 2018 and 6,150 in 2033.

The increase in activity at our airport will work towards addressing this by providing both direct and indirect employment opportunities and stimulating the local economy.

Community Relations

Environmental issues are naturally a key concern for communities living within the locality of airports particularly with regards to noise, pollution and visual impacts. As a member of the community it is our intention to work alongside our neighbours and consult with them on how best to manage any negative impact on their lives. Over time it is important to ensure that no nuisance issues occur as a result of expansion. Working closely with the local community through the KIACC our airport will inform local community groups of all developments at the airport identifying all current and future impacts and how these can be mitigated.

Procurement

As well as being a key employer for the local communities, we are also committed to sourcing local contractors for our future developments. This not only reduces vehicle mileage but is also an important driver for the regional economy, engendering a feeling of community pride in locally built projects.

In addition, the purchasing and use of natural and manufactured resources is a key sustainability aspect and can usually be addressed to realise significant cost savings and environmental benefits. We are therefore seeking to assess current procurement practices for our airport by including environmental criteria in purchasing decisions.

Section Highlights

- Sustainability is core to our business and we are working towards implementing a robust Environmental Management System
- It is recognised that future growth in passenger numbers and freight movements will bring additional environmental pressures to our airport that will need to be planned for and managed sustainably. However, our airport is not subject to any direct environmental designations
- Surveys have identified that the overall ecological habitat potential of our airport is low. Despite this, all future airport developments will be assessed to establish their impact on biodiversity and provide appropriate mitigation in consultation with key stakeholders. We are committed to the sensitive stewardship of land at and around our airport
- Archaeological resources are known to be present within our site but are not visually prominent. These sites will be considered in the design and location of future development
- We are committed to taking a low carbon approach to the way we operate, the emphasis being on the ground level emissions attributable to the operation of airport facilities. We have set a target of making all operations carbon neutral through new development
- It is very unlikely that there will be any breaches of air quality strategy objectives at our airport during the Master Plan period. We currently have a robust air quality monitoring system in place and will continue to use this to feedback to key consultees
- Waste stream volumes will increase as our airport grows. We aim to mitigate the effects of waste through our emerging waste management programme
- We are committed to ensuring the growth of our airport will have no adverse impacts on local watercourses and are mindful of the ecological sensitivity of Pegwell Bay. Discharge from the airport will be monitored and appropriate action taken where necessary
- Normal airport activities do not generate surface and groundwater pollution to any significant degree
- The noise contours produced indicate the potential requirement for some properties to be noise insulated as our airport grows and develops. We will work towards preparing a noise insulation scheme and consult on this in due course.

7. Our Conclusions & Next Steps

Our Master Plan identifies many positive factors in support of the growth of the airport. These include a positive planning policy framework, capacity for growth at our airport, access to airport infrastructure, potential contribution to the economy and regeneration effects and demand for enhanced airport facilities.

Planning Policy Context

There is very strong policy support at the national, regional and local level for our airport to become an airport of regional significance. The White Paper acknowledges that our airport has a valuable role to play in meeting local demand, while the Progress Report identifies that making the best use of existing runways in the South East (such as our airport) could help to alleviate pressures on the major South East Airports. The South East Plan specifically recognises the potential for our airport to become a regional airport (policy T9).

The South East Plan and Local Plan policies estimate that a throughput of up to 6 mppa and up to 400,000 tonnes of freight per annum could be achieved at the airport and that these figures should not be seen as a ceiling limit on development at the airport.

Capacity for Expansion

We have sufficient space at our airport to meet our forecast growth requirements for the period to 2033. Our runway is capable of accommodating all commercial aircraft types and existing airport facilities require further developing to meet the forecast passenger and freight throughput. Preliminary surveys have identified that the airport is not heavily constrained by environmental features.

We are seeking a greater flexibility of land uses for our Northern Lands through the planning policy framework review process and we regard the ability to develop both aviation and non-aviation activity in this area as key to the successful growth of our airport.

Access to Our Airport

As throughput at the airport increases, a greater range of destinations will be serviced and the frequency of flights will increase. This will strengthen our airport's role as a gateway to the South East and have positive benefits in terms of economic and tourism growth which we shall continue to actively encourage.

Our airport has good connections with the strategic road and rail network, offering short journey times to London and the rest of the South East. The proposed East Kent Access scheme will increase road capacity in this part of East Kent and will ensure local junctions do not become overloaded. Public transport linkages to the airport will be enhanced as growth occurs and our green travel plan, once developed, will encourage people to travel by alternative means of transport to the private car where possible.

Surface access growth will occur as throughput increases and it is considered that the local highway network has, and will continue to have, sufficient capacity to accommodate the increases in vehicle movements anticipated during the Master Plan period.

The Master Plan proposals have been orientated so as to avoid adverse impacts on the environment and detailed environmental assessment work will be undertaken to support the planning applications that will come forward at our airport in due course.

Further specific transport assessments will be undertaken as required, and appropriate mitigation measures provided where necessary.

Contribution to the Economy

The growth of our airport will contribute to the national, regional and local economy in terms of direct, indirect, induced and catalytic employment generation. New businesses will require staff and it is likely that staffing requirements will be met by people living in close proximity to the airport. The development of our airport will generate over 2,800 jobs by 2018, and over 6,000 jobs by 2033 within Kent, predominantly in East Kent. As the economic profile of the area is strengthened, people will be increasingly attracted to live and work in Kent and Thanet.

Available land, suitable for a range of employment uses is located at, and immediately adjacent to, our airport. These opportunities are likely to appeal to businesses that cannot afford the rental or capital land values at or around the other major South East airports. Many aviation and non-aviation related businesses will benefit from easy access to air transport services.

Access to low cost air transport infrastructure and services will also promote the development of sub regional and local tourism, leisure and recreation business sectors.

As jobs are created the demand for local housing will increase and the communities near to our airport will experience regeneration benefits during the Master Plan period. This will help strengthen the local economy.

Aviation Demand

We have been liaising with a number of passenger airline operators who are very interested in establishing regular scheduled flights from our airport to a number of UK and European destinations. We shall continue to work with them in developing opportunities at our airport.

Freight operations have been a key area of business for us since we purchased the airport in 2005. Freight activities at our airport will be strengthened through the Master Plan period and we are actively investigating opportunities to alleviate freight congestion at other South East airports.

Next Steps

In due course we will submit our initial phase of planning applications, which will outline our proposals to make more efficient use of land within our existing boundary through appropriate development outlined in this Master Plan.

Before the applications are submitted further surveys will be undertaken to assess:

- Landscape impacts of the proposals (including detailed fieldwork and photographic surveys to assess the predicted significance of visual impacts of development on residential properties around the airport);
- Geological and ground condition impacts;
- Economic impacts;
- Health impacts;
- Noise impacts;
- Water environment impacts (in relation to emissions generated by aircraft, ground support vehicles and buildings);
- Cultural heritage impacts (including an assessment of the impact on listed buildings in the village of Manston, which could potentially be affected by development) and scheduled monuments;
- Surface access impacts;
- Local biodiversity and ecology impacts; and
- Sustainability.

A detailed emissions assessment (particularly in terms of nitrogen dioxide) will be undertaken to assess the impact of the 2033 scenario and the growth of the airport beyond 3mppa.

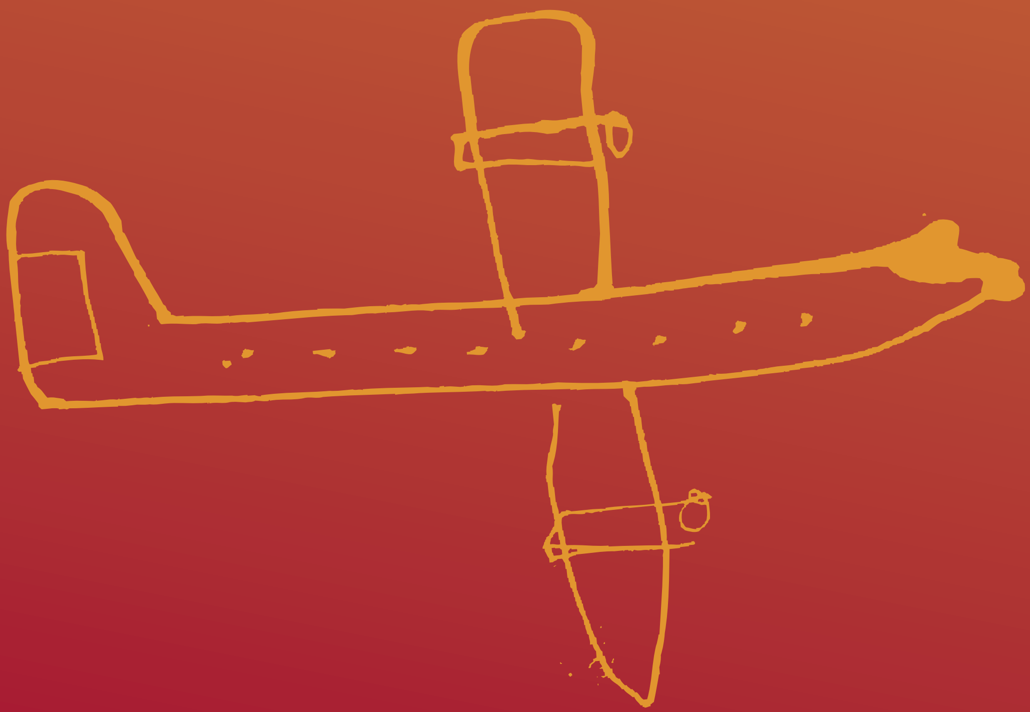
Where adverse impacts are identified, we will ensure that appropriate mitigation measures are in place.

We are committed to consult on our development proposals and will continue stakeholder involvement during the planning application process. We will also continue to liaise with the KIACC, which has been crucial to our progress at the airport so far.

Information on the progress of the planning applications will be provided on our website and updated as we progress.

The Final Word

Our airport has long played a central role in Thanet through its history of aviation activity stretching back over 90 years. The airport will continue to contribute to the Thanet economy and community as it grows during the exciting years ahead. Development at and around the airport will also add considerable weight to the regeneration and economic growth of the wider East Kent area, providing connectivity, opportunity and employment. We are pleased to share our vision and we look forward to working with the community to make this vision a reality.



Appendices

Appendix A

South East Plan and Thanet Local Plan Policies

South East Plan Policies

Policy T9: Airports

Relevant regional strategies, local development documents (LDDs) and local transport plans (LTPs) will include policies and proposals that:

i) Support the development of Gatwick and Heathrow Airports and safeguard land at Gatwick for possible new runway after 2019 as set out in the 2003 Air Transport White Paper and subsequent Government statements;

ii) Encourage Southampton Airport to sustain and enhance its role as an airport of regional significance;

iii) Support an enhanced role for Kent International Airport as an airport of regional significance; and

iv) Take account of airport operator master plans produced in accordance with the Air Transport White Paper.

Priority should be given in Airport Surface Access Strategies:

i) To reduce the environmental impact of surface access;

ii) To increase modal share in favour of public transport and sustainable modes; and

iii) To set and monitor targets that are consistent with the aims of LDDs and LTPs.

Policy EKA4: Urban Renaissance of the Coastal Towns

Local authorities and development agencies will work together to encourage new economic impetus throughout the coastal towns including the following:

i) Regeneration measures will create high quality urban environments within the coastal towns;

ii) Concentrations of employment in small businesses, education, culture and other services are encouraged, notably in central Folkestone, Margate and Dover;

iii) The economy of Thanet will be developed and diversified through provision of a full range of accessible local services, a regional role for Kent International Airport (Manston), expansion of Port Ramsgate as Kent's second Cross-Channel port and continued inwards investment in manufacturing and transport, notably aviation and marine engineering;

iv) The Port of Dover and Eurotunnel have potential to generate freight handling and tourism;

v) Further growth will be encouraged and supported at the large-scale pharmaceutical manufacturing and research plant at Sandwich;

vi) The regeneration of former colliery sites has attracted manufacturing and food processing and their transformation should be completed including mixed-use expansion of Aylesham;

vii) The smaller towns of Deal, Faversham, Herne Bay and Whitstable should develop stronger local service functions and mixed employment uses of a scale and character suitable to their size; and

viii) New measures to increase local employment will be required in Shepway to coincide with the decommissioning of the nuclear power plant at Dungeness in the short term and around 2018.

A broad balance between new housing and new jobs will be sought at each urban area at a level commensurate with the size and character of the town.

Policy EKA5: The Gateway Role

The growth of the gateways will be supported as catalysts for economic development, including that associated with freight handling and tourism, and to encourage a choice of transport modes and adequate capacity on the cross-Channel routes:

i) Appropriate development of the Port of Dover will be supported to enable growth of freight and passenger traffic. Any such development outside the existing harbour will be subject to the reinstatement of the rail link to the Western Docks to enable a significant proportion of freight to reach the port by rail; and

ii) At the Port of Ramsgate, proposals should assist the growth of port trade and not compromise its role as a major port.

In the event of a second fixed cross-Channel link being proposed it will be considered on the basis of the economic, transport, social and environmental impacts. Such a proposal should be designed to increase the share of traffic carried by rail.

The growth of Kent International Airport as a regional airport with up to 6 mppa is supported provided proposals satisfy policy criteria for the environment, transport and amenity.

Thanet District Local Plan policies

The Planning and Compulsory Purchase Act 2004 introduced measures that meant that the policies of the Thanet Local Plan would expire in June 2009 unless the Secretary of State extended the policies beyond that date. Following a direction from the Secretary of State, 93 local plan policies have been saved. The policies, which have not been saved, and that are relevant to Kent International Airport, include:

- Policy EC3 'Kent International Airport, surface transport issues';
- Policy CC3 'Local landscape features';
- Policy CC4 'Island approach routes'
- Policy HE1 'Listed buildings of special architectural or historic interest';
- Policy HE10 'Protection of scheduled ancient monuments';
- Policy D4 'Design statements';
- Policy NC1 'Habitats'; and
- Policy NC2 'Nature reserves and SSSI'

The saved Thanet Local Plan policies which are relevant to the airport and remain part of the development plan are listed below.

Policy EC2: Kent International Airport

Proposals that would support the development, expansion and diversification of Kent International Airport will only be permitted subject to the following requirements:

- Demonstrable compliance with the terms of the current agreement under section 106 of the Town and Country Planning Act 1990 or subsequent equivalent legislation;
- New built development is to be designed to minimise visual impact on the open landscape of the central island. particular attention must be given to roofscape and to minimising the mass of the buildings at the skyline when viewed from the south;

- Appropriate landscaping schemes, to be designed and implemented as an integral part of the development. Any application for development for the purpose of increasing aircraft movements in the air or on the ground, auxiliary power or engine testing, must be supported by an assessment of the cumulative noise impact and the effectiveness of mitigation measures to be implemented in order to minimise pollution and disturbance. the acceptability of proposals will be judged in relation to any identified and cumulative noise impact, the effectiveness of mitigation and the social and economic benefits of the proposals;
- An air quality assessment in compliance with policy EP5, to demonstrate that the development will not lead to a harmful deterioration in air quality. Permission will not be given for development that would result in national air quality objectives being exceeded;
- Development will not be permitted within the airport complex to the south of the airside development site identified in policy ec4, unless it has been demonstrated that the development is necessary for the purpose of air traffic management;
- Any new development which would generate significant surface traffic must meet requirements for surface travel demand in compliance with policy EC3; and
- It must be demonstrated that new development cannot contaminate groundwater sources or that appropriate mitigation measures will be incorporated in the development to prevent contamination.

Given the prime role of Kent International Airport in the strategy of this plan, the district council will carefully consider the potential adverse impacts of landscaping and nature conservation enhancements in the vicinity of the airport, given, for example, the potential to increase the risk of bird strike.

Policy EC4: Airside development area

Land at the airport, as identified on the proposals map, is reserved for airside development. Development proposals will require specific justification to demonstrate that an airside location is essential to the development proposed. Development will be required to retain sufficient land to permit access by aircraft of up to 65m (217ft) wingspan to all parts of the site.

Policy EC5: Land at, and east of, the airport terminal

Until such time as a new airport terminal is built, land at, and east of, the existing airport terminal is identified on the proposals map for airport terminal-related purposes. Uses will be restricted to those which directly support or complement the operational requirements of the existing airport terminal. Should a new terminal be built, other airport related development will be permitted on this allocated site. Planning conditions or planning agreements will be applied to limit any development granted planning consent to uses conforming to this policy.

Policy EC6: Fire training school / MOD complex

If the current use of the fire training school or adjoining land ceases, the local planning authority will support the development of airport or airport-related uses, which would assist in the expansion of the airport. These could include:

- Educational / training uses (such as fire training);
- Hotels;
- Car parking;
- Or uses falling within use classes A2 and B1, with an airport orientation.

Policy TR4: New road and highway improvements

During the plan period to 2011 the district council will seek the implementation of the following highway improvements and will, where appropriate, safeguard any land required for their construction. Each improvement shall be sensitively designed and landscaped so as to minimise environmental impact.

- Improvements to dual carriageway standard to the A256 and A299 between Richborough, lord of the manor and mount pleasant, minster (known as phases 1 & 2 of East Kent access)
- Realignment of the A256 adjacent to Eurokent Business Park.

Policy EP5: Local air quality monitoring

Proposals for new development that would result in the national air quality objectives being exceeded will not be permitted. Development proposals that might lead to such an exceedance, or to a significant deterioration in local air quality resulting in unacceptable effects on human health, local amenity or the natural environment, will require the submission of an air quality assessment, which should address:

1. The existing background levels of air quality;
2. The cumulative effect of further emissions; and
3. The feasibility of any measures of mitigation that would prevent the national air quality objectives being exceeded, or would reduce the extent of air quality deterioration.

Policy EP7: Aircraft noise

Applications for noise sensitive development or redevelopment on sites likely to be affected by aircraft noise will be determined in relation to the latest accepted prediction of existing and foreseeable ground noise measurement of aircraft noise. Applications for residential development will be determined in accordance with the following noise exposure categories.

NEC predicted aircraft noise levels (dbl aeq.0700-23.00)

A <57	noise will not be a determining factor
B 57-63	noise will be taken into account in determining applications, and where appropriate, conditions will be imposed to ensure an adequate level of protection against noise (policy ep8 refers)
C 63-72	planning permission will not be granted except where the site lies within the confines of existing substantially built-up area. where residential development is exceptionally granted, conditions will be imposed to ensure an adequate level of protection against noise (policy EP8 refers).
D >72	residential development will not be permitted

Applications for non-residential development including schools, hospitals and other uses considered sensitive to noise will not be permitted in areas expected to be subject to aircraft noise levels exceeding 60 db(a) unless the applicant is able to demonstrate that no alternative site is available. proposals will be expected to demonstrate adequate levels of sound insulation where appropriate in relation to the particular use

Policy EP8: Aircraft noise & residential development

When planning consent is granted for residential development on any land expected to be subject to a level of aircraft noise of above = 57db(a)**, such consent will be subject to provision of a specified level of insulation to achieve a minimum level of sound attenuation in accordance with the following criteria:

NEC predicted aircraft minimum noise levels
attenuation required (db(a)
(frequency range 100-3150 hz)

A <57	no attenuation measures required
B 57-63	20db
C 63-72	30db

** laeq 57db 07.00-23.00

Policy EP13: Groundwater protection zones

If a proposed development in the groundwater protection zones identified on the proposals map would have the potential to result in a risk of contamination of groundwater sources, it will not be permitted unless adequate mitigation measures can be incorporated to prevent such contamination taking place.

Policy CC2: Landscape character areas within the landscape character areas identified on the proposals map,

The following policy principles will be applied:

1. At Pegwell Bay priority will be given to the conservation and enhancement of the natural beauty of the landscape over other planning considerations;
2. In the former Wantsum Channel area, new development will not normally be permitted;
3. In the Wantsum Channel north shore area, development will only be permitted that would not damage the setting of the want sum channel, and long views of Pegwell Bay, the Wantsum Channel, the adjacent marshes and the sea;
4. On the central chalk plateau, a number of sites are identified for various development purposes. Where development is permitted by other policies in this plan, particular care should be taken to avoid skyline intrusion and the loss or interruption of long views of the coast and the sea;
5. At Quex Park, new development proposals should respect the historic character of the parkland; and
6. At the urban coast, development that does not reflect the traditional seafront architecture of the area, maintain existing open spaces and long sweeping views of the coastline will not be permitted. Development proposals that conflict with the above principles will onlybe permitted where it can be demonstrated that they are essential for the economic or social well-being of the area.

In the event of a real and specific threat to the landscape character of these areas from permitted development, the use of article 4 directions will be considered, and Secretary of State approval for the direction sought.

Policy D1: Design principles

1. All new development is required to provide high quality and inclusive design, sustainability, layout and materials.
2. A new development proposal will only be permitted if it:
    a. Respects or enhances the character or appearance of the surrounding area, particularly in scale, massing, rhythm, and use of materials appropriate to the locality;
    b. Is compatible with neighbouring buildings and spaces and does not lead to unacceptable loss of amenity through overlooking, noise or vibration, light pollution, overshadowing, loss of natural light, or sense of enclosure;
    c. Incorporates where practicable a high degree of permeability for pedestrians and cyclists and also considers access for public transport;
    d. Incorporates provision for disabled access;
    e. Retains open spaces, gaps in development, mature trees, other vegetation and any other features that contribute to biodiversity and the quality of the local environment;
    f. Incorporates new landscaping as an integral part (as set out in policy D2);
    g. Incorporates, where appropriate, wildlife habitats, wildlife corridors and initiatives for their long term management;
    h. Incorporates measures to prevent crime and disorder, promotes public safety and security and the perception of public safety and security;
    i. Incorporates, where practical and appropriate, high quality integrated public art which is relevant to the site and locality;
    j. Provides safe and satisfactory means of pedestrian and, where provided, vehicle access;
    k. Provides for clothes drying facilities and refuse disposal or dustbin storage;
    l. Incorporates sustainable drainage systems.

Policy D2: Landscaping

The following elements will be required as part of landscaping proposals for any new development:

1. The enhancement of the development site in its setting;
2. The retention (and protection during site works) of as many of the existing trees, hedges and other habitat features on site as possible;
3. On sites of one hectare or more, the setting aside of 10% of the development site for the planting of native tree species, either within or at the boundary of the development site;
4. The maximising of nature conservation opportunities where development is proposed in proximity to existing open space or wildlife habitats, and
5. Where both appropriate and possible, the provision of landscaping in advance of new development to facilitate the assimilation of new development into the landscape.

The district council will require to be satisfied that the developer has made adequate arrangements to ensure continued maintenance of landscaping, and may seek to secure arrangements for this purpose by entering into a planning agreement.

Glossary

Common terms used in this Master Plan are defined below:

ACI	Airports Council International
Aprons	An apron is where passengers and / or freight board and disembark the aircraft
ATF	Air Transport Forum
CAA	Civil Aviation Authority
DfT	Department for Transport
DRDF	Digitally Resolved Direction Finder
GA	General Aviation
GPA	Glasgow Prestwick Airport
IAEL	Infratil Airports Europe Ltd.
ICAO	International Civil Aviation Organisation
ILS	Instrument Landing System
LDF	Local Development Framework
mppa	Million passengers per annum
MRO	Maintenance Repair and Overhaul
NDB	Non-Directional Beacon
NPF	National Planning Framework published in 2004
NPF2	National Planning Framework published in 2008 (draft)
RES	Regional Economic Strategy
RFF	Rescue and Fire Fighting
White Paper	The Future of Air Transport White Paper, published December 2003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York Aviation

STONE HILL PARK LIMITED

SUMMARY REPORT ANALYSING USE OF YORK AVIATION MATERIAL BY RIVEROAK STRATEGIC PARTNERS LIMITED AND ASSESSMENT OF CAPABILITY OF MANSTON AIRPORT

NOVEMBER 2017

York Aviation

Originated by: Louise Congdon/James Brass/Niall Gunn/Richard Connelly

Dated: 10th November 2017

Reviewed by: Richard Kaberry

Dated: 13th November 2017

STONE HILL PARK LIMITED

SUMMARY REPORT ANALYSING USE OF YORK AVIATION MATERIAL BY RIVEROAK STRATEGIC PARTNERS LIMITED AND ASSESSMENT OF CAPABILITY OF MANSTON AIRPORT

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EXECUTIVE SUMMARY

1. York Aviation was appointed by Stone Hill Park Limited (SHP) in September 2017 to review the evidence presented by RiverOak Strategic Partners Limited (RSP) in connection with RSP's prospective application for a Development Consent Order (DCO) for the redevelopment and re-opening of Manston Airport as a hub for international air freight services, which also offers passenger, executive travel and aircraft engineering services.

2. We were the authors of two specific reports upon which RSP seek to rely in making their case, namely a report for the Freight Transport Association (FTA) and Transport for London (TfL) in 2015 and a note on Freight Connectivity for TfL in 2013. The first of these documents was used by RSP in its public consultation and this may have led respondents to believe that we were supporting the re-opening of Manston, which is not true and, as we go onto explain in this report, our analysis in these documents for the FTA and TfL does not support RSP's conclusion that there would be a substantive or sustainable role for Manston in the UK air freight industry.

3. The RSP case is principally based on circumstantial evidence presented in the Volumes I to IV of *Manston – A Regional and National Asset* prepared by Dr Sally Dixon of Azimuth Associates (June 2017 consultation version). Much of the material upon which Azimuth seek to rely as the basis of RSP's case relates to the economic costs to the UK if additional passenger hub capacity is not provided in the South East of England by 2050. This is not relevant to the specific question as to whether there would be sufficient demand for pure freighter movements to be operated to/from Manston in the foreseeable future or by their assessment year 2040.

4. The analysis presented by Azimuth shows a lack of understanding of the economics of the air freight market. This leads to a misinterpretation of our work, upon which Azimuth seek to rely to support RSP's case. Just because there could be excess air freight demand in 2050, compared to the bellyhold capacity available in the absence of further runway capacity at the UK's main hub, it does not follow that displaced bellyhold freight will seek a more expensive pure freighter service from a relatively nearby airport over the use of available bellyhold capacity from a more distant airport which can be provided at a lower cost to the shipper with only a marginal penalty in terms of the overall shipment time.

5. Fundamentally, Manston's past operation was economically inefficient due to the inherent lack of viability. Hence, reopening the Airport, in the face of a very limited niche market, has the potential to damage the productivity of the UK aviation sector overall, particularly, as we have demonstrated in our own assessment of cargo demand for Manston in Section 3 of this report, that there are more economically efficient alternatives available for any freight displaced due to specific capacity constraints at Heathrow both now and in the future.

6. Manston is too peripheral for integrator operations serving the UK. Integrators have a strong preference for locations more centrally located in the UK with good road access to all of the major markets. The availability of land for warehouses, for example as suggested in terms of the use of the 'Northern Grasslands' part of the overall Airport site, is far less important than a location central to the market and the availability of good road access, neither of which are characteristics of Manston. It is simply in the wrong place to serve the market being located at the far south east at the end of a peninsular, away from the main centres of population and distribution in the UK.

7. In the absence of hard market evidence of the need for Manston Airport, Azimuth undertook an interview survey to supplement RSP's case and to inform the forecasts. However, the list of interviewees was small, dominated by mainly local companies with something of a vested interest in seeing Manston re-opened. Even so, if anything, the views of those interviewed by Azimuth suggest that there would, at best, be a limited role for Manston. The one airline interviewed made clear that *"success at Manston depended upon identifying a niche market and becoming known for excellence. In particular, suggestions included a perishables centre, handling of live animals, easy access for charter flights, and handling cargo that is not necessarily straightforward"*. The scale of this opportunity was never quantified by Azimuth. It is clear, however, that the realistic expectation for Manston is for a small niche operation rather than as a general 'overspill' cargo airport for London.

8. The outputs from these interviews are then used by Azimuth as a basis for postulating a number of cargo aircraft movements that might operate at Manston. However, it is not possible to relate the proposed services to be operated with the responses by the interviewees. There is simply no explanation for, or justification for, the services postulated by Azimuth. At the very least, there is a lack of transparency in the approach adopted.

9. In our view, the Azimuth cargo movement forecasts simply lack credibility. To illustrate this lack of credibility of the forecasts, in Year 2 (the first operational year), a cargo throughput of nearly 100,000 tonnes is forecast by Azimuth. This would make Manston the 5th largest freight airport in the UK in its first year after re-opening (compared to 2016 actual throughput at the other airports). This would place it close to the scale of freight operations at Manchester Airport, which includes a substantial amount of bellyhold freight. It would make Manston the 3rd busiest airport in the UK in terms of tonnage carried on dedicated freighter aircraft. This is simply not a credible proposition. This lack of credibility is important in reaching any decision under section 23 of the Planning Act 2008 (as amended).

10. We have updated and further developed our analysis of the UK air freight market from that previously undertaken in 2013 and 2015 for TfL and for the FTA and TfL (RSP seek to rely on our 2013 and 2015 work as corroboration of their own cargo movement forecasts). When properly interpreted, our forecasts of air freight demand and capacity across the UK as a whole, taking the role of bellyhold fully into account, show that, to the extent that there is any need for additional pure freighter movements, there is plenty of freighter capacity at Stansted and East Midlands to accommodate any growth. These airports are better located relative to the market and the key locations for distribution within the UK. Overall, we conclude from this analysis that there will be no shortage of freighter capacity in the UK in the period up 2040 (RSP's assessment end date) and that overspill from other airports would not provide a rationale for re-opening Manston.

11. Taking the most optimistic basis for assessing its potential role, we have estimated that Manston might be able to achieve at most 4,470 annual air transport movements by cargo aircraft by 2040, but this is highly unlikely given its location and the clear market trend away from the use of dedicated freighter aircraft. Our more likely projection is that it might attain 2,000 annual air cargo aircraft movements by 2040 and it is equally plausible that it might not achieve more than 750 such movements annually. These are all far below Azimuth's projection, upon which RSP rely, of 17,171 annual cargo aircraft movements.

12. Our initial assessment of the passenger market is that the throughput might, at best, be around half of that projected by RSP and, hence, given the dependence on passenger related income for the financial viability of airport operations, this will impact substantially on the viability of the proposal. The other activities suggested by RSP, such as business aviation, maintenance, repair and overhaul, and aircraft dismantling are highly competitive markets and, to the extent that Manston might attract any such operations, these are unlikely to contribute substantially to the overall viability of the Airport.

13. The existing infrastructure at Manston Airport, if made good, is capable of handling 21,000 annual air cargo aircraft movements[1]. The actual usage of that capability would depend on the pattern of operation and how the infrastructure was used on a day by day basis. Our assessment, therefore, provides essential missing information from RSP's materials to date which is necessary for the purposes of section 23 of the Planning Act 2008 (as amended), for assessment purposes under the Environmental Impact Assessment Regulations and for consultation purposes.

14. Without prejudice to our view that demand to use Manston is not likely to be anything like 17,171 cargo aircraft movements a year, we have considered the land required to accommodate such a number of movements. Our assessment is that the land required would be substantially less than shown on the RSP Master Plan and that the proposed land take is excessive and without justification in terms of the compulsory acquisition of the land. Any development required to handle 17,171 annual movements by air cargo aircraft can all be accommodated to the south of the B2050 and, even allowing for passenger operations and other activities, would not require all of the airfield land to the south of the road. Obviously, on the basis of more realistic forecasts of future demand, the area required to support the ongoing operation of the Airport would be materially smaller.

15. We can see no justification for the inclusion of the 'Northern Grasslands' area within the DCO on the basis of it being for associated development. There will be little requirement for or likelihood of the relocation of freight forwarding activity from adjacent to the UK's main cargo hub at Heathrow to Manston, as suggested by RSP, and any requirement for such activity specifically to support the proposed level of freight activity at Manston could easily be accommodated on land to the south of the B2050. The development on the 'Northern Grasslands' site appears to be speculative commercial development which, based on the precedent at East Midlands Airport – the UK's principal airport for pure freighter operations – would be expected to be largely for non-aviation related uses.

[1] Based on an 18-hour operational day. Should a night time noise policy be agreed with Thanet District Council pursuant to the existing planning agreement that enabled a longer operational day and/or a number of scheduled night movements, then the capability could, in theory, be higher than 21,000 annual cargo aircraft movements.

16. In terms of the socio-economic implications of the proposed development, Azimuth have shown a lack of understanding of how such impacts should properly be calculated. Leaving aside the use of inappropriate multipliers, the impacts have been assessed at a national scale and should have taken displacement of activity from other airports fully into account, reducing the impacts well below those stated. Furthermore, the assessment should have considered the impact on alternative uses of the site, including SHP's proposed mixed use development and the socio-economic benefits deriving therefrom. We have set out a more realistic and robust assessment, which shows that the local impacts within Kent, even on Azimuth's forecasts, would be substantially less than claimed and it is these lower order effects which would need to be balanced with the environmental and other impacts in assessing the acceptability of the proposed development against the alternatives.

17. Unsurprisingly, the socio-economic impacts associated with the Airport are lower still on the basis of more realistic forecasts of likely usage if it re-opened. The operation is simply of a much smaller scale such that, in Year 2, it would generate only 452 jobs, 17% of Azimuth's estimate of 2,654. By Year 20, the differential is even larger, with the Azimuth estimates reaching over 30,000 jobs compared to our estimate of just over 1,000 jobs. Once again, the evidence presented by Azimuth on behalf of RSP cannot be relied upon. It is infected with the flaws in the traffic forecasting methodology identified previously but also the approach to identifying socio-economic impacts is, in itself, badly flawed. The socio-economic impacts are, as a result, massively overstated. In any event, these benefits would not be realised if the Airport ceases operation again due to it not being commercially viable.

18. As well as the Azimuth reports which form the basis of RSP's case, we have also reviewed a number of other reports on the potential for Manston. In overall terms, we agree with Aviasolutions for Thanet District Council that there is little realistic prospect of the re-opening of Manston Airport being a commercially viable proposition. We have reviewed their original report and the more recent reports and concur with their views on the overall structure of the UK air cargo market, noting that they, unlike Azimuth, have correctly understood the implications of our 2015 work for the FTA. We do not accept Northpoint's rebuttal of the Aviasolutions work. Like Azimuth, Northpoint's work is largely aspirational without any robust evidence or analysis of the market. Northpoint, too, misinterpret our previous work for the FTA and TfL.

19. In overall terms, we do not consider that the case that the re-opening of Manston Airport would constitute a Nationally Significant Infrastructure Project has been robustly made or substantiated. In any event, given that the baseline capability of Manston Airport is at least 21,000 annual cargo air transport movements (see section 4), this means that RSP must, effectively, be seeking to increase the capability of Manston Airport from 21,000 annual air transport movements by cargo aircraft to at least 31,000 such movements each year, a level of activity which has not been consulted on or assessed in RSP's Preliminary Environmental Information Report (PEIR). Indeed, RSP's consultation material does not provide any detail as to what the increase in capability would be as a result of its proposals (i.e. the increase in capability as a result of its proposed alteration to Manston Airport). As a minimum, the increase in capability would be to 31,000 annual air transport movements by cargo aircraft, but in our view their proposals would result in a significantly higher 'new' capability which is not revealed or assessed by RSP.

20. Our overall assessment is that RSP have failed to provide their own evidence of the capability of Manston Airport and the amount by which their proposals would increase that capability by. Rather, the only information that they present is a forecast of future freight demand, which has no credibility as explained in this report. There are, hence, major omissions in RSP's consultation material. This failure means that, in our opinion, the requirements in section 23 of the Planning Act 2008 (as amended) have not been satisfied. In essence, we would have expected RSP to be able to show:

- the capability of Manston Airport of providing air cargo transport services;
- the amount by which RSP is proposing to increase that capability by and thus the "new" capability; and
- a credible forecast for why that ‘new’ capability is required.

None of this information is provided by RSP.

1 INTRODUCTION

1.1 York Aviation was appointed by Stone Hill Park Limited (SHP) in September 2017 to review the evidence presented by RiverOak Strategic Partners Limited (RSP) in connection with RSP's prospective application for a Development Consent Order (DCO) for the redevelopment and re-opening of Manston Airport as a hub for international air freight services, which also offers passenger, executive travel and aircraft engineering services.

1.2 York Aviation is a specialist air transport consultancy that focusses on airport planning, demand forecasting, strategy, operation and management. The company was established in 2002. We offer a broad range of services to airports, airlines, governments, economic development organisations and other parties with an interest in air transport. Our team is a mixture of experienced air transport professionals and economists. Key members of the team have substantial experience of airport operations and development gained through working for Manchester Airports Group. Our core services include:

- business planning and strategy;
- capacity and facilities planning;
- master planning and planning application support;
- demand forecasting;
- economic impact assessment and economic appraisal;
- policy and regulatory advice;
- route development;
- transaction support.

1.3 Our clients include:

- Transport for London;
- Transport for the North;
- Department for Transport;
- Scottish Enterprise;
- Northern Ireland Government;
- Manchester Airports Group;
- Birmingham Airport;
- London City Airport;
- London Luton Airport;
- Ryanair;
- Freight Transport Association.

As well as numerous investors in airports and other parties with an interest in the development, operation and management of airports in the UK and abroad.

1.4 Louise Congdon, Managing Partner of York Aviation has provided evidence in relation to the need for and economic impact of airport development at several airport public inquiries, including Manchester Runway 2, Liverpool Airport, Doncaster Sheffield Airport, Stansted Generation 1, London Ashford Airport (Lydd) and London City Airport.

1.5 We were the authors of two specific reports upon which RSP seek to rely in making their case, namely a report for the Freight Transport Association (FTA) and Transport for London (TfL) in 2015 and a note on Freight Connectivity for TfL in 2013. The first of these documents was used by RSP in its public consultation and this may have led respondents to believe that we were supporting the re-opening of Manston, which is not true and, as we go onto explain in this report, our analysis in these documents for the FTA and TfL does not support RSP's conclusion that there would be a substantive and sustainable role for Manston in the UK air freight industry.

Historical Position

1.6 Manston Airport closed to commercial operations in May 2014, following several unsuccessful attempts to attain commercially viable operations. In the decade prior to closure, the Airport did manage to attract some cargo and passenger activity but not to levels that could ensure financial and commercial viability for its owners. The historic traffic performance is set out in **Table 1.1**. The Airport's cargo traffic peak was in 2003.

Table 1.1: Historic Commercial Traffic at Manston Airport

	Passengers	Cargo (tonnes)	Air Transport Movements[2] (excl. Air Taxis)	of which, Cargo Aircraft Movements[3]	Total Aircraft Movements
2003	3,256	43,026	1,106	1,081	24,934
2004	101,328	26,626	3,333	730	23,324
2005	204,016	7,612	4,631	177	21,358
2006	9,845	20,841	461	322	16,687
2007	15,556	28,371	608	444	21,521
2008	11,625	25,673	540	412	19,269
2009	5,335	30,038	583	485	18,902
2010	25,692	28,103	1,151	491	16,260
2011	37,169	27,495	1,472	419	18,695
2012	8,262	31,078	687	432	14,688
2013	40,143	29,306	1,640	511	17,504

Source: CAA Airport Statistics

[2] Air Transport Movements (ATMs) are those services sold to the public as distinct from private flights or those operated on behalf of individual companies using their own aircraft. All substantive cargo operations in the UK would be treated as air transport movements. Aircraft movements are all aircraft movements at an airport, including 'touch and go' landings by flying school aircraft.

[3] Based on more detailed records maintained by the former airport operator, it would appear that CAA data may not record all empty cargo positioning flights. However, we do not have complete data. The total number of cargo flights could, hence, be somewhat greater than shown.

1.7 Table 1.1 shows that the number of air cargo movements and the tonnage carried was fairly consistent over the last 10 years of the Airport's operation, but these operations were not sufficient to support a commercially viable operation at the Airport.

1.8 We address the realistic levels of freight demand that Manston Airport might attract if re-opened in **Section 3** of this report.

The Application

1.9 RSP's prospective DCO application is predicated on its proposed alterations to the Airport's infrastructure, the effect of which is expected to increase by at least 10,000 a year the number of cargo air transport movements (CATMs) a year that the Airport is capable of accommodating. In practice, the case set out in the consultation documents produced by RSP and used in the Preliminary Environmental Information Report (PEIR) are predicated on it being able to attract and handle a forecast of 17,171 CATMs and 1.4 million passengers per annum (mppa) by 2039 and all of the assessments are made on this basis.

1.10 In order for RSP's proposals to be considered a Nationally Significant Infrastructure Project (NSIP), which can be taken forward using the DCO procedure under the Planning Act 2008 (as amended), it must comprise of an alteration to an airport which would *"increase by at least 10 million per year the number of passengers for whom the airport is capable of providing air passenger services"* or *"increase by at least 10,000 a year the number of air transport movements of cargo aircraft for which the airport is capable of providing air cargo transport services."*[4] [5] In this case, the relevant criterion relates to air transport movements for cargo aircraft. It is clear, therefore, that validating the capability of Manston Airport of providing air cargo transport services is vital to determining the legitimacy of a DCO.

1.11 RSP's prospective DCO application does not provide any explanation or understanding of the capability of the Airport before its proposed alteration is made. The capability of the Airport is a necessary component of Section 23(5) of the Planning Act 2008 (as amended), as it is from that figure that a prospective applicant must consider the effect of its proposed alteration, which must be expected to have the effect of an increase of at least 10,000 annual air transport movements by cargo aircraft. Without identifying the capability of Manston Airport, one does not have all of the components required under section 23 of the Planning Act 2008 (as amended) for a decision to be made as to whether the proposed alteration falls within section 23. In addition, an applicant must then explain what the 'new' capability would be following its proposed alteration in order to then assess the effects of the proposed alteration. We consider this further in **Section 4**.

[4] Section 23(5) of the Planning Act 2008 (as amended).

[5] It is noted that the Planning Act 2008 (as amended) also refers to an increase in permitted use as a relevant criterion. In this case, the existing planning consent under which Manston operated contained no limit on the number of annual aircraft movements permitted although there was a prohibition on night movement of aircraft between 23.00 and 07.00 in force, pending agreement to a night movement policy with the local planning authority, Thanet District Council. In any event, the increase would still need to be at least 10,000 per year in the number of air transport movements of cargo aircraft for which the airport is permitted to provide air cargo transport services.

1.12 A further consideration is the extent of development proposed in terms of its capability of supporting the projected number of movements but, more importantly, given that RSP is seeking to compulsory acquire the entirety of the Manston Airport site from SHP, whether the land area proposed is actually necessary in order to handle the projected number of aircraft movements and whether there is a *"compelling case in the public interest"* for its acquisition[6]. This requires consideration as to whether the case for the development and re-opening of Manston Airport is *"compelling"* and whether the full extent of land required has been fully justified. We consider this in Section 4 of this report.

1.13 We consider the socio-economic case for the development in **Section 5** of this report.

This Report

1.14 RSP sets out its strategic case and need for the re-opening of Manston Airport as a hub for international air freight in 4 volumes prepared by Dr. Sally Dixon of Azimuth Associates (Azimuth), namely '*Manston Airport - a Regional and National Asset, Volumes I-IV; an analysis of air freight capacity limitations and constraints in the South East and Manston's ability to address these and provide for future growth; June 2017'.* **Section 2** of this report reviews this analysis and the extent to which the analysis presented by Azimuth justifies the forecast cargo and passenger activity projected for Manston. This is important for the purposes of section 23 of the Planning Act 2008 (as amended) and whether the analysis presented by Azimuth provides a compelling case in the public interest for the acquisition of the site through compulsory acquisition procedures.

1.15 Within this report, we address, in particular, the use made by Azimuth of analysis that we undertook for Transport for London[7] and for the Freight Transport Association[8] in connection with the work of the Airports Commission and the need for new hub airport capacity for London. For reasons which will be made clear, the York Aviation work relied upon by RSP does not, and cannot be taken to, support RSP's proposed alteration to Manston Airport and, therefore, cannot be relied upon by RSP, the Planning Inspectorate, the Secretary of State and any future appointed Examining Authority (should RSP submit the application and the Secretary of State accepts the application). Given the errors in the interpretation and use of our work by Azimuth, we are concerned that the consultation carried out to date has not properly informed the public in respect of the valid interpretation of our work regarding the prospects for the viable operation of Manston as a freight airport.

1.16 We also review independent reports produced variously by Aviasolutions (Avia) for Thanet District Council in September 2016 and August 2017 and Northpoint Aviation Services (Northpoint) for RSP. This peer review of the other reports is at **Section 6** of this report. To the extent that we agree with these other reports, we do not repeat the detailed analysis in this report but reference the corroborating evidence as appropriate.

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[6] Department for Communities and Local Government, *Guidance on compulsory purchase process*, October 2015, page 6.

[7] Referenced by Azimuth as Transport for London (TfL), *Note on Freight Connectivity*, unpublished paper 2013. For the avoidance of doubt, this note as made available by TfL under a Freedom of Information Request is appended to this report at **Appendix A**.

[8] York Aviation (2015), *Implications for the Air Freight Sector of Different Airport Capacity Options*.

1.17 Our conclusions are presented in **Section 7**.

2 CRITIQUE OF RSP APPROACH TO FORECASTING

2.1 In this section, we review the work of Azimuth that forms the justification for the DCO and was part of RSP's consultation documents in June and July 2017. The work is presented in 4 volumes:

- Volume I: Demand in the south east of the UK
- Volume II: A qualitative study of potential demand
- Volume III: The forecast
- Volume IV: The economic and social impact of airport operations

This section also addresses the basis of the demand forecasts for Manston as set out in Volumes I, II and III, focussing principally on air freight in this summary report. We address the socio-economic assessment in Volume IV in Section 5 of this report. Given the repetition of much of the material across the first three volumes of Azimuth's work, we have grouped issues broadly under the appropriate volume in this section.

2.2 We do not, in the main, dispute the accuracy of the factual detail, some relevant and some not, set out in the Azimuth reports or the veracity of the secondary evidence presented. We do, however, have serious and considerable issues in relation to the interpretation and the completeness of this evidence base, in particular relating to the use of previous York Aviation reports, and the inferences and conclusions drawn from it. Ultimately, we consider that the case put forward by Azimuth is weak and unsubstantiated as the extensive evidence base presented does not, in reality, support the conclusions drawn which, in many cases, go well beyond what can reasonably and sensibly be inferred from the information presented. Much of the information is effectively circumstantial and falls far short of making a compelling case, or indeed any case, that the demand forecasts would be capable of being realised.

2.3 Although Azimuth state at paragraph 1.2.1 of Volume 1 *"RiverOak, who specialise in identifying profitable market opportunities, has identified the substantial need for additional and specialised airport capacity for dedicated freighters in the southeast of England"*, we are unaware of any other research upon which RSP rely. All other documents produced in support of the prospective DCO appear to rely on the work of Azimuth.

2.4 In essence, the work of Azimuth sets out to address three key questions, which they assert provide the answer as to whether there is a compelling case in the public interest for the development of Manston Airport sufficient to meet the test for the inclusion of compulsory acquisition powers as part of the DCO. These are largely addressed in Volumes I and II, and lead on to the preparation of demand forecasts set out in Volume III. The three tests put forward by Azimuth are:

- *Does the UK require additional airport capacity in order to meet its political, economic, and social aims?*
- *Should this additional capacity be located in the South East of England?*
- *Can Manston Airport, with investment from RiverOak, relieve pressure on the UK network and meet the requirement of a nationally significant infrastructure project?*

2.5 At the outset, we query whether these are the correct questions to be addressed in terms of the case that RSP seek to make for the use of Manston as a major freighter hub. As is clear from the draft Airports National Policy Statement (NPS)[9], the first two questions relate to the requirement for more capacity at the UK's main passenger hub airport at Heathrow. The updated draft NPS makes clear at paragraph 1.30 that, in relation to the Government's preferred solution of a new northwest runway at Heathrow:

"Consideration has been given to alternative solutions to the preferred scheme, and the conclusion has been reached that there are no alternatives that would deliver the objectives of the Airports NPS in relation to increasing airport capacity in the South East and maintaining the UK's hub status."

2.6 Hence, these first two questions are not relevant to considering whether there is a need for dedicated freighter capacity at Manston sufficient to meet the tests for a DCO. Manston would make no contribution to meeting the identified requirement of passenger hub capacity for the UK or for the South East of England. Furthermore, the draft NPS makes clear, at paragraph 1.39 in relation to any other development consent application for airport development, that:

"Nevertheless, the Secretary of State considers that the contents of the Airports NPS will be both important and relevant considerations in the determination of such an application, particularly where it relates to London or the South East of England. Among the considerations that will be important and relevant are the findings in the Airports NPS as to the need for new airport capacity and that the preferred scheme is the most appropriate means of meeting that need."

2.7 This confirms that the proposed northwest runway at Heathrow addresses the identified need as set out by the Airports Commission for new airport capacity in the South East of England and that this provides a context against which any other DCO application would need to be assessed.

Demand in the South East of the UK (Volume I)

2.8 As has been noted above and in the most recent 2017 reports from Avia, much of the analysis presented by Azimuth relates to the evidence for a shortage of airport capacity overall in the South East of England and, specifically, the work of the Airports Commission relating to the need for additional hub airport capacity serving both the needs of passengers and of air freight. Much of the evidence presented by Azimuth to justify the existence of an airport capacity shortfall in the South East of England relates to the shortfall in capacity for passenger aircraft and, specifically, a shortage of capacity at the main aviation hub at Heathrow as noted above. This does not provide any underpinning justification for the specific development that RSP proposes at Manston, which comprises a specialist freight airport with a small number of low fare, regional and charter flights for passengers.

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[9] Department for Transport, *Revised Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*, October 2017. Note that the provisions referred to have not changed since the original draft as of February 2017, which pre-dated RSP's consultation.

2.9 Azimuth cite a number of reports which highlight the potential shortage of airport capacity, not just in the UK but across Europe, and the economic costs of not addressing these shortfalls. Azimuth then seek to imply that Manston could provide part of the solution and contribute to delivering these benefits. This is not justified and creates a false impression of the potential economic significance of RSP's proposals. A key point is that the reports relied on by Azimuth need to be seen in the context in which they were written, namely to set out the economic consequences of the failure to address the shortage of hub airport capacity principally for passengers but also providing bellyhold capacity for freight in the UK. All of the reports pre-date the Government's decision to promote an additional runway at Heathrow and were largely directed at ensuring that a positive decision was taken regarding the development of additional runway capacity.

2.10 Furthermore, the reference at paragraph 5.1.4 to concern expressed in the Aviation Policy Framework[10] regarding the implications of capacity shortfalls on the range of destinations served does not, as Azimuth infer, indicate a need for additional aircraft movements by dedicated freighter aircraft as these would require a concentration of freight flows to a specific destinations to fill a single aircraft at a time. Rather, the Aviation Policy Framework refers to the need for a wide range of global destinations being available at the UK's national hub airport, offering passenger and bellyhold capacity so as to maximise the choice and convenience for both passengers and shippers[11] of airfreight. It is this variety of destinations and, importantly, the high frequencies of service that lead the market to favour a bellyhold hub and spoke system so that freight can reach its end destination in the most efficient and cost effective way possible.

2.11 In the light of the Government's support for the provision of a third runway at Heathrow and the potential for further development of airport capacity beyond 2030[12], the use of these economic assessments of a constrained situation to 2050 is no longer relevant, if indeed it ever was, as a context for the potential re-opening of Manston as a freight airport. The use of this data by Azimuth to support RSP's proposals is disingenuous at the very least.

Reliance on York Aviation work

2.12 Ultimately, Azimuth rely heavily on two existing pieces of research undertaken by York Aviation during the Airports Commission process. The first an unpublished note for Transport for London (TfL) prepared in the early stages of that process (see Appendix A), and a later more detailed piece of research undertaken for the Freight Transport Association (FTA), in conjunction with TfL[13]. Both documents considered the overall position of the air freight market in the London system and what might be the circumstances of that market in 2050 under different assumptions regarding runway capacity development in the South East. Whilst we continue to believe that, in the very long term, there will be excess demand for air freight and that existing infrastructure in the London area will struggle to service this demand, more recent developments lessen the capacity pressure.

[10] Department for Transport, *Aviation Policy Framework*, 2013.
[11] Shippers are the originators of the airfreight, i.e. the exporters or importers.
[12] Department for Transport, *Beyond the Horizon The future of UK Aviation*, Call for Evidence, July 2017, paragraph 7.23.
[13] The FTA report being included explicitly in RSP's consultation documents on its website.

2.13 The key point, however, is that, to the extent that there is excess air freight demand in the long term, it does not follow that there will be a market for Manston, as asserted by Azimuth, as any excess demand at the Heathrow hub does not lend itself to being displaced onto dedicated freighter operations at Manston, for reasons we explain later in this section. To the extent that there is any role for additional freighter aircraft to accommodate some part of the displaced demand, there is ample spare capacity at other airports in the short to medium term at least. Thus, the York Aviation work relied upon by RSP does not, and cannot be taken to, support the need for a re-opened Manston Airport as a freight airport and cannot be so relied upon by RSP, the Secretary of State, the Planning Inspectorate and any appointed Examining Authority (should RSP submit its application and the Secretary of State accepts the application).

2.14 Specifically, Azimuth seek to rely on estimates presented in our reports of the number of freighter movements which might be required to carry the freight tonnage that could be displaced from the London airports in 2050 if there is no additional capacity provided by that date. It is important to note that our reports for TfL and the FTA went on to explain why there were other alternatives, such as regional airports or trucking to Europe, which would be favoured to meet demand ahead of any residual use of more dedicated freighters.

2.15 Despite the reports being very clear, when read in their entirety, that the solution to any shortage of capacity would <u>not</u> be extensive use of pure freighter aircraft, Azimuth rely on the freighter movement equivalents from our reports as justification for their projections of freighter movements at Manston both in the short to medium term and up to 2039. There are a number of problems with this approach:

- The analysis as at 2050 is not representative of the position at 2039 or any earlier date;
- The Government is committed to there being a third runway at Heathrow, with a major justification being the increase in bellyhold freight capability at the UK's principal freight hub;
- Gatwick has increased its effective hourly movement capacity, enabling more passenger aircraft and associated bellyhold capacity, particularly related to recent expansion of the long haul network;
- Stansted has 20,500 annual movements that are reserved for freighter aircraft, of which only around half are currently used. The Airport's Sustainable Development Plan[14] sets out an aspiration to grow cargo, including on dedicated freighter aircraft, to 400,000 tonnes annually;
- Regional airports have developed additional long haul services, providing additional bellyhold capacity, and have plenty of spare capacity to accommodate additional freighter aircraft movements to the extent that there is any need for more pure freighter capacity;
- The Government has not ruled out the provision of further additional airport capacity beyond 2030.

2.16 Fundamentally, the use of theoretical levels of excess air freight demand at 2050 cannot be used to underpin short to medium term forecasts for the expected usage at Manston or an assessment as to whether it could be viably developed in the meantime, regardless of the precise timing of the delivery of the third runway at Heathrow.

[14] Stansted Airport Ltd, *Sustainable Development Plan 2015*, Summary.

Transport for London

2.17 At the outset, it is important to note that our 2013 paper for TfL (referenced by Azimuth as an unpublished TfL note[15]) points out the UK did not then appear to be disadvantaged in terms of air freight capacity and that there was still substantial capacity for freighter movements remaining at Stansted. This is an important consideration in terms of short term forecasting and should have informed Azimuth's thinking.

2.18 In this paper for TfL, we estimated the excess air freight that could not be accommodated in bellyhold capacity on passenger aircraft under different scenarios of additional capacity at the London airports and converted that excess to an equivalent number of freighter movements. The 54,000 potential additional freighter movements that Azimuth (and Northpoint) cite at paragraph 3.4.5 are the additional freight carrying capacity required in the event of there being no further runway capacity at any of the London airports[16] (a severely constrained scenario) that is simply no longer realistic as we have set out above. Azimuth's (and Northpoint's) use of this figure as a potential market for Manston is misleading.

2.19 The note then goes on to set out how this requirement for additional freight capacity might be met and the economic consequences. In the first instance, we noted that around 14,000 additional freighter movements could be accommodated in the London system if no capacity expansion takes place, and this included the use of additional available freighter slots at Stansted. Azimuth appear to have taken our inclusion of Manston, as an example of a smaller airport in the South East that could accommodate some movements, as an indication that it could play a substantial role, wrongly stating in the Executive Summary and at paragraph 3.4.5 that we said that Manston was expected to handle 14,000 freighter movements. Manston was given simply as an example of an airport with freighter activity at the time of writing (2013) with the potential to accommodate some additional movements (as we set out in Section 4 of this report, the capability of Manston Airport is 21,000 annual cargo aircraft movements before allowing for any night operations).

2.20 In essence, our assumption was that, across the London airports (including Manston albeit on the periphery of the South East of England), it was plausible that, by 2050, double the number of existing freighter movements could be accommodated compared to 2012. If anything, the correct inference to draw from this is that we expected the number of freighter movements to double from 2012 levels, i.e. to around 1,000 movements a year at Manston.

2.21 Beyond this, the question of how excess freight demand in the London system in the future will be served is largely left open in our 2013 note but we made clear, at paragraph 26, that we believed the two most likely options would be greater use of bellyhold capacity and freighter operations at UK regional airports, noting Birmingham, East Midlands and Manchester particularly, or the trucking of freight to major European hub airports with substantial route networks and bellyhold capacity. This reflects the growing role of regional airports in serving their local freight markets (avoiding the need to truck to London), while balancing particularly the attractiveness of the substantial bellyhold capacity, lower air freight rates, and flexibility offered by the major continental hubs. We discuss this further below in relation to the economics of the air freight sector.

[15] See Appendix A.

[16] Based on the Airports Commission capacity assumptions.

2.22 Our TfL note also makes clear (paragraph 25) that, to the extent that there was a capacity constraint, the first consequence might well be less capacity for transit freight through the UK airports, prioritising freight to and from the UK. Ultimately, our TfL note concludes that:

"In the constrained, max use, case, there would be severe limitations of pure freighter movements at the London airports, which could amount to around 26% of the required air freight capacity to/from London. The extent to which this would act as a limitation on overall air freight volumes would depend on the extent to which the freight is still carried from regional airports or by truck. Clearly this would impact on the cost/efficiency of shipment, which in turn could impact on freight volumes carried. Again, it is outside the scope of the current exercise to assess these effects.

Overall, in assessing the economic value for air freight between the scenarios, the main difference is likely to lie in producer costs passed through to users and the impact that would have on business costs and hence output/freight generated. It would not be safe to assume that the reduction in cargo ATMs at the London airports necessarily translates to lost shipment value in its entirety."

2.23 Azimuth, at paragraph 3.3.2, incorrectly characterises our note to TfL as expressing a concern about the amount of trucking to Europe. Significantly, the last part of paragraph 9 is omitted by Azimuth. When looked at in its entirety, it is evident that we were noting that trucking is an inevitable part of the market, for reasons which we explain later in this section:

"However, the role of the low countries and Germany in acting as the major freight centre in western Europe is noticeable. In total, the main German freight airports handled almost 4.2 million tonnes of freight in 2012 which, when combined with the Netherlands and Benelux countries, amounted to 7.2 million tonnes of air freight flown. These airports have developed major and specialist air freight roles, with freight being trucked from all over Europe to feed these freight hubs. The integration of trucking with air freight should not be overlooked, even within the UK. In practice, it is unlikely that the UK could replicate this role, even with unconstrained airport capacity, due to its island location on the western edge of Europe."[17]

2.24 In other words, our assessment was that there would not, in effect, be a shortage of capacity for freight, albeit that there would be some loss of producer efficiency by way of increased trucking and time related costs, which would be small in the context of the overall cost of air freight transport. Our summary conclusion in this note makes this clear:

"The key difference between these two scenarios would be in terms of the efficiencies and economies of scale gained by the industry arising from the concentration of freight activity at a single hub. In both cases, the overall volume of air freight to and from the UK is expected to be broadly the same, although the actual freight carried including transit freight would be higher in the hub case. However, under the new hub scenario, savings from greater efficiency may be passed onto users, so reducing shipping costs and facilitating trade leading to higher freight volumes, but it is beyond the scope of the current exercise to assess this. "[18]

[17] See Reference 6, paragraph 9.
[18] Ibid, paragraph 30.

2.25 We were cautioning against the assumption that there would be a requirement for more capacity for dedicated freighter aircraft in a constrained scenario as there would be other more cost effective routes by which the freight would be carried, albeit at a higher cost than with the availability of more bellyhold capacity under a 4-runway hub scenario as being advocated by TfL at the time. Use of more dedicated freighter aircraft would represent a further increase in cost for shippers as we explain further later in this section.

Freight Transport Association

2.26 Our work for the FTA and TfL in 2015[19] again identified the potential for excess demand for air freight in the London system by 2050 and converted this number to freighter movements to demonstrate the point that a four runway hub could house this excess demand in one place. If this demand could not be served in the London system, the report makes clear our belief that it would then be trucked to alternate airports that offer significant options in terms of bellyhold freight or freighter operations. In this context, the bellyhold capacity and destinations offered by the continental hubs are a decisive factor in determining how the market will be served due to the range of destinations served and the lower costs inherent in using bellyhold freight. These continental airports act as freight consolidation hubs for the whole of Europe given their more central locations and, hence, offer consolidation advantages and more competitive freight rates.

2.27 Azimuth's interpretation of our work for FTA appears to erroneously assume that excess demand in the London system will need to be met by additional freighter movements from an airport in the vicinity of London. For instance, at para 4.2.3, they state that *"Even so and as York Aviation figures show, there will be a shortfall of slots for dedicated freighters, likely to be in the region of 45,000 by 2050"*. Whilst our report does estimate that the excess air freight demand with a third runway at Heathrow would be around 1.2 million tonnes by 2050, equivalent to 45,000 additional freighter movements, at no point does our report say that this is how the market could or should be served. Indeed, as we state on Page 20 of our FTA report *"we have assumed that freighter aircraft primarily act as a means to supplement bellyhold capacity where insufficient bellyhold capacity is available"* and our later analysis of how the market might react to this excess tonnage focusses on this assumption by considering the attractiveness of alternative airports in terms of both passenger and freight services on offer. We continue to be of the view that bellyhold capacity elsewhere will be the primary alternate given the price advantages, the flexibility offered by the long haul networks of major airports, including those on Continental Europe, and the low cost of trucking as our report for FTA makes clear.

2.28 By the time of this report for FTA, Manston had closed but, even if it had not and had been included within our modelling work, the lack of bellyhold capacity and limited overall market presence would have meant it could only be projected to capture a very small percentage of the excess demand. For instance, East Midlands, an airport with around 10 times the freight throughput of Manston, and only 1 hour further away from London than Manston (and substantially closer than Manston to many of the major regional markets and manufacturing centres) captured only 8% of the excess demand in our 2015 modelling. In the Heathrow 3rd runway scenario, this equates to around 100,000 tonnes in 2050. This would equate to around 3,600 additional freighter movements in 2050.

[19] See paragraph 1.14 above.

The Economics of the Air Freight Industry

2.29 Throughout the analysis, Azimuth appear to assume complete interchangeability between bellyhold freight, pure freighter operations and express/integrator operations without any analysis of the economic drivers for the use of each type of freight transport and the economics of trucking of air freight between the UK and Europe. This is a fundamentally unrealistic assumption and leads to a misrepresentation of the market opportunity for pure freighters.

2.30 In our work on international connectivity for Transport for the North (TfN) in 2016 (in conjunction with MDS Transmodal[20]), we identified the key characteristics of the air freight market. We identified that air freight can, in principle, be broken down into three main sectors:

(i) bellyhold, where cargo is carried principally in wide-body long-haul passenger jets[21]. Shippers are able to take advantage of flights to a wide variety of destinations from the main hub airports such as Heathrow and from other major European hubs, e.g. Frankfurt and Paris, similarly offering a wide range of global destinations on passenger flights;

(ii) freight only services, which are viable on only a handful of routes and/or for specialist commodities on an ad hoc basis. This is an increasingly limited sector in the UK due to the variety of bellyhold routes available and the strong presence of the integrators in the market;

(iii) express 'parcel' type services that operate on a hub and spoke network basis by 'integrators' (typically DHL, Fedex and UPS). These services increasingly carry larger consignments and East Midlands and Stansted Airports dominate the UK market, feeding bigger hubs located more centrally within Europe.

2.31 In general, air freight is seeking door to door journey times of the order of 4-5 days, which is possible using bellyhold through major hub airports, whilst integrator freight will generally seek a door to door journey time of no greater than 2 days.

2.32 The majority of tonnage moves by bellyhold as, in essence, this capacity is sold at marginal cost, with the majority of the airlines' operating costs covered by the passengers carried. The market is dominated by Heathrow and the other major European passenger hub airports because the sheer range and frequency of services provides a competitive environment which typically delivers the lowest freight rates and the greatest range of destinations served. There is high locational inertia in the air freight sector, which is likely to remain focussed around Heathrow for the foreseeable future as it is expected to remain by far the largest UK airport for cargo. In our TfN work, we estimated that around 70% of freight from the North of England in 2015 was trucked to or from other hubs for uploading, with some freight trucked to Heathrow for consolidation by the freight forwarders before being trucked back to Manchester to avail of bellyhold capacity there. Assuming similar proportions from other regions of the UK, it is clear that at least a part of any excess demand at the London airports is likely to be satisfied at regional airports, not least as airports such as Manchester, Birmingham and Edinburgh increase their range of direct long haul services offering bellyhold capacity.

[20] Transport for the North, *International Connectivity Evidence Report*, York Aviation/MDS Transmodal July 2016, Appendix C.

[21] Short haul flights provide small amounts of bellyhold capacity but, generally, low fares airlines do not carry cargo within their operating model.

2.33 The integrator sector carries more urgent parcel traffic based upon hub and spoke networks offering (typically) two day intercontinental transits. Spoke services from the UK from East Midlands and Stansted serve central European hubs at airports such as Brussels and Frankfurt. The need for frequency tends to mean that, typically, only one 'spoke' can be justified per integrator per country and these spoke services tend to be centrally located to maximise accessibility from all parts of Great Britain. East Midlands Airport is ideally placed in this regard. The integrators are increasingly using bellyhold capacity as well, essentially acting as freight forwarders in this regard.

2.34 A handful of freight only services complement bellyhold and integrator services where there is sufficient cargo to justify dedicated aircraft to a particular destination. There are a small number of scheduled freighter services which circumnavigate the globe, picking up and dropping off cargo at each point. More often, dedicated freighter services, other than those linking with major cargo hubs such as Hong Kong, Seoul or Dubai, operate on an ad hoc basis dealing with special consignments, such as large loads, or specific commodities where time is of the essence, such as the perishables trade, which was previously the principal cargo usage at Manston. Whilst there is some cascade from bellyhold to pure freighter operations where capacity is not available or time is critical, ultimately, it is the economics of the operation which is key. It does not follow that displaced bellyhold freight will seek a more expensive pure freighter service from a nearby airport over the use of available bellyhold capacity from a more distant airport.

2.35 In particular, we identified that the high cost of air freight leads to a pressure to be cost effective and the role of freight forwarders[22] in consolidating loads in order to secure the lowest possible freight rates. Cargo, other than integrator operations, tends to be assembled by specialist air freight forwarders, which cluster around the major hub airports so as to avail of the competitive freight rates on offer. As the road transport costs are very low compared to the value of the cargo and the air freight costs, air cargo is often trucked long distances to find capacity (at a lower freight rate). This forms an important driver in how freight moves from its origin to the actual airport of uploading and applies both within the UK and between the UK and Europe.

2.36 The charges levied per tonne of cargo for the long haul flight leg are high relative to inland haulage costs so that a relatively small difference in air freight rates between different airports will easily cover any additional costs for road haulage. It is for this reason that the majority of air freight will always gravitate towards bellyhold where there is capacity available, even if there is a substantial road haul as part of the journey. Given the wide range of bellyhold services available from the UK, which will increase following the development of a third runway at Heathrow and long haul service growth elsewhere, it is reasonable to expect that pure freighter operations will continue to make up a declining share of the market.

[22] A freight forwarder, forwarder, or forwarding agent is a person or company that organizes shipments for individuals or corporations to get goods from the manufacturer or producer to a market, customer or final point of distribution. For example, the freight forwarder may arrange to have cargo moved from a plant to an airport by truck, flown to the destination city, then moved from the airport to a customer's building by another truck.

2.37 Trucking of air freight is not a new phenomenon. The work by Steer Davies Gleave for the Department for Transport (DfT) in 2010[23] estimated that over 50% of air freight leaving the UK for Europe was trucked rather than using the bellyhold of passenger aircraft. In other words, airlines are using trucks rather than aircraft to distribute freight arriving on and connecting to their global passenger (bellyhold) and freighter operations. At the time of this analysis, Manston was still operational. If it was more economical to use a pure freighter service from Manston rather than trucking over the Channel, this would have been happening in 2010 but it was not. Other than the potential additional border checks as a consequence of Brexit, Azimuth advance no reasons why freight would switch from the cheaper trucking/bellyhold model to expensive pure freighter operations. We believe that the economics of air freight will continue to favour the use of bellyhold freight, other than for a minority of consignments, to and from the UK even if there is a lengthy trucking leg.

Manston in the context of the drivers of air freight

2.38 At Para 4.0.2, Azimuth suggest the reasons why cargo airlines choose airports. In reality, Manston does not fulfil a number of these key criteria meaning that, even in the most favourable circumstances, it can never be more than a niche player in the market. Specifically:

- It does not provide convenient access to the main markets;
- The drive time to Central London is nearly two hours[24];
- The great majority of the Airport's natural catchment is sea and there is very limited evidence of any local demand base;
- Competition is strong from the London airports, with already established freight forwarding and a wide range of bellyhold capacity;
- Given that the Airport is closed and staff dispersed, Manston would not provide any advantages in terms of experience of cargo handling and is likely to offer only marginal advantages in terms of the speed of transit through the Airport;
- Manston could potentially offer lower airport costs, albeit this would impact on the viability of the Airport, but these lower airport costs and any reduction in flying time would not offset the additional cost of freighter transport compared to bellyhold;
- It is also unclear as to what extent night time operations will be an option at Manston given the operating constraints under which the Airport formerly operated which prohibited scheduled night flying[25].

[23] Steer Davies Gleave, *Air Freight: Economic and Environmental Drivers and Impacts*, March 2010
[24] Based on Google maps standard driving speeds.
[25] Azimuth Vol 1 paragraph 7.1.6 quotes from a 2005 MORI survey that people were not impacted by night flights but this would reflect that there were no scheduled night flights when the airport was operational. Local resident support for re-opening (paragraph 7.1.1) needs to be seen in this context. We note that RSP's Consultation Overview Report states (on page 11) that *"Air freight operations would be predominantly during the daytime, in accordance with operations at other similar air freight airports. There may be a requirement for a small number of night-time flights, the details of which will be determined as part of the on-going project design, taking account of feedback from the Statutory Consultation, and presented with the DCO and assessed within the Environmental Statement. For the purpose of the PEIR assessment, and as a worst case, the working assumption is that there might be a maximum of eight (8) aircraft movements at night between the hours of 2300 and 0600."*

2.39 A key consideration is Manston's geographic position substantially away from the economic spine of the UK and with very limited local demand. It is remote from most markets with a journey time to the M25 of nearly 1 hour and accessibility beyond would be subject to the general levels of traffic congestion in the London area. Azimuths's suggestion (paragraph 1.2.2) that Manston might effectively serve as a 4th runway for Heathrow for air cargo flights is merely fanciful given the journey time of 1¾ hours, which is little shorter than the time from Heathrow to East Midlands Airport with an already well developed infrastructure for handling air freight and more likely to fulfil such a role in relation to freight overspill from Heathrow that is time critical or of such a special nature as to warrant the use of pure freighter aircraft.

2.40 Many of the other points raised by Azimuth regarding security, e-commerce and just-in-time delivery are all factors relating to the overall efficiency of the industry. If anything, what the analysis presented by Azimuth demonstrates is the importance of developing efficient freight networks serving the whole of the UK rather than the need for a re-opened freight focussed airport in the South East of England. Manston could only recapture economic benefits from cargo being trucked to the continent, as asserted at paragraph 4.8.4, to the extent that it provides a more economically efficient solution. Manston was not viable in the past and there do not appear to be significant changed circumstances that would make it viable in the future. This lack of inherent viability is indicative of the fact that it did not provide an economically efficient solution.

2.41 One of the key reasons that the UK aviation sector is so productive, as cited by Azimuth at paragraph 5.2.1, is that it allows the market to work. Inefficient and unnecessary actors in the market are allowed to fail. There is a strong argument to suggest that the closure of Manston is simply a part of the process of the market working and delivering more efficient solutions. The argument around the importance of the sector and Manston's role only applies if it is commercially viable (and makes an adequate return to shareholders) and represents an economically efficient allocation of resources. Otherwise, it will in fact damage the productivity of the UK aviation sector.

2.42 Azimuth asserts, paragraph 6.2.2, that the perceived lack of investment in Manston by the previous owners was an impediment to freight growth. However, this is at odds with previous statements by former operators of the Airport and comments by interviewees, in Azimuth's Volume I, on the quality of service received by customers at Manston. In its 2002 results, the Wiggins Group plc claimed that, following investment, Manston was capable of handling 200,000 tonnes of cargo a year[26]. The subsequent owners, Infratil, published a Master Plan in 2009[27] which identified triggers when there might need to be some increase in cargo aprons or warehousing at 100,000 tonnes and 200,000 tonnes of cargo annually. Given that peak tonnage was 43,000 tonnes, this does not suggest that lack of capacity or shortage of investment was an impediment to increasing cargo volumes at Manston in the past, rather the limitation was the market.

[26] https://www.investegate.co.uk/wiggins-group-plc---230-/rns/final-results/200207300700452686Z/
[27] Manston, *Kent International Airport Master Plan*, November 2009, page 62.

2.43 The only specific impediment to increasing throughput cited by Azimuth is a limitation to 1 aircraft being handled at a time but we understand that this was not the case, albeit supervised taxi-ing procedures had to be put in place when there were 2 aircraft using the apron at the same time. In practice, it does not appear that lack of investment was an issue which impacted on freight throughput. Rather, it must be assumed that the previous owners did not believe there was a viable economic case for investment. Lack of investment does not necessarily mean constrained demand and it may simply be that there was not sufficient demand to justify investment and that the market was functioning properly.

Qualitative assessment of demand (Volume II)

Forecasting Methodology

2.44 Volume II of Azimuth's work begins with an assessment of different forecasting approaches for cargo, noting that forecasting of cargo is not as well developed as that for passenger activity. We agree that air freight forecasting is difficult and that there is a lack of hard data. However, we do not agree with Azimuth's assertion that quantitative methods are, therefore, not suitable and that qualitative methods are more appropriate. The evidence cited by Azimuth at Table 3 does not support this conclusion and suggests that causal methods (regression analysis) remain the most appropriate for forecasting demand for cargo and freighters. Such an approach is far more akin to the type of analysis undertaken by York Aviation in its work for TfL and FTA and upon which Azimuth seek to rely as a basis for the scale of activity that Manston might attract.

2.45 Whilst we understand the reason for Azimuth's assertion that it may not be appropriate to extrapolate Manston's future performance from its historic performance, this does not take away from the importance of grounding any future forecast in quantitative evidence of the drivers of the market and how these might change in the future. In any event, the assertion is at odds with the reliance placed by Azimuth on our quantitative assessments of 'spill' from the London airports at 2050, in the circumstances of no additional runway at Heathrow, as corroboration of their qualitative projections for Manston to 2039. To reiterate, reliance on these estimates is not appropriate for considering the potential role for Manston, not least as they relate to 2050 and cannot be applied to 2039, or any earlier year, without working through from first principles how any constraints in the London system might bite and the likely market reaction.

2.46 As well as reviewing forecasting methodologies, Azimuth sets out some air freight growth forecasts produced by others. At paragraph 3.6.1, Azimuth cite the DfT's assumption for growth in freighter movements in its 2013 UK Aviation Forecasts at 0.4% p.a[28]. The DfT makes clear that the growth in freighter flights is seen as a residual, representing the share of freight on pure freighter flights after allowance is made for bellyhold cargo being the primary mode. It is clear that the DfT is expecting the share of the market using pure freighters to and from the UK to continue to decline. Indeed, the most recent UK Aviation Forecasts published by the DfT[29] suggest that there is expected to be no growth in the number of pure freighter movements to and from the UK above 2016 levels in the period to 2050. Hence, any increase in freight movements at Manston would have to come at the expense of other airports. We discuss the ability of other airports to handle such movements in Section 3.

2.47 Given the existence of a definitive 'official' UK forecast for freighter movements over the period to 2050, it is not clear why Azimuth rely on global forecasts for air freight produced by the manufacturers Boeing and Airbus for the purpose of selling aircraft (paragraph 2.1.10) as a basis for the longer term projections of freighter movements at Manston in their Volume III (paragraph 2.3.2). The global growth rates cited by Azimuth are inappropriate for projecting growth in freighter movements at Manston for several reasons:

- They relate to RTKs (Revenue tonne kilometres) (Boeing[30]) and FTKs (Freight tonne kilometres) (Airbus[31]) and will reflect increased tonnage per aircraft, including freight carried in the bellyholds of passenger aircraft, and longer sector lengths as well as any growth in aircraft movements;
- The projections relate to growth in air cargo at the global level and lower growth is clearly shown as expected to/from and between more advanced economies such as the UK;
- In the case of Airbus, specific lower growth rates are cited for growth in freight tonne kilometres in freighter aircraft (2.6% p.a. compared to 3.8% per annum in their latest forecasts which are lower in any event than the previous forecasts used by Azimuth). Even then, this growth rate relates to FTKs not to freighter movements.

2.48 Taken together, these reports point to a declining market share for freighter aircraft in mature markets such as the UK, where there is a good supply of bellyhold capacity. It is, hence, not reasonable to use the Boeing and Airbus growth rates as a basis for projecting future growth in movements by pure freighter aircraft to and from the UK, particularly given the existence of DfT projections for such movements. Rather than being conservative, as suggested at paragraph 2.3.2 in Volume III, the use of a 4% per annum growth rate for years 10 to 20 at Manston is highly optimistic, and is certainly not supported by the DfT's analysis of the UK market.

[28] Department for Transport, *UK Aviation Forecasts 2013,* paragraph 3.49.
[29] Department for Transport, *UK Aviation Forecasts*, October 2017, paragraph 2.56. The decline in pure freight movements since 2001 is illustrated in Figure 4.5.
[30] Boeing, *World Air Cargo Forecast 2016-2017*, page 2.
[31] Airbus, *Growing Horizons – Global Market Outlook 2017/2036*, page 101. Note that the 2016 version to which Azimuth refer is no longer available on the Airbus website.

Interviews

2.49 Having rejected the recognised methodologies for forecasting freight demand at an airport, Azimuth rely on interviews with 24 individuals and/or organisations as set out in Table 4 of their report. To a large extent, these are people with past connections with Manston and who may not have a totally unbiased view on the desirability of it re-opening. It is notable that few cargo airlines or large scale air freight operators were interviewed, rather the list is dominated by local interested parties and logistics firms, not all of which are still in business. In some cases, throughout the remainder of Volume II, individuals are referred to who are not listed in Table 4 and, in other cases, individuals or organisations are referred to in different terms to those listed in the table. This does not suggest a very robust or rigorous approach to setting out the potential for Manston. Although the framework of questions is set out at paragraph 4.3.1, we are unable to identify any questions that would enable an assessment to be made of future passenger or freight volumes that would be likely to use Manston and which could be used as the basis for any forecast of future usage.

2.50 In the light of this, the remainder of Volume II is largely a qualitative description of current problems experienced in transporting cargo in general in the UK and in terms of past operations at Manston. These do not, however, provide any insight into the potential scale of demand for freight or passenger services at Manston. Essentially, it constitutes a speculative description of where there might be opportunities if Manston re-opens. We highlight the speculative nature of some of these comments relating to freight activity below. Taking Azimuth's categories in turn:

Process and Issues associated with airfreight

2.51 This analysis is generic and of no direct relevance to the potential for Manston. In particular, no linkage is drawn between the commodities which typically use air freight set out at paragraph 5.1.2 and the economic sectors active in Kent. Significantly, at paragraph 5.1.5, Azimuth cite a respondent that made clear that *"tendered"* prices determine how air freight moves. This is a powerful reason why bellyhold will in most instances win over pure freighter operations. Issues of price for pure freighter operations are reinforced at paragraph 5.1.10, particularly in relation to the risks associated with higher fuel prices.

2.52 There are then a number of comments regarding the current difficulties of operating at Heathrow at paragraph 5.1.6ff. It is recognised that there are few realistic slots available for additional freighter operations at Heathrow so unsurprisingly Coyne Airways cite a difficulty for them if they sought to fly to Heathrow on an ad hoc basis. However, in reality, this airline is not a major player in the UK or Europe, operating a small number of weekly flights from Amsterdam to feed its network of flights within the Caspian Sea region[32]. Comments from ACC Shipping and Active Transport need to be read in the context that they are local Kent shippers and transporters of cargo that have a vested interest in seeing Manston re-opened.

[32] http://www.coyneair.com/caspian_schedule.htm

Future trends in airfreight

2.53 To some extent, the issues highlighted here regarding security relate to the specific issues around Calais at the time when the interviews were carried out but the situation has now changed since October 2016. It is recognised that security of air freight is an increasing concern globally but this would apply at Manston as well as elsewhere.

2.54 Again, paragraph 5.1.15 highlights the dominance of bellyhold freight. Whilst noting that the A380 aircraft has more limited space for bellyhold cargo than B747s at paragraph 5.1.14, Azimuth neglect to point out that other new aircraft, such as B787 and A350 aircraft, do not suffer from similar reductions in space and capacity and continue to offer substantial bellyhold opportunities and capacity.

Motivation to use Manston

2.55 The response cited at paragraph 5.1.19 makes clear that the most important factor in considering freighter operations is *“cost, speed and access to road networks”*, which is not a condition which Manston can meet for the majority of the UK. The local transport firms (paragraph 5.1.21) clearly saw an advantage for them in Manston re-opening but it is far less clear that this was reflected by the broader industry. Significantly, paragraph 5.1.20 does not address the operational reasons why major freight forwarders seek to locate close to Heathrow, Stansted or East Midlands, except possibly for their city centre sales offices.

2.56 The response quoted at paragraph 5.1.23 makes clear that for Manston to be an attractive option to freighter operations, it would need to offer night operations. In the light of the past ban on scheduled night flying, this would be a major change to operating mode, with consequential environmental impacts. Furthermore, RSP’s position in relation to whether scheduled night flights will be allowed or not is ambiguous (see paragraph 2.37 above) and we understand that some supporters of the re-opening have said that such operations would not be allowed. In the event that night flights are not allowed or heavily restricted, this would further diminish the attractiveness of Manston for pure freighter operations (comparisons with the major European freight hub at Frankfurt as included by Azimuth are simply not realistic).

Demand model and data for Manston Airport

2.57 This section does not, in fact, contain any data for Manston nor set out a view on how future demand might be modelled.

Freight focussed findings

2.58 The one airline interviewed made clear (paragraph 5.2.3) that *“success at Manston depended upon identifying a niche market and becoming known for excellence. In particular, suggestions included a perishables centre, handling of live animals, easy access for charter flights, and handling cargo that is not necessarily straightforward”*. We would have expected the remainder of the report to concentrate on quantifying the size of this niche market, including any Brexit implications for exports (paragraph 5.2.1). It is clear, however, that the realistic expectation for Manston is for a small niche operation rather than as a general ‘overspill’ airport for London.

2.59 The spurious suggestion that freight might be *"banned"* from Heathrow (paragraph 5.2.6) and Manston might benefit is clearly nonsense in the context of the Government's support for a third runway to provide capacity for freight in the bellyholds of passenger aircraft as much as for passengers.

2.60 Whilst the suggestion from Coyne Airways about the potential for Manston to offer fuel cost savings when flying south from the UK (paragraph 5.2.11) is interesting, it appears not to take any account of the locations where freight is generated in the UK or where it is consolidated into viable loads. It does not seem likely that Coyne Airways would itself relocate its one European feeder service from Amsterdam to Manston given this would increase rather than decrease fuel burn. As noted earlier, the real reason freight is trucked across the channel is to avail of cheaper freight rates available at the main European hub airports, which act as focal points for cargo for the whole of Europe.

2.61 Azimuth also claim that the bellyhold model is broken and that there is about to be a shift back to pure freighter operations at paragraph 5.2.25 but this is pure speculation and at odds with other industry commentators (see Airbus freighter forecasts which project an increasing share of bellyhold globally[33]) and the UK Government's view as expressed by the Department for Transport.

2.62 Whilst paragraph 5.2.24 says there was underinvestment in facilities by the previous owners, the quotation from Finlays at paragraph 5.2.26 makes clear that Manston previously offered a good level of service. Hence, there is little evidence to suggest that underinvestment was any impediment to Manston attaining its natural share of the market in the past. Although Finlays have now relocated their operation back to Stansted, we would accept that they might choose to return to Manston with a similar number of movements as previously if the facilities were re-instated and provided the cost of operating was competitive compared to Stansted. There may also be scope for some humanitarian and military flights (paragraph 5.2.48) but these will be small in number and not the basis for a viable operation of the Airport.

2.63 At paragraph 5.2.45, Fedex's criteria for an airport to be attractive to an integrator are set out and these seems to describe the characteristics of their main UK base at Stansted. There is then a discussion about some of the problems DHL perceive at Heathrow but, of course, DHL's principal UK operation is focussed at East Midlands where they have an extensive operation. From our work with the integrators and with the Freight Transport Association, we know that Manston is too peripheral for integrator operations serving the UK. Integrators have a strong preference for locations more centrally located in the UK with good road access to all of the major markets. The availability of land for warehouses (paragraph 6.2.6) is far less important than a location central to the market and the availability of good road access, neither of which are characteristics of Manston. This would apply equally to the suggestion that Amazon might locate there or that the Airport could become a base for drone operations (6.3.24-27). It is simply in the wrong place to serve the market being at the far south east at the end of the country on a peninsula.

[33] See Footnote 31.

2.64 The comparisons to Frankfurt Airport, in terms of the ability to sustain a freight operation without night movements, are simply irrelevant given that Frankfurt carries the second highest freight tonnage of any European airport and acts as a major cargo hub for air and road freight given its highly central location. Much of Frankfurt's cargo is carried in the bellyholds of passenger aircraft and this underpins the freight hub role. Given that Manston does not have anything like the overall market attractiveness of Frankfurt, for many reasons, any constraint on night operations would be a major impediment to freighter operations.

2.65 We do not discuss the passenger market in this report, albeit we have reviewed Azimuth's forecasts and disagree with their conclusions, which we can report upon should any application be made by RSP. The latter parts of Azimuth's Section 5 mention opportunities around ancillary activities such as MRO, aircraft recycling, flying schools and business aviation. We would simply highlight, at this stage, that these areas are highly competitive markets and it is not immediately obvious why Manston would provide an attractive option for operators in these markets when compared to what is often global competition. Nor is it evident that such activities would contribute substantially to the viability of Manston.

Analysis and Conclusions

2.66 Sections 6 and 7 of Azimuth's Volume II, go on to discuss what this means for Manston and draw conclusions. In general terms, Azimuth seek to draw conclusions about the cargo performance of Frankfurt, Heathrow and Stansted airports which are not consistent with the actual facts.

2.67 Again, there is reliance on our work for TfL and the FTA (paragraph 6.1.8) to justify the conclusions reached. As stated above this work does not support RSP's case.

2.68 Azimuth then identify that there are sectoral and geographic markets for which Manston has potential but there is no quantification of the scale of these markets. This is a fundamental gap if the scale of any potential opportunity is to be understood.

2.69 At paragraph 6.3.1, Azimuth set out 9 potential scenario drivers for Manston. However, it is not clear how these scenario drivers have been taken forward to the forecasts set out in Volume III, which do not set different potential scenarios for growth. If we take each of these drivers in turn:

1. *The UK's position in Europe* – Azimuth appear to assume that there will be an opportunity for multi-hop freighter services from Manston but it is far from clear that the traffic rights for such services will continue to be available post-Brexit.
2. *Changes to fuel prices* – in the face of the decline in the value of sterling, these are more likely to work against the operation of more freighter aircraft.
3. *The availability of more efficient aircraft* – the introduction of B787 and A350 aircraft will increase bellyhold capacity rather than reduce the capacity.
4. *Onshoring of manufacturing in the UK* – it is not clear how this is relevant given Kent does not have a strong manufacturing base.
5. *Changes to logistics and transport systems in Kent* – this is a circular argument as it relies on the re-opening of Manston driving a step change in the logistics and transport sector in Kent.

6. *Dramatic changes to economic performance* – it is noted that these are not factored into the forecasts but to the extent that there are Brexit effects on the economy, these would reduce trade and demand for air freight.

7. *Manston becomes a major integrator/forwarder base* -

8. *Manston becomes an Amazon base* -

9. *Manston becomes a hub for drone activity* –

for the reasons noted above, all three of these seem highly unlikely and are, at best, pure speculation with no evidence base whatsoever.

2.70 Section 7 sets out the conclusions from Volume II. According to Azimuth (paragraph 7.1.1), the key issues that are seen to favour Manston are:

- Lack of available slots at other South East airports;
- Bumping of freight from passenger aircraft;
- Security issues particularly with outsized cargo;
- Speed of turnaround.

However, our analysis of the factors would suggest that, other than perhaps the last two factors, there are few factors which would favour Manston and, in any event, these could be replicated by other airports closer to the main UK distribution centres, such as Doncaster Sheffield Airport, if these were deciding factors in the market.

2.71 Based on their analysis, Azimuth then set out (at paragraph 7.1.2), the markets which it believes that Manston could attract:

- Parcels and packages through an integrator;
- Perishables including fruit, vegetables, flowers, fish, and shellfish;
- Outsized freight;
- Formula One and luxury cars;
- Live animals;
- Time sensitive items such as aircraft [parts] and the oil and gas industry;
- Humanitarian and military flights.

In addition, some passenger operations along with a number of ancillary activities such as recycling, MRO[34] etc. are postulated for Manston.

[34] Maintenance, repair and overhaul of aircraft

2.72 Whilst, except for integrator operations, they are plausible markets for some potential operations from Manston, Azimuth make no assessment of the potential quantum of local demand as a basis for assessing how big a market there is. Whilst seeking to discredit analytical methods for projecting future demand at Manston, at the same time, Azimuth rely heavily on estimates made by us and using such methods that suggest there would be excess demand in the London system at 2050 if there is no new runway at all. Fundamentally, Azimuth make no assessment of the viability of what might be on offer or address any concerns as to why such operations have not secured a viable future for the Airport previously.

2.73 The key conclusion drawn by Azimuth is that *"This report demonstrates the potential demand for Manston Airport, indicating its viability and clearly showing that Manston Airport is a valuable local, regional and national asset, providing airport infrastructure badly needed by the UK."* (Paragraph 7.0.1) There is, quite frankly, no factual basis for Azimuth to make this claim. Azimuth claim that the capacity is *"badly needed by UK"* but this is linked to erroneous use of the economic costs of there being no further runway capacity in the UK (see paragraph 2.6 of this report) and a lack of understanding of the air freight market.

2.74 In summary, Azimuth's insistence that Manston's past market performance is not a relevant consideration in understanding how it might perform in the future is both erroneous and contradictory to the evidence put forward to support the qualitative market forecasting approach. The interview findings presented are clearly focussed towards operators that have used Manston in the past and would be pleased to be able to use it again but the evidence presented does not suggest that operators would do more than reinstate past operations. This did not result in an airport that was viable and certainly did not result in annual cargo air transport movements predicted by Azimuth. In our view, and having regard to the evidence, it is unlikely that circumstances have changed so dramatically in the intervening period since the Airport was last operational that there is likely to have been a fundamental change in its ability to capture market share. Its previous cargo performance remains the best starting point from which to consider its future.

2.75 In defence of their position, Azimuth cite lack of investment by the previous owners as being a key cause of Manston's inability to fulfil its potential previously but this is not borne out by the interview responses as the quality of service was noted as good. Fundamentally, the failure to consider the drivers of the Airport's previous performance effectively is a key error which infects the subsequent forecasts presented. The limited size of the market is perhaps the best explanation as to why there was not still further investment in developing the facilities as the operation was fundamentally not viable and it would have been imprudent to invest further.

Forecasting (Volume III)

2.76 The forecasts set out in Volume III draw extensively on the analysis in Volumes I and II. Although stated to be derived on a 'bottom up' basis (Executive Summary Page 1) and claimed to be more conservative than top down, econometrically driven, projections, reliance is still placed, at paragraph 1.1.1, on our quantitative work for TfL/FTA to justify/verify the overall quantum of movements projected, stating *"Rather than merely extrapolating past activity, studies that have focused on the 'lost' or suppressed demand include York Aviation's work (2015, p. 19)."* This work was itself fundamentally top down, based on examining past activity and its implications for the future. Azimuth rely on this as, effectively, the only quantitative evidence presented of a possible level of future demand which might be available to Manston. However, for the reasons set out earlier, Azimuth has incorrectly interpreted our findings and their use of our data to support RSP's case cannot be relied on.

2.77 Paragraph 2.1.2 again suggests that the literature review undertaken showed that *"a qualitative approach was the most appropriate method through which to gather data on the potential demand for an individual airport"*. Whilst we agree that freight forecasting is difficult, as Azimuth themselves note, at paragraph 2.1.4, qualitative forecasts still need to be based on *"market data"* and, at paragraph 2.1.6, Azimuth go on to refer to the anecdotal information collected in the interviews as primary market data. Overall, this anecdotal evidence does not provide a basis for the development of a forecast of future usage nor for the presentation of a business case of the proposed development.

2.78 To further justify the approach to forecasting, Azimuth claim that the Airports Commission recommended the use of a Delphic approach. This is not strictly true as what the Airports Commission actually said was:

"In cases where there is limited or no data available, judgement based forecasting, using techniques such as the 'Delphi Method' is applied. This approach involves experts in the field considering historical patterns to predict future trends and is often used in conjunction with both naïve and causal models to compare forecast trends. The Delphi method is considered especially useful for long term forecasting (20-30 years) and is effective in drawing on existing knowledge to identify areas of agreement and disagreement in forming the forecast. However, for complex themes the Delphi Method is not always considered appropriate as there is no way of testing different outcomes e.g. through scenario testing."[35]

2.79 First of all, the Delphi Method involves a number of independent experts considering historic patterns of data and forming a judgement based forecast. Results are shared and refined until a consensus is reached amongst experts. This is not the same as a single judgemental based forecast as Azimuth have presented, based not on historic data but some unquantified estimate of 'lost' demand. In any event, we would question the appropriateness of this methodology, for the reasons that the Airports Commission cite, namely the importance of scenario testing in the context of a forecast to be used for a planning application, particularly one where the applicant is purporting to promote a NSIP under Section 23 of the Planning Act 2008 (as amended) and seeking to demonstrate that there is a compelling case in the public interest for the compulsory acquisition of the Airport site.

[35] Airports Commission, Discussion Paper 01, *Aviation Demand Forecasting*, February 2013, Paragraph 2.8

Freight Forecasts

Short to Medium Term (10 years)

2.80 Azimuth place reliance on both the overspill argument (paragraph 2.2.2) and that there will be a reversal away from the existing preference for bellyhold for most types of air freight, despite the overwhelming evidence that this is likely to remain the case in future due to the lower freight rates available. Azimuth's claim is not supported by the facts, current market trends or by other industry observers including the DfT and Airbus.

2.81 Furthermore, Azimuth appear to assume that, to the extent there is overspill seeking freighter capacity as an alternative, that Manston would be the only solution. This is not the case given available capacity for freighters at airports such as East Midlands (particularly well placed for the distribution of goods across the UK), Stansted and Doncaster Sheffield. These airports are already established and operational and, therefore, well placed to deal with any such requirements in the short to medium term using their existing infrastructure and without the need for any compulsory acquisition of land.

2.82 At paragraphs 2.2.6 and 2.2.7, Azimuth set out the methodology they have used for deriving freight movements and tonnage for Manston. In essence, these movement forecasts are entirely based on claimed confidential discussions with airlines, airports and others involved in the industry, which are then converted to freight tonnage based on the capacity of each aircraft and assumed load factors. These discussions would appear to be different from the list of interviewees reported in Volume II, which included only 1 airline (unlikely itself to relocate its single European operation to Manston) and no other airports. Although it is claimed (paragraph 2.2.9) that switching costs have been taken into account, there is no explanation as to how these costs have been factored into the assessment of what operations Manston might attract. It is likely that RSP would need to incentivise such a switch of activity and this would impact on the overall viability of the Airport, particularly in the early years. A further consequential issue arising from this is the economic cost of displacement of activity, which we discuss further in Section 5, as this needs to be accounted for in economic assessment of RSP's proposal.

2.83 A vague list of potential operations is set out at paragraph 3.2.3, albeit with specific assumptions then stated about the loadings on each. However, the basic information regarding the likely annual frequency of each operation is not given, which is essential to enable an understanding of the likelihood of such operations using Manston in the context of the UK air cargo market as a whole and taking into account ongoing operations at other airports. Paragraph 3.2.3 appears to set out simply a list of generic airlines that might offer services if Manston is re-opened. It provides no insight into whether the demand to fill those services will be there or whether the services could be operated viably by the airlines concerned and at what weekly or annual frequency. This is simply not an appropriate or robust basis for a forecast.

2.84 Whilst accepting that there may be confidentiality concerns in revealing the specific plans of any individual airline, this is all the more reason why there needs to be some underpinning analysis of the potential scale and viability of each specific market identified in the forecast in order to provide some basis for asserting that any of the airlines might operate to the destinations postulated. As presented, the aircraft movements and the consequential tonnage forecasts are entirely hypothetical with no obvious linkage back to any of the evidence presented in the earlier volumes. This is not acceptable given the implications and importance of any proposed application for a DCO and the requirement that a compelling case be demonstrated for the purpose of compulsory acquisition. At the very least, there is a lack of transparency in the approach that needs to be explained so that consultees can understand the forecast and in order to determine whether or not the proposed DCO application falls within Section 23 of the Planning Act 2008 (as amended).

2.85 To illustrate the lack of credibility of the forecasts, Table 1 shows for Year 2 (the first operational year), a throughput of nearly 100,000 tonnes. This would make Manston the 5th largest freight airport in the UK in its first year after re-opening (compared to 2016 actual throughput at the other airports). This would place it close to the scale of freight operations at Manchester Airport, including bellyhold freight. It would make Manston the 3rd busiest airport in the UK in terms of tonnage carried on dedicated freighter aircraft. This is simply not a credible proposition. It is simply at odds with the verifiable evidence and contrary to all experience there is of operations at Manston. If there is a short term market of that scale available for Manston, why did it historically not exceed 43,000 tonnes (2003)? Without full explanation of the scale of each of the markets and a reasoned justification for the number of movements assumed for each of the operations identified at paragraph 3.2.3, the forecasts as presented cannot be considered robust and substantial further evidence is required to validate the basis of the RSP DCO proposal.

<u>Long Term (10-20 years)</u>

2.86 As noted earlier in this section, the long term forecasts wrongly apply a 4% per annum growth rate as a basis for deriving the longer term freighter aircraft movement forecasts for Manston. To reiterate, this is inappropriate and unrealistic given that it is based on forecasts by Airbus for freight tonne kilometres at the global level[36]. Even if the short term forecasts were credible, which they are not, their extrapolation is on an unrealistic basis. At most, any extrapolation should more realistically have been based on the 2013 DfT freighter movement growth rate of 0.4% per annum and the latest DfT estimates[37] suggest that even this may be too high.

2.87 Table 6 then sets out the infrastructure requirements for cargo, which are based entirely on the forecasts put forward. However, even then, we are not told how these infrastructure requirements have been derived in terms of the operating pattern over the day, turnaround times, the number of night movements and other key assumptions for each aircraft type stated or indeed how they relate to the capability of Manston Airport with its existing infrastructure. Such information is critical to validate the infrastructure required (if indeed any is required given our assessment of the capability of Manston Airport), as well as to carry out the assessment of the environmental impacts.

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[36] Now reduced to 3.8% in the latest Airbus forecasts.

[37] Department for Transport, UK Aviation Forecasts, October 2017, paragraph 2.56.

Passenger Forecasts

2.88 Although not the main focus of this summary report, we note that the passenger forecasts, set out by Azimuth in Section 2.4, suffer from many of the same problems as the freight forecasts. They appear to be based almost entirely on supposition and inferences that cannot be relied upon. There appears to be no consideration of what is known about market sizes, nature or previous performance, nor a recognition of the extent to which growth will need to be incentivised through discounting of airport charges and marketing support payments. Similarly to the freight forecasts, and for reasons that are not given, Boeing global growth rates appear to be used by Azimuth for passenger operations beyond year 10 rather than the UK specific forecasts produced by the DfT[38], which are substantially lower. This, once again, is a substantial overstatement of the potential for growth.

Overall Conclusions on Forecasts

2.89 Azimuth's entire analysis of the air freight market is focussed on the existence of a theoretical opportunity based on estimates of spill from London in the event of the third runway at Heathrow not being built or being delayed, an unsupported hypothesis that there is a trend away from bellyhold freight, and based on a small sample of interviews with largely marginal players in the UK air freight sector and/or local interests.

2.90 Azimuth's reports do not at any point provide any substantive evidence or analysis as to whether Manston Airport can effectively, viably and sustainably compete in that market. Azimuth's reports do not explain how Manston Airport will be able to price effectively against the bellyhold rates offered by growing established and operational UK regional airports or the continental hubs. Azimuth's reports do not explain how Manston Airport will compete against the range of destinations offered by the long haul passenger networks of the continental hubs or the much greater freighter network offers of East Midlands or Stansted airports. We agree that there may be a niche market for Manston, just as there was previously, and that this market will probably grow in the future in line with the pure freighter market overall (noting that the DfT does not see growth in this market to 2050), but we cannot see how Manston will provide a sufficiently attractive alternative in a broader freight market to attract a market share sufficiently large as to reach the volume and movement numbers envisaged by Azimuth and required to justify RSP's proposals to be considered under the Planning Act 2008 (as amended). Indeed, if we look at past history, it seems highly unlikely that commercially viable operations for the Airport would be attainable for the foreseeable future.

2.91 In overall terms, the forecasts presented by Azimuth at Table 1 of Volume III are simply not credible and do not provide a robust basis for promoting a DCO. We present analytically derived cargo movement forecasts in Section 3 of this report to evidence and support this conclusion that any future projected use of Manston Airport would be significantly lower than that asserted by RSP.

[38] Department for Transport, UK Aviation Forecasts 2013 and 2017.

2.92 In terms of Azimuth's key questions, as set out at paragraph 2.3 at the start of this section, the first two tests may well be met in terms of the need for more airport capacity in the South East of England. That is why the draft Airports National Policy Statement is promoting the development of a third runway at Heathrow as a solution in the period up to 2030. The first two questions are, therefore, irrelevant to RSP's proposals. However, in relation to the third test, the key point is that for Manston to be a long term solution to the UK's capacity problems, it must be a sustainable, commercial proposition, capable of attracting airlines, passengers and shippers to use it. Azimuth's analysis ignores the history at Manston and does not provide any evidence to conclude that any future projected use of Manston Airport would require an increase in the capability of the Airport.

2.93 Indeed, whilst we have provided in this report our assessment of the capability of Manston Airport (Section 4), we note that nowhere has RSP done the same exercise. The failure of RSP to provide their own evidence of the capability of Manston Airport and the amount by which the proposals would increase that capability by is a major omission in RSP's consultation material. Rather, the only information that they present is a forecast of future freight movement demand, which has no credibility as explained in this report. This failure means that, in our opinion, the requirements in Section 23 of the Planning Act 2008 (as amended) have not been satisfied. In essence, we would have expected RSP to be able to show:

- the capability of Manston Airport of providing air cargo transport services;
- the amount by which RSP is proposing to increase that capability by and thus the "new" capability; and
- a credible forecast for why that 'new' capability is required.

None of this information is provided by RSP.

3 FREIGHT FORECASTS

Introduction

3.1 In this section, we present our view of demand in the UK air cargo market at present and consider how this market will develop in the future, setting out a number of potential cargo forecast scenarios for Manston Airport specifically over the period to 2039/40 (RSP's assessment year). This is a more robust approach than the qualitative approach adopted by Azimuth and builds on the approach adopted in our work for TfL and the FTA, by updating this work and assessing Manston's potential share of the market. This is the correct way to use our earlier work to inform an assessment of the potential at Manston.

3.2 The analysis presented here builds on our previous work but supersedes it and extends it in terms of:

- considering changes in the market and circumstances since the time of the previous research, notably the decision to move forward with a third runway at Heathrow, the increasing long haul passenger operations at regional airports and the continued commitment from Stansted Airport to the freight market through its future plans;
- examining the demand and capacity position not only in London but across the UK as a whole;
- analysing potential cargo capacity growth in more detail using Airports Commission traffic forecast data, not available at the time of our previous work;
- more explicitly considering the nature of air cargo that might be affected by any form of constraint within the London airport system or in the UK;
- providing some indication of how cargo demand is spread geographically in the UK to aid consideration of how it might be served in the future.

3.3 Our previous work did not consider in detail the role that might be played by Manston Airport or indeed other UK regional airports. It considered, in broad terms, the effect of a constrained London system capacity on freight demand and how this demand might be met within the confines of the capacity position at the time, noting particularly the role that might be played by the major continental hub airports, given the price advantages that they might offer through the availability of bellyhold capacity.

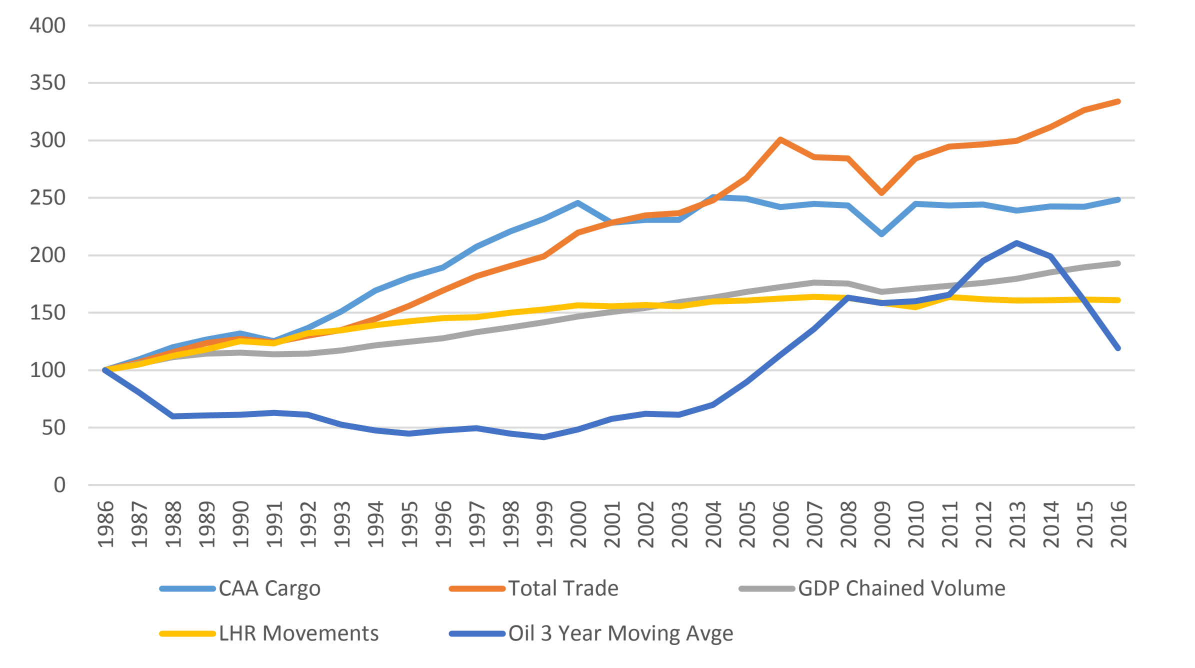
3.4 In this report, we now consider specifically the potential role for Manston by way of a scenario analysis that draws on the analysis of the overall market and the past performance of the Airport. The use of scenarios rather than a single forecast is intended to show a range of possible outcomes for Manston, allied to an assessment of the likelihood that the scenarios might be achieved in a manner which properly reflects the uncertainties identified in air freight forecasts.

Historic Performance of the UK Air Cargo Market

3.5 Our assessment of the quantum of air freight demand in the UK is fundamentally driven by analysis of the past performance of UK air cargo against a range of key economic and market indicators, notably UK trade in goods, GDP, oil price and ATM numbers at Heathrow. **Figure 3.1** shows the indices for these various metrics over time (with each indicator set to 100 in 1986).

3.6 This analysis reveals a number of interesting patterns. Until around 2000, UK air cargo was strongly related to UK trade in goods, with what would appear to be some stimulus provided by falling oil prices that would have made the cost of air cargo relatively more competitive with other cheaper modes. However, in around 2000, the market changed and this relationship appears to break. UK trade in goods continues to grow but growth in air cargo essentially stalls.

Figure 3.1: UK Air Cargo and Economic Metrics (Index: 1986 = 100)



Source: CAA Statistics, ONS

3.7 It is, therefore, helpful to look at why this might have happened. There are two main factors that need to be considered. The first is the oil price, which, through much of the late 80s and 90s, had been on a relatively benign downward trend. However, in around 2000, it started to rise again, accelerating through the mid-2000s and peaking in around 2013. The price of fuel is a key factor in the attractiveness of air cargo compared to other modes, particularly for pure freighter services, where the full direct operating costs of the flight must be borne by the cargo being shipped (as opposed to bellyhold freight where direct operating costs are largely covered by passenger operations, with cargo revenue essentially treated as a marginal benefit). This change in oil prices slowed demand for air freight globally and, in particular, drove users towards bellyhold rather than freighter options[39]. We set out the effect in the UK further below.

[39] Department for Transport, *UK Aviation Forecasts 2013*, paragraph 3.48, Steer Davies Gleave for Department for Transport, *Air Freight: Economic Drivers and Environmental Impacts*, 2010, Executive Summary.

3.8 The second point to note is the relationship to Heathrow ATMs. Up until around 2000, Heathrow was still growing its annual ATMs, which ultimately was driving the availability of bellyhold capacity in the UK air freight market. However, with runway capacity constraints biting, from around 2000, the rates of growth in ATMs at Heathrow initially slowed dramatically then stalled as it reached its consented limit.

3.9 When these two factors are combined, it is possible to understand what has happened in the UK air cargo market. It also has two key implications for considering the growth of the air cargo market moving forward and specifically in relation to Manston:

- it is reasonable to assume that the fundamental link between economic or trade growth and air cargo still exists and that, ultimately, with economic growth and increasing trade, demand for air cargo will grow. However, with oil prices remaining higher than seen in the past, it is likely that the growth path will be lower. We have assumed that it is likely to be more in line with the growth in real GDP over time;
- the capacity position at Heathrow is clearly a constraining issue for UK air freight demand but it is noticeable that this constraint has not resulted in significant gains being made by other airports in the London system. This suggests that, while there is probably a degree of constrained demand in the London system at present, this is affecting bellyhold air cargo and that is not translating through into substantially greater freighter growth at, for instance, Stansted or East Midlands. We examine this issue further below.

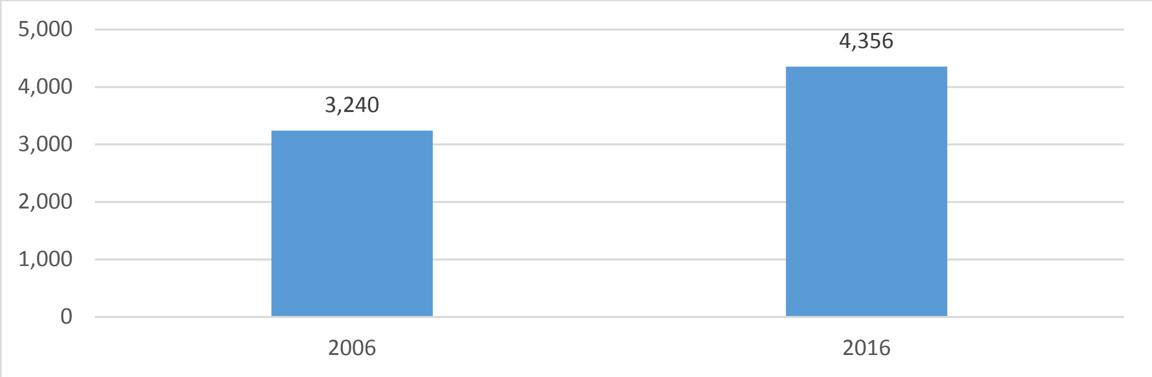
3.10 This is particularly important as it suggests that the market for bellyhold freight is different from that for pure freighter traffic. This is a function of price and urgency in relation to general air freight, as opposed to either express freight or niche products. For express freight or niche products, shippers are prepared to pay a premium which allows the use of freighters because either speed is of the essence or the destination is hard to reach or the cargo is difficult to handle in some way. For general air freight, these drivers are not the same. Accepting that all air cargo is to some degree sensitive to speed of delivery, it seems that what is likely to be being pushed from bellyhold capacity, in a capacity constrained environment, is less time sensitive and shippers' willingness to pay is lower. Hence, in the current market with relatively high fuel prices, freighter options are not an adequate substitute.

3.11 This is very important from the perspective of considering the potential role of Manston. It suggests that it will be very difficult for the Airport to compete effectively for any traffic displaced as a result of constraints in the London market as it cannot and will not be able to provide the price, frequency and breadth of destination advantages that bellyhold freight can offer. The airports competing for cargo traffic being pushed away from Heathrow, now and in the future, are the large UK regional airports with growing long haul passenger networks and the near European global hub airports, which offer the closest substitutes to Heathrow and are within easy trucking time of, certainly, the London and South East market. In any event, bellyhold capacity at Heathrow is expected to increase substantially once the third runway becomes operational so driving down the competitive prices in the market, making it even more difficult for freighters to compete. Even if there are delays to the provision of additional runway capacity at Heathrow, we would not expect a change to the pattern of behaviours observed since 2000, namely that cargo displaced from Heathrow will be trucked to other airports with available competitively prices bellyhold capacity.

3.12 Whilst the volume of air cargo flown to/from the UK's airports over the past 15 years has remained relatively static, there have been considerable changes in the way that demand has been serviced, which again reflect the drivers and constraints on demand described above. Essentially, the market has been consolidating to a small number of airports and bellyhold cargo has become more dominant.

3.13 The Herfindahl-Hirschman index (HHI) is a commonly accepted measure of market concentration[40]. **Figure 3.2** shows the HHI for the UK air cargo market in 2006 and in 2016. The change in the concentration level in the market over the last 10 years has been marked. The HHI for the UK air cargo market has increased by around 34%. The consolidation in the UK air cargo market in the last 10 years has resulted in an increase in the HHI of nearly 1,100. This continued concentration in the market can also be seen by examining the drivers of change in UK air cargo over the last decade. **Figure 3.3** sets out a bridge diagram between 2006 and 2016 showing the change in freight handled via bellyhold and pure freighter at major UK freight airports.

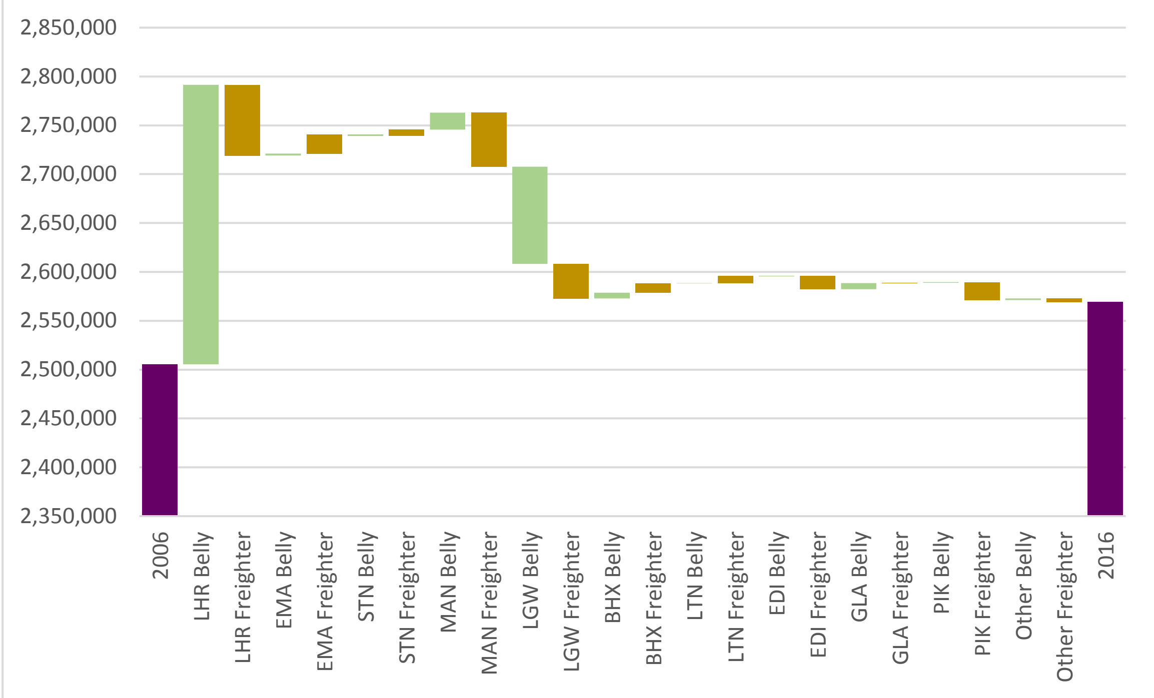
Figure 3.2: UK Air Cargo Market Herfindahl-Hirschman Index of Market Concentration



Source: York Aviation analysis of CAA Statistics

[40] It is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers, and can range from close to zero to 10,000. The closer a market is to being a monopoly, the higher the market's concentration (and the lower its competition). If, for example, there were only one firm in an industry, that firm would have 100% market share, and the HHI would equal 10,000, indicating a monopoly. If there were thousands of firms competing, each would have nearly 0% market share, and the HHI would be close to zero, indicating nearly perfect competition.

Figure 3.3: Drivers of Change in the UK Air Cargo Market – 2006 to 2016



Source: York Aviation analysis of CAA Statistics

3.14 There are a number of key points to note:

- the market has continued to consolidate into Heathrow through increased bellyhold capacity due to the increasing focus on long haul destinations. These gains have been offset by significant erosion of freighter capacity;
- elsewhere in London, Gatwick has seen both bellyhold and freighter capacity significantly eroded as that airport has become more capacity constrained and it has focussed increasingly on short haul low fare passenger services, albeit this trend is starting to reverse as more long haul operations come on stream. Stansted and Luton have seen some growth in freighter tonnage but this does not come close to offsetting what has been lost from elsewhere with Stansted heavily focussed on the integrator and express services market;
- East Midlands, with major DHL and UPS bases, has been the only airport that has seen significant growth in pure freighter traffic, but again this has not offset losses in freighter traffic from elsewhere, suggesting that, for more general air cargo, bellyhold capacity is fundamentally more attractive, even potentially if this involves trucking to distant airports;
- this is reinforced by what has happened at Manchester, which has seen growth in its bellyhold market, relating to its growing long haul network, but with its freighter traffic falling away. The growth in bellyhold traffic at Birmingham is also probably reflective of its growing long haul passenger network;
- in general, there has been a noticeable switch towards the use of bellyhold capacity. Since 2006, pure freighter cargo's share of the UK market has dropped from 37% to 30%, while actual freighter tonnage has dropped by 17%;

- the performance of Prestwick (PIK) provides perhaps the most obvious direct comparator to Manston, with a similar sized freighter operation in 2006 to Manston at its peak. Freighter traffic at that airport has dropped by 64% since 2006. In the meantime, Prestwick was nationalised to maintain operations as it had been heavily loss making for a considerable period of time.

3.15 The implications for Manston are clear. Bellyhold is the preferred option for a significant proportion of the air cargo market and this preference has intensified in recent years. The only airports experiencing freighter growth are those with significant integrator activity. This suggests that Manston's likely niche freighter offer will struggle to penetrate the market. There has been consolidation into larger airports, which again suggests that Manston will struggle to establish market presence. Finally, the experience of Prestwick, its nearest comparator in many ways, is not encouraging for Manston. Prestwick's well established pure freighter operation has been heavily eroded and the airport has had to be nationalised to maintain its operation due to inherent lack of commercial viability.

The Geographic Distribution of UK Air Cargo Demand

3.16 At the outset, it should be made clear that there is very limited data on where air cargo originates from or is destined for within the UK. However, some indications are available from other research, notably recent work by MDS Transmodal, in conjunction with York Aviation, for TfN in relation to its International Connectivity Strategy[41]. MDS analysed a series of datasets on air freight and road haulage and estimated that around 14% of UK air freight demand originates in or is destined for the North of England. We also know that air cargo is often trucked a considerable distance before being loaded on to aircraft.

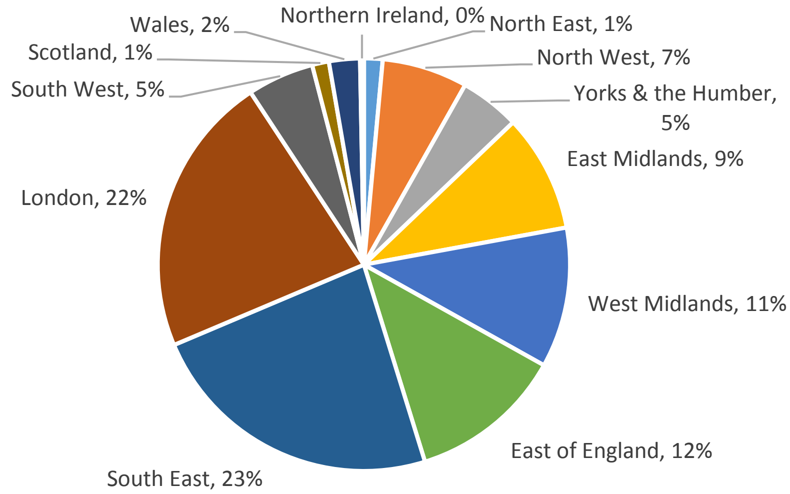
3.17 We have, therefore, developed a simple gravity model that distributes air cargo regionally across the UK based on:

- for exports, the distribution of manufacturing employment in the UK. This is intended to reflect that air cargo exports are likely to be primarily manufactured goods;
- for imports, the distribution of UK population. This is intended to reflect that imports are, in many cases, destined either for consumers directly or retailers. This is clearly a simplification but we believe a sensible one given the data available;
- a relatively low distance decay factor of 1.5, reflecting the relative insensitivity of air freight to trucking times. This has, in part, been calibrated based on observed distance decay factors using data available in the TfN work. This is generic and we have no reason to believe that the balance between trucking costs and the use of air freight would vary across the UK.

3.18 The resulting distribution of air cargo demand is shown in **Figure 3.4**. While there is a heavy concentration of demand in the Greater South East, there is significant demand located across the country. The issue for Manston is that it is poorly placed geographically to serve this demand, even for London and the South East, particularly once the location of distribution centres for import freight, which cluster around the M1 and M6, is taken into account.

[41] Transport for the North, *International Connectivity Evidence Report*, York Aviation/MDS Transmodal July 2016, Appendix C.

Figure 3.4: Modelled Regional Distribution of UK Air Cargo Demand



Source: York Aviation analysis of CAA Statistics, ONS and Google Maps Data

3.19 In the event of air cargo capacity constraints in London, this demand is likely to look initially for cargo capacity closer to home at the major regional airports, particularly those that are developing broader long haul passenger networks. Even if freighter aircraft are required for this demand, there are likely to be substantially better options than Manston. Not least the national freight hub at East Midlands, with its central location in the UK and excellent multimodal connectivity to a wide geographic area.

Future Demand for Air Cargo in the UK

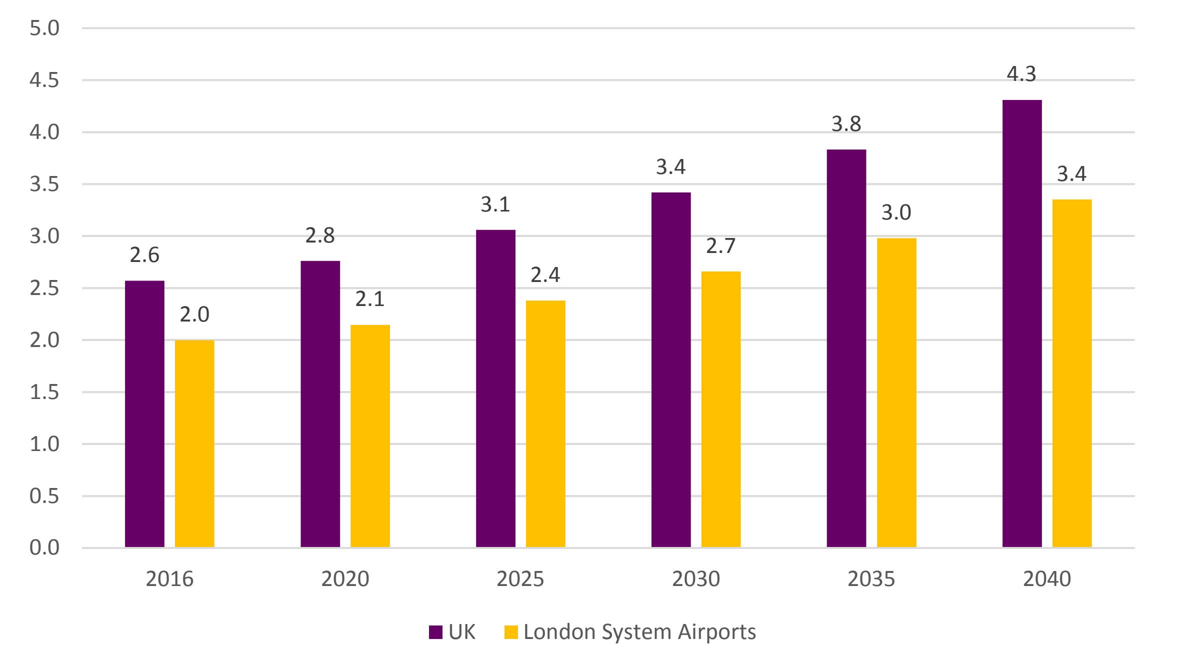
3.20 The initial step in producing our cargo forecasts for Manston is to consider the likely size of the London system and UK air cargo markets in the period to 2040. This is an unconstrained forecast and does not, at this stage, consider whether capacity will be available to deliver this demand.

3.21 In line with our analysis above and consistent with our 2015 report for the FTA, we adopted a relatively simple approach, growing existing air cargo demand forward in line with GDP projections for the UK economy. The GDP forecasts used are the latest forecasts produced by the Office for Budgetary Responsibility at the time of writing. These are taken from:

- Economic & Fiscal Outlook (March 2017), which provides short to medium term forecasts;
- Fiscal Sustainability Report (January 2017), which provides long term forecasts for the UK economy.

3.22 These forecasts suggest average real growth in UK GDP of around 2.2% over the period to 2040. The resulting projections of air cargo demand at the London system airports and across the UK are set out in **Figure 3.5**. This analysis sees total UK air cargo demand reach around 4.3 million tonnes by 2040 and demand in the London system[42] of around 3.4 million tonnes by 2040. At this stage, we have assumed that the split of tonnage between the London airports and the rest of the UK remains as currently, driven by the large concentration of freight forwarders in the vicinity of Heathrow in the light of its major air freight hub role. This may well overstate the scale of demand in London given increasing long haul networks at regional airports.

Figure 3.5: Air Cargo Tonnage Forecasts (million tonnes)



Source: York Aviation

Air Cargo Capacity at UK Airports

3.23 The second stage in our assessment is to consider the extent to which the demand identified above could be met by UK airports and the London system airports. This is, again, in line with our approach taken in our work for the FTA in 2015. However, the analysis undertaken for this research is more detailed, uses more up to date and detailed information on future passenger ATM forecasts and, specifically, considers Stansted's more recent statements in relation to continuing growth in the cargo market to around 400,000 tonnes[43] and removal of the existing 35 mppa passenger planning cap and extension to 43 mppa[44]. Had we been specifically asked, we would have advised Azimuth of the need to carry out such an assessment so as to understand the implications of our earlier work for TfL and the FTA.

[42] Based on the London airports current share of the national market.
[43] Sustainable Development Plan – Stansted Airport (March 2015).
[44] Press Release – Stansted Airport (17 October 2017).

3.24 In order to estimate the likely bellyhold capacity that will be available through the period to 2040, we have produced projections of passenger ATM demand for each of the top 10 freight airports in the UK in 2016, along with a residual forecast for Other UK airports. For Heathrow, Gatwick and Manchester, these forecasts have been split into domestic, EU and non-EU ATMs. The future years for each airport have been based on the ATM forecasts produced by the Airports Commission for which detailed data files have been released[45]. Years prior to the opening of Runway 3 at Heathrow, uses the Base ATMs scenario, while post opening uses the HAL ATMs scenario, which reflects the third runway.

3.25 The existing freight loads per passenger ATM for each airport have been estimated using CAA Statistics. These average loads have then increased by 1.0% per annum tapering to 0.5% per annum for Heathrow and 1.6% per annum tapering to 1.0% per annum for other airports. This reflects trends in average loads identified from CAA Statistics over the last five years.

3.26 In relation to pure freighter capacity, we have, in the first instance, considered what might be termed a business as usual view of capacity moving forward. This considers the likely number of freighter ATMs that might be flown rather than considering the actual movement capacity of individual airports, which may be greater. This is, ultimately, a more stringent view of capacity moving forward and is more likely to lead to a conclusion that there is a lack of freighter capacity to meet any demand than simply considering what any given airport could actually handle, especially given that Stansted is some distance from its freighter ATM cap and East Midlands is not close to any form of ATM limit. To enable this analysis, we have grown freighter ATMs at each airport by 0.4% per annum, in line with the expected growth rate from the DfT's Aviation Forecasts 2013[46]. However, we note that the most recent DfT forecasts[47] suggest that no growth in freighter movements to or from the UK is now expected. Hence, our use of the previous DfT growth rate may overstate the market for pure freighter operations but we have retained this approach so as not to understate the extent of any potential overspill market for Manston.

3.27 Once again, average loads per freighter ATM have been estimated for each airport from CAA Statistics. As with bellyhold cargo per ATM, there has been an upward trend in average loads on freighters in recent years of around 1.1% per annum (York Aviation analysis of CAA Statistics). This is assumed to continue over the period.

3.28 In addition to this business as usual view, we have also taken a view as to the likely total tonnage capacity over time of the two largest freighter airports in the UK, East Midlands and Stansted, based on those airports' development plans:

- the Stansted Sustainable Development Plan talks about developing cargo capacity to handle around 400,000 tonnes of cargo. We have assumed that current capacity is around 300,000 tonnes and that this grows steadily over time to 400,000 tonnes by 2040;

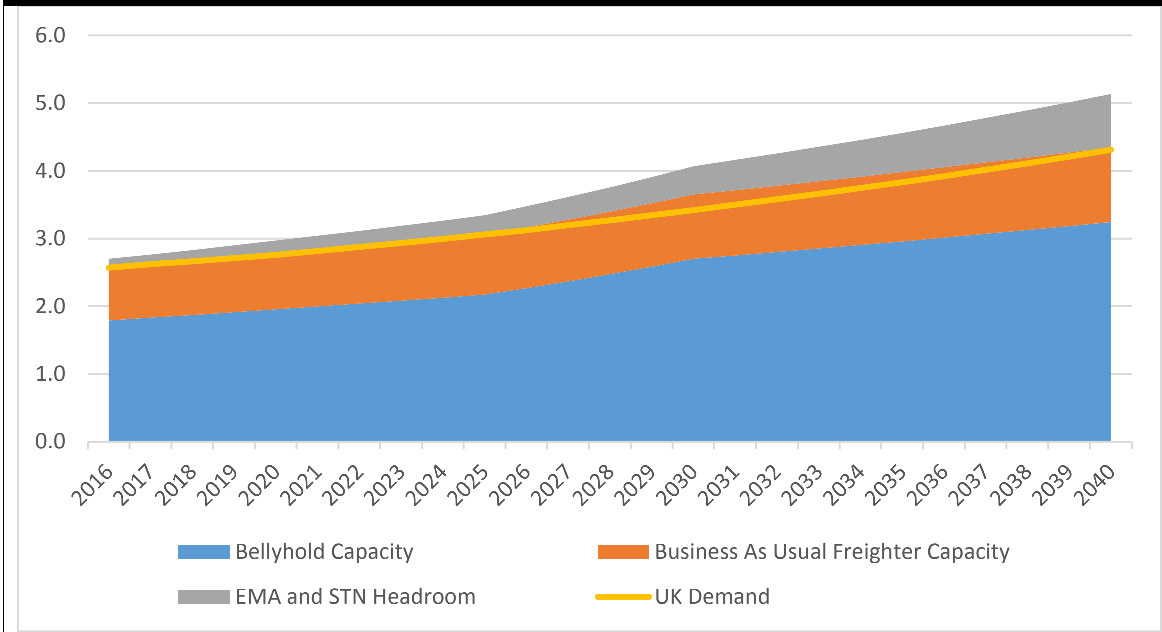
[45] https://www.gov.uk/government/publications/airports-commission-documents-and-data.
[46] The exception to this is the small number of freighter movements at Heathrow, which are not allowed to grow until the Third Runway is opened.
[47] Department for Transport, *UK Aviation Forecasts*, October 2017, paragraph 2.56.

- the East Midlands Sustainable Development Plan describes its runway capacity as able to support a 10 million passenger and 1.2 million tonne cargo airport[48]. We have assumed that this capacity could be developed over time to 2040 from a base capacity of 400,000 tonnes.

3.29 This assessment of the cargo capacity headroom at Stansted and East Midlands helps provide a view of how any excess demand identified could be handled by freighters in the UK if this were the response of the market to any shortage of bellyhold capacity, although it is important to note that we do not believe this would be the primary market response given the lower cost of bellyhold alternatives. It should, however, be recognised that the speed of build-up of this headroom is to a significant degree a matter of conjecture. There will be infrastructure developments required to enable capacity but, if demand were there, it is likely that these could be brought forward as they would be incremental expansion of existing facilities which could be phased in to meet demand more easily and cheaply than the substantial cost involved in re-opening Manston.

3.30 The resulting estimates for air cargo capacity for the UK as a whole and the London system over time are shown in **Figures 3.6** and **3.7**.

Figure 3.6: UK Air Cargo Capacity

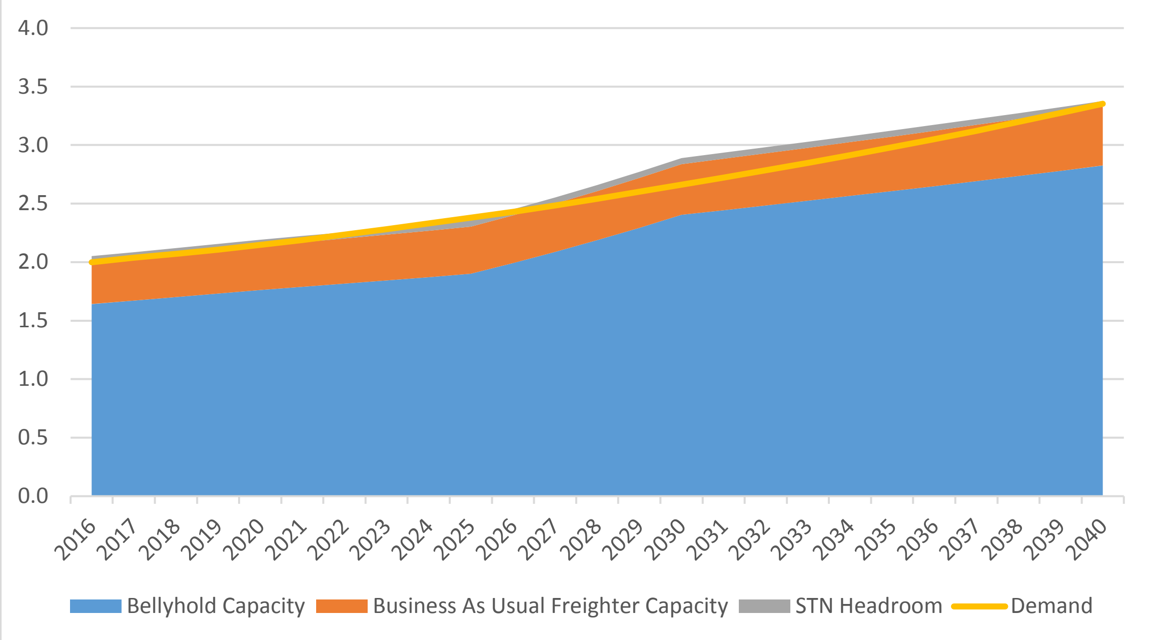


Source: York Aviation

[48] East Midlands Airport Sustainable Development Plan, 2015. Page 75.

3.31 At a UK level, our analysis suggests that there are unlikely to be capacity issues in the cargo market prior to 2040 even on a Business As Usual Freighter Capacity basis. Once the third runway is opened at Heathrow, there is in fact likely to be excess capacity in the market, which is likely to soften demand for supporting freighter capacity dedicated to general air freight (accepting that integrator/express freight is a separate market to a significant degree). It should, however, be noted that capacity on a Business As Usual Freighter Capacity basis is likely to become constrained shortly after 2040 but this can easily be addressed by exploiting the inherent airport capacity headroom still available at Stansted and East Midlands if it is appropriate to serve the market in that way. Overall, we can conclude from this analysis that there will be no shortage of freighter capacity in the UK before 2040 and overspill from other airports would not provide a rationale for re-opening Manston.

Figure 3.7: London System Air Cargo Capacity



Source: York Aviation

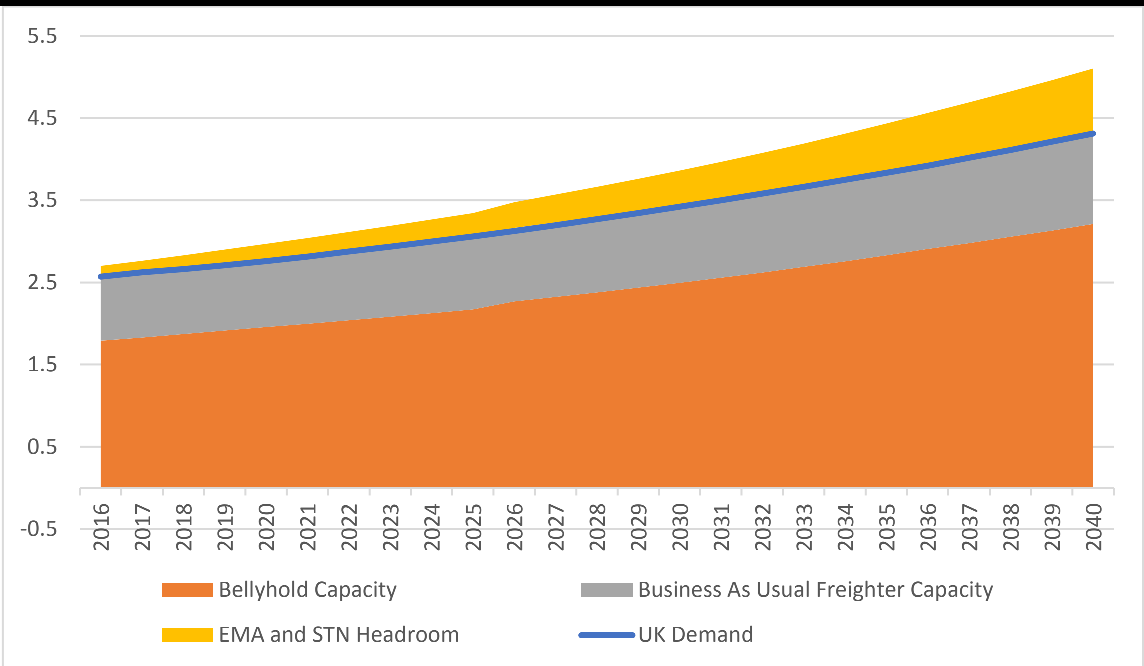
3.32 The situation at the London airports is slightly different if we assume that London maintains its market share of the overall market and there is no natural ‘clawback’ to the regions. With Heathrow’s bellyhold growth relatively constrained, there are potentially some limited capacity constraints in the medium term before the third runway opens but, if there was demand, we would expect Stansted to develop additional freighter capacity sooner. Any constraint would be fleeting. Once the third runway is opened, excess capacity develops rapidly. Potential capacity issues do not then start to re-emerge until around 2040, when it appears that Heathrow is likely to become runway capacity constrained once more.

3.33 The implications for Manston Airport are that, even in pure volume terms, push factors from other airports in London are unlikely to provide opportunities for growth before 2040, and this is before any consideration is given to Manston's suitability to serve the markets in question. In the short to medium term, there is likely to be some limited constraint in the London system before the third runway at Heathrow is opened. However, this is largely a function of bellyhold constraints at Heathrow and it is highly questionable as to whether the type of cargo that is likely to be forced out will be suitable for Manston or indeed would switch from bellyhold to pure freighter operations at all.

3.34 Logic would suggest that what will be pushed out is relatively low yielding, general air cargo that is more sensitive to price and less sensitive to time. Essentially, this is akin to business passengers forcing leisure passengers out of Heathrow. This type of air cargo is not likely to see pure freighters as an effective alternate, given the higher prices involved. It is more likely to seek out alternative bellyhold capacity at UK regional airports (which might actually be closer to its point of origin given our analysis above) or travel via truck to the continental European airports.

3.35 Our analysis here has been predicated on the construction of a third runway at Heathrow, as this is clear stated Government policy. In the event that the third runway is delayed or does not happen at all, it is expected that there would be other adjustments in the UK air transport market, including the provision of more long haul services from other airports offering bellyhold capacity. In this case, whilst there could theoretically be a level of capacity shortfall at the London airports assuming that they maintain a constant market share, we would expect demand and capacity to keep pace at the UK level as growth at regional airports is accelerated. This is illustrated in **Figure 3.8**. We consider that analysis at the UK level remains the most relevant and this does not suggest that there will be a capacity shortfall before 2040.

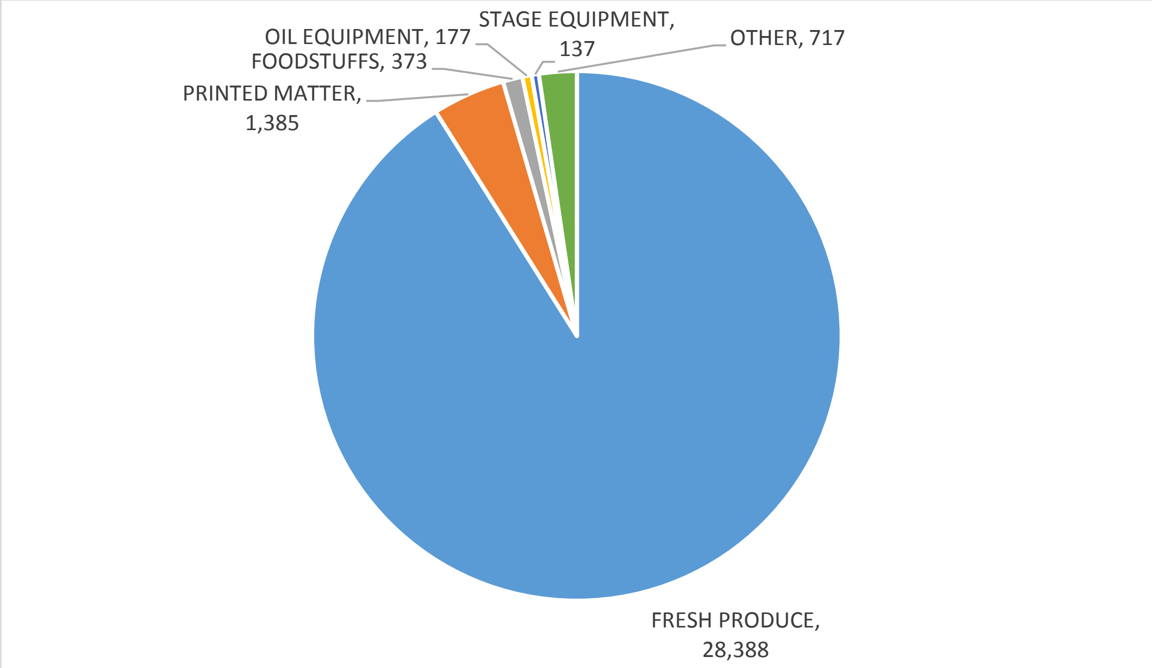
Figure 3.8: UK Air Cargo Capacity with No Third Runway at Heathrow



Source: York Aviation

3.36 An examination of the nature of cargo traffic that used Manston in the past also supports this assessment. Data provided to York Aviation by the current owner and set out in **Figure 3.9** shows that the Airport was essentially an import point for fresh produce (91% of total tonnage in 2012). This is a time critical market with associated high yields (hence allowing freighter operations) but also one that is dominated by Heathrow through its perishables hub and its bellyhold capacity to Africa. It is unlikely that Heathrow would shed significant amounts of this traffic with cargo constraints and certainly it would likely gain market share once the third runway is opened. Heathrow remains better located for the distribution of this produce to the core London market given its location inside the M25.

Figure 3.9: Air Cargo at Manston by Commodity Type in 2012 (tonnes)



Source: York Aviation analysis of Stone Hill Park data

3.37 It should also be remembered that this assessment assumes that Stansted does not accelerate its cargo development plans to meet any excess demand that is suitable for freighter activity. Indeed, we understand that the perishables activity that used to use Manston has shifted back to Stansted and that the operation at Manston was supported by low charges to the airline to compensate for the less attractive location.

Specific Air Cargo Market Forecasts for Manston Airport

3.38 Building on the analysis above, we have considered three scenarios for future cargo growth at Manston Airport. In each case, we have considered the likelihood of the scenario coming forward. It should be noted that, in the air transport market, demand is the driver of airport usage not capacity. Provision of capacity at Manston is no guarantee that airlines, shippers and passengers will use it unless there is demand and Manston represents the most efficient way for that demand to be met.

Scenario 1: Relief for Capacity Constraints in London (Highly Optimistic and very unlikely)

3.39 In this scenario, we have assumed that Manston is able to capture the excess demand that is seen in the London system in the medium term when only Freighter Business As Usual capacity is considered. It is then able to maintain its market share into the long term, even once the excess demand has disappeared with the appearance of the third runway.

3.40 We ultimately regard this scenario as highly optimistic and very unlikely to occur. We do not believe that the nature of excess demand is likely to suit freighter operations. This fits with the current market, where Heathrow is almost certainly constrained in terms of its ability to offer bellyhold capacity and yet there remains significant freighter capacity elsewhere and there has been no upturn in the demand for air freighter operations. We also feel it is highly unlikely that Manston could maintain market share in the context of the opening of a third runway at Heathrow. Even in the absence of a third runway, pure freighter capacity at Manston is not likely to be attractive for most of the freight displaced which would still choose cheaper bellyhold capacity available elsewhere in the UK and Europe.

3.41 We consider this scenario to be an upper bound to the envelope for Manston Airport. Even in this scenario, forecast tonnage only reaches around 105,000 tonnes by 2040 or around 4,470 cargo aircraft movements. The estimate of aircraft movements assumes loads similar to that of Manchester Airport's current freighter operations, growing by around 1.1% per annum. This appears to be a relatively low loading compared to Manston's previous operations[49] (hence providing a higher ATM number for any given tonnage and thus likely to overstate the number of movements).

3.42 We note that Azimuth have assumed an even lower tonnage per cargo air transport movement of under 20 tonnes, so leading to an overstatement of the number of aircraft movement at any predicted tonnage, but this does not appear realistic based on Manston's past operations nor tonnages seen elsewhere.

[49] We estimate that the number of tonnes per cargo ATM previously at Manston was 35-40 tonnes, taking into account empty aircraft backhauls.

Scenario 2: Manston Achieves Its Previous Market Share (More Likely but still with optimistic elements)

3.43 This scenario assumes that Manston essentially re-enters the market as a niche player in the key markets that it served previously, mainly fresh produce. This reflects the view that, in reality, very little has changed in the market compared to when Manston was last operational, not least that Heathrow was already suffering from runway capacity issues prior to 2014. There are no major changes that we would consider sufficient to alter Manston's attractiveness fundamentally compared to 2014. We note Azimuth's contention that Brexit will make trucking to Europe more difficult but would point out that the freight involved is most likely to be general air cargo heading for bellyhold capacity that is relatively less sensitive to time and that additional regulatory burdens are likely to be found at airports as well post Brexit. Hence, the impact on relative transit times may actually be comparatively limited. Furthermore, it is far from clear to us, from the evidence presented by Azimuth, that there were concerns regarding the quality of service offered at Manston historically sufficient to have constrained its share of the market in the past. Hence, it is not unreasonable to start from a position that its past market share was representative of what it might attain in future and that the provision of more infrastructure would not give rise to a change in the market or a higher level of underlying demand.

3.44 We regard this as the most likely of our three scenarios but it also has optimistic elements. Notably, it is highly optimistic to assume that Manston will be able to maintain market share in the face of expanded capacity at Heathrow. We would also note that the Airport was not viable at similar demand levels previously and would appear to have only been able to reach its recorded market share by 'buying' traffic through very low airport charges based on our discussions with SHP and its staff that worked at the Airport when operational. In this scenario, the Airport reaches around 47,000 tonnes by 2040 and around 2,000 cargo aircraft movements.

Scenario 3: Relief for Capacity Constraints in London (More Realistic but still with some optimism)

3.45 Scenario 3 is a variant of Scenario 1 that takes a more realistic view on how the limited excess demand in London in the medium term (allowing for pure freighter Business as Usual activities only) might be served. We would view this scenario as substantially more realistic than Scenario 1 but still with highly optimistic elements.

3.46 In this scenario, the excess demand is split as follows:

- 50% is assumed to be to diverted via truck to make use of bellyhold capacity at UK regional airports or at the continental hubs in Europe. This reflects the view that, in the majority of cases, this freight is likely to be relatively price sensitive, less time critical general air cargo for which pure freighters are not likely to be an appropriate substitute;
- the remainder is assumed to be split evenly between East Midlands, Stansted and Manston airports. This is, again, probably an optimistic assumption given the economies of scale and better proximity to markets overall offered by the other two airports compared with Manston.

3.47 Once the excess demand in London has peaked (just before the opening of a third runway), Manston is assumed to be able to maintain its market share into the future. This is again an optimistic assumption given what will be an excess of capacity in the market for much of the following period through to 2040. This scenario involves the lowest cargo throughput of the three options. By 2040, the Airport is handling only 17,500 tonnes of freight and handling around 750 aircraft movements each year.

Summary of Cargo Forecast Scenarios

3.48 The cargo tonnage and freighter ATMs associated with each of the three scenarios are set out below in **Table 3.1**.

Table 3.1: Summary of Manston Cargo Forecast Scenarios						
	Scenario 1: Relief for London (Highly Optimistic)		Scenario 2: Previous Market Share		Scenario 3: Relief for London (More Realistic)	
	Tonnes	ATMs	Tonnes	ATMs	Tonnes	ATMs
2020	7,608	402	30,359	1,605	1,268	67
2021	18,407	963	30,966	1,619	3,068	160
2022	31,758	1,643	31,616	1,635	5,293	274
2023	45,571	2,332	32,280	1,652	7,595	389
2024	59,860	3,029	32,958	1,668	9,977	505
2025	74,638	3,736	33,650	1,684	12,440	623
2026	76,205	3,773	34,357	1,701	12,701	629
2027	77,958	3,818	35,147	1,721	12,993	636
2028	79,751	3,863	35,956	1,742	13,292	644
2029	81,585	3,909	36,782	1,762	13,598	651
2030	83,462	3,955	37,628	1,783	13,910	659
2031	85,381	4,002	38,494	1,804	14,230	667
2032	87,345	4,050	39,379	1,826	14,557	675
2033	89,354	4,098	40,285	1,848	14,892	683
2034	91,409	4,147	41,212	1,869	15,235	691
2035	93,511	4,196	42,159	1,892	15,585	699
2036	95,662	4,246	43,129	1,914	15,944	708
2037	97,958	4,300	44,164	1,939	16,326	717
2038	100,309	4,355	45,224	1,964	16,718	726
2039	102,716	4,411	46,310	1,989	17,119	735
2040	105,182	4,468	47,421	2,014	17,530	745
Source: York Aviation						

3.49 Our updated analysis of the market and specific consideration of three potential scenarios for freighter growth at Manston Airport demonstrate that, even on the most optimistic assumptions, it is not likely to generate above 4,470 annual movements by air cargo aircraft. On a more realistic basis, it might attain similar levels of tonnage as seen in 2003 by 2040 but with a higher number of aircraft movements due to the assumption we have made that freighter loads would be similar to those seen elsewhere in the UK rather than the higher loads actually observed at Manston in the past. On past performance, the number of movements at Manston might well be lower. **None** of our scenarios suggest that there is a need to increase the capability of Manston Airport given our assessment in Section 4.

4 CAPABILITY OF THE SITE

4.1 Our start point for this assessment is the capability of the Airport site based on its historic and consented planning status and on the basis that the existing infrastructure could all be 'made good'. This assessment is based on the existing Lawful Use in planning terms. The existing Airport's permitted use is for civil aerodrome use, and there are no conditions limiting either passenger numbers or ATMs.

Capacity of Existing Facilities

4.2 In the first instance, it is important to highlight that Manston Airport did not operate under any form of restriction on the number of aircraft movements. The planning agreement between TDC and Manston Airport, which governed the permitted activity of the Airport, was entered into in 2000. In respect of night-time flying it sets out the limitations on such operations until a "Night-time Flying Noise Policy" is in place. Clause 1.1 of the Second Schedule states:

"The Owner agrees not to cause suffer or permit any Regular Night Flying Operations at any time (subject to Paragraph 1.4 below) before a Night-time Flying Noise Policy shall have been prepared and a copy lodged with the Council."

Further, it defines:

"Regular Night Flying Operation means Flight movements which are scheduled or programmed and which occur frequently or regularly to the same or similar patterns for the same operator during Night-time"

4.3 It is understood that the Night-time was defined as 23.00-07.00, though Manston Airport was also seeking a Night Quota Period which would have run from 23.30-06.00. In practice, there were a number of night movements which were deemed to be ad-hoc and often driven by technical delays but that were permitted to operate in any event.

4.4 We have assessed the capability of the existing infrastructure at Manston Airport assuming that the range of existing facilities, as at the time of its closure, are made good. There are three principal elements – runway, passenger and freight:

- **Runway:** for the handling of commercial passenger and freight aircraft, the runway would operate without a parallel taxiway. The current marked parallel taxiway is too close to the runway centreline to allow such aircraft to taxi independently of a runway movement. Landing and departing flights would then need to back track along the runway to and from the entry/exit taxiways. The achievable maximum runway rate with this operation might be around 20 to 24 flights per hour depending on the mix of aircraft types. This runway movement rate, even at 50% utilisation of available slots, would be capable of accommodating around 64,000 aircraft movements a year. However, we recognise that this is in excess of the capability of the passenger and freight handling facilities as existing.

- **Passenger:** the passenger apron has been designed to accommodate 4 E-Jet FK100 passenger aircraft. These aircraft types are now rare and have a wingspan that is much less, at 28 metres, than the typical low fares airline Code C type aircraft that Ryanair, easyJet and Wizzair, for example, use. These airlines typically use aircraft such as the B737-800 and A320, with wingspans of 36 metres. On this basis, the passenger apron would be able to accommodate up to 3 of these larger Code C aircraft simultaneously and could, in the alternative, be used for handling cargo flights. The terminal itself is quite compact and would have a maximum of 6 check-in desks and very small baggage make up area, and a departure lounge that could depart a maximum of 2 flights within the same 30 to 40-minute period, with an hourly capacity in total of around 250 passengers. There are more than 1,000 car parking spaces. We estimate that the passenger terminal at its current size could support around 0.7 to 0.9 mppa based on there being up to two based Code C aircraft with a reasonable number of other visiting flights across a typical day.
- **Freight:** the aircraft parking area close to the freight sheds can park up to 2 or 3 small to medium sized cargo aircraft or one large aircraft. There are two freight sheds that were originally organised to be used one for imported freight and one for export. Adjacent to these is an 'equine' handling facility for processing livestock. In practice Manston, when operational, normally handled one large freight aircraft at a time due to size and juxtaposition of the freight sheds and apron to each other and the single taxiway connecting to the runway. Whilst Manston handled up to 30,000 tonnes of freight at its peak, our understanding is that the freight facilities could have handled substantially more tonnage.

4.5 Our assessment into the capability of Manston Airport is based on the reinstatement of the runway, air traffic control, fire station, navigational aids, apron (stands) and taxiways. We have taken into account the use of both apron areas, one to the west adjacent to the cargo sheds and one to the east, adjacent to the passenger terminal. These could accommodate collectively up to 4 freight aircraft simultaneously. The assessment is also based on an 18-hour operational day (allowing for a small number of ad hoc night movements consistent with previous operations) and with a turnaround window of up to 2½ hours from the arrival to departure of each freight aircraft resulting in the capability of each stand to handle over 7 aircraft rotations a day, or over 14 cargo aircraft movements.

4.6 On this basis, across a year, this would equate to a capability for at least 21,000[50] annual air cargo aircraft movements with the existing consented infrastructure, subject only to reinstatement. This assessment is consistent with the assertion made in presentations on behalf of RSP[51], which stated that the 10,000 cargo aircraft movement threshold, necessary to pass the Section 23 test in the Planning Act 2008 (as amended), could be met by providing for 14 aircraft arrivals and 14 aircraft departures each day. As the existing infrastructure could provide for 4 cargo aircraft being handled simultaneously, this would equate to 20,440 annual air transport movements by cargo aircraft. This would be more than sufficient to accommodate any reasonable forecast of the cargo related movement demand that Manston might attract as we have set out in Section 3.

[50] Should a night time noise policy be agreed with Thanet District Council pursuant to the existing planning agreement that enabled a longer operational day and/or a number of scheduled night movements, then the capability could, in theory, be higher than 21,000 annual cargo aircraft movements.
[51] RSP, Presentations for Thanet District, Dover District, and Canterbury City Councils

4.7 We recognise that the actual usage of that capability will depend on how an airport is used in terms of the daily and seasonal pattern of movements but this does not, of itself, reduce the capability offered by the existing consented infrastructure for air transport movements. Our assessment, therefore, provides essential missing information from RSP's materials to date which is necessary for the purposes of section 23 of the Planning Act 2008 (as amended), for assessment purposes under the Environmental Impact Assessment Regulations and for consultation purposes.

Land Required to accommodate RSP’s Forecasts

The RSP Master Plan

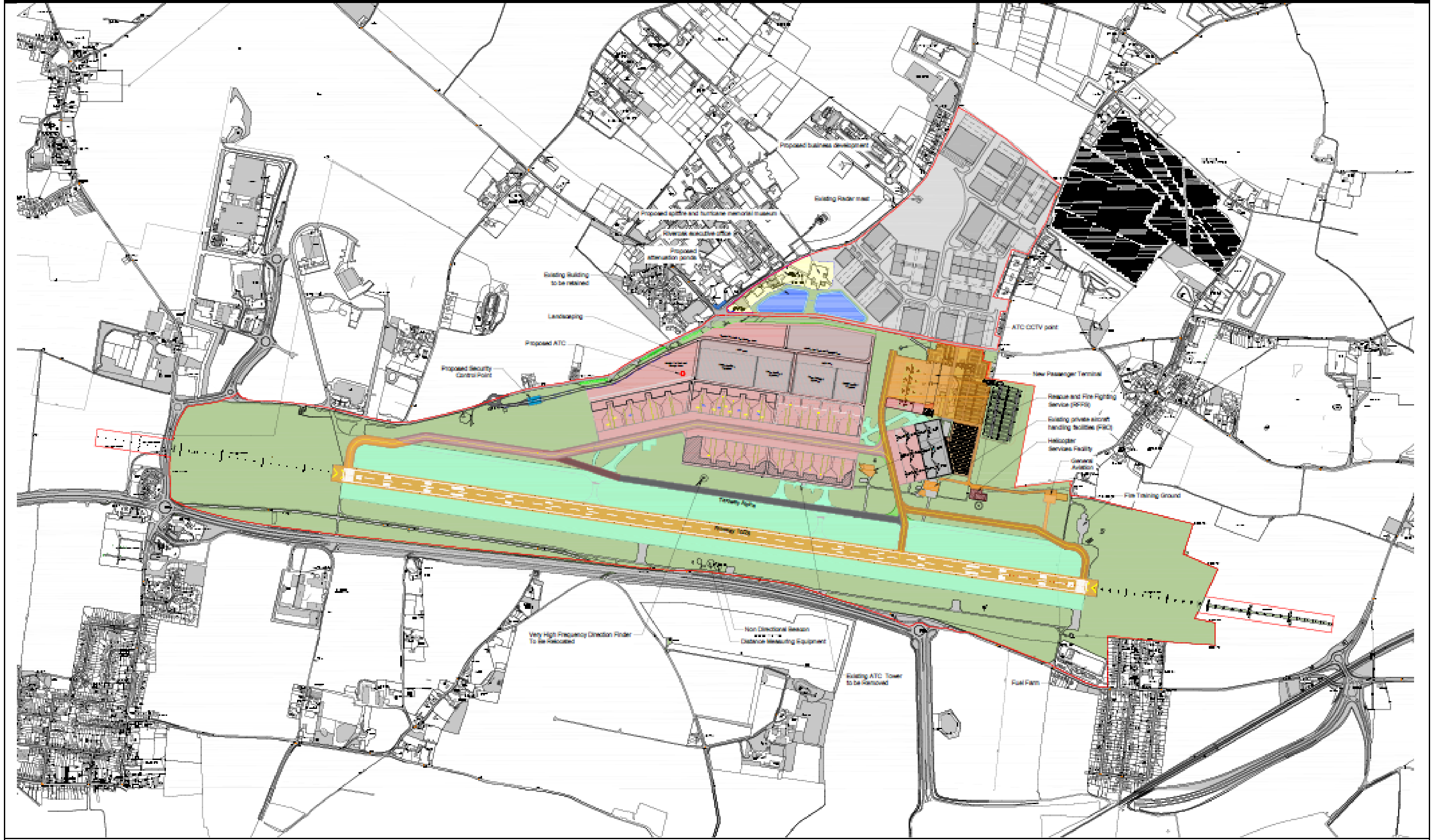
4.8 The Master Plan presented by RSP for the Manston Airport site is shown at **Figure 4.1**. It makes use of the full length of the runway and provides a full length parallel taxiway. The western side of the site is dedicated to freight handling activity and has 19 Code E aircraft stands for cargo flights and 4 large cargo sheds for the processing of freight supported by truck loading and parking areas. The eastern side of the site shows as a new passenger terminal and apron along with a MRO hangar and apron. The existing private aircraft handling facility (FBO) and fire station site is retained. We are not entirely clear how such works would be phased, although we understand that 4 phases of development are planned. RSP projects that Manston will need to be able to handle 17,171 cargo related ATMs and that 1.4 mppa of passengers will be handled by 2039. These represent the basis for the proposed DCO application and we assume, therefore, that these will be the limits on the number of movements and passengers which the site would be capable of accommodating as these form the basis for the assessment of environmental and other impacts. However, this is unclear from the consultation documentation.

4.9 We are unclear why 19 Code E stands are proposed given that the fleet mix at 2039[52] shows 85% of aircraft (at 17,171 annual cargo aircraft movements) being by aircraft smaller than Code E dimensions. Even allowing for some larger Code F types (<2% of movements), it would be possible to reduce the area of apron required for the fleet mix proposed, leaving aside whether 19 stands are required for the simultaneous parking of cargo aircraft at any one time, which we discuss further below.

4.10 To the north of the site, on the ‘Northern Grasslands’, a new development is shown, which appears to consist of commercial sheds and factory buildings with no obvious connection to the operation of the Airport being located entirely on the landside of the B2050. We assume that RSP’s intention is to lease out these landside commercial buildings on this northern site so as to provide a rental income to cross subsidise the operation of the Airport. We discuss the need for this land further below.

[52] Azimuth Volume III, Table 2.

Figure 4.1: RSP Masterplan – Proposed Site Layout



Source: RSP

Land Required

4.11 Without prejudice to our position that we do not consider that RSP's proposals are credible in terms of the level of demand that might be attracted to Manston, we do not consider that the scale of development proposed by RSP for 17,171 cargo related movements is necessary, justifiable or reasonable, based on the principles set out at paragraph 4.5 above.

4.12 At **Figure 4.2**, we illustrate the justifiable and reasonable extent of land required at Manston Airport to support a cargo operation of 17,171 ATMs and passenger operation of 1.4 mppa (even though we do not accept that these ATMs and passenger numbers can be reached). This is based on our experience of airport operations around the world.

4.13 We recognise that there could be an opportunity for maintenance hangars for heavier aircraft maintenance activities but the need for these will not necessarily be triggered by the establishment of passenger operations. Depending on the nature of the freight and passenger carriers that set up services at Manston, the need for maintenance hangars cannot be ruled out and we have allowed for one twin bay hangar with a footprint of approximately 6,000m2 or two single bay hangars at 3,000m2 each.

4.14 It is also reasonable to expect that there will be some business and some general aviation activity. However, unless a bespoke FBO is set up, which we believe is unlikely given the distance from the main business aviation market in London and with Biggin Hill much closer to the core market, there would be very limited use by business aviation. Any small general aviation or flying school activity can be accommodated within the land area shown. These facilities, and any aircraft dismantling activity as also suggested in Azimuth's forecasts, would need to have direct airside access and so would need to be located to the south of the B2050. In other words, all of the operational facilities to support the operation of the Airport would require to be located to the south of the road and not on the 'Northern Grasslands' site.

4.15 We have clearly marked the area of land to the south of the B2050 that is not required for the defined airport operations in green on Figure 4.2. To the north of the Airport site, the 'Northern Grasslands' are marked in yellow and is not required for the scale of airport activity proposed by RSP. We discuss the potential use of this area further below. Figure 5.2 clearly shows that the extent of airport land needed to support the scale of freight and passenger activity proposed by RSP is significantly less than that proposed by the RSP. There are surplus areas of land within the core airport site as well as the 'Northern Grasslands' that are not required to support the throughput proposed.

Figure 4.2: Airport Land for 17,121 Freight ATMs and 1.4 mppa Operation – Surplus Land: Airport Land (Green), Northern Grasslands (Yellow)

Source: York Aviation

4.16 We summarise at **Table 4.2**, those facilities proposed by RSP in its Master Plan but are not, in fact, required to support essential airport operations.

Table 4.2: Classification of RSP Proposed Airport Facilities at Manston Airport		
	RSP proposed airport-related development	**Facilities not Essential for an Operational Cargo Airport**
4	Retention & Extension of Passenger Apron	✓
11	New replacement Passenger Terminal building	✓
12	New and extended passenger car parking areas	✓
23	Relocation of the two existing museums	✓
24	Demolish old Control Tower in northern area	✓
25	Airport related businesses on Northern Grasslands	✓
26	New MRO aircraft maintenance hangars	✓
27	New FBO in refurbished business aviation terminal	✓

4.17 Although a replacement radar is shown by RSP re-using the old radar tower within the ‘Northern Grasslands’ area, it is not clear that a replacement radar would actually be required, although a radar service would be required. It is likely that a radar service could be procured more cheaply by buying in radar coverage from an alternative radar position rather than re-providing a radar on site. This is increasingly common practice at smaller airports. In the event that a replacement radar was required, this would not need to be located on the ‘Northern Grasslands’ but could be located within the airfield site to the south of the B2050.

4.18 In terms of the use of the ‘Northern Grasslands’, there is no particular requirement for extensive freight forwarding facilities on site as consolidation of loads is likely to continue to take place in and around Heathrow as currently. Any freight forwarding activity directly to support 17,171 cargo aircraft movements is likely to be containable within the area shown for freight warehousing within the airfield site.

4.19 No other justification is given for the extent of the commercial development shown on the ‘Northern Grassland’ part of the site. In our view, it is certainly not ‘associated development’ required to support the operational airport, other than in terms of providing a financial cross subsidy from rental income for general commercial buildings.

4.20 The need, then, for such an extensive development across the 'Northern Grasslands' cannot, in our opinion, be justified and is substantially in excess of what is seen elsewhere. The scale of supporting infrastructure proposed appears substantially greater than exists at the UK's main pure freight hub at East Midlands. We have seen no reasoned justification for the scale of facilities proposed. It appears to cover an area (c.48 hectares), which is more than double the size of the associated Pegasus Business Park area at East Midlands Airport (c.21 hectares), which currently handles virtually the same cargo tonnage as projected by Azimuth for Manston at 2039. Furthermore, it is significant that a substantial part of the East Midlands area is occupied by hotel development (3 hotels) in support of the much greater passenger throughput at that airport, a Regus office complex, and many of the other occupiers of sites within the Pegasus Business Park are not related to the activity at the Airport and include companies such as PwC, Laser Optical Engineering, Nikon Metrology UK, Medstrom Healthcare, Rail Vision and PKF Cooper Parry making use of an accessible location close to the M1. None of these activities would be essential in relation to freight activity at the airport and so would not meet the test for associated development required for inclusion with a DCO.

Realistic Requirements

4.21 Clearly, as is evident from earlier sections of this report, our opinion is that RSP's projections for the use of Manston Airport cannot be realised. Hence, the area of land required to accommodate lower levels of activity would be proportionately smaller, occupying a substantially smaller area of land to the south of the B2050 than shown on Figure 4.2.

Conclusions on Capability

4.22 The existing infrastructure at Manston Airport, if made good, would be capable of handling 21,000 annual air cargo transport movements[53]. However, the actual usage of that capability would depend on the pattern of operation and how the infrastructure was used on a day by day basis.

4.23 Without prejudice to our view that demand to use Manston is not likely to be anything like 17,171 cargo aircraft movements a year, we consider that the land required to accommodate such a number of movements would be substantially less than shown on the RSP Master Plan.

4.24 We can see no justification for the inclusion of the 'Northern Grasslands' within the DCO as associated development as there will be little requirement for the relocation of freight forwarding activity from adjacent to the UK's main cargo hub at Heathrow to Manston and any requirement could be accommodated south of the B2050. The development on the Northern Grasslands site appears to be speculative commercial development which, based on the precedent at East Midlands Airport – the UK's principal airport for pure freighter operations – would be expected to be largely for non-aviation related uses.

[53] Based on an 18-hour operational day. Should a night time noise policy be agreed with Thanet District Council pursuant to the existing planning agreement that enabled a longer operational day and/or a number of scheduled night movements, then the capability could, in theory, be higher than 21,000 annual cargo aircraft movements.

5 SOCIO-ECONOMIC IMPACT

Introduction

5.1 In this section, we examine the socio-economic benefits that are put forward by Azimuth and the flaws that are apparent in their approach. These render the socio-economic case put forward unreliable. We then move on to provide our own estimates of the socio-economic impacts of Azimuth's traffic forecasts based on more appropriate assumptions and also set out the socio-economic impacts associated with our own traffic forecasts to provide a more reasonable basis for considering the extent of the benefits that might realistically accrue from the re-opening of the Airport.

Comments on Azimuth Socio-Economic Assessment

5.2 Volume IV of the Azimuth's Report sets out the socio-economic case for the DCO for Manston. This assessment naturally relies on the traffic forecasts presented in Volume III. This means, of course, that the socio-economic assessment is rendered unreliable by the failings of the traffic forecasting approach and the incorrect inferences drawn from the assessment of the market. However, there are also substantial failings in relation to the methodology used for the socio-economic impact assessment itself, which result in significant over estimates of the impacts. We would also re-emphasise that the Airport must be commercially viable to be able to deliver these benefits, otherwise it will simply fail and no level of benefit will be delivered. RSP has not clearly demonstrated that the operation of the Airport would be viable at any level of throughput and, in the light of the conclusions of Aviasolutions in their advice to Thanet (see Section 6 of this report), viability must be in serious doubt based on our analysis of the likely usage as set out in Section 3. This renders any analysis of the socio-economic impacts to a large extent moot. Setting aside the issue that the Airport is highly unlikely to be viable and that the traffic forecasts set out are significantly overstated, we have identified below a number of key flaws in Azimuth's approach and analysis of the economic impacts.

5.3 At the outset, it is probably helpful to highlight the key area in which we agree with Azimuth's analysis and conclusions. We agree that the East Kent area is in need of regeneration. It is simply that we do not believe that Manston Airport can deliver the benefits set out. Any attempt to re-open the Airport is not likely to succeed as it is hard to see that viability could be attained with realistic forecasts of usage. Another failure of the Airport would be more likely to damage the image of Kent as a place to invest than enhance it.

5.4 Azimuth spend some time considering the appropriate employment density on which to base an assessment of direct employment. They ultimately conclude that East Midlands Airport provides an appropriate comparator (see paragraph 4.1.4 of Volume IV). This information is then used to drive large parts of the benefit calculations for Manston. York Aviation provides economic impact advice to MAG in relation to both its major freight airports, East Midlands and Stansted. From this knowledge, we would suggest that the job numbers quoted and used here are an incorrect base as they include substantial numbers of non-airport related jobs located on the business park at East Midlands Airport, discussed in the previous section. This means that the employment density used by Azimuth is far too high for genuine airport related activity. In any event, the employment at East Midlands is higher than might be anticipated anyway given the very significant employment supported at the site by DHL's UK main base of operations, which is not likely to be replicated at Manston.

5.5 We accept that it is difficult to identify an ideal comparator for a re-opened Manston in the UK but would suggest that an airport such as Glasgow Prestwick would be a much more appropriate comparator. The Airport has a low fares operation by Ryanair and has a reasonably significant pure freighter operation (although this has been substantially larger in the past). There is also detailed information on the economic impact of that airport in the public domain from work undertaken by both York Aviation[54] and SQW[55]. We have used information from this research later in this section to provide a more realistic base for assessing the economic impact of Manston.

5.6 The multipliers used by Azimuth for indirect and induced employment and economic activity in their assessment are simply inappropriate. Firstly, the multipliers adopted are for the impact at a national level. The study area for this economic assessment and the focus of Azimuth's comments is the sub-region around Manston Airport. Multipliers appropriate to this much smaller area should have been used and would have been substantially smaller. Secondly, the multiplier used (2.1) is a European average taken from research by InterVISTAS for ACI EUROPE[56]. The adoption of this Europe-wide multiplier is strange given that that the research does actually provide a specific multiplier for the UK[57], which is substantially smaller at 1.5. Use of the appropriate multiplier would, of course, have significantly reduced the job impacts suggested, even at a national scale.

5.7 There is a further issue in relation to the use of an inappropriate multiplier covering national level effects in that displacement of activity from other airports should have been taken into account. To the extent that any of the activity projected for Manston is displaced from other airports, as our analysis strongly suggests it will be, there will be a relative reduction in employment and economic activity in the vicinity of these other airports. So whilst, correctly calculated, the employment and economic effects local to Manston would be additional, the effect of displacement of activity would need to be netted off wider national or regional (South East) impact assessments.

[54] The Economic Impact of Glasgow Prestwick Airport – York Aviation (2012). http://www.evaluationsonline.org.uk/evaluations/Search.do?ui=basic&action=show&id=509
[55] Economic Impact of Glasgow Prestwick Airport – SQW (2008). http://www.sqw.co.uk/files/4413/8712/8925/99.pdf.
[56] The Economic Impact of European Airports – InterVISTAS for ACI Europe (2015).
[57] Ibid. Page 103.

5.8 As well as using a multiplier for indirect and induced impacts, a multiplier is used to assess the wider catalytic employment[58]. The multiplier used is taken from out of date research for ICAO[59] and it should be said that catalytic impacts remain a difficult area in terms of quantification. There is not sufficient detail in the ICAO report[60] that Azimuth rely on to understand how this catalytic multiplier has been derived. However, again, there are issues with the use of this multiplier. Firstly, it appears to be a global multiplier, which would again be completely inappropriate for use in considering sub-regional impacts around Manston and it has been wrongly applied to total job numbers rather than direct job numbers. In practice, the correct approach would have been to consider the specific additional connectivity that Manston Airport might provide for Kent and assess how this might relate to attracting additional business activity and tourism to the area.

5.9 In examining the employment projections presented (Section 5.1 of Volume IV), it appears that no allowance has been made for either productivity growth or returns to scale over time and as the Airport grows. While information on potential on-site productivity growth can be hard to come by, we would expect some allowance to have been made. A typical figure might be around 2% per annum based on our experience at other airports. The result of this omission is that future direct job numbers, in particular, are likely to be significantly overstated given the compounding effect of failing to account for productivity growth.

5.10 Section 7 of Volume IV discusses other socio-economic impacts. In particular, it talks about contributions to GDP. Para 7.1.1 describes GDP as *"a monetary measure of the state of a Region's or a Country's economy"*. This is not correct. It is a measure of the size of the economy. It does not comment on the state of the economy or the prosperity or wealth within it. The calculations of GDP impacts presented are based on the job numbers estimated earlier in the report. They are, therefore, likely to be significant overestimates given the flaws in the demand forecast method and the job density and multiplier assumptions.

5.11 The comments in Paragraph 7.1.7 describing how Manston could contribute significantly to Thanet's Economic Growth Strategy aspirations in terms of GVA per job and per capita are, in reality, unsupported. Given the methodology adopted, which essentially measures Manston's impact at a national level, it is actually very difficult to know what the effect might be on the Thanet economy. Undoubtedly, the Airport could support local jobs if it is re-opened but, in reality, the number of those jobs and their value has not been effectively calculated here. The aviation supply chain in the UK is heavily concentrated around the major airports, particularly in relation to air cargo. So, in practice, much of the economic benefit claimed would be realised in and around Heathrow rather than locally if Manston were to re-open. To the extent that any activity would be displaced to Manston, there would be negative economic implications elsewhere.

[58] Catalytic employment is related to additional economic activity generated in areas adjacent to an airport as a result of the additional connectivity offered by the airport.
[59] ICAO – International Civil Aviation Organisation, which is the inter-governmental body which regulates air transport globally.
[60] ICAO – Economic contribution of civil aviation: Ripples of prosperity, 2000.

The Socio-Economic Impact of the Azimuth Traffic Forecasts

5.12 Below, we have set out an estimate of the socio-economic impacts of the Azimuth traffic forecasts using more appropriate assumptions. We have retained the same basic analytical framework, which considers direct, indirect, induced and catalytic impacts, but we have used different basic assumptions in all areas:

- we have estimated the direct employment associated with the re-opening of the Airport based on employment densities observed at Glasgow Prestwick Airport during the production of our 2012 report for Scottish Enterprise[61]. This includes considering which elements of on-site employment are likely to be driven by passenger growth and which by cargo growth. Given the slightly differing approach, it is hard to provide a perfect comparison of job density. However, in Year 3, when both cargo and passenger operations begin, the York Aviation job density is around 650 jobs per million workload units, compared to around 890 assumed by Azimuth;
- we have used an indirect and induced multiplier for Kent of 0.4[62]. This is again taken from our work on Prestwick and reflects impacts of that airport in the Ayrshire economy, which would seem a sensible comparator. This multiplier is also in line with the benchmark multipliers set out in the Homes and Communities Agency Additionality Guide (2014)[63]. At this level, displacement affects do not need to be accounted for albeit they would still arise to the extent that activity at Manston displaces activity elsewhere;
- we have used catalytic multipliers for air freight taken from Steer Davies & Gleave's report on the UK Air Freight Industry for the DfT[64]. This identified national level catalytic multipliers for air freight of 3.46 and 3.76 (inclusive of the direct impact). There is no simple way to adjust these multipliers to the Kent economy. We have, therefore, reduced these multipliers by 75%. This is broadly akin the difference between sub-regional and national level multipliers for indirect and induced effects. As with all estimates of catalytic impacts, these should be regarded with some caution in the absence of a more detailed and specific assessment of the potential effects;
- we have assumed productivity growth at Manston Airport of around 2% per annum. This is typical of our experience of productivity growth rates at UK airports;
- in order to estimate the GVA impacts of the re-opening of the Airport, we have used GVA per job estimates from ONS for Kent. On-site jobs are assumed to generate GVA in line with the Transportation & Storage sector (£57,763), while jobs in the wider economy are assumed to reflect the average GVA per job for Kent (£52,623).

5.13 In **Tables 5.1** and **5.2**, we have set out our estimates of the socio-economic impact of the Azimuth traffic forecasts compared to the original estimates produced by Azimuth.

[61] *The Economic Impact of Glasgow Prestwick Airport* – York Aviation (2012).
[62] Note that this excludes the initial direct effect.
[63] See page 36.
[64] *AIR FREIGHT Economic and Environmental Drivers and Impacts* – Steer Davies and Gleave for DfT (2010). Page 106.

Table 5.1: Employment Impact of Manston Airport – YAL Socio-Economic Assumptions Comparison					
	Y2	Y5	Y10	Y15	Y20
Azimuth Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	856	2,150	2,749	3,438	4,271
Indirect & Induced	1,798	4,515	5,773	7,220	8,970
Catalytic/Wider	0	8,601	10,996	13,753	17,085
Total	**2,654**	**15,266**	**19,518**	**24,411**	**30,326**
YAL Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	688	1,555	1,791	2,033	2,291
Indirect & Induced	275	622	716	813	917
Catalytic/Wider	475	1,073	1,236	1,403	1,581
Total	**1,439**	**3,250**	**3,743**	**4,249**	**4,789**
YAL Total as % of Azimuth	**54%**	**21%**	**19%**	**17%**	**16%**
Source: York Aviation and Azimuth Associates					

Table 5.2: Gross Value Added Impact (£ million) – YAL Socio-Economic Assumptions Comparison					
	Y2	Y5	Y10	Y15	Y20
Azimuth Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	£43	£108	£138	£173	£215
Indirect & Induced	£78	£195	£250	£312	£388
Catalytic/Wider	£0	£391	£499	£625	£776
Total	**£121**	**£694**	**£887**	**£1,110**	**£1,379**
YAL Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	£41	£99	£126	£158	£197
Indirect & Induced	£15	£36	£46	£58	£72
Catalytic/Wider	£25	£61	£78	£97	£121
Total	**£82**	**£196**	**£250**	**£313**	**£389**
YAL Total as % of Azimuth	**68%**	**28%**	**28%**	**28%**	**28%**
Source: York Aviation and Azimuth Associates					

5.14 The differences between the two sets of estimates are marked. Our assumptions result in economic impacts being around a half to two thirds of those estimated by Azimuth initially. However, the gap widens over time as the impact of Azimuth's failure to allow for productivity growth and high multiplier assumptions feed through. In our view, the Azimuth estimates simply cannot be relied upon as a measure of the potential economic impacts of re-opening of Manston Airport. Not only are they infected by the errors in traffic forecasting, but the approach itself is highly flawed. A more realistic and robust assessment suggests that the local impacts within Kent, even on Azimuth's forecasts, would be substantially less than claimed and it is these lower order effects which would need to be balanced with the environmental and impacts in assessing the acceptability of the proposed development, including the loss of SHP's proposed mixed use development and the socio-economic benefits deriving therefrom**.**

A More Realistic View of the Socio-Economic Impacts of Manston

5.15 As we have described above, the socio-economic assessment undertaken by Azimuth was destined to fail before it started because of the failings in the traffic forecasts that feed the approach. We do not consider there is any realistic prospect of the Airport attaining 10,000 annual movements by cargo aircraft and the build up of traffic would be materially slower than Azimuth estimate.

5.16 We have, therefore, set out below an assessment of the socio-economic benefits that might be associated with re-opening Manston on the basis of York Aviation's most likely cargo forecast (that Manston is able to regain its previous market share) and our passenger forecasts, which are around half those assumed by Azimuth. Once again, we have used our socio-economic impact assumptions as described above. The resulting employment and GVA impacts are again set out compared to Azimuth's assessment of the economic impact of reopening Manston in **Tables 5.3** and **5.4**.

Table 5.3: Employment Impact of Manston Airport – YAL Forecasts Comparison

	Y2	Y5	Y10	Y15	Y20
Azimuth Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	856	2,150	2,749	3,438	4,271
Indirect & Induced	1,798	4,515	5,773	7,220	8,970
Catalytic/Wider	0	8,601	10,996	13,753	17,085
Total	**2,654**	**15,266**	**19,518**	**24,411**	**30,326**
YAL Impact Assumptions with YAL's freight + passenger forecast					
Direct	216	391	409	442	486
Indirect & Induced	87	156	164	177	194
Catalytic/Wider	149	270	283	305	335
Total	**452**	**817**	**856**	**925**	**1,015**
YAL Total as % of Azimuth	**17%**	**5%**	**4%**	**4%**	**3%**
Source: York Aviation and Azimuth Associates					

Table 5.4: Gross Value Added Impact (£ million) – YAL Forecasts Comparison

	Y2	Y5	Y10	Y15	Y20
Azimuth Impact Assumptions with Azimuth's freight + passenger forecast					
Direct	£43	£108	£138	£173	£215
Indirect & Induced	£78	£195	£250	£312	£388
Catalytic/Wider	£0	£391	£499	£625	£776
Total	**£121**	**£694**	**£887**	**£1,110**	**£1,379**
YAL Impact Assumptions with YAL's freight + passenger forecast					
Direct	£13	£25	£29	£34	£42
Indirect & Induced	£5	£9	£11	£13	£15
Catalytic/Wider	£8	£15	£18	£21	£26
Total	**£26**	**£49**	**£57**	**£68**	**£83**
YAL Total as % of Azimuth	**21%**	**7%**	**6%**	**6%**	**6%**
Source: York Aviation and Azimuth Associates					

5.17 Unsurprisingly, the socio-economic impacts associated with the Airport are reduced even further on the basis of more realistic forecasts. The operation is simply of a much smaller scale. In Year 2, in generates 452 jobs, only 17% of the Azimuth estimate of 2,654. By Year 20, the differential is even larger, with the Azimuth estimates reaching over 30,000 jobs, but with our estimates at only just over 1,000. More likely, the Airport would cease operating again due to the inability to attain viable operations. In these circumstances, it becomes a moot point as there would be no jobs and economic impact over the medium to long term.

Conclusion

5.18 Once again, the evidence presented by Azimuth on behalf of RSP cannot be relied upon. It is infected with the flaws in the traffic forecasting methodology identified previously but the approach to identifying socio-economic impacts is, in itself, badly flawed. The socio-economic impacts are, as a result, massively overstated and, in any event, would not be realised if the operation of the Airport is not commercially and financially viable.

6 PEER REVIEW OF OTHER REPORTS

6.1 In this section, we set out a brief review of other reports produced on the potential for a re-opened Manston Airport.

Aviasolutions for Thanet

Commercial Viability of Manston Airport – September 2016

6.2 We note that this assessment was focussed on the likely viability of a re-opened Manston Airport. Hence the main focus was on scenarios for passenger growth as passenger operations make a significantly greater financial contribution to operating an airport given the ability to earn revenue from retail, catering and car parking as well as direct revenue from airport charges (landing, aircraft parking, passenger fees and any cargo handling fees). We note that Avia took a much more optimistic view than we do of the scope for passenger overspill from the main London airports to Manston but, to an extent, these scenarios were designed to assess whether re-opening Manston would be commercially viable rather than to assess a realistic level of demand.

6.3 Having assessed the historical performance of Manston, Avia assumed that it would be possible for the Airport to regain the broad level of cargo activity that is was handling before it closed. This is not dissimilar to our 'most likely' assumption. Significantly, Avia noted that:

"Our freight interviews indicated that the demand to use the airport for freight was very limited. This, in large parts, is due to two factors; the infrastructure investments that have already been made by the industry around Heathrow and Stansted, and the geographical location of the airport. Infrastructure, and the associated knowledge, skill and supporting industry at airports such as Heathrow and Stansted, as well as the major European hubs such as Frankfurt, and Paris, would be almost impossible for Manston to replicate. The geographic location of the airport, tucked into the corner of the UK, cannot compete with airports such as East Midlands for Integrator services that are sold as fast delivery, due to the increases in surface transportation times. The interviews did however indicate that charter services and ad-hoc freighter flights would certainly return, providing some revenue income for the airport"[65].

This accords with our view of the most likely prospects for Manston.

6.4 Overall, the Avia 2016 work concluded that Manston was not likely to be a commercially viable prospect if re-opened, certainly if it is assumed that another runway would be built at either Heathrow or Gatwick. We concur with this conclusion and, on the basis of our more realistic assessment of the level of passenger demand that the Airport might attract, commercial viability is even less likely to be attained.

[65] Aviasolutions, *Commercial Viability of Manston Airport*, September 2016, Section 8.3.

Local Plan Representations - Final Report – August 2017

6.5 This report largely deals with individual specific representations one at a time. Overall, Avia conclude that their *"opinion, based on updated market information since the publication of our previous study, is consistent with our earlier view that Manston Airport does not represent a financially viable investment opportunity under normal market conditions."*[66]

6.6 In relation to these representations, Avia state clearly that:

"The Local Plan Representations do not make a credible case, nor provide the evidence for AviaSolutions' to change its views on the financial viability of Manston Airport. We remain of the view that whilst Heathrow Airport continues to offer substantial freight capacity to a truly global network, and Stansted Airport utilises only around half of the statutory provision of air freighter movements, the London air freight market has capacity to grow without the re-introduction of capacity at Manston Airport. Freight Forwarders have invested heavily in infrastructure around these core airports, carriers have developed their networks as such, and without clear value drivers that support relocating services to Manston Airport, the case remains to be made that demand exists for a freight facility at Manston Airport. This view is reinforced by the empirical evidence of multiple failed attempts to develop profitable operations at the airport."[67]

6.7 Again, Avia's analysis concurs with our own in terms of the limited role that there would be for a re-opened Manston Airport given the evolution of the air freight market. We concur with Avia's analysis of the potential for other activities at Manston such as business aviation or aircraft dismantling and note that, in our experience, income generation from such activities would be low.

6.8 We note that, in this report, Avia correctly interpret our work for the FTA in terms of the potential for the equivalent of 80,000 air freighter movements to be accommodated away from the main London airports by 2050 in the event of no new runway being constructed. As Avia note, this demand is likely to be accommodated at a variety of other airports, including Manchester and East Midlands, with the former offering a substantial amount of bellyhold capacity by that date and the latter offering a dedicated freighter service. Displacement to regional airports is also a logical response given the amount of cargo from the regions which is currently trucked to the London airports. We have had no dialogue with Avia regarding the interpretation of our work but their interpretation of it confirms that Azimuth have simply misused headline figures from our work to support RSP's case without considering or understanding the broader meaning of our analysis in 2015 as Avia demonstrate.

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[66] Aviasolutions, *Local Plan Representations - Final Report*, August 2017, Executive Summary.
[67] Ibid.

Review of Azimuth and Northpoint Forecasts for Manston – August 2017

6.9 In this report, Avia conclude that the Azimuth and Northpoint forecasts are *"highly ambitious"* and that *"the likelihood of these forecasts being realised is very low"*[68]. Avia do not, themselves present any updated forecasts of their own in this report. They make clear that neither report presents *"a credible case"* sufficient for Avia to change its view on the likelihood of viable commercial operations being attained at Manston Airport.

6.10 Avia conclude that:

"We remain of the view that whilst Heathrow Airport continues to offer substantial freight capacity to an extensive global network, and Stansted Airport offers capacity for air freighter movements, the London air freight market has capacity to grow without the re-introduction of capacity at Manston Airport. Freight Forwarders have invested heavily in infrastructure around the UK's core cargo airports and carriers have developed their networks as such. Without clear value drivers that support relocating services to Manston Airport, the case remains to be made that demand exists for a freight facility at Manston Airport.

Provision of capacity alone is no guarantee of financial success, a view reinforced by the empirical evidence of multiple failed attempts to develop profitable aviation operations at Manston Airport."[69]

This accords with our view.

6.11 Like ourselves, Avia point out[70] that provision of infrastructure is not of itself sufficient to ensure a financially viable airport at Manston and that this will depend on the demand that can be attracted. Avia conclude, like ourselves, that *"Azimuth's report does not provide sufficient evidence of demand at Manston Airport from air freight operators to support the required investment in facilities and profit generation potential to re-establish Manston Airport as a going concern."*[71] Avia, like ourselves, highlight that if there had been a market for Manston to accommodate any overflow from Heathrow, this would have been evident prior to the Airport's closure in 2014. Avia also conclude[72], in relation to the extensive interviews carried out by Azimuth, that they largely address the overall issues of airport capacity in the South East of England and do not effectively explain why Manston, at the tip of Kent, would be an attractive solution for the UK air freight sector.

6.12 Avia also note that the other activities that Manston might attract, as suggested by interviewees, such as maintenance, repair and overhaul, aircraft dismantling, a fixed based operator for business aviation and the establishment of an integrator base could have been attracted previously if there was demand at Manston but that such demand was not evident. We concur that the reports of interviews set out by Azimuth do not constitute real evidence of actual demand for such facilities or the likelihood of them locating at Manston.

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68 Aviasolutions, *Review of Azimuth and Northpoint Forecasts for Manston*, August 2017, Executive Summary
69 Ibid.
70 Ibid, page 9.
71 Ibid.
72 Ibid, page 11.

6.13 Like ourselves, Avia point out that Azimuth's freight forecasts would suggest that Manston would be a major presence in the UK air freight market from Year 2[73] and that by the end of the period would be on a par with the UK's main freight hub at East Midlands by 2039. They go on to note that the methodology adopted by Azimuth to forecast cargo movements could be acceptable, which we take to mean a 'bottom up' movement driven approach. However, they caution that the primary data used (from the interviews) *"has significant potential to exaggerate or overstate the market"*[74]. As Avia note, the aspirations of the interviewees, that as we have noted earlier were largely local interests in Kent, would need to be tempered by commercial realism and the risks attaching to the operations put forward. Avia conclude, in relation to Azimuth's freight forecasts, that *"the probability of such an outcome remains very low"*[75]. We concur.

6.14 In overall terms, Avia conclude that there is nothing in the Azimuth analysis which would give rise to them changing the conclusions set out in their earlier 2016 report.[76]

6.15 Avia then go on to consider the Northpoint report, discussed further below, which was prepared as a direct rebuttal of their 2016 report. In the first instance, they note that they do not accept that the benchmark airports[77] cited by Northpoint as comparators for what Manston could be are relevant:

There are clearly structural and geographical reasons as to why each of these airports is different to the proposal for Manston Airport. As such, suggesting these are comparable benchmarks is not realistic. In order for Manston Airport to acquire the status of these airports it would need to demonstrate key elements of development, namely; commitments from key express players (DHL / UPS / FedEx / Amazon / Alibaba); an ability to operate night operations with few regulatory restrictions; and geographical advantages from nearby cities, industrial parks, and population centres.

We agree. These benchmark airports serve different roles, principally based around their selection by large integrators/distributors as main distribution hubs for large urban conurbations. These are simply not comparable to Manston and it would be misleading to believe otherwise.

[73] Ibid, Section 2.3.2.
[74] Ibid, Section 2.3.3.
[75] Ibid.
[76] Ibid, page 15.
[77] Alliance Fort Worth in Texas, USA, Hamilton Airport in Ontario, Canada, Bergamo in Italy, Liege in Belgium and Leipzig in Germany.

6.16 In relation to air freight forecasts, Avia again note RSP's reliance on our work for the Freight Transport Association. Again, Avia correctly interpret this work as being based on the assumption that *"freight growth is bellyhold focussed"* going on to note that our *"report also questions Boeing and Airbus' forecast growth rates, which are utilised in the long term growth forecast by Dr Dixon."*[78] Avia go on to note Northpoint's use of the 55,000 air cargo movements figure from our earlier work for Transport for London (2013) and cite Northpoint's claim that we asserted that Manston was the only realistic opportunity to accommodate this level of freighter movements if they were displaced. As we have discussed at length in Section 2, this is simply a misapplication of our 2013 work. Unsurprisingly, Avia could not find these figures in the 2015 report for the FTA.

6.17 Avia also highlight Northpoint's misinterpretation of the interaction between bellyhold and pure freighter demand. We agree with their conclusions in this regard, which explain why the market for more pure freighter operations to/from the UK is limited:

"AviaSolutions' experience in the freight industry is that many bellyhold operators can, when supply exceeds demand, reduce rates to such a level as to cover the marginal cost of freight plus a margin. The business is often operated as an addition to the passenger service, and therefore its real marginal costs are low. It is simply impossible for a freighter operator to reduce its rate to match this marginal cost and operate at profitably [SIC]*. Therefore, freighters tend to operate on thick routes where the economies of scale of a freighter operation can be realised. These routes are also curtailed by a non-related market, that of passenger demand. Where large scale passenger demand exists e.g. UK to USA, a residual effect of this is large scale freight capacity, which is unmatched to demand. The reverse can be seen on routes to the East, where passenger demand is less, but freight demand, particularly inbound to the UK, is high. As such, many freighters operate on these routings."*[79]

We agree that the extensive passenger based route network and the availability of bellyhold capacity limits the need for a substantial pure freighter operation to/from the UK, in contrast with other parts of the world where passenger air route networks are less developed. This is why global data on the demand for air freighters is simply not relevant in the UK context.

Northpoint

6.18 We have largely addressed key points of Northpoint's rebuttal of the original Aviasolutions work above on the basis of Avia's most recent report. We highlight here a few other key observations on Northpoint's *"The Shortcomings of the Avia Solutions Report and an Overview of RSP's Proposals for Airport Operation at Manston"* prepared for RSP.

6.19 As with Azimuth's work, the key criticism of this work is that it is based on assertion rather than evidence or systematic analysis of the potential market for Manston. As noted above, benchmark airports in the middle of Continental Europe or adjacent to major conurbations in the US and Canada do not provide robust examples of how Manston might develop given its geographic position. Northpoint set out that:

[78] Ibid, page 17.
[79] Ibid, Section 3.1.6.

"RSP's plans are centred on a developing a strategically important air cargo operation focused dedicated freighters importing and exporting a range of perishable and high-value/time-critical goods to markets in London and across the wider south-east." [80]

And that these operations would be supplemented by a *"modest"* passenger offering, a variety of business and general aviation activities as well as maintenance, repair, overhaul and aircraft dismantling activities. However, the report does not, itself set out how the scale of such activity could be assessed and whether it would, in combination, secure a viable operation.

6.20 In terms of forecasting the volume of air freight that Manston might secure, Northpoint make an unsubstantiated leap from noting the reasons why Heathrow is dominant in the market to asserting that the key determinant for pure freighter operations is the infrastructure provided at an airport and supply driven factors, noting that it is important that these latter are *"transparent"*[81]. We have already noted the lack of transparency in relation to the air cargo forecasts produced by Azimuth upon which RSP rely. Nor are the projections set out in Northpoint's Appendix A any more transparent in terms of how the estimated tonnage to be accommodated by freighter movements at Manston has been derived.

6.21 Although lacking transparency, it would appear that Northpoint, like Azimuth, have relied on Boeing's global forecasts for freight revenue tonne kilometres as a basis for projecting UK air cargo tonnage[82]. For the reasons set out in Section 2, this is inappropriate and will lead to a material overstatement of the overall market.

6.22 Like Azimuth, Northpoint see cross channel movement of air cargo as an opportunity for pure freighter operations at Manston[83] rather than simply the natural economic response to shortage of bellyhold capacity at Heathrow. Northpoint then seek to rely on our assessment of displaced tonnage equivalent to 55,000 annual movements by air cargo aircraft in 2050 from our 2013 work for TfL as corroborating evidence of Manston's potential[84]. This is to misrepresent the conclusions from this work, which indicated clearly that, in practice, there was unlikely to be a problem even if Heathrow did not get a third runway, albeit that there might be some additional trucking costs to make use of bellyhold capacity in Europe. This would still be cheaper for shippers than the alternative use of pure freighter aircraft from Manston or elsewhere. Furthermore, in assessing the scope for airports to accommodate more freighter aircraft[85], we do not agree with their assessment in respect of Stansted for the foreseeable future and Northpoint appear to ignore the main pure freight hub at East Midlands.

[80] Northpoint, *The Shortcomings of the Avia Solutions Report and an Overview of RSP's Proposals for Airport Operation at Manston*, paragraph 1.3.
[81] Ibid, paragraph 2.4.
[82] Ibid, paragraph 2.18.
[83] Ibid, paragraph 2.21.
[84] Ibid, paragraph 2.24.
[85] Ibid, paragraph 2.30.

6.23 In dismissing the potential for these other, established airports, Northpoint seek to highlight the constraining effect of night movement restrictions on air cargo operations. By inference, then, Northpoint appear to assume that Manston will not suffer from such restrictions so making it more attractive. This appears to be corroborated at Appendix A[86] where it is claimed that the presence of a logistics centre at Manston without significant night movement restrictions would be one of the attractions and a factor in the forecasts being attainable. However, it is our understanding that night movements will at best be limited to 8 per night and could be limited further if the promises of no night movements are upheld.

6.24 In relation to the potential in the aircraft maintenance and dismantling/recycling market[87], we note that these are activities being 'chased' by many airports. There is no analysis of competition nor of the likelihood of Manston capturing any of these activities in Northpoint's report. In any event, the level of activity generated by such activities is unlikely to make the difference between the Airport being viable or not.

6.25 Overall, Northpoint present no real evidence in its Conclusions[88] to substantiate why the operation at Manston could be viable. Its forecasts of cargo movement and passenger demand are no more transparent nor based on market analysis than those set out by Azimuth and do not justify why the RSP application would meet the tests set out in Section 23 of the Planning Act 2008. In general, we agree with Avia's conclusions regarding the robustness of this report.

[86] Ibid, Appendix A, A.8.
[87] Ibid, Section 4.
[88] Ibid, Section 5.

7 CONCLUSIONS

7.1 In this report, we have examined the case for RSP's proposed development at Manston Airport. Our overall assessment is that RSP have failed to provide their own evidence of the capability of Manston Airport and the amount by which their proposals would increase that capability by (all we have are forecasts which have no credibility as explained in this report). This results in glairing omissions in RSP's consultation material. This failure means that, in our opinion, the requirements in section 23 of the Planning Act 2008 (as amended) have not been satisfied. In essence, we would have expected RSP to be able to show:

- the capability of Manston Airport of providing air cargo transport services;
- the amount by which RSP is proposing to increase that capability by and thus the "new" capability; and
- a credible forecast for why that 'new' capability is required.

None of this information is provided by RSP.

7.2 RSP's case is principally based on circumstantial evidence presented in the Volumes I to IV of *Manston – A Regional and National Asset* prepared by Azimuth Associates. Much of the material upon which Azimuth seek to rely as the basis for the case for Manston relates to the economic costs to the UK if additional passenger hub capacity is not provided in the South East of England by 2050. This is not relevant to the specific question as to whether there would be sufficient demand for pure freighter aircraft movements to be operated to/from Manston in the foreseeable future.

7.3 The analysis presented by Azimuth shows a lack of understanding of the economics of the air freight market. This leads to a misinterpretation of work by ourselves, upon which Azimuth seek to rely to support their case. Just because there could be excess freight demand in 2050 in the absence of further runway capacity at the UK's main hub, it does not follow that displaced bellyhold freight will seek a more expensive pure freighter service from a relatively nearby airport over the use of available bellyhold capacity from a more distant airport which can be provided at a lower cost to the shipper with only marginal penalty in terms of time. Our previous work simply cannot be relied on to support RSP's case.

7.4 Fundamentally, Manston's past operation was economically inefficient due to the inherent lack of viability. Hence, reopening the Airport, in the face of a limited market, has the potential to damage the productivity of the UK aviation sector overall, particularly, as we have demonstrated in our own assessment of cargo demand for Manston in Section 3 that there are more economically efficient alternatives available for any freight displaced due to specific capacity constraints at Heathrow both now and in the future.

7.5 Whilst there may be a role for Manston, on the margin, providing some niche specialist air freight operations, the market for such services is small and often ad hoc, which will impact on the prospects for a viable operation of the Airport.

7.6 Manston is too peripheral for integrator operations serving the UK. Integrators have a strong preference for locations more centrally located in the UK with good road access to all of the major markets. The availability of land for warehouses, for example as suggested in terms of the use of the 'Northern Grasslands' part of the overall airport site, is far less important than a location central to the market and the availability of good road access, neither of which are characteristics of Manston. This would apply equally to the suggestion that Amazon might locate there or that the Airport could become a base for drone operations. It is simply in the wrong place to serve the market being in the far south east at the end of a peninsular, away from the main centres of population and distribution in the UK.

7.7 In the absence of hard market evidence of the need for Manston Airport, Azimuth undertook an interview survey to supplement the need case and inform the forecasts. However, the list of interviews was small, with few national players interviewed compared to a large number of local companies with something of a vested interest in seeing Manston re-opened. Even so, if anything, the views of those interviewed by Azimuth suggest that there would, at best, be a limited role for Manston. The one airline interviewed made clear that *"success at Manston depended upon identifying a niche market and becoming known for excellence. In particular, suggestions included a perishables centre, handling of live animals, easy access for charter flights, and handling cargo that is not necessarily straightforward"*. The scale of this opportunity was never quantified by Azimuth. It is clear, however, that the realistic expectation for Manston is for a small niche operation rather than as a general 'overspill' airport for London.

7.8 The outputs from these interviews are then used by Azimuth as a basis for postulating a number of cargo aircraft movements that might operate at Manston. However, it is simply not possible to relate the proposed services to be operated with the responses by the interviewees. There is a complete absence of any explanation for or justification of the services postulated. At the very least, there is a lack of transparency in the approach that needs to be explained so that consultees can understand the basis of what is proposed and to ascertain whether there is a credible forecast for why an increase in Manston's capability is required.

7.9 In our view, the Azimuth forecasts simply lack credibility. To illustrate this lack of credibility of the forecasts, in Year 2 (the first operational year), a cargo throughput of nearly 100,000 tonnes is forecast by Azimuth. This would make Manston the 5th largest freight airport in the UK in its first year after re-opening (compared to 2016 actual throughput at the other airports). This would place it close to the scale of freight operations at Manchester Airport, which includes a substantial amount of bellyhold freight. It would make Manston the 3rd busiest airport in the UK in terms of tonnage carried on dedicated freighter aircraft. This is simply not a credible proposition. This lack of credibility is important in reaching any decision under Section 23 of the Planning Act 2008 (as amended).

7.10 We have updated and further developed our analysis of the UK air freight market from than previously undertaken for TfL and the FTA, and upon which RSP seek to rely as corroboration of their own cargo movement forecasts. When properly interpreted, our forecasts of air freight demand and capacity across the UK as a whole, taking the role of bellyhold fully into account, show that there is plenty of freighter capacity at Stansted and East Midlands to the extent that there is a need for more pure freighter capacity. Overall, we conclude from this analysis that there will be no shortage of freighter capacity in the UK before 2040 (RSP's forecast assessment year) and that overspill from other airports would not provide a rationale for re-opening Manston.

7.11 Our initial assessment of the passenger market is that the throughput might, at best, be around half of that projected by RSP and, hence, given the dependence on passenger related income for the financial viability of airport operations, this will impact substantially on the viability of the proposal. The other activities suggested by RSP, such as business aviation, maintenance, repair and overhaul, and aircraft dismantling are highly competitive markets and, to the extent that Manston might attract any such operations, this are unlikely to contribute substantially to the overall viability of the Airport.

7.12 The existing infrastructure at Manston Airport, if made good, is capable of handling 21,000 annual air cargo aircraft movements[89]. The actual usage of that capability would depend on the pattern of operation and how the infrastructure was used on a day by day basis. Our assessment, therefore, provides essential missing information from RSP's materials to date which is necessary for the purposes of Section 23 of the Planning Act 2008 (as amended), for assessment purposes under the Environmental Impact Assessment Regulations and for consultation purposes.

7.13 Without prejudice to our view that demand to use Manston is not likely to be anything like 17,171 cargo aircraft movements a year, we have considered that the land required to accommodate such a number of movements. Our assessment is that the land required would be substantially less than shown on the RSP Master Plan and that the proposed land take is excessive and without justification in terms of the compulsory acquisition of the land. Any development required to handle 17,171 annual movements by air cargo aircraft can all be accommodated to the south of the B2050 and, even allowing for passenger operations and other activities, would not require all of the airfield land to the south of the road. Obviously, on the basis of more realistic forecasts of future demand, the area required to support the ongoing operation of the Airport would be materially smaller.

7.14 We can see no justification for the inclusion of the 'Northern Grasslands' within the DCO on the basis of it being for associated development as there will be little or no requirement for the relocation of freight forwarding activity from adjacent to the UK's main cargo hub at Heathrow to Manston and any requirement to support Manston operations could be accommodated south of the B2050. The development on the 'Northern Grasslands' site appears to be speculative commercial development which, based on the precedent at East Midlands Airport – the UK's principal airport for pure freighter operations – would be expected to be largely for non-aviation related uses.

[89] Based on an 18-hour operational day. Should a night time noise policy be agreed with Thanet District Council pursuant to the existing planning agreement that enabled a longer operational day and/or a number of scheduled night movements, then the capability could, in theory, be higher than 21,000 annual cargo aircraft movements.

7.15 In terms of the socio-economic implications of the proposed development, Azimuth has shown a lack of understanding of how such impacts should properly be calculated. Leaving aside the use of inappropriate multipliers, the impacts have been assessed at a national scale and should have taken displacement of activity from other airports fully into account, reducing the impacts below those stated. Furthermore, the assessment should have considered the impact on alternative uses of the site, including SHP's proposed mixed use development and the socio-economic benefits deriving therefrom. We have set out a more realistic and robust assessment, which shows that the local impacts within Kent, even on Azimuth's forecasts would be substantially less than claimed and it is these lower order effects which would need to be balanced with the environmental and impacts in assessing the acceptability of the proposed development.

7.16 Unsurprisingly, the socio-economic impacts associated with the Airport are reduced even further on the basis of more realistic forecasts of likely usage if it re-opened. The operation is simply of a much smaller scale. In Year 2, in generates 452 jobs, only 17% of the Azimuth estimate of 2,654. By Year 20, the differential is even larger, with the Azimuth estimates reaching over 30,000 jobs, but with our estimates at only just over 1,000.

7.17 Once again, the evidence presented by Azimuth on behalf of RSP cannot be relied upon. It is infected with the flaws in the traffic forecasting methodology identified previously but the approach to identifying socio-economic impacts is, in itself, badly flawed. The socio-economic impacts are, as a result, massively overstated. In any event, these benefits would not be realised if the Airport ceases operation again due to it not being commercially viable.

7.18 As well as the Azimuth reports which form the basis of RSP's case, we have also reviewed a number of other reports on the potential for Manston. In overall terms, we agree with Aviasolutions for Thanet District Council that there is little realistic prospect of the re-opening of Manston Airport being a commercially viable proposition. We have reviewed their original report and the more recent reports and concur with their views on the overall structure of the UK air cargo market, noting that they, unlike Azimuth, have correctly understood the implications of our 2015 work for the FTA. We do not accept Northpoint's rebuttal of the Aviasolutions work. Like Azimuth, Northpoint's work is largely aspirational without any robust evidence or analysis of the market. Northpoint, too, misinterpret our previous work for the FTA and TfL.

7.19 **In overall terms, then, we do not consider that the case for the development of Manston Airport has been robustly substantiated. In any event, the capability of the existing infrastructure at the Airport, once made good in line with existing planning consents, is at least 21,000 annual air transport movements by air cargo aircraft. This means that, in practice, RSP are seeking permission to increase the number of cargo air transport movements that Manston Airport is capable of handling from 21,000 to at least 31,000 a year, well beyond the level assessed in the PEIR. Indeed, RSP's consultation material does not provide any detail as to what the increase in capability would be as a result of its proposals (i.e. the increase in capability as a result of its proposed alteration to Manston Airport). As a minimum, the increase in capability would be to 31,000 annual air transport movements by cargo aircraft, but in our view their proposals would result in a significantly higher 'new' capability which is not revealed or assessed by RSP.**

APPENDIX A

York Aviation

Transport for London

Note on Freight Connectivity

1. This note explains the approach taken to estimating the number of pure freighter air transport movements at the London airports in 2050 under three different scenarios of capacity growth:

   - Maximum use of existing capacity;
   - 2+2+2 – additional runways at each of Gatwick and Stansted;
   - New 4 runway hub.

2. The number of additional freighter movements required depends on the volume of passenger flights providing bellyhold capacity under the different scenarios. Under the constrained Max Use scenario, 48,000 pure freighter movements could be required, up from 14,000 at the London airports today. As there would be no spare runway capacity at the main London airports, this capacity would need to be provided from smaller airports serving the London area or from regional airports, with loss of economies of scale and producer efficiency, or through trucking to alternative hubs in Europe with implications for speed of transit.

3. With the provision of additional runways, increased bellyhold capacity reduces the number of additional freighter movements required to 28,000 and 21,000 respectively under the 2+2+2 and 4 runway hub scenarios. In both cases, we believe there will be sufficient runway capacity available to accommodate these freighter movements, albeit the 2+2+2 scenario will still result in dispersal of air freight capacity across a range of airports with the consequent loss of economies of scale and efficiency which could be attained at a single hub.

Freight Volumes

4. In 2012, the London airports handled 1,805,761 tonnes of freight[1]. Only 17% of this freight was flown on pure freighter aircraft. 83% was flown in the bellyhold of passenger aircraft. This may be as a result of limited capacity for freighter operations at Heathrow, where the bulk of air freight consolidation activity is concentrated. However, it may equally reflect the scale of bellyhold capacity offered at Heathrow, which reduces the need for pure freighter capacity to serve the London market as a whole.

5. Using data from ACI EUROPE[2], the volume of freight flown from the London airports is compared with that flown from other key European cities in Table 1.

[1] CAA Airport Statistics.
[2] The small discrepancy to CAA Statistics is noted but it is not considered to be material. The * against Hahn indicates estimated freight taken from airport's own website.

Table 1

	Tonnes
Heathrow	1,464,596
Gatwick	97,565
Stansted	214,904
Luton	29,637
London	**1,806,702**
Paris CDG	1,935,180
Paris Orly	94,700
Paris	**2,029,880**
Frankfurt	1,986,180
Frankfurt Hahn*	223,000
Frankfurt	**2,209,180**
Amsterdam	1,483,450
Milan MXP	405,858
Milan LIN	15,513
Milan BGY	116,733
Milan	**421,371**
Brussels	394,870
Luxembourg	614,906
Madrid	359,360
Zurich	281,683
Vienna	178,128
Dublin	102,717
Lisbon	90,264
Helsinki	176,987

6. There is no clear evidence that London is currently disadvantaged in terms of air freight capacity as the majority of freight is flown from Heathrow in the bellyhold of passenger aircraft rather than in pure freighter aircraft. To the extent that there is a need for freighter capacity, it can be provided at Stansted where there is ample spare capacity for additional movements and areas are set aside to increase aircraft parking and freight handling facilities if required. Although it is possible that limitations on bellyhold capacity at Heathrow may force greater trucking of freight to Europe, this is not evident from a comparison of overall air freight carried compared to other major European countries. In any event, the fact that freight is trucked rather than flown to Europe may have only a marginal impact on total transit times and, hence, limited economic detriment.

7. As well as the main city airports, there are a number of other specialist freight airports in both the UK and western Europe. Those handling over 75,000 tonnes in 2012 are shown in Table 2.

Table 2

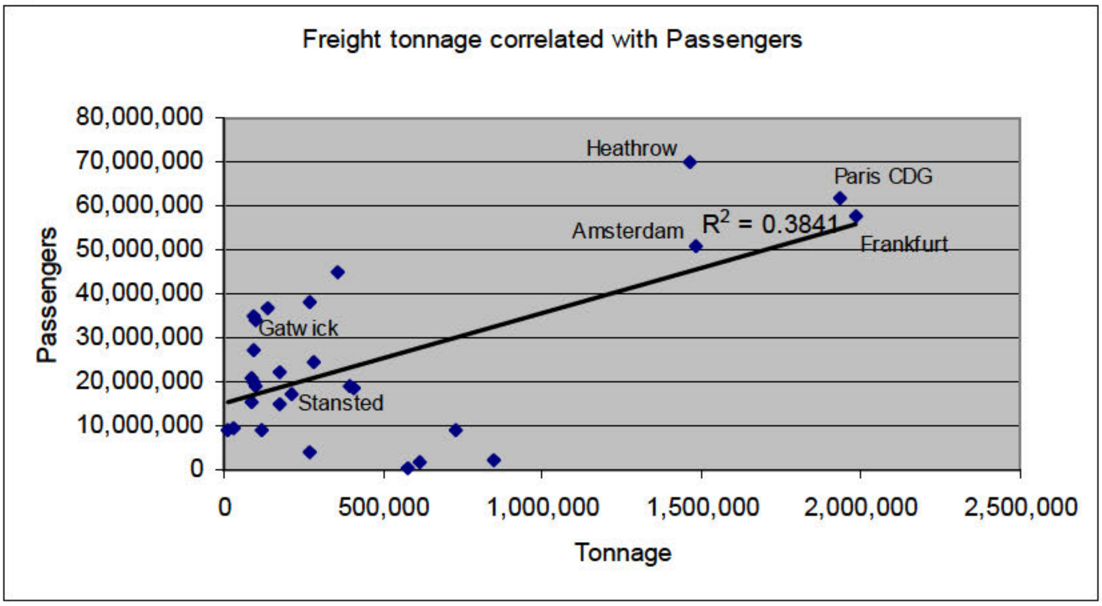
	Tonnes
Manchester	97,215
East Midlands	267,350
Cologne	730,040
Munich	272,203
Dusseldorf	86,729
Leipzig	846,086
Rome	135,777
Liege	577,226

8. Overall, on the basis of substantial air freight flows recorded by ACI EUROPE, the UK handled around 2.2 million tonnes of flown freight, France a similar amount, Italy around 600,000 tonnes and Spain around 500,000 tonnes. This does not suggest that the UK is disadvantaged in terms of freighter capacity overall currently.

9. However, the role of the low countries and Germany in acting as the major freight centre in western Europe is noticeable. In total, the main German freight airports handled almost 4.2 million tonnes of freight in 2012 which, when combined with the Netherlands and Benelux countries, amounted to 7.2 million tonnes of air freight flown. These airports have developed major and specialist air freight roles, with freight being trucked from all over Europe to feed these freight hubs. The integration of trucking with air freight should not be overlooked, even within the UK. In practice, it is unlikely that the UK could replicate this role, even with unconstrained airport capacity, due to its island location on the western edge of Europe.

10. There is some correlation between air freight flown to/from an airport and passengers carried as shown in Figure 1 below but this relates in large part to belly hold capacity. Figure 1 shows the correlation between flown freight and passengers across 29 European airports in 2012 as recorded by ACI EUROPE and which were either major airports in terms of freight handled or secondary airports serving the same cities.

Figure 1



Freighter Operations

11. The pattern of freighter operations is complex. As well as air freight carried in the bellyhold of passenger aircraft, there are freight charters for specialist and ad hoc consignments and large numbers of flights by the integrators (DHL, Fedex, UPS) etc. Obtaining detailed timetable information for freight operations is not possible as most do not publish timetables. Only scheduled freighter operations are shown in OAG and there is some uncertainty over whether this data is comprehensive.

12. Using OAG data for the week of 17th June 2013, the London airports have 49 scheduled freighter departures (98 freighter movements). According to CAA statistics for 2012, there were just over 14,000 freighter aircraft movements at the London airports or around 270 per week. This suggests that the OAG recorded movements account for only around 37% of total freighter aircraft movements to/from the London airports.

13. Similar data has been extracted for other western European airports. The table in Appendix A summarises the main pattern of freighter departures at airports with more than 30 freighter departures per week. This table also includes the principal UK freight airports and secondary airports serving major cities which in combination had more than 30 scheduled freighter departures per week in June 2013.

14. The number of scheduled freighter departures at the main freight airports is summarised in Table 3 along with the freight tonnage handled and passengers carried. It is evident that there is no clear correlation between freight tonnage handled and the weekly number of scheduled departures. This is illustrated in Figure 2. Amsterdam and Frankfurt have a high number of scheduled movements relative to the total volume of air freight whilst Paris and Heathrow handle similar volumes of air freight but with significantly fewer scheduled movements. We believe that the principal reason for these differences is in the relative importance of bellyhold freight but also the extent to which integrator activity is present; for example Fedex has its principal European hub in Paris and its movements are not recorded in OAG.

Figure 2

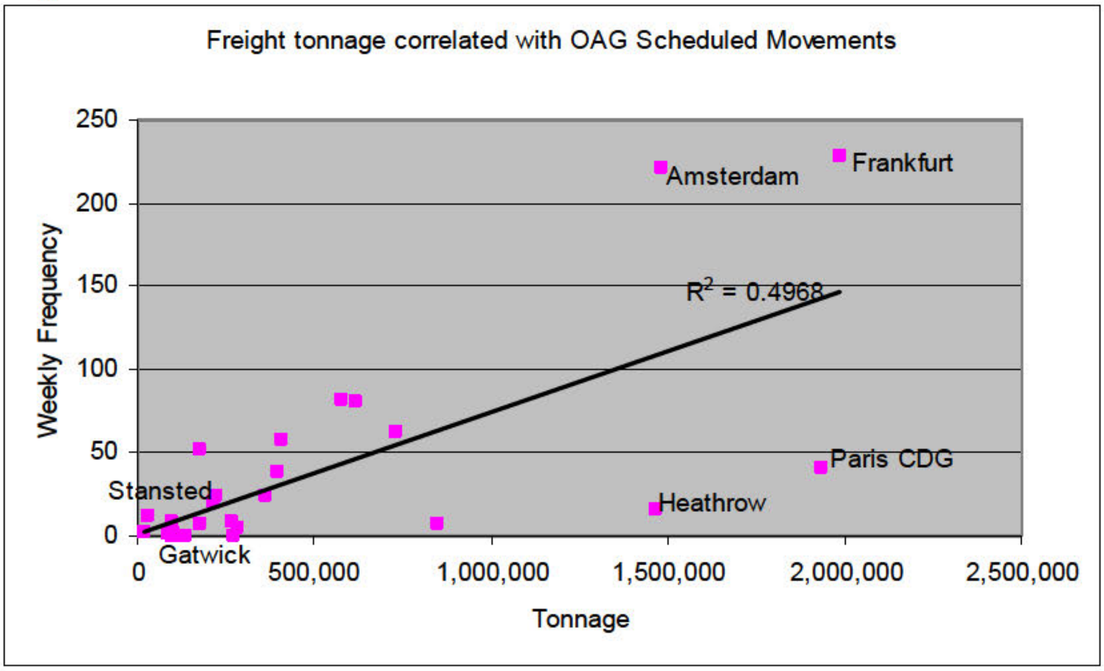


Table 3

	Freight tonnes	Pax	2013 wk freighters
Heathrow	1,464,596	70,038,804	16
Gatwick	97,565	34,222,405	0
Stansted	214,904	17,463,794	21
Luton	29,637	9,630,128	12
Manchester	97,215	19,841,747	8
East Midlands	267,350	4,086,849	9
Paris CDG	1,935,180	61,611,934	41
Paris Orly	94,700	27,232,263	0
Frankfurt	1,986,180	57,520,001	228
Frankfurt Hahn*	223,000		24
Cologne	730,040	9,280,070	62
Munich	272,203	38,360,604	0
Dusseldorf	86,729	20,833,246	1
Leipzig	846,086	2,279,221	7
Amsterdam	1,483,450	51,035,590	221
Milan MXP	405,858	18,522,760	58
Milan LIN	15,513	9,176,997	3
Milan BGY	116,733	8,888,017	0
Rome	135,777	36,980,161	0
Brussels	394,870	18,943,688	38
Liege	577,226	300,813	82
Luxembourg	614,906	1,912,806	81
Madrid	359,360	45,175,501	24
Barcelona	96,519	35,131,771	2
Zurich	281,683	24,751,649	5
Vienna	178,128	22,165,650	52
Dublin	102,717	19,096,572	1
Lisbon	90,264	15,301,236	1
Helsinki	176,987	14,859,981	7

*2011 data from airport website

15. Examination of the detailed information set out in Appendix A also shows how complex the pattern of freighter operations actually is. Few freighters, particularly those serving markets beyond Europe, operate on a strict point to point basis. Many transit more than one of the main European freight airports and a number of points overseas. Examination of arriving freighter patterns also reveals that the inbound pattern does not necessarily mirror the outbound pattern. Hence, there is already considerable flexibility to add new points if the market warrants.

16. Some freighters operate simple round trips. Others operate on a triangular basis, e.g. Lufthansa operating Frankfurt-Dallas-Detroit-Dallas-Manchester-Frankfurt. Inbound freight from the US to Manchester will be flown direct but outbound freight will transit Frankfurt. Other freighters operate effectively round the world journeys, e.g. British Airways operating Chicago-Houston-Stansted-Dammam-Dubai-Shanghai.

17. There is simply no way of knowing how much of the freight capacity on such aircraft is assigned to or used by freight originating in or destined for any airport, which may vary day by day. Freighter departures are, hence, not a reliable proxy for how much air freight capacity is available to uplift goods to and from any country or city.

18. Overall, our analysis of current freighter operations suggests that it is hard to distinguish a relationship between freighter movements and tonnage of freight carried.

19. Nor is it evident that the UK air freight capability is adversely affected today by shortage of capacity at Heathrow. There is ample spare airport capacity at Stansted for pure freight aircraft to the extent that there is demand for such aircraft operations given the amount of bellyhold capacity available at Heathrow. The volume of freight uplifted probably reasonably reflects the UK market, allowing for transit freight, and the limitations of the UK acting as a hub for freight trucked from continental Europe based on its geographic position. The principal issue is one of producer efficiency as a consequence of splitting locations, with the bulk of freight forwarding/consolidator activity being located around Heathrow and freight needing to be trucked to Stansted, Luton, or continental hubs. Whilst concentrating all freight activity at the main hub might make additional freighter flights viable by facilitating onward connections between bellyhold freight and pure freight operations, it is not clear the extent to which this would result in higher volumes of air freight being carried to/from the UK (as distinct from transit freight) as the UK does not appear to be significantly underperforming in aggregate terms compared to countries such as France, Spain or Italy.

Predicting Future Freighter Operations

20. In order to predict the volume of freighter activity in future at the London airports, we have developed a simple spreadsheet as set out in Table 4.

21. We have first projected forward total flown freight demand to and from London[3] on the assumption that it grows in line with overall passenger demand growth at 2.1% per annum in the absence of any specific forecasts of freight tonnage from DfT. We note that the DfT 2013 forecasts only give information for expected growth in pure freighter movements at 0.4% per annum but the basis of this is not clearly stated. Prima facie, this appears to understate unconstrained demand for pure freighter movements over the period to 2050.

22. In contrast, OE have identified that the expected average freight growth to and from Europe would be in the range 3.37% (Boeing) to 3.99% (Airbus). However, this would lead to substantially higher estimates of freight tonnage growth than passenger growth. Recent trends would suggest this to be unlikely so we have adopted the more cautious approach of using the same underlying growth as for passengers.

23. We have then estimated the bellyhold capacity offered at the London airports in 2050 based on the current average tonnage carried per international movement in 2012 at Heathrow, including both EU and non-EU flights, based on CAA Airport Statistics assuming average tonnes per movement increase by 0.5% per annum. This allows us to estimate the residual volume of freight under each scenario which would need to be accommodated on pure freighter aircraft.

[3] This is a simplifying assumption as it assumes the same proportion of UK regional air freight is trucked to London for uplift and the same proportion of freight is trucked to the continental freight hubs. On balance, this is likely to be a neutral assumption for the situation of unconstrained hub capacity as the proportion of regional freight flying direct from major regional airports might be expected to increase, particularly as more long haul flights develop, whilst the proportion being trucked from London to Europe might be expected to decrease with unrestricted capacity available.

Table 4

	2012	2050 Max Use	2050 2x2x2	2050 New Hub
Freighters 2012	14,123			
Freight in Freighters	310,022			
Total Freight	1,805,761	3,977,759	3,977,759	3,977,759
Tonnes per freighter	21.17	25.59	25.59	25.59
Tonnes per international bellyhold movement London	1.76	2.13	2.13	2.13
Forecast International Movements	834,725	1,051,034	1,298,981	1,375,452
Bellyhold Capacity	1,469,116	2,235,836	2,763,285	2,925,960
Freighter tonnage required		1,741,923	1,214,474	1,051,799
Freighter movement		68,077	47,463	41,106
Additional Freighters Required		53,954	33,340	26,983

24. We estimate that the number of freighters required to accommodate projected air freight demand would rise from 14,000 in 2012 to around 41,000 in the New Hub case, 47,000 in the 2+2+2 case and 68,000 in the Max Use case. In both the New Hub case and 2+2+2 case, we estimate there will be sufficient runway capacity available to accommodate these movements at 2050, at the New Hub and/or Stansted respectively. However, in the Max Use case, the London airports will, by definition, be full with passenger aircraft movements. Whilst we believe there will still be a small number of pure freighter operations accommodated in off-peak periods (as today at Heathrow), the number of freighter operations will be constrained.

25. It is reasonable to assume that around 14,000 freighters a year could still be accommodated in the vicinity of London by using capacity at airports such as Manston, which already handles some long haul freighters. However, capacity equivalent to an additional 54,000 freighter movements per year could be required to ensure demand is met, although this could be mitigated to an extent if the freighter capacity was prioritised for freight to and from the UK with less transit freight.

26. A key question is the extent to which such freighter capacity would be provided at airports such as East Midlands, Manchester and Birmingham. This could serve to reduce trucking movements from the regions to London, as take place today, with environmental benefits but it would reduce producer efficiency through split operations. In the absence of detailed data regarding freight trucking movements today, it is difficult to determine whether this would have positive or negative impacts overall..

27. In terms of the specific destinations of future freighter movements, our analysis of the existing patterns of service reveals the difficulty of defining market demand and aircraft routings. We do not believe it is sensible to attempt to determine the future geographic split by destination in either the constrained or unconstrained cases as a single freighter may serve a variety or markets as necessary. In the constrained case, it is likely that more freight would be trucked to the continental hubs as well as to UK regional points, which would potential add to shipment costs.

Conclusions

28. Overall, we have made a best estimate of the number of freighter aircraft movements likely to be using the London airports (or near London airports) under each of the capacity scenarios. These are as follows:

- ✈ Maximum use of existing capacity 14,000
- ✈ 2+2+2 – additional runways at each of Gatwick and Stansted 33,000
- ✈ New 4 runway hub 27,000

29. In the latter two cases, our assessment is that, across both bellyhold capacity and pure freighter activity, there would be sufficient capacity to meet expected demand for air freight to and from the UK. Our estimates for additional freighter capacity are substantially above those made by DfT. Hence, to the extent that our baseline is understated (although we do not believe this to be substantial) due to the current patterns of trucking freight to the continent, this will offset any overstatement as a consequence of assuming higher growth than DfT and by reductions in the amount of trucking to London from regional airports due to expected growth in their own freighter operations over the period to 2050.

30. The key difference between these two scenarios would be in terms of the efficiencies and economies of scale gained by the industry arising from the concentration of freight activity at a single hub. In both cases, the overall volume of air freight to and from the UK is expected to be broadly the same, although the actual freight carried including transit freight would be higher in the hub case. However, under the new hub scenario, savings from greater efficiency may be passed onto users, so reducing shipping costs and facilitating trade leading to higher freight volumes, but it is beyond the scope of the current exercise to assess this.

31. In the constrained, max use, case, there would be severe limitations of pure freighter movements at the London airports, which could amount to around 26% of the required air freight capacity to/from London. The extent to which this would act as a limitation on overall air freight volumes would depend on the extent to which the freight is still carried from regional airports or by truck. Clearly this would impact on the cost/efficiency of shipment, which in turn could impact on freight volumes carried. Again, it is outside the scope of the current exercise to assess these effects.

32. Overall, in assessing the economic value for air freight between the scenarios, the main difference is likely to lie in producer costs passed through to users and the impact that would have on business costs and hence output/freight generated. It would not be safe to assume that the reduction in cargo ATMs at the London airports necessarily translates to lost shipment value in its entirety.

23 May 2013

Appendix A

				Total Airport	Total City	Total Country
Heathrow	Amman	1				
	Amsterdam	1				
	Amsterdam	1	onwards to Sharjah and Singapore			
	Brussels	1				
	Copenhagen	1				
	Copenhagen	1	onwards to Sharjah and Singapore			
	Dubai	1				
	Frankfurt	1				
	Leipzig	1				
	Lisbon	1				
	Milan	1				
	Milan	2	onwards to Hong Kong			
	Paris	1	onwards to Delhi and Hong Kong			
	Seoul	2		16	49	71
Stansted	Amsterdam	1	originates in Bogota, Puerto Rico			
	Amsterdam	2	originates in Miami, Buenos Aires, Bogota and Puerto Rico			
	Cologne	1	onwards to Madrid and Johnannesburg			
	Cologne	1	onwards to Tbilisi			
	Cologne	1	onwards to Tbilisi and Delhi			
	Dammam	1	originates in Chicago and Houston, onwards to Dubai and Shanghai			
	Dubai	1	onwards to Hong Kong			
	Frankfurt	1	originates in Chicago and Atlanta, onwards to Shanghai			
	Frankfurt	2				
	Frankfurt	1	onwards to Chicago			
	Frankfurt	1	onwards to Hong Kong			
	Frankfurt	2	originates in Seoul and Moscow			
	Frankfurt	1	originates in Atlanta, onwards to Delhi and Hong Kong			

	Frankfurt	2	originates in Moscow, onwards to Seoul			
	Luxembourg	2	originates in Hanoi and Hong Kong			
	Zaragoza	1	onwards to Bahrain and Hong Kong	21	49	71
London Luton	Frankfurt	3				
	Istanbul	1				
	Istanbul	2	originates in Paris			
	Istanbul	2	originates in Cologne			
	Milan	4		12	49	71
Manchester	Amsterdam	1	onwards to Dubai and Hong Kong			
	Brussels	1	onwards to Dubai and Hong Kong			
	Dubai	1	originates in Amsterdam, onwards to Hong Kong			
	Frankfurt	2	originates in Detroit and Dallas			
	Frankfurt	1	onwards to Dubai and Hong Kong			
	Frankfurt	1	originates in Toronto and Houston			
	Milan	1	onwards to Hong Kong	8	8	71
East Midlands	Frankfurt	1				
	Keflavik	2	originates in Liege			
	Keflavik	2				
	Liege	2	originates in Keflavik			
	Paris	1		8	8	71
Prestwick	Los Angeles	1	originates in Luxembourg, onwards to Seattle			
	Luxembourg	1	originates in New York and Houston			
	Luxembourg	1	orginates in Los Angeles and Seattle			
	Paris	2	originates in Chicago			
	Seattle	1	orginates in Luxembourg, onwards to Calgary	6	6	71
Amsterdam	Abu Dhabi	4				
	Abu Dhabi	1	onwards to Taipei			
	Almaty	2	onwards to Hong Kong, Delhi, Sharjah			
	Bahrain	1	onwards to Mongolia, Hong Kong, Chennai			
	Baku	2	onwards to Kuala Lumpur			

	Bangalore	1	onwards to Singapore		
	Beijing	7			
	Beirut	2			
	Budapest	2	onwards to Moscow		
	Chengdu	4			
	Chennai	1	originates Nairobi, onwards to Singapore		
	Chennai	1	originates in Chicago and Atlanta, onwards to Singapore		
	Chicago	2	originates in Doha		
	Chicago	7			
	Chongqing	2	onwards to Shanghai		
	Copenhagen	1	originates in Nairobi, onwards to Sharjah and Singapore		
	Copenhagen	2	onwards to Sharjah and Singapore		
	Curitiba (Br)	1	onwards to Sao Paulo		
	Dacca	1	originates in Nairobi, onwards to Singapore		
	Doha	1	originates in Chicago		
	Doha	3			
	Dubai	2			
	Dubai	1	originates in Eldoret and Nairobi		
	Dubai	1	originates in Nairobi		
	Dubain	1	originates in Manchester, onwards to Hong Kong		
	Entebbe	1	onwards to Nairobi		
	Frankfurt	1	originates in Hong Kong		
	Frankfurt	1	onwards to Mumbai and Hong Kong		
	Gothenburg	3	onwards to Dubai		
	Guangzhou	5			
	Harare	3	onwards to Nairobi		
	Heathroiw	1			
	Hong Kong	7			
	Houston	7			

	Jeddah	2			
	Johannesburg	1	onwards to Dar-Es-Salaam and Nairobi		
	Khartoum	2	onwards to Nairobi		
	Kigali	1	onwards to Nairobi		
	Kuala Lumpur	1			
	Los Angeles	4			
	Luxembourg	1	originates in Libreville, Brazzaville, Nairobi		
	Manchester	1	onwards to Dubai and Hong Kong		
	Mexico City	7			
	Miami	2	onwards to Buenos Aires, Bogota, Puerto Rico and Stansted		
	Miami	1	onwards to Buenos Aires, Quito and Guayaquil		
	Miami	2	onwards to Santiago, Quito, Bogota and Puerto Rico		
	Miami	2	onwards to Santiago, Quitoand Guayaquil		
	Milan	3	originates in Tokyo		
	Milan	2	onwards to Moscow		
	Milan	4	onwards to Tokyo		
	Mongolia	2	onwards to Hong Kong and Chennai		
	Moscow	2			
	Moscow	2	onwards to Shanghai		
	Nairobi	1			
	New York	3	orginates in Bahrain		
	New York	1	originates in Bahrain		
	New York	7			
	Paris	1	onwards to Mumbai and Hong Kong		
	Puerto Rico	1	onwards to Bogota		
	Puerto Rico	2	onwards to Quito		
	Riyadh	1			
	Riyadh	2	onwards to Sharjah, Singapore and Kuala Lumpur		

	Santiago	1				
	Sao Paulo	2	onwards to Buenos Aires and Santiago			
	Sao Paulo	1	onwards to Curitiba and Santiago			
	Seattle	1				
	Seoul	7				
	Shanghai	21				
	Sharjah	1	originates in Heathrow, onwards to Singapore			
	Sharjah	2	onwards to Guangzhou			
	Sharjah	1	onwards to Muscat and Hong Kong			
	Stockholm	2	originates in Seoul			
	Stockholm	4	onwards to Seoul			
	Taipei	1				
	Tel Aviv	1				
	Tenerife	1	onwards to Sao Paulo, Quito and Bogota			
	Tenerife	3	onwards to Sao Paulo, Quito and Guayaquil			
	Tianjin	15	onwards to Shanghai			
	Tokyo	1	originates in Frankfurt Hahn			
	Tokyo	5				
	Toronto	4				
	Tripoli	1				
	Vienna	3	onwards to Shanghai	221	221	221
Brussels	Amman	1	onwards to Jeddah			
	Chennai	1	originates in Los Angeles and Dallas, onwards to Singapore			
	Dammam	1				
	Dubai	3	originates in New York			
	Dubai	1	originates in Frankfurt, onwards to Hong Kong			
	Dubai	1	originates in Manchester, onwards to Hong Kong			
	Heathrow	1				
	Istanbul	1	originates in Jeddah			
	Kolkata	1	originates in Los Angeles, onwards to Singapore			
	Milan	2	originates in Riyadh			

	Milan	1	originates in Jeddah			
	Mumbai	1	orginates in Los Angeles and Chicago, onwards to Singapore			
	New Guinea	1	onwards to Seoul			
	New York	1	originates in Jeddah			
	New York	1	originates in Jeddah, onwards to Houston			
	New York	6	originates in Dubai			
	Riyadh	1				
	Riyadh	1	onwards to Jeddah			
	Seoul	1	orginates in New York			
	Seoul	2	originates in New York			
	Sharjah	2	originates in Dallas, onwards to Singapore			
	Sharjah	1	originates in Chicago and Dallas, onwards to Singapore			
	Taipei	1				
	Tianjin	1	onwards to Seoul			
	Vienna	2	originates in Riyadh	36	36	118
Liege	Accra	2	onwards to Lagos and Addis Ababa			
	Addis Ababa	5				
	Bahrain	11	originates in New York			
	Bucharest	1	onwards to Tel Aviv			
	Dubai	12	onwards to Hong Kong			
	East Midlands	4	onwards to Keflavik			
	Entebbe	1				
	Istanbul	5				
	Keflavik	4				
	Keflavik	1	onwards to New York			
	Lagos	2	onwards to Addis Ababa			
	Lagos	1	onwards to Ougadougou			
	Lagos	1	onwards to Port Harcourt			

	Lome	2				
	Luxembourg	1	onwards to Congo, Addis Ababa			
	New York	1	originates in Tel Aviv			
	New York	2	originates in Tel Aviv			
	New York	5				
	Ougadougou	1	onwards to Congo			
	Shanghai	1				
	Shanghai	2				
	Siauliai Lithuania	1				
	Singapore	1				
	Tel Aviv	3	originates in New York			
	Tel Aviv	1	originates in Chicago			
	Tel Aviv	6				
	Vienna	5		82	82	118
Luxembourg	Abidjan	1	onwards to Accra			
	Abu Dhabi	1	onwards to Taipei			
	Almaty	1	onwards to Hong Kong			
	Atlanta	1				
	Atlanta	1	onwards to Chicago			
	Atlanta	2	originates in Doha, onwards to Houston			
	Baku	1	onwards to Almaty and Shanghai			
	Baku	1	onwards to Hong Kong			
	Baku	4	onwards to Shanghai			
	Baku	1	onwards to Singapore and Hong Kong			
	Baku	1	onwards to Singapore and Kuala Lumpur			
	Baku	2	onwards to Taipei and Bangkok			
	Beijing	1	onwards to Xiamen			
	Beirut	1	onwards to Amman and Hong Kong			

	Beirut	1	onwards to Amman and Istanbul		
	Chicago	1	onwards to Atlanta		
	Chicago	1	onwards to Los Angeles		
	Congo	1	originates in Liege, onwards to Addis Ababa		
	Dallas	1			
	Dammam	1	onwards to Saigon and Hong Kong		
	Doha	1	onwards to Hanoi and Hong Kong		
	Doha	1	onwards to Singapore and Kuala Lumpur		
	Doha	1	originates in Houston		
	Doha	1	originates in Chicago		
	Dubai	1	onwards to Bangkok and Hong Kong		
	Dubai	1	onwards to Hong Kong		
	Frankfurt Hahn	3	originates in Shanghai		
	Indianapolis	1	onwards to Chicago		
	Indianapolis	1	onwards to Los Angeles, Calgary		
	Johannesburg	3			
	Komatsu	2	onwards to Seoul		
	Kuwait	2	onwards to Hanoi and Hong Kong		
	Lagos	1	onwards to Port Harcourt and Kinshasa		
	Libreville	1	onwards to Brazzaville		
	Libreville	1	onwards to Kinshasa		
	Los Angeles	1	onwards to Seattle		
	Los Angeles	1			
	Mexico City	1			
	Mexico City	1	onwards to Guadalajara		
	Miami	2	onwards to Houston		
	Milan	1	onwards to New York and Chicago		
	Milan	4			

	Ndjamena	1	onwards to Lagos			
	New York	1	originates in Tel Aviv			
	New York	1	orginates in Tel Aviv, onwards to Chicago			
	New York	1	onwards to Atlanta			
	New York	1	onwards to Houston			
	New York	1	onwards to Mexico City and Guadalajara			
	Prague	2	originates in Chengdu			
	Prestwick	1	onwards to Los Angeles and Seattle			
	Prestwick	1	onwards to Seattle and Calgary			
	Riyadh	1	onwards to Dammam and Hong Kong			
	Sao Paulo	1				
	Sao Paulo	2	onwards to Curitiba			
	Sao Paulo	1	onwards to Manaus			
	Seoul	1				
	Sharjah	1	onwards to Karachi			
	Singapore	1	onwards to Kuala Lumpur			
	Taipei	2				
	Tbilisi	2	onwards to Baku and Shanghai			
	Yerevan	1		80	80	80
Paris	Beirut	1				
	Cairo	1	onwards to Reunion			
	Chicago	5				
	Cologne	2	onwards to Istanbul			
	Delhi	1	originates in Heathrow, onwards to Hong Kong			
	Djibouti	1	onwards to Reunion			
	Hannover	4				

	Heathrow	1				
	Istanbul	1				
	London Luton	2	onwards to Istanbul			
	Mexico City	6				
	Milan	1	onwards to Delhi and Hong Kong			
	Mumbai	2	onwards to Hong Kong			
	Mumbai	1	originates in Amsterdam, onwards to Hong Kong			
	New York	1	onwards to Chicago			
	Niamey	1	onwards to Ouagadougou and Bamako			
	Njamena	1	onwards to Bangui, Brazzavile and Port Harcourt			
	Porto	1	onwards to Mexico City			
	Seoul	2				
	Shanghai	2	originates in Copenhagen			
	Shanghai	2				
	Tokyo	2		41	41	41
Cologne	Basle	4				
	Berlin	5				
	Bucharest	4				
	Bucharest	2				
	Istanbul	2	originates in Paris			
	Istanbul	2				
	Katowice	4				
	Keflavik	5				
	Ljubljana	4				
	Ljubljana	1	onwards to Zagreb			
	London Luton	2	originates in Istanbul			
	London Luton	2	onwards to Istanbul			
	Madrid	1	originates in Stansted			
	Prague	5				
	Sofia	1				
	Tblisi	1	originates in Stansted			

	Tblisi	1	originates in Stansted, onwards to Delhi			
	Tel Aviv	12				
	Zagreb	4		62	62	304
Frankfurt Hahn	Almaty	1	originates in New York			
	Almaty	6	originates in New York, onwards to Shanghai			
	Amsterdam	1	onwards to Tokyo			
	Amsterdam	1	originates in Tokyo			
	Atyrau	1	onwards to Almaty			
	Baku	3				
	Beijing	3				
	Chatearoux	1	onwards to Kabul			
	Doha	2				
	Johannesburg	2				
	Milan	1	onwards to Tokyo			
	Toronto	1	onwards to Mexico City			
	Yerevan	1		24	242	304
Frankfurt	Abu Dhabi	5				
	Almaty	1				
	Almaty	1	onwards to Guangzhou			
	Almaty	1	onwards to Hong Kong			
	Almaty	2	onwards to Shanghai			
	Amman	2				
	Amsterdam	1	originates in Hong Kong and Chennai			
	Atlanta	4				
	Baku	1	onwards to Bangkok and Kuala Lumpur			
	Baku	2	onwards to Kuala Lumpur			
	Bangalore	3	onwards to Chennai			
	Bangalore	1	onwards to Hyderabad and Guangzhou			
	Bangkok	2				
	Beijing	3	onwards to Shanghai			
	Brussels	1	onwards to Dubai and Hong Kong			

	Cairo	3	
	Chicago	7	
	Chicago	1	onwards to Los Angeles
	Chicago	4	onwards to Mexico City
	Chicago	2	onwards to Mexico City and Guadaljara
	Chicago	1	originates in Stansted
	Coventry	10	
	Dakar	3	originates in Dubai, onwards to Sao Paulo
	Dammam	2	onwards to Sharjah and Hong Kong
	Delhi	4	onwards to Singapore and Bangkok
	Delhi	1	originates in Atlanta and Stansted, onwards to Hong Kong
	Detroit	2	
	Doha	1	
	Dubai	1	originates in Lagos and Accra
	Dubai	4	originates in Sao Paulo and Dakar
	Dubai	3	
	Dubai	1	originates in Dusseldorf
	Dubai	1	originates in Manchester, onwards to Hong Kong
	East Midlands	1	
	Heathrow	1	
	Helsinki	1	
	Hong Kong	3	
	Hong Kong	1	originates in Stansted
	Istanbul	6	
	Istanbul	1	onwards to Tel Aviv
	Jeddah	1	onwards to Sharjah, Hyderabad and Guangzhou
	Kabul	1	
	Krasnojarsk	1	
	Krasnojarsk	6	onwards to Beijing and Seoul
	Krasnojarsk	1	onwards to Seoul and Shanghai
	Krasnojarsk y		onwards to Shanghai

Krasnojarsk	7	onwards to Tokyo and Osaka
London Luton	3	
Madrid	4	
Malta	1	
Milan	1	originates in Hong Kong and Dubai
Milan	1	onwards to Dubai and Hong Kong
Milan	1	onwards to Hong Kong
Moscow	10	
Moscow	2	onwards to Tokyo
Moscow	1	onwards to Tokyo and Seoul
Mumbai	1	
Mumbai	1	onwards to Chennai
Mumbai	3	onwards to Hong Kong
Mumbai	1	onwards to Hyderabad
Mumbai	1	originates in Amsterdam, onwards to Hong Kong
Nairobi	5	onwards to Johannesburg
New York	5	
Riyadh	3	
Riyadh	1	onwards to Dammam
Riyadh	1	onwards to Sharjah and Hong Kong
Sao Paulo	3	
Sao Paulo	1	onwards to Curitiba
Sao Paulo	1	onwards to Curitiba, Quito and Puerto Rico
Sao Paulo	2	onwards to Manaus, Quito and Puerto Rico
Sao Paulo	2	onwards to Montevideo and Buenos Aires
Seoul	1	originates in Vienna
Seoul	2	originates in St Petersburg
Seoul	12	

	Seoul	2	originates in Atlanta and Stansted			
	Seoul	1	originates in Moscow and Vienna			
	Shanghai	1	originates in Chicago, Atlanta and Stansted			
	Shanghai	18				
	Sharjah	2	onwards to Kolkata and Hong Kong			
	Stockholm	1	onwards to Dubai and Hong Kong			
	Stockholm	4	onwards to Seoul			
	Taipei	3				
	Tel Aviv	3	onwards to Istanbul			
	Toronto	1	onwards to Houston	218	242	304
Milan	Abu Dhabi	2				
	Almaty	1	onwards to Osaka and Hong Kong			
	Baku	1				
	Dammam	1				
	Delhi	1	originates in Paris, onwards to Hong Kong			
	Doha	2				
	Dubai	2	onwards toHong Kong			
	Dubai	1	originates in Frankfurt, onwards to Hong Kong			
	Heathrow	5				
	Hong Kong	1	originates in Frankfurt			
	Hong Kong	2	originates in Heathrow			
	Hong Kong	1	originates in Manchester			
	Istanbul	1				
	Istanbul	2	originates in Lagos			
	Istanbul	1	orginates in Tirana			
	Jeddah	1				
	Luxembourg	1	originates in Chicago and Los Angeles			
	Luxembourg	4				
	Luxembourg	1	orginates in Chicago and New York			
	Madrid	1				
	Moscow	2	originates in Amsterdam			

	New Guinea	1	onwards to Seoul			
	Osaka	1	onwards to Hong Kong			
	Riyadh	1				
	Sao Paulo	1				
	Seoul	1	originates in Uzbekistan			
	Seoul	9				
	Shanghai	4				
	Tokyo	4	originates in Amsterdam			
	Tokyo	1	originates in Frankfurt Hahn	57	57	57
Vienna	Amman	1				
	Copenhagen	2	orginates Seoul			
	Frankfurt	1	orginates Seoul			
	Istanbul	2				
	Kiev	5				
	Liege	5				
	Milan	3	orginates Seoul			
	Moscow	2	orginates Seoul and onwards to Gothenburg or Frankfurt			
	Oslo	3	orginates Seoul			
	Oslo	6				
	Riyadh	2				
	Seoul	1	via Frankfurt			
	Seoul	3	via Gothenburg			
	Seoul	1	via Tel Aviv			
	Seoul	4	via Copenhagen			
	Seoul	1	originates Moscow			
	Shanghai	3	originates Amsterdam			
	St Petersburg	1	orginates Seoul and onwards to Gothenburg			
	Tel Aviv	1	orginates Seoul			
	Timosoara	5		52	52	52