From: Georgina Rooke [redacted]
Sent: 28 January 2019 19:54
To: Manston Airport
Subject: Re: Representations from the public hearing 9-11 Jan

Dear Examining Authority,

Following your email below and with thanks I attach the first of a number of emails containing documents that relate to my representation at the public hearing (in this email in my capacity of representative of Holiday Homes Against Manston)

Kind regards,
Georgina Rooke

Public Hearing 11 Jan. Georgina Rooke. Summary

Socio-Economic Background

"Thanet was the most deprived Kent local authority in the IMD2010 and remains Kent's most deprived local authority district in IMD2015. Nationally, Thanet is ranked at 28 out of 326 authorities placing it within England's 10% most deprived of authorities. " This means that Nationally there are now just 27 poorer local authority districts in England than in Thanet, and 298 that are better off.

English Index of Multiple Deprivation 2015 (IMD 2015): Headline findings for Kent. Business Intelligence Statistical Bulletin. October 2015

This assessment is based on factors such as unemployment, healthcare, crime levels and educational achievement.

Further, **English Index of Multiple Deprivation 2015** found that poverty and deprivation levels in Thanet worsened between 2010 and 2015. In other words, Thanet is being left behind. It is failing to keep pace with the rest of England and the poverty gap is increasing.

The Contribution of Tourism:

In the period between 2013 and 2015 tourism has played an important role in helping to mitigate the effects of worsening poverty in Thanet. According to **Visit Kent. 2017, Isle of Thanet – Margate, Broadstairs & Ramsgate:**

In 2015 over 3.9M tourists spent £293M in Thanet during their visit to the area and directly supported 6,403 jobs. A further 909 non-tourism jobs were linked to multiplier spend from tourism. This is a total of 7,312 jobs in Thanet, a reported 23% increase from 2013.

Visit Kent state that tourism accounted for 17% of all jobs in Thanet, an increase of 23% since 2013.

It is interesting to look at the distribution of visitor accommodation in Thanet. Again, **according to Visit Kent 2017** we can see the following:

Ramsgate accounts for 26% of hotel rooms and 38% of Airbnb accommodation in Thanet (source: Population Estimates Unit, Office for National statistics © Crown Copyright) whilst Out of Town accounts for a further 27% of hotel rooms.

Visitor Accommodation provision in Thanet:

Margate		
	Properties	Rooms
Hotels	5	175
B&Bs / Guest houses	17	117
Self Catering	21	
Total Rooms	292	
Broadstairs		
	Properties	Rooms
Hotels	4	88
B&Bs / Guest houses	21	77
Self Catering	18	
Total Rooms	165	
Ramsgate		
	Properties	Rooms
Hotels	6	229
B&Bs / Guest houses	9	31
Self Catering	5	
Total Rooms	260	
Out of town		
	Properties	Rooms
Hotels	4	251
B&Bs / Guest houses	8	20
Self Catering	3	
Total Rooms	271	

Accommodation shown is Quality Assessed and Kent Accommodation Scheme

Airbnb Accommodation in Thanet:

	Room	Flat / Apartment	House / Cottage	Alternative Accommodation
Margate	22	18	6	1
Ramsgate	21	15	9	0
Broadstairs	9	10	5	0
Villages	1	0	2	0

Manston 24/7 Cargo Hub Flight Path:

RSP's proposal for a 24/7 Cargo Hub will put Ramsgate and the Villages directly under the flight path, with aircraft flying as low as 150m from Ramsgate rooftops day and night.

Who would honestly choose to spend their hard-earned vacation under this?

So what is the risk to the Thanet economy; to the £293M of Tourism related income and a growth sectors of the economy on which this deprived area depends?

On the basis that Ramsgate and the Villages will be worst affected, and that they account for over 50% of hotel rooms and c40% of AirBnB accommodation one could argue that as much as 50% of £293M and 7,312 jobs; that up to 10% of the total Thanet economy could be at risk.

Why would a British Government Body endorse a proposal that threatens worsening the plight of some of the very poorest in our country, by putting as much as 10% of its economy at risk?

Presumably if the benefits outweigh the costs. At a National level. At a local level. In short, if RSP is able to deliver an infrastructure programme that will truly transform the fortunes of the country and the area, then presumably it could make sense to risk what little the area can rely on.

Manston Cargo Hub. Can It Be A NSIP?:

This then raises a number of important questions, in assessing whether the risk is justified:

1. Can Manston deliver on the promise of a nationally significant infrastructure programme?
2. Can RSP grow and operate something of the scale of a nationally significant infrastructure programme? Do they have the funding; the expertise; do they have a successful track record in airfreight operations at NSIP scale; in short do they have the profile and does the

Secretary of State have confidence that they have the attributes of successful NSIP applicants?
3. Does the Country have demand for the service proposed?
4. Is there evidence of a customer base waiting to take advantage and procure the services in question? Is the pricing competitive such that the up-take of the service will happen?
5. Will the Country really benefit? Are there clear structural limitations today (e.g. capacity constraints), or will the proposed service rely on taking business from other existing operators currently successfully servicing the needs of the Country?
6. Will existing operators allow the loss of their business to a new entrant? And who will be best placed to compete to secure existing and new business?
7. Will the jobs identified really materialise, and what will the net contribution of number of jobs to locals be after the risk of damage to other sectors like tourism have been taken into account?
8. How does this proposal compare to the Legal owners' own plans for the site and the area? And does the Legal owner have a track record of delivery? Would their plans supplement and complement the existing local economy rather than put it at risk, and looking at net numbers of jobs and taking a risk-based view would their proposals likely offer a better outcome?
9. What do the experts say? And who is most credible and least biased that has the necessary expertise that can be relied upon for a robust, independent opinion?
10. And does either option align better with Government strategy and policy, Nationally and for the area?

Ultimately it is our hope and expectation that we can rely on PINS to answer these questions and more. However, given the requirement to present evidence-based positions on the proposed DCO I would like to share the views of a number of independent experts on these questions.

Expert Opinion:

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. They were appointed by Stonehill Park 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.

Their conclusions are clear:

"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 […]) 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.

MANSTON IS IN 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.

THERE IS 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. "

MAG Airports

Looking at what the owners of East Midlands, Manchester and Stanstead Airports have to say this view is corroborated. They are clear that they have capacity to support growth in the UK sector for the next 15 years. Further, they can offer their customers several cargo gateways across the UK – not just one geographical point of entry and exit. This allows them to work with their airline and freight forwarding customers to service a variety of key markets: automotive, oil and gas, fresh produce, pharmaceuticals. https://www.magairports.com/our-expertise/cargo-services/

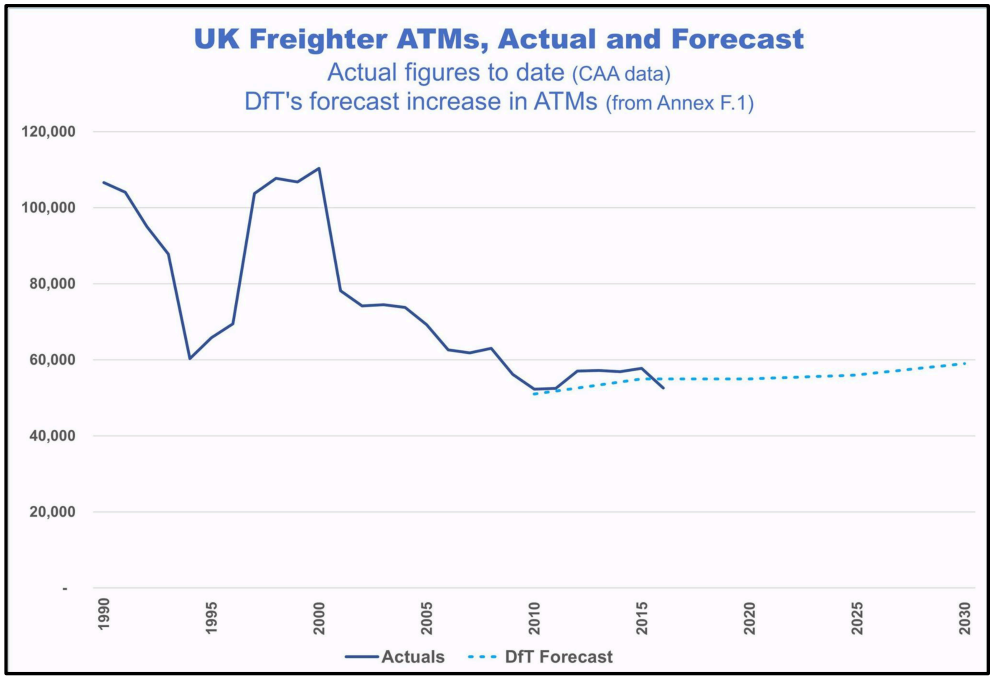
"LACK OF VIABILITY:

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." (York Aviation, September 2017).

Again, this view is corroborated by the evidence of Manston's past performance, taken from Civil Aviation Authority records. As can be seen in 2003 Manston captured 1081 cargo movements, of total actual UK air freighter movements of c75,000 (CAA data for the Department for Transport). The UK air freighter movement market has shrunk considerably since that time to actuals <60,000 in 2016.

AIR TRANSPORT MOVEMENTS AT MANSTON 1972-2004
(Source data – CAA records office, Gatwick)

YEAR	TOTAL AIR TRANSPORT MOVEMENTS	PASSENGER MOVEMENTS	CARGO MOVEMENTS
1972	464	-	-
1973	480	-	-
1974	484	-	-
1975	280	-	-
1976	-	-	-
1977	75	75	0
1978	580	580	0
1979	-	-	-
1980	-	-	-
1981	442	415	27
1982	739	700	39
1983	653	636	17
1984	671	658	13
1985	709	667	42
1986	740	444	296
1987	434	168	266
1988	259	154	105
1989	352	313	39
1990	447	342	105
1991	273	86	187
1992	246	91	155
1993	282	130	152
1994	298	95	203
1995	282	52	230
1996	148	56	92
1997	130	62	68
1998	269	46	223
1999	746	46	700
2000	984	64	920
2001	937	26	911
2002	805	5	800
2003	1106	25	1081
2004	3333	2603	730



Thanet District Council's own consultants drew similar conclusions to York Aviation. In their report: **Commercial Viability of Manston Airport, AviaSolutions FINAL Report for Thanet District Council. September 2016** they conclude:

"2.3. Historic Performance of Manston Airport

During its years of operation as a commercial airport, Manston had a range of air services to domestic and short haul Europe points, and handled around 30,000 tonnes of freight a year, almost exclusively imports of fresh produce coming on dedicated freighter aircraft. The scale and nature of the passenger traffic suggests that Manston has relatively few air journeys originating or destined for a catchment area of East Kent that it might reasonably be expected to serve: we estimate that demand from this catchment area is about a third of the size of the demand in a catchment area of Southend Airport. While we consider that a re-opened Manston Airport would attract some passenger services and regain freighter operations at a level similar to its historic performance, our financial assessment is that this would be insufficient to support financially viable operations of the airport.

Altitude Aviation's in-depth review (Jan 2018) conclude likewise:

37. "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.

38. 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 levels9.

    - […]

    - 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.

Concluding Remarks:

In answer to the question, "Can Manston deliver on the promise of a nationally significant infrastructure programme?" then we would have to believe that Manston can take 30% market share (17,000 ATMs of c58,000 ATMs) from a sector that has existing capacity to support UK growth for the next 15 years. In other words, the only way Manston could be of NSIP scale is if it succeeds in taking business from established cargo operators such as MAG.

Does the Country have demand for the service proposed? The evidence suggests not; that capacity constraints centre on long-haul passenger demand (and in particular in and around London) but that the UK's cargo capacity requirements are not a constraint.

On this basis will UK Plc really benefit? The evidence suggests not, due to a lack of structural constraints. The proposed service relies on taking business from other existing operators currently successfully servicing the needs of the Country.

And will existing operators allow the loss of their business to a new entrant? The evidence clearly shows that MAG and Heathrow are fiercely committed to growing their respective cargo businesses; through the addition of long-haul passenger flights and associated bellyhold cargo in the case of Heathrow, and use of existing spare capacity in the case of MAG.

Will the jobs RSP have identified really materialise, and what will the net contribution of number of jobs to locals be after the risk of damage to other sectors like tourism have been taken into account? Again the weight of evidence suggests there the numbers of jobs RSP contend (10,000 – 40,000) will fail to materialise. Further this is a gross number that fails to take account of any adverse impact to the existing Thanet economy of a 24/7 cargo hub, and the growing role and importance of tourism in places like Ramsgate and the Villages in particular. York Aviation forecasts that Manston realistically is only likely to support around 16% of their forecasts, and that if the airport is not viable that this will reduce to zero. Indeed, when Manston closed its doors in 2014, 144 people lost their jobs.

Evidence Base:

Thanet Economy & Contribution of Tourism:

- The English Index of Multiple Deprivation (IMD 2015): Headline findings for Kent. October 2015
- THANET CCG. Analysis of Deprived Areas In the most deprived decile for Kent , January 2016
- Isle of Thanet – Margate, Broadstairs & Ramsgate. Visit Kent. 2017
- Thames Estuary 2050 Growth Commission. 2050 Vision. June 2018

Manston Cargo Hub. Can It Be A NSIP?:

- Is a Nationally Significant Air Freight Hub a realistic prospect at Manston? York Aviation, December 2017
- Commercial Viability of Manston Airport, AviaSolutions FINAL Report for Thanet District Council. September 2016
- Analysis of the Freight Market Potential of a Reopened Manston Airport. Altitude Aviation. January 2018
- SUMMARY REPORT ANALYSING USE OF YORK AVIATION MATERIAL BY RIVEROAK STRATEGIC PARTNERS LIMITED AND ASSESSMENT OF CAPABILITY OF MANSTON AIRPORT . York Aviation. November 2017
- Regional & City Airports https://www.bournemouthairport.com/regional-city-airports/

Commercial Viability of Manston Airport

AviaSolutions FINAL Report for Thanet District Council

September 2016

aviasolutions
A GECAS Company

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Glossary of Terms

- **Air Journeys:** Also referred to Journeys. A unit of measurement for the number of flights taken by passengers.
- **Air Traffic Movement:** Abbreviated to 'ATM'. Defined as an aircraft landing or taking-off for commercial purposes.
- **Belly-hold:** A term referring specifically to passenger aircraft (as opposed to freighters). This term refers to the hold of the aircraft that is utilised for the carriage of passengers' baggage and freight.
- **Capacity per ATM:** A unit of measure defined as the number of seats or freight capacity on each ATM. Often an average of a larger sample.
- **Capacity:** The total capacity of an airport or aircraft to transport passengers or freight.
- **Catchment Area:** Airports draw their passengers from within a catchment area. The size of the airport and its network affect the size of the catchment area. Typically, the smaller the airport the smaller the catchment area that it can draw upon.
- **Discovery Park Limited:** Also referred to as Discovery Park. An entity that is closely linked to Stone Hill Park Limited through shared ownership.
- **Freight per ATM:** A unit of measure defined as the number of tonnes of freight loaded on each ATM. Often an average of a larger sample.
- **Freight:** Also referred to as Cargo or Air Freight. This includes all shipments that are transported for commercial purposes on board the aircraft under an Air Waybill excluding 'Mail'.
- **Freighter:** An aircraft specifically designed for the transportation of freight. This type of aircraft has no seats fitted, and in their place, has a cargo hold.
- **Full Service Carrier:** An airline business model that includes carriers who have traditionally offered all services included in one ticket price. This includes carriers such as British Airways, Lufthansa, Air France-KLM and Virgin Atlantic.
- **IATA Airport Code:** A three letter code designated by IATA to many airports around the world. All major airports are assigned a code, the most commonly used in this report are.
- **Kent Airport Limited:** Formally Infratil Kent Airport Limited. An entity whose main purpose is the operation of Manston, Kent's International Airport.
- **Kent Facilities Limited:** Formally Infratil Kent Facilities Limited. An entity whose main purpose is the provision of facilities to the operator Manston, Kent's International Airport. This entity in effect owns the airport site.
- **London System:** Also referred to as London Area Airports. A term referring to six airports of London (LHR, LGW, STN, LTN, LCY, SEN).
    - London City - LCY
    - London Gatwick - LGW
    - London Heathrow - LHR
    - London Luton - LTN
    - London Southend - SEN
    - London Stansted - STN
- **Low Cost Carrier:** Abbreviated to LCC. Low cost carriers are one of the major airline business models. Major European LCCs include Ryanair, easyJet, Norwegian, Wizz, and Vueling.
- **Million Passengers per annum:** Abbreviated to mppa. A standard unit of measurement for airport capacity or throughput.
- **Narrow-Body:** A type of aircraft, typically distinguished as one which has a fuselage wide enough for one passenger aisle. Includes aircraft such as Boeing B737 series and Airbus A320 family.
- **Passenger Movement:** A unit of measure referring to the number of passengers arriving or departing from an airport.
- **Passenger:** Abbreviated to PAX. The fare paying passengers on board an aircraft. Excludes those travelling on non-revenue tickets such as airline employees.
- **Passengers per ATM:** Abbreviated to PAX per ATM. A unit of measure defined as the number of passengers carried on each ATM. Often an average of a larger sample.
- **Peak Demand:** The demand at its highest point for an airport. There are several forms of peak demand, these include a daily peak (often early morning) and annual peaks (often around holiday seasons).
- **RiverOak Investment Corporation LCC:** Also referred to as RiverOak. An American investment firm that is seeking to acquire the Manston Airport site.
- **RTK:** Revenue tonne kilometre. A unit of measure in the freight industry. Calculated as the tonnes uplifted multiplied by distance flown.

- **Stone Hill Park Limited:** Previously Lothian Shelf (718) Limited. The current entity that owns Manston Airport.
- **Unaccommodated Demand:** A term referring to the demand that cannot be accommodated at a particular airport or combination of airports due to it exceeding the capacity available.
- **Wide-Body:** A type of aircraft, typically distinguished as one which has a fuselage wide enough for two passenger aisles. Includes aircraft such as Boeing 767, 777 and 787 series and Airbus A330, A340 and A350 family.

1. Introduction

1.1. Context

Thanet District Council ("TDC") appointed AviaSolutions to provide independent advice on whether a re-opened Manston Airport might a have financially viable future as an operational airport.

The airport closed in May 2014 and the current owner, Stone Hill Park (formally Lothian Shelf 718), has submitted a planning application for a mixed-use development on the site, comprising 2,500 dwellings, general business and commercial areas which is reported to support the creation of up to 4,000 jobs, and a range of leisure and sports activities.

RiverOak Investment Corporation ("RiverOak") is an American investment firm that wish to acquire the Manston site and re-establish airport operations. The re-established airport would be freight focussed but would also offer passenger services along with ancillary businesses. RiverOak are seeking a Development Consent Order (DCO) under the Planning Act 2008 to compel the sale of the site as a Nationally Significant Infrastructure Project.

TDC is seeking guidance on whether the airport has a reasonable prospect of operating as a financially viable, standalone entity within the period of the Local Plan which extends to 2031.

AviaSolutions commenced this study on 13th July 2016.

1.2. Scope and Limitations

The scope of AviaSolutions work was set out in the procurement document issued in June 2016 by TDC and our proposal for services submitted in the same month. Specifically, the scope requested:

> "The Council requires an independent assessment advising whether or not it is possible to run a viable and economically sustainable free-standing airport operation from Manston. The Council is seeking advice from an independent expert aviation consultant who can make this assessment within the context of the national and international air traffic market, the viability of airport operations at a national and international scale and likely future developments in airport operations."
>
> *Source: TDC Briefing Document*

Our proposal and this subsequent report have been developed in the context of these requirements. It is therefore necessary to indicate specifically those areas which fall outside of the scope of our works, and to which we have given no credence in the application of our analysis. These areas include:

- Whether Manston Airport is an asset of national significance
- The effect of any scenario on the wider Kent economy, or subsequently the effect on the UK economy as a whole
- The legal, planning, environmental, or social effects of any scenario, or whether these elements would present any challenges
- The economic benefit or need for industrial or housing units in the Thanet area
- The comparison between any airport scenario and any other alternative use of the airport site
- Passing judgement on the use of the site beyond that of whether an airport may be viable
- We take a neutral view with regards to the local campaign groups, both those for and against the airport

It should also be noted that many of the stakeholders engaged by AviaSolutions sought to broaden the discussion to include a wide range of airport-related topics. Whilst this has provided useful context and highlights the political sensitivity of the airport, AviaSolutions study is restricted to commercial analysis and does not seek to provide any legal, environmental or socio-economic advice or comments.

1.3. Our Approach

AviaSolutions commenced the study with a review of the various documents that describe the history of Manston Airport, the local and national planning context and the current development proposals for the site. The two main aspects of our work however were seeking the views of stakeholders relevant to the specific topic of airport commercial viability, and an extensive analysis of the relevant air transport market.

In conjunction with TDC, we agreed the primary and secondary stakeholders to be contacted for this engagement. Our interview programme was not intended to canvass the views and opinions of the many parties and individuals with views, many strong held, about the airport and its future. It was intended to seek facts about its historic development and proposed future development from the two prospective developers (Stone Hill Park and RiverOak) and from a range of parties within the air transport and freight industries. It is these parties and their like who will determine whether commercial aviation activities could be viable on the Manston site. Whilst conducting these interviews, many companies and individuals spoke on the condition of anonymity.

Our analysis added to our existing knowledge of the air transport industry the specifics that are associated with Manston Airport, namely its historic traffic performance, details of its catchment area, and the experiences of previous airline and freight users of the airport. AviaSolutions has developed two models specifically for this study. The first assessed the capacity of six airports serving the London Area and how future passenger and freight traffic might be distributed between these airports including Manston, and the second was a financial model to assess the potential cashflow outlook for Manston Airport.

1.4. Report Structure

In this report, we first summarise the history of Manston Airport and describe the different visions of its future put forward by Stone Hill Park and RiverOak. We next describe different scenarios for possible air transport use of Manston Airport, before investigating the passenger and freight traffic potential of each scenario. We then describe our financial model, setting out the basis of our revenue and cost assumptions if Manston were to be brought back to use as an operational commercial airport. Finally, we bring together the different threads of our analysis and reach our conclusions on the financial viability of Manston Airport.

1.5. AviaSolutions' Qualifications

AviaSolutions has been appointed to provide an independent assessment of the prospects for Manston Airport. We are is an aviation management consultancy, established in 2001. In October 2012, GE Capital Aviation Services acquired 100% ownership, adding consultancy to the leasing business for which it is known. Since then, AviaSolutions has grown rapidly, building an airline business in addition to our traditional airport advisory services. Over the past 15 years AviaSolutions has earned a strong market reputation in a number of key areas:

- Airport Strategy and Support
- Airline Strategy and Support
- Airport and Aviation Transactions
- Air Service Development
- Regulation, Policy and Planning
- Passenger and Cargo Traffic Forecasting
- Route and Network Strategy
- Ground Handling
- Business and Commercial Advisory

2. Executive Summary

2.1. Summary

AviaSolutions was appointed by Thanet District Council ("TDC") to advise on whether viable airport operations could be re-instated on the site of Manston Airport. Following ownership by the Ministry of Defence, three separate private companies tried and failed to operate Manston Airport profitably and the airport closed in May 2014. TDC needs to prepare its next Local Plan looking forward to 2031, and has two proposals for the use of the site: an operating airport or a mixed residential, business and leisure development.

AviaSolutions has discussed the re-opening of Manston Airport with a number of organisations and individuals, and carried out a detailed assessment of the air transport market and the potential finances of a re-opened Manston Airport. On this basis of this work, we have concluded that it is most unlikely that Manston Airport would represent a viable investment opportunity even in the longer term (post 2040), and certainly not during the period of the Local Plan to 2031.

The assessment of financial performance of a re-opened Manston Airport is based on relatively favourable assumptions for Manston Airport. We would typically position the financial forecast as a 'High Case' as a number of tailwinds are required to deliver the financial forecast in terms of passenger and freight volume and the revenue yield that can be achieved. Throughout the research AviaSolutions has consistently taken a positive outlook with regards to the underlying demand assumptions. Specifically, this means that we have opted for the upper bounds of traffic, the upper bounds of unit operating revenue, the lower bands of unit operating costs, and minimal asset costs and capital investment requirements.

2.2. Background

Since the Ministry of Defence sold Manston Airport in 1998, three separate private sector investors have attempted to develop the airport as a viable commercial undertaking. These ventures have all been unsuccessful and have incurred substantial losses in the process. The airport closed in May 2014. TDC has undertaken extensive exercises to find new investors prepared to re-open the airport, but has failed to identify an appropriate party. One interested party, RiverOak Investment Corporation LLC ("RiverOak"), has though emerged from this process, and is interested in acquiring the site and developing Manston Airport as a freight airport. RiverOak has been critical of previous owners, considering that they were not sufficiently active in seeking to develop and market Manston as a freight airport. In contrast, the current owner of the site, Stone Hill Park Limited ("Stone Hill Park"), has brought forward plans to develop the area for mixed residential, employment and leisure uses. TDC has identified a need to understand whether an airport would be a viable use for the site, and whether there is a reasonable prospect of that occurring within the period of the Local Plan to 2031.

2.3. Historic Performance of Manston Airport

During its years of operation as a commercial airport, Manston had a range of air services to domestic and short haul Europe points, and handled around 30,000 tonnes of freight a year, almost exclusively imports of fresh produce coming on dedicated freighter aircraft. The scale and nature of the passenger traffic suggests that Manston has relatively few air journeys originating or destined for a catchment area of East Kent that it might reasonably be expected to serve: we estimate that demand from this catchment area is about a third of the size of the demand in a catchment area of Southend Airport. While we consider that a re-opened Manston Airport would attract some passenger services and regain freighter operations at a level similar to its historic performance, our financial assessment is that this would be insufficient to support financially viable operations of the airport.

2.4. Manston as an Overflow Airport for London

Manston is located in the South East of England, where there is a need for additional runway capacity. This issue has been researched extensively over recent years, including the Davies Commission which recommended in 2015 that a third runway be constructed at Heathrow. A decision on the new runway

capacity is expected to be made in October 2016. In addition to the recommendation for Heathrow, Davies also considered a second runway at Gatwick, opening up the possibility of alternative decisions, including of course that either both or neither runway may be approved. We have developed a detailed model of how future passenger and freight demand might be distributed around the six airports in the London area under different airport capacity scenarios, in order to assess how much unaccommodated demand would be generated by 2050. We have also assessed how much traffic might be attracted to a re-opened Manston Airport.

These traffic estimates have been inputs to a financial model which AviaSolutions has developed to assess Manston's viability to 2050. We have based our estimates of unit aeronautical revenue, commercial revenue and operating costs on those levels achieved at other UK airports of a similar scale to that projected for Manston. We have also assumed that the site could be acquired for £10 million, and that further capital expenditure of £27 million would be required to re-commission the site as a licensed commercial airport. We further assume that the business is financed initially through an equity injection from shareholders of £50 million with no debt funding.

The scenario recommended to Government by the Davies Commission is the construction of a third runway at Heathrow. Under this scenario, the forecast passenger traffic at Manston would initially grow to almost 2.5 million passengers per annum (mppa) immediately before the opening of the third runway in 2030, but would fall materially afterwards. Retained earnings would not become positive until around 2040, preventing payment of dividends to equity investors until around that date. EBITDA margin would become positive in the early 2030's and grow and reach 41% by 2050. On this basis, we would very much doubt that an informed private sector investor would consider an equity stake in Manston Airport.

The scenario which most supports the re-opening of Manston Airport is one in which no new runways are built in the South East of England in the period to 2050. In this scenario, forecast operating cash flow of Manston Airport is negative until 2025; re-financings of £20 million are required in both 2028 and 2029 to fund terminal expansion; and retained earnings remain negative until 2029 preventing the payment of dividends. Thereafter, financial performance improves significantly, but it is 2043 before EBITDA margin reaches 50%.

It should be noted that these conclusions are based on a set of assumptions that favour Manston Airport at all times, with examples including above market aeronautical yield, aggressive cost reduction projections and minimal acquisition costs, which, while in our opinion are achievable, would nonetheless require some significant management attention. This attention would be focused on two aspects, securing new business at advantageous aeronautical revenue per passengers from LCC's and structuring the business to take advantage of unit cost reduction through scale. . These would not be assumptions which AviaSolutions would suggest are presented as a Base Case to an Investment Committee considering the proposition, but rather ones describing a potential upside scenario. In our experience, it is likely that an Investment Committee would not consider investing on this basis.

This scenario of no runway development in the South East of England before 2050 is also a low probability scenario in our view. It also carries a high risk that a decision in 2016 not to commission another runway could be reversed at any time in the future. If Manston were operational at the time a decision were reversed the impact on the business would be considerable, and the decision is not one in which the owners would have any control whatsoever To give just one minor illustration of the risk, it was reported in early September 2016 that Heathrow Airport Limited was considering requesting permission to operate an additional 19,000 ATMs each year, which if granted would reduce the traffic that might spill to Manston.

The other runway scenarios which collectively are more likely than 'no runway development', produce worse financial forecasts for Manston Airport.

2.5. Conclusions

AviaSolutions concludes that airport operations at Manston are very unlikely to be financially viable in the longer term, and almost certainly not possible in the period to 2031.

3. Manston Airport: History and Development Proposals

3.1. Introduction

In this chapter, we briefly describe the history of Manston Airport and the different development proposals that are currently being tabled. We also summarise the information and views that we gathered during our interviews with each prospective developer of the site.

3.2. Manston Airport History

The history of Manston Airport has been well documented in a series of reports and investigations about its prospects. Like many airports, it started life as a military airfield and played an important role during the Second World War. Although it continued as an Air Force base after the war, civilian operations were permitted. In 1998, the Ministry of Defence sold the site to the Wiggins Group plc, which endeavoured to build up commercial operations, including investment in an airline (EU Jet) to provide passenger services. However, the airline quickly ceased operations in July 2005 and the parent group (renamed Planestation), went into administration.

The following month, Infratil Limited acquired Manston Airport from the administrators, and sought to continue commercial air transport operations. However, without the support of a based airline, passenger numbers returned to the historically low levels experienced prior to EU Jet. 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. Infratil disposed of the airport and associated liabilities in November 2013 for the notional price of £1.

Manston Skyport Limited completed its acquisition of the airport in December 2013, but in the face of continuing financial losses gave notice to staff in March 2014. The airport closed for operations on 15 May 2014.

TDC then explored the possibility of using a Compulsory Purchase Order (CPO) to buy the airport, and then sell immediately onto a private sector investor willing to use the site as a commercial airport. A month-long search yielded a small number of interested parties but further scrutiny indicated that none provided the Council with sufficient confidence that it would be indemnified were it to exercise its CPO rights. This led the Council to reach an initial conclusion in December 2014 that it was unable to find a CPO Indemnity partner.

At the request of RiverOak Investment Corporation (one of the previously interested parties), in May 2015 it started a review of this decision and in October 2015 reached the same conclusion. Nonetheless, at the start of 2016, the Council launched a further search for a CPO Indemnity partner, but this again proved unsuccessful.

In the meantime, the former airport site was sold in September 2014 to the current owners, Stone Hill Park Limited

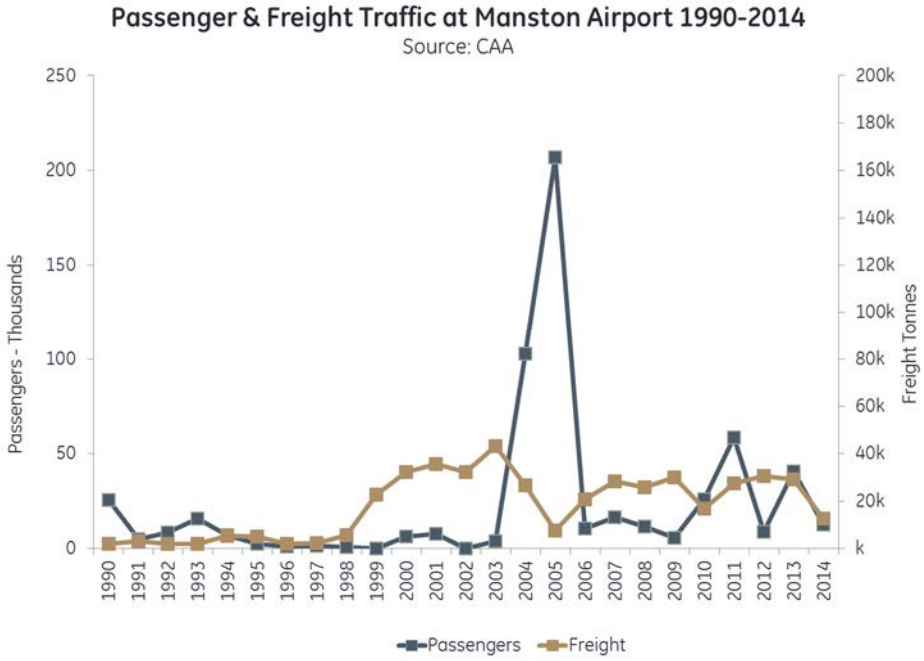
3.3. Commercial Activity at Manston Airport

Immediately after Wiggins Group plc acquired the airport Manston saw an increase in freight traffic. This grew rapidly to circa 30,000 tonnes per annum, however the passenger element of the business stagnated. After Wiggins Group plc invested in an airline specifically for the region, EUJet, the airport saw rapid growth in passengers increasing to 200,000 in 2004. EUJet however, quickly fell into financial difficulty and ceased operations in July 2005 bringing an abrupt halt to the passenger growth.

In the years since, through the ownership of Infratil and Manston Skyport, freight volumes were maintained at circa 30,000 tonnes per annum. Passenger volumes increased with the introduction of Flybe in 2010 but

fell back as the routes were withdrawn. Most recently, KLM began operations from the airport in 2013 but were also withdrawn due to the announcement of the airports closure.

Since being taken into private ownership the airport has averaged 30,500 passengers and 25,000 tonnes of freight per annum, with the peak being 207,000 passengers in 2005 and 43,000 tonnes of freight in 2003.



3.4. Stone Hill Park Development Proposal

Stone Hill Park Limited has lodged a planning application with TDC to construct a mixed development of residential and business units on the site of the former airport.

Stone Hill Park set out its position with regard to the history of the airport, indicating its years of financial losses under various ownerships. The company also outlined the steps that had been taken by management and consultants, both when the airport was operational as Manston SkyPort, and when it came into its ownership, to revive the airport's fortunes. It should be noted that Stone Hill Park indicated that no documents or reports were available to evidence these efforts. Stone Hill Park concluded that the airport site would be better utilised as a redevelopment site than as an airport[1].

3.5. RiverOak Investment Corporation Development Proposal

RiverOak was perhaps the most interested party in TDC's search for an Indemnity Partner to support its consideration of a CPO. It has indicated that its plan for the re-opening of Manston Airport is based on attracting 10,000 annual movements by freighter aircraft.

During AviaSolutions interviews, RiverOak provided a high level review of why it wished to acquire the airport and its vision of the airport's future development. The strategy is to develop a freight hub with supporting passenger services. RiverOak criticised the previous owners' lack of effort to develop air freight traffic at Manston.

[1] The scope of this report does not extend to a consideration of other uses for the airport, and AviaSolutions is therefore not able to comment on the reasonableness or otherwise of the alternative use proposals.

RiverOak was unwilling to disclose any material detail of its Business Plan for reasons of commercial confidentiality. Therefore, the discussion over future viability was at a more generic high-level basis, with RiverOak not disclosing any traffic projections, revenue projections, cost base or specific airlines (passenger or freight) with whom it had discussed plans (with the exception of Ryanair). It did not name any parties that had given firm commitments to use a re-opened Manston[2].

A critical factor for RiverOak's proposal is that in order to establish an airport on the Manston site it will need to obtain ownership of the site from the current owners. They have not secured the site's sale through negotiation with the owners and are currently preparing for a DCO process, a part of which shall aim to demonstrate to the relevant authorities that the airport site is nationally significant transport infrastructure. If successful, RiverOak may then be granted the ability to purchase the site on a compulsory basis. Without this power, there appears little prospect at present of the group securing ownership.

[2] For the avoidance of doubt, AviaSolutions therefore does not offer any opinion about the reasonableness or otherwise of RiverOak's commercial plans for the airport.

4. Potential Development Scenarios

4.1. Introduction

In this chapter, we describe a number of possible development scenarios for Manston Airport. These scenarios have been developed on the basis of our experience of the air transport industry and provided the background for our discussions stakeholders within the air transport industry.

We first describe two scenarios (4.2 and 4.3) that consider possible developments at Manston with regards to cargo and passengers. These scenarios are considered in isolation from decisions made in relation to the provision of a runway in the London area. However, given that Manston is in the South East of the UK, its potential development is likely to be directly influenced by any runway decision. Consequently, we incorporate the first two scenarios into a wider consideration of possible developments in the London area in view of the possibility that Manston might provide some 'over-flow' airport capacity. These considerations are drawn together in our four distinct demand scenarios for Manston Airport.

4.2. Cargo Activity

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.

We also consider whether the scale of activity might be greater than experienced in the past. There would be two possible causes for this:

- 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. We discuss this further throughout the remainder of this chapter.

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.

4.3. Regional Passenger Airport

Manston Airport played a role from the early 2000s until its closure as a local airport serving the East Kent region. Although our research and analysis (described in Section 5) has indicated that its core catchment area produces significantly less demand for air travel than the area around Southend Airport, we consider that it might nonetheless be able to support an operation equivalent to one or two 150-200 seat passenger aircraft operated by a LCC based at Manston. However, the longevity of such a development may be limited since if a new runway were to be built at Heathrow or Gatwick, the LCC concerned would in all probability transfer its aircraft to the new runway. There are many reasons why these aircraft would be re-based, including:

- Gaining access to vitally important catchment area

- Competitive positioning, the major LCCs are likely to fiercely compete and attempt to gain first mover advantages
- The airlines will need to base multiple aircraft at the airport with a new runway in order to achieve economies of scale on the cost lines of their business
- Securing slots at valuable airports to secure slots
- Airlines have finite resources, including the number of aircraft they have to operate. A major structural change in the runway capacity environment will demand that those resources be reviewed and the optimum allocation revised.

In our analysis we make the assumption that the airport quickly ramps up to 800,000 passengers per annum on this basis until such a time as a new runway is opened, at which point the aircraft are re-based and the passenger traffic lost. This volume of annual passengers is equivalent to two B737-800 based aircraft with a typical LCC seat configuration. We also assume that Manston would not feature in the network plans of airlines for non-based aircraft.

4.4. Runway Development in the South East

The shortage of airport capacity in the South East of England has been widely debated for many years, if not decades. The most recent public investigation was undertaken by the Davies Commission which reported to Government in 2015. No decision on its recommendation to provide a third runway at Heathrow has yet been made, although one is expected in October 2016. Even if a decision is made as currently planned, it could be ten years or more before that runway would be operational. The Davies Commission considered a long list of possible locations for additional runway capacity in the South East, although it should be noted that Manston Airport (still open at the time) was not one of them, and despite its available capacity a new runway was still deemed necessary.

The Commission short-listed two schemes at Heathrow for a third runway (LHR3) and the provision of a second runway at Gatwick (LGW2), and recommended LHR3. During the next ten years, there will be a shortage of airport capacity in the South East, leading to a scenario in which Manston acts as an overflow airport for demand that cannot be accommodated elsewhere. We consider that there are four possible outcomes from the Government's current decision process:

- Build LHR3: While in line with the Davies Commission recommendation, this choice would nonetheless be the most controversial, and probably take the longest time to deliver.
- Build LGW2: It is likely that a runway at Gatwick would be available earlier than at Heathrow. It is probably the outcome that would be least supportive of a re-opening of Manston Airport, since Gatwick is the closest airport to Manston, and a runway there is likely to be operational several years before one at Heathrow.
- Build both: Should Government indicate that its policy would permit both to be built, Gatwick shareholders might well conclude that while its runway could be operational first, there would be a significant risk of loss of traffic to Heathrow as and when its additional runway opened.
- No expansion: It is possible that Government will not sanction any runway expansion in the South East. It is the outcome that would be most supportive of a re-opening of Manston Airport, albeit an outcome that could be reversed at any time in the future, thereby depriving a re-opened Manston of traffic.

It is feasible that there would be a legal challenge, irrespective of which of the above possibilities were chosen (possibly less so with the fourth 'do nothing' option), further delaying the opening of a new runway. It is unclear whether the Government's decision would indicate simply its preferred location with the airport operator then following the normal planning process to obtain the necessary permissions, or whether it would seek to provide the permissions through a Parliamentary process.

4.5. Dynamics of Traffic in the London Airport System

The six airports of the London Airport system all have different owners, and each has a particular characteristic in the traffic which it handles. However, there is a dynamic in the distribution of traffic between the airports, which also have a particular hierarchy.

Heathrow is the premier airport, and there are numerous examples of airlines moving services there when they are able to do so. This has been evidenced with airlines purchasing slots from incumbent Heathrow

airlines, for example in February 2016 Oman Air purchased a pair of Heathrow slots from Air France-KLM for a reported $75 million.

Gatwick is clearly the second airport in the system, and secondary slot trading is also beginning to take place. The airports of Stansted and Luton to the north of London play similar roles in supporting the low cost airline market. London City Airport is very much a niche airport and has marginally relieved pressure on Heathrow by serving an increasing range of short haul (often business-oriented) destinations. The least busy airport is Southend which has grown again in the last few years as a result of easyJet basing two to three aircraft at the airport.

4.6. Model Scenarios

Before the construction of a new runway at Heathrow and/or Gatwick, there is expected to be a shortage of airport capacity with passenger demand growing. We have developed a simulation model to estimate the size of unaccommodated demand at one airport, and how the demand might respond to an airport capacity shortage. Our demand cascade follows the form of:

- Some passengers using the airport to connect between flights will choose to use other airports as their connection point (voluntarily to avoid over-crowded facilities and delayed flights, or as a consequence of airlines increasing fares to such passengers);
- Some passengers will choose not to travel, or not to travel by air (as air fares are increased);
- Some passengers will endeavour to use another London airport; and
- The remaining potential travellers are available for attraction by UK airports other than the six London area airports.

We have used our experience and discrete analyses to determine the likely sizes of the first two categories above, and then estimated the passenger handling capacities of the airports. In general, this is based on the number of Air Transport Movements (ATMs) that each airport's runway system can handle[3] and the average number of passengers per ATM at the airport. There is a long-term and widespread trend for passengers per ATM to increase, meaning that the passenger handling capability of an airport can grow even though there may be no change in the number of ATMs that it can handle. We have also divided the maximum ATMs between passenger and freighter operations, maintaining freighter operations at the average level seen over the five years 2011 to 2015[4], except at Stansted. Within this model we have also considered freight demand and the ability of airlines to carry this demand, either on the dedicated freighter ATMs or in the belly-holds of passenger aircraft.

Once the total unaccommodated demand for the London System has been identified we then apply analysis to identify the share of this unaccommodated demand Manston might attract. These 'spill' demand scenarios are in addition to the base loads of 800,000 passengers (up until a new runway) and 30,000 tonnes of freight. Our demand scenarios are therefore:

- LHR3: The spilled passenger demand Manston would capture if a third Heathrow runway were developed and in addition 800,000 passenger per annum and 30,000 tonnes or freight per annum until FY2030.
- LGW2: The spilled passenger demand Manston would capture if a second Gatwick runway were developed and in addition 800,000 passenger per annum and 30,000 tonnes or freight per annum until FY2025.
- Both: The spilled passenger demand Manston would capture if a third Heathrow runway were developed and a second Gatwick runway were developed and in addition 800,000 passenger per annum and 30,000 tonnes or freight per annum until FY2025.
- No Runway: The spilled passenger demand Manston would capture if no new runway were developed and in addition 800,000 passenger per annum and 30,000 tonnes or freight per annum until FY2050.

[3] *In the cases of Heathrow, Stansted and London City there are also statutory limits*
[4] *One of Stansted's S106 conditions specifies the division of ATMs between passenger and freighter, with freighter ATMs being 20,500 per annum, and passenger ATMs 243,500 per annum*

4.7. Development Options Outside of Scenarios

We have not included in the possible scenarios any development that does not include commercial air transport operations. Hence, we do not consider the potential use of the Manston site as; a Maintenance, Repair and Overhaul (MRO) centre, an aircraft refurbishment or fit-out location, aircraft 'tear-down' or storage centre, or flight training facility. These and similar activities are often sought by owners of airports with low levels of aircraft activity as a means of generating ancillary revenue to boost income. However, the operators of these businesses are often flexible about the location of the works, and as such, the businesses providing these types of activities are highly sought-after by existing airports and the businesses are able to negotiate favorable commercial terms.

Given the intense competition that exists for these types of business, in our judgment no private sector investor would re-open Manston Airport based primarily on this type of activity. Similarly, while the site has an historic position in aviation and has a heritage centre, and this activity could add to viability, this would be only a marginal financial contribution and would be dependent on there being a commercially viable airport around which to build such an activity.

We also discounted the possibility of Manston developing as a business aviation (GA) centre: it is simply too distant from London to be an attractive offering to corporations and high net-worth individuals using private jets and would struggle against established airports such as Farnborough and London City.

5. Passenger Analysis

5.1. Introduction

In this section, we discuss the passenger market both at Manston and in the London Area as a whole. We then explore the potential demand scenarios outlined in section 4.6.

5.2. Historic Passenger Traffic at Manston Airport

Various passenger services have operated at Manston Airport in the past. In general, they were consistent with the type that might be expected at a small UK regional airport, namely scheduled services to major short haul domestic and European destinations, supplemented by charter flights to the more popular Mediterranean holiday resorts.

Passenger volumes peaked in 2005, when EUJet, then a subsidiary of Planestation, was operating from Manston Airport. A large number of destinations were served, although EUJet was achieving a load factor of only 41% when it ceased trading in July 2005.

Destinations/Origins of Manston Airport Passengers, 2005

Airport	Passengers	Airport	Passengers
Edinburgh	32,259	Gerona	6,177
Dublin	26,879	Newcastle	5,118
Amsterdam	16,600	Belfast	4,563
Manchester	15,091	Barcelona	4,351
Malaga	14,119	Ibiza	3,657
Prague	10,434	Shannon	2,897
Nice	9,848	Valencia	2,316
Murcia	9,774	Glasgow	2,200
Alicante	7,822	Madrid	2,077
Palma	7,584	Other international	12,186
Geneva	6,801	Other domestic	18
Faro	6,502	Total	209,273

Source: CAA Airport Statistics

After EUJet ceased trading, passenger volumes fell dramatically, and remained persistently below 20,000 per annum until 2010/11 when Flybe commenced some limited flying to domestic destinations. The service to Manchester performed poorly, with an average load factor of 26% (source: CAA) and was soon terminated. A Belfast service had a marginally better load factor at 44% but ultimately was unsustainable. The highest performing route in terms of load factor was to Edinburgh which reached a load factor of 53% Passengers were mainly outbound from Manston and travelling for personal or leisure reasons resulting in fare yields being relatively low. The culmination of this poor demand resulted in Flybe ceasing services from the airport (source: Flybe Interview).

In 2013, KLM commenced a twice daily service on weekdays from and to Amsterdam, aiming to feed its connecting hub at Schiphol as well as facilitating travel to and from the city. KLM operates to many airports in the UK on this basis and in 2013, KLM carried nearly 36,000 passengers. However, in that same year, a further 48,000 passengers from Manston's core catchment area travelled to Amsterdam from other London Area Airports, meaning that the Manston service captured just 42% of the demand that arose from Manston's core catchment area (albeit services started only in April 2013).

Passengers to Amsterdam, 2013

London Area Airport	Passengers to Amsterdam from Manston Catchment Area, 2013
Heathrow	22,008
Gatwick	20,048
London City	4,091
Stansted	1,932
Luton	596
Total	48,675
Passengers on KLM service from Manston	35,854 (42%)
Total Catchment Area Passengers to Amsterdam	84,529 (100%)

Source: CAA Passenger Survey (N.B. Southend not included in survey)

5.3. Local Demand

We have defined an area of eastern Kent as Manston's core catchment area, as shown in the diagram below.

To gauge the demand from Manston Airport's core catchment, we analysed the number of journeys from the core catchment to a basket of easyJet destinations (using Southend Airport's easyJet network as a typical example). The London airports captured 517,000 air journeys to these UK domestic and short haul

European destinations[5]. This figure does not include the small number of passengers that travelled via Manston to Amsterdam in the first three months of the year.

District	Passengers from Manston's Catchment Area
Ashford	59,463
Canterbury	78,339
Dover	48,575
Maidstone	74,279
Medway	131,123
Shepway	41,159
Swale	47,074
Thanet	37,315
Total Using London Area Airports	**517,327**
Passengers on Services from Manston	**12,344**
Total Catchment Area Passengers to these points	**529,671**

Source: CAA Passenger Survey (N.B. Southend not included in survey)

In contrast, in 2014, the core catchment area for Southend generated more than 580,000 passengers to and from these points flying from the other London Airports. This is in addition to the passengers carried by easyJet from Southend to these destinations.

A proportion of the passengers that used services from Southend will have come from outside the airport's core catchment area. The analysis indicates that the maximum proportion of demand from a core catchment area that a small airport might attract is around 60%. This assumed percentage capture is broadly in line with the 42% capture by KLM from Manston during its first nine months of operations in 2013.

Airport Used	Passengers from Southend Catchment Area
Gatwick	270,450
Stansted	251,443
Heathrow	21,978
London City	20,868
Luton	16,820
Total using London Area Airports	581,559 (38%)
Passengers on easyJet services from Southend	959,523 (62%)
Total Catchment Area Passengers to these points	1,541,082 (100%)

Source: CAA Passenger Survey (N.B. Southend not included in survey)

If this same percentage were applied to the 2014 demand from Manston's core catchment area, it suggests that the maximum number of passengers that might be attracted to these points on services from a re-opened Manston would be some 330,000 per annum (529,000 x 62%). To sustain operations, it is therefore conceivable that Manston would, like Southend, almost certainly need to attract passengers from outside its catchment area. Southend is some 55 minutes from central London by rail (with pedestrian access between airport terminal and station), while Manston is scheduled to be 75 to 105 minutes from

[5] *Barcelona, Belfast, Amsterdam, Faro, Alicante, Ibiza, Malaga, Jersey, Palma. Geneva, Venice, Edinburgh, Berlin, Krakow, Tenerife*

Central London. Manston would face a significant challenge to match Southend's attraction to passengers from central London.

Train to London from airport, (Assumes Ramsgate connection for Manston)

Airport	Train to London	Connect to Terminal	Vs. Manston
Heathrow	15 minutes every 15 minutes from Paddington	Direct to terminal	75 minutes quicker
Gatwick	30 minutes every 15 minutes from Victoria	Direct to terminal	60 minutes quicker
Stansted	50 minutes every 15 minutes from Stratford / Liverpool Street	Direct to terminal	40 minutes quicker
Luton	40 minutes every 10 minutes to Kings Cross St Pancras	10 minute shuttle	50 minutes quicker
London City	On the DLR Line	Direct to terminal	Variable
Southend	53 minutes to Liverpool Street, 44 minutes to Stratford. 8 trains an hour at peak	Direct to terminal	37 minutes quicker
Manston	75 - 105 minutes to Ramsgate, four trains per hour to Kings Cross St Pancras	15 minute shuttle	n/a

Source: Airport website, national rail

This potential level of passenger demand at Manston for short haul services would be approximately equal to that which could be handled by one 150 seat narrow-body aircraft (such as a Boeing B737 or an Airbus A319) operated by an LCC based at Manston.

5.4. Airline Interviews

AviaSolutions spoke to several passenger airlines with regards to potential future operations at Manston airport. More detailed notes are provided in Appendix A.

Ryanair provided the most positive indication of future service concluding that:

> '*Ryanair are constantly reviewing their network and remain open to approaches from any airport. If the airport became operational, the airline would review its potential and fit within the wider airline network in due course, and is available to discuss terms with the owners at any time*'
> Ms. Kate Sherry, Deputy Director of Route Development, Ryanair

Whilst Ryanair remained somewhat open to the possibility of future services, it was in our opinion, far from a commitment to serve Manston airport if it should re-open. We received a similar positon statement from KLM, effectively citing that a re-opened Manston would be included in the annual network review.

Discussions with other carriers indicated a less positive outlook for the airport, with Flybe, an airline that had previously served Manston stating:

> '*It is unlikely that, even if Manston should reopen, the airline would choose to serve the airport.*'
> Mr. Martin Pearce, Flybe

Other airlines and individuals interviewed had similar stances, stating that:

> '*...Manston would not be a consideration for us...*'
> Major European LCC

and that:

> '*Following the BREXIT vote many airlines will be considering their approach to the UK. During a period of uncertainty, it will be difficult for Manston to convince carriers to open routes to the airport*'
> Ex-Director of Network Route Development for Major European LCC

We also discussed with a major UK carrier its views on Manston Airport as part of an operational resilience strategy. This is an aspect of the airport which has been made promoted as a potential benefit to the UK aviation sector. Flight Operations within an airline is a highly scrutinised function, in particular with regards to fuel and diversionary airport selection. When calculating a Flight Plan, airlines plan contingency fuel based on regulatory standards that ensure sufficient fuel is available upon landing, meeting this minimum landing fuel is a core part of the duty of all aircraft commanders. Our contact stated that:

'It is my personal view that Manston does not offer any safety or resilience benefits of a material nature to the UK system. The airport is located in close proximity to six London airports which offer excellent resilience already'
Manager, Flight Operations, Major UK Carrier

Based on AviaSolutions interviews in relation to passenger services, we conclude that whilst there is some notional interest in passenger services at Manston Airport, no airline was committed at present, or in the future seeking to serve to the airport should it re-open. No airline wished to give any more commitment beyond that it would consider Manston as part of their process of reviewing their network.

5.5. Potential Overflow from London Area System - Model

We outlined in Section 4 the principles on which we have based our model of how passenger traffic might cascade around the London Area Airport system. In this section we set out the main assumptions and results.

Capacity
The starting point of our assumptions is the ATM capacity of the London airports. At a number of airports, the ATM capacity has a statutory cap (as opposed to an estimate based on its physical capacity). At these airports we have assumed up to 97.5% of the movement cap to reflect constraints on the optimal scheduling and peak demand profiles.

Airport ATM Capacity

Airport	Annual ATM Capacity	Comment
Heathrow	480,000	With two runways. Statutory limit
	720,000	With three runways, from 2030 if added
Gatwick	280,000	Estimated capacity of single runway
	480,000	With two runways, from 2025 if added
Stansted	264,000	Statutory limit. Includes 20,500 for freight flights
Luton	100,000	Estimated. Statutory passenger cap of 18 mppa
London City	111,000	Statutory cap (noise-adjusted) - passenger limit of 6.5 mppa
Southend	53,300	Statutory cap

These ATM capacities are converted into a passenger capacity by multiplying by the average number of passengers per ATM. Passengers per ATM have historically increased over time as a result of larger aircraft with more seats and the increase in the number of seats occupied (the load factor).

We have assumed a continuation of this trend, although at a rate of 0.5% per annum, much lower than seen in recent years. It may be seen that even by 2050, the number of passengers per ATM with this assumption never exceeds 200 at any airport. This assumption acts to increase the demand that cannot be accommodated at the six London Area airports. However, it is likely that when faced with runway capacity constraints, airlines will increase passengers per ATM at a faster rate than would otherwise be the case. Our assumed rate of increase is consequently likely to lead to an over-estimation of the demand that is available to be handled at Manston.

Passengers per ATM

Airport	Passengers per ATM					CAGR 2011 to 2015	CAGR 2015 to 2050	Pax per ATM 2050
	2011	2012	2013	2014	2015			
Heathrow	146.6	149.5	155.0	156.8	159.7	2.2%	0.5%	190.2
Gatwick	137.9	142.5	145.2	149.7	153.5	2.7%	0.5%	182.8
Stansted	142.3	144.1	146.3	149.2	155.9	2.3%	0.5%	185.6
Luton	136.4	139.0	141.8	143.3	145.1	1.5%	0.5%	172.8
London City	49.2	46.9	49.7	52.0	54.5	2.6%	0.5%	64.9
Southend	33.8	84.9	102.4	95.5	100.4	5.7%*	0.5%	119.5

* 2012 to 2015

Demand

We have based our forecasts of future passenger traffic on those set out in the Davies Commission Report - unconstrained carbon traded forecast (the most optimistic). Given that the early forecast volumes have been superseded by actual performance, we have uplifted the forecast figures to reflect actual demand seen across the London System in the intervening years.

Demand Allocation London System

Demand is then compared to capacity available, and assigned to the airport which Davies assumes is its natural first choice. The greatest demand is for Heathrow, and traffic not accommodated there is assumed to (a) spill to other non-London Area airports for connecting traffic, (b) 5% is assumed not to travel (by air), or (c) spill to Gatwick.

A similar process is then followed for Gatwick, with any unallocated demand being allocated to one of the other four London Area airports, until each has reached its capacity. At this point, any unaccommodated demand becomes available for other airports outside the London System to handle. We summarise below the forecast demand at the London Area airports in 2050 for each of our defined scenarios, together with unaccommodated demand.

Forecast Passenger Demand (mppa) at London Area Airports, 2050

Airport	Scenario			
	LHR R3	LGW R2	Both	Neither
Heathrow	134	89	134	89
Gatwick	51	88	88	51
Stansted	45	45	45	45
Luton	17	17	17	17
London City	7	7	7	7
Southend	2	2	2	2
Unaccommodated	44	40	5	79

Unaccommodated Demand (mppa) by Scenario and Year

Year	Scenario			
	LHR R3	LGW R2	Both	Neither
2020	5	5	5	5
2025	11	9	9	11
2030	17	6	2	25
2035	9	9	4	36
2040	16	16	5	49
2045	27	27	3	61
2050	44	40	6	79

Demand Allocation - Regionals

This Unaccommodated Demand is potentially available to airports other than the six London airports and specifically to airports in regions other than the South East as well as to Manston. Using CAA data, we have calculated the origin and destination distribution of passengers at the London Airports split by the part of the UK they are travelling either to or from. This indicates that 49% of total passengers are travelling to or from Greater London and 4% to or from Kent. We have assumed that the distribution of future Unaccommodated Demand matches the pattern of demand seen in 2014, such that if 100 passengers were unaccommodated, 49 of those are travelling to or from Greater London and 4 to or from Kent.

We have then estimated how much of this Unaccommodated Demand Manston may reasonably be assumed to capture. Given its location in Kent it is reasonable to assume it would capture a large share of the Unaccommodated Demand for Kent (4 passengers in the example above). We have assumed that this share is 90% (90% of the 4 passengers). Applying a similar logic, we assume that the Greater London passengers would have more choice and therefore Manston would capture a smaller share of this market. We have assumed Manston will captures 10% of the Greater London market (10% of the 49 passengers).

It is also important to recognise that currently 27% of passengers using the London Area airports do not have origins or destinations in the South East region, but use surface means to access the air services at the London airports. It is our view that airlines will consider adding additional capacity at airports to the North and West of London (potentially Southampton, Bournemouth, Cardiff, Birmingham, Manchester) to dissipate this excess demand and permit the London System to absorb the demand growth in the Greater London area. These non-London airports, in general, have a wider catchment area already provide services from many carriers with the associated economics of scale and mature presence in these markets.

Surface Origin/Destination of Terminating Passengers at London Area Airports, 2014 (mppa)

Area	LHR	LGW	STN	LTN	LCY	Total	%
South East	36.0	28.1	11.6	10.2	3.3	84.2	73%
of which							
Greater London	24.9	15.0	10.1	5.3	3.1	56.7	49%
Kent	0.9	2.5	0.4	0.1	0.1	4.1	4%
Other UK regions	11.3	7.2	7.5	5.0	0.3	31.2	27%
Total Terminating	47.3	35.2	19.1	10.2	3.6	115.4	100%
Connecting	25.8	2.6	0.8	0.2	0.1	29.5	
Total Terminal	**73.1**	**37.9**	**19.9**	**10.4**	**3.6**	**144.9**	

Source: CAA Passenger Survey

In addition to this overflow of unaccommodated demand, in each of our scenarios we have added the introduction of an LCC base of two aircraft supporting 800,000 passengers per annum from 2018, equivalent to two Ryanair B737-800 aircraft. This base continues at Manston until a new runway is opened at Heathrow and/or Gatwick. In the year when new capacity is introduced, the Manston based aircraft are assumed to transfer to the airport with the new runway, as the airline concerned seeks to establish presence at that airport at the same time as consolidating its operations in the London area.

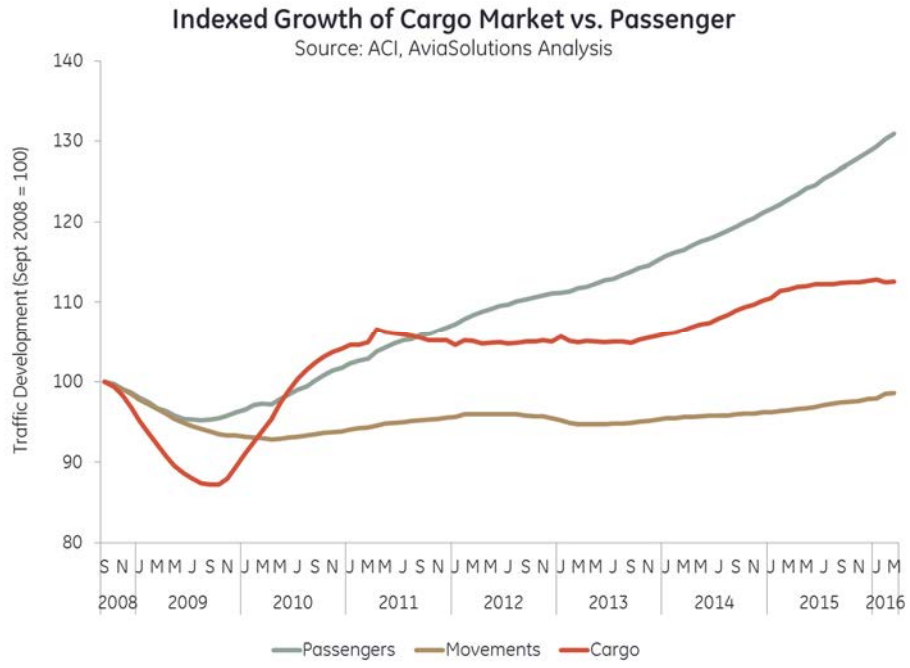
6. Cargo Analysis

6.1. Introduction

In this chapter we examine the air cargo market and its overall prospects. We also consider how freight traffic might develop at Manston Airport in our scenarios.

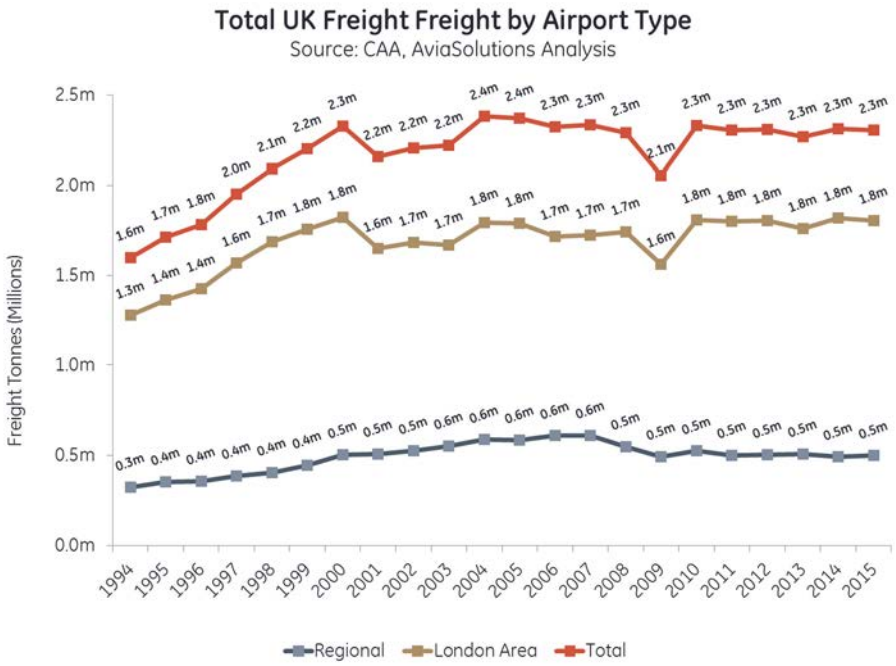
6.2. Overall Cargo Market

The air cargo market declined significantly after the global financial crisis of 2008. Although cargo volumes recovered to previous levels within two years following the crash in 2008, growth over the last five or six years has been modest.



A similar pattern has been observed in the UK. Indeed, total air freight handled at UK airports has been virtually constant at around 2.3 million tonnes per annum since 2000, with the exception of reductions immediately after the start of the recession in the early 2000s and the financial crisis in 2008. Prior to this period, demand for air freight had grown at CAGR of 8% since 1990.

There is a reasonably even split between freight set-down (imports for international freight) at 52.5% and freight picked-up (exports) at 47.5%. More than 95% of UK air freight in 2015 was international.



Within this national context, individual airports' performance has varied, with the five London area airports (Heathrow, Gatwick, Stansted, Luton and City) increasing their aggregate share slightly to just under 80%, with regional airports reducing by an equivalent amount.

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[6], 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.

Air freight activity in the UK is highly concentrated, with just six airports handling 95% of the UK's air freight volume.

[6] *Stansted's freight ATMs declined from 13,967 in 2000 to 9,956 in 2015*

Freight by UK Airport

Airport	Freight (Tonnes) 2013	2015	% of 2015 Total	Cumulative Share	% carried on Freighters in 2015
Heathrow	1,422,939	1,496,551	65%	65%	5%
East Midlands	266,968	291,689	13%	78%	100%
Stansted	211,952	207,996	9%	87%	100%
Gatwick	96,724	73,371	3%	90%	0%
Manchester	96,373	100,021	4%	94%	10%
Manston	29,306	-	0%	94%	100% (2013)
Belfast International	29,288	30,389	1%	95%	100%
Luton	29,074	28,008	1%	97%	96%
Birmingham	21,067	7,164	0%	97%	0%
Edinburgh	18,624	19,322	1%	98%	99%
Total	**2,267,812**	**2,304,345**			**30%**

Source: Analysis of CAA Statistics

In 2015, there were around 60,000 ATMs by all-freight aircraft across UK airports. These were split almost equally between international and domestic operations. Freight movements are relatively concentrated on a small number of airports, with East Midlands and Stansted accounting for 64% of movements in 2015.

Airport	Freighter ATMs Domestic	International	Total	Int. as % of 2015 Total
Heathrow	3	2,385	2,388	8%
East Midlands	9,603	12,516	22,119	42%
Stansted	3,445	6,511	9,956	22%
Gatwick	0	3	3	0%
Manchester	205	830	1,035	3%
Belfast International	4,091	17	4,108	0%
Luton	183	1,519	1,702	5%
Birmingham	0	0	0	0%
Edinburgh	3,883	1,088	4,971	4%
Other	10,136	5,032	15,168	17%
Total	31,549	29,901	61,450	100%

Source: Analysis of CAA Statistics

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.

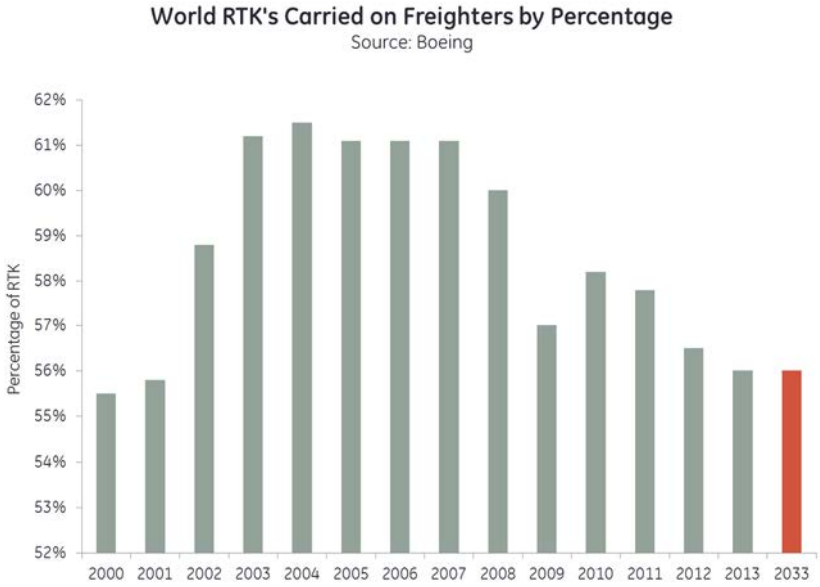
As passenger demand increases additional belly-hold capacity will enter the market. This capacity growth is unhooked from the demand scenario for belly-hold cargo and can result in excess capacity in the market. As a result airlines will often sell this belly-hold capacity using a marginal cost pricing 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

structure, belly-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.

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 belly-hold 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.



Manston

Before its closure in 2014, Manston Airport was the sixth busiest airport in the UK for freight. For the last ten years of operations the airport handled between 25,000 and 30,000 tonnes of freight annually, representing just over 1% of the UK market (refer table 'Freight by UK Airport' on previous page)

In 2013, the overwhelming majority of the airport's freight was carried on all-freight aircraft, CargoLux being the primary operator. There were 511 freighter movements (landings or take-offs) during the year, with an average of 57 tonnes of freight per movement. In reality Manston was almost exclusively used for imports, and this averaged 107 tonnes per import, with virtually no export volume.

6.3. Freight Industry Interviews

Our discussions with representative of the cargo industry indicate that much of the cargo at Manston was fresh produce from Africa. The airport was popular with shippers as it was uncongested, offered good quality handling services (provided by airport staff) and the airport charges were competitive. While it is close to continental Europe, airlines/shippers nonetheless had to incur the costs of flying freight aircraft virtually empty on the return leg to their base airport (e.g. Luxembourg, Ostend and Liege) after off-loading. When Manston closed, it is understood that some movements transferred to Stansted, whilst others switched to airports on the near-Continent and their loads trucked across the Channel to the UK.

Our primary interest in interviewing representatives of the freight industry (current and former executives), and previous users of the airport was to assess potential future use. It was clear from these discussions that whilst the airport clearly offered a professional service, the strategic position of the airport was a clear disadvantage.

> *'Airlines base the decision on where to operate their freighters based on a multitude of factors. However, the overriding factor is based on where investments in infrastructure have been made by*

their clients, freight forwarders. These capex investments by freight forwarders are required to ensure they maintain economies of scale through their transit facilities and distribution centres. In the UK, these investments are centred at Heathrow, and more recently Stansted'
Senior Executive in Cargo Division for airline operating freighters at Stansted.

The individual went on further to discuss the possibility of relocating his freighters to Manston Airport and was unequivocal in his position:

'The airline would be extremely unlikely to consider moving services to Manston, even if we were no longer able to serve Stansted, regardless of the commercial terms offered. If the airline had to move services, we would consider East Midlands and Manchester or other centrally located airports before Manston'
Senior Executive in Cargo Division for airline operating freighters at Stansted

This view was echoed by Mr. Stanley G. Wraight, a cargo professional with a global reputation, and over 40 years' experience in the cargo industry:

'The conclusion is there is virtually no incentive for operators to move operations to Manston, there are alternative UK airports that offer competitive services on reasonable terms. The UK doesn't need another airport for freight that has no USP. If Manston were to be developed it would be essential for it to gain a niche market such as becoming an Amazon or Alibaba e-commerce base'
Mr. Stanley G. Wraight – Senior Executive Director Strategic Aviation Solutions Limited

Balancing this view were those of an air cargo charter broker who had previously used Manston for charter services. The airport had offered excellent service and, while the broker's use might be for a moderate level of ATMs, it would be keen to re-establish a presence, provided the right commercial terms could be agreed:

'...we would certainly be interested in using the airport again if it re-opened but in order to do so, we would be looking to secure competitive rates for landing, parking and screening charges...'
Air Cargo Charter Broker – UK

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.

6.4. Potential Future Freight Operations - Model

Based on our research and analysis, it is AviaSolutions' view that if Manston were to re-open as an airport, it would attract some dedicated freighter operations. However, in the absence of a firm commitment from a multinational to establish a distribution centre near Manston, the growth of freight activity at the airport would be in line with historic performance, with incremental growth resulting from a general expansion of the UK cargo market and a diversion of freighter flights if these were constrained at Stansted.

Demand

There are very few national forecasts for the development of air freight. One example is the report developed by Oxford Economics and Ramboll for Transport for London as part of the investigation of the development of an estuary airport for London. A potential cause of the stagnation of growth in air cargo since 2000 was identified as the increase in oil and jet fuel price. Trend forecasts were based on average growth from 2000 to 2012 (the Lower Bound) and from 1990 to 2012 (the Upper Bound). The difference in growth rates of the two periods produce very different forecast outcomes.

Average Annual Growth	Period	London Area Airports	UK

Belly Hold Cargo	1990-2012	2.95%	2.87%
Belly Hold Cargo	2000-2012	0.49%	0.48%
Dedicated Cargo	1990-2012	2.76%	3.52%
Dedicated Cargo	2000-2012	0.02%	0.40%

Source: Oxford Economics

We note that despite being one of the world's leading economics consultancy's, Oxford Economics relied on a forecasting technique based on historic trends, rather than econometric regression analysis seeking to correlate historic growth in air cargo with changes in external/exogenous variables such as GDP, international trade etc. that might be driving the freight growth. Boeing and Airbus base their long term forecasts on GDP changes. The Oxford Economics' approach is consistent with it either not being confident in any relationships that exist, or simply not finding any explanation for the stagnation of air freight. Certainly, the forecasts produced have an exceptionally large range between low and upper bounds, which indicate the difficulty of forecasting cargo growth with confidence.

We have used the mid-point of these forecasts to drive our cascade model of how traffic might be distributed across the London area airports as and when airport capacity becomes constrained. We have estimated available capacity for cargo based on belly hold capacity generated on passenger services and on dedicated freighter flights.

Capacity

We have considered only belly-hold capacity Heathrow and Gatwick. 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. In an environment of freight growth, we have assumed this figure would increase at 1% per annum, reaching 4.3 tonnes per ATM in 2050, a load factor of 61%.

Currently, the majority of flights (85%) at Gatwick are narrow-bodied aircraft to short haul destinations, and likely to carry minimal volumes of freight. We estimate Gatwick's belly-hold capacity to be two tonnes per ATM. In 2015, actual belly-hold loads averaged less than 0.3 tonnes per ATM. We have assumed that this increases at 1.5% per annum, and reaches just over 0.3 tonnes per ATM in 2050, reaching a load factor of 15%.

We have assumed that the number of dedicated freighter flights remains at the average activity of the last five years at Heathrow and Luton. However, at Stansted permitted freighter movements may approach the statutory cap of 20,500 per annum. We have not included freighter movements at any of the other London airports. As the capacity per ATM on freighters at both Heathrow and Stansted was significantly above the loads actually carried, we have assumed that loads on freighters at these airports would grow by 1.5% per annum if UK freight market was growing at the forecast rate noted above. These assumptions take average loads on freighters to 55 tonnes and 53 tonnes respectively in 2050, still materially lower than the available capacity. We have assumed that the average load on freighters at Luton continues at 2015 levels.

Airport	Capacity Type	2011	2012	2013	2014	2015	Capacity 2015
Heathrow	Belly Hold load (tonnes)	3.0	3.0	2.9	3.0	3.0	7
	Freighter ATMs	2,456	2,380	2,365	2,084	2,388	2,388
	Freighter load (tonnes)	31.3	30.0	29.9	32.8	32.9	83
Gatwick	Belly Hold load (tonnes)	0.4	0.4	0.4	0.3	0.3	0.3
Stansted	Freighter ATMs	9,359	9,602	9,788	9,340	9,741	20,500
	Freighter load (tonnes)	20.3	21.3	21.2	21.7	21.0*	80*
Luton	Freighter ATMs	1,717	1,810	1,716	1,520	1,701	1,693
	Freighter load (tonnes)	15.6	15.9	16.3	15.1	15.8	15.8

* The average load in international freighter ATMs in 2015 was 31.7 tonnes per ATM, and the capacity on these movements 80.3 tonnes. We have used this as our forecasting base since most freight traffic is international.

Demand Allocation

These assumptions indicate that all forecast freight demand can be accommodated in all scenarios up to 2045. It is only in this year that some demand remains unaccommodated in two of the scenarios, although by 2050 there is unaccommodated demand in all scenarios.

Unaccommodated Demand (Tonnes x 1,000) by Scenario and Year

Year	Scenario			
	LHR R3	LGW R2	Both	Neither
2020	0	0	0	0
2025	0	0	0	0
2030	0	0	0	0
2035	0	0	0	0
2040	0	0	0	0
2045	0	35	0	123
2050	173	178	62	278

There is strong anecdotal evidence that a material proportion, probably around 20%, of air freight flying to and from the UK actually originates or is destined for continental Europe and is trucked across the channel. We have assumed that 20% of unaccommodated demand is lost to the UK air freight industry and flies from continental European airports. 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.

7. Financial Analysis

7.1. Introduction

In this section, we present the findings of our financial analysis based on the passenger and cargo forecasts set out in the earlier sections following an assumed re-opening of Manston Airport. The principles of the financial model and underlying assumptions are explained, followed by the outputs of the model for the Heathrow Third Runway scenario as it is the recommendation of the Davies Commission to Government. Finally, we present summary results of the other scenarios. A more comprehensive description of the outputs for the other scenarios is given in Appendix C.

7.2. Model Description and Input Assumptions

7.2.1. Financial Model

AviaSolutions has developed a model to assess the financial viability of a re-opened Manston Airport. This model assesses the financial performance of the airport based on various assumptions for four London area capacity scenarios which result in different demand scenarios for Manston. The assumptions have been developed in a number of different ways and draw on a wide range of sources including; analysis of the wider aviation industry, published financial accounts of the companies responsible for Manston Airport, benchmarking of comparable airports, information from our stakeholder interviews and our independent judgment based on knowledge and expertise within the aviation industry.

7.2.2. Brief Overview of Model

The model simulates the financial performance of the airport under different scenarios. This performance is measured through simplified financial statements including a Profit and Loss Statement (P&L), Cash Flow Statement and Balance Sheet. It should be noted that these are simplified statements used to illustrate performance and have not been produced to GAAP standards. The financial statements are modelled over a period from FY2017 to FY2050, on the assumption that the airport is reinstated on the site in FY2018. The Financial Year is assumed to correspond to the calendar year. This time period is typical of that used to evaluate long term infrastructure assets such as an airport, and the specific dates correspond with the period of the passenger forecasts used by the Davies Commission.

7.2.3. Approach to Assumptions

Throughout the research AviaSolutions has consistently taken a positive outlook with regards to the underlying demand assumptions. Specifically, this means that we have opted for the upper bounds of traffic, the upper bounds of unit operating revenue, the lower bands of unit operating costs, and minimal asset costs and capital investment requirements.

We therefore conclude that the assumptions and analysis that follow present the prospects of Manston airport in a very favourable context. We would consider these outputs to represent a 'High Case' and believe they present the airport in a situation where there is a very limited prospect of additional revenue or lower cost structures.

7.2.4. General Assumptions

Revenue

Airports generate revenue from two primary sources: from the charges levied on airlines for using their facilities (referred to as Aeronautical Revenue), and from more discretionary activities including retail, car parking and property (referred to as Non-aeronautical or Commercial Revenue). Manston Airport historically provided ground handling services to its customer airlines, and revenue from these activities is included in Aeronautical Revenues. Previously Manston Airport supplied fuel to some airlines, and our model includes this as a separate revenue line (as a net revenue so that the cost of the fuel does not need to be considered).

Revenue Assumptions within AviaSolutions Model

Revenue	
Aeronautical Revenue per Passenger	£7.00
Revenue per Tonne of Freight	£50.00
Commercial Revenue per Passenger	£5.00
Fuel Revenue per WLU	£0.93

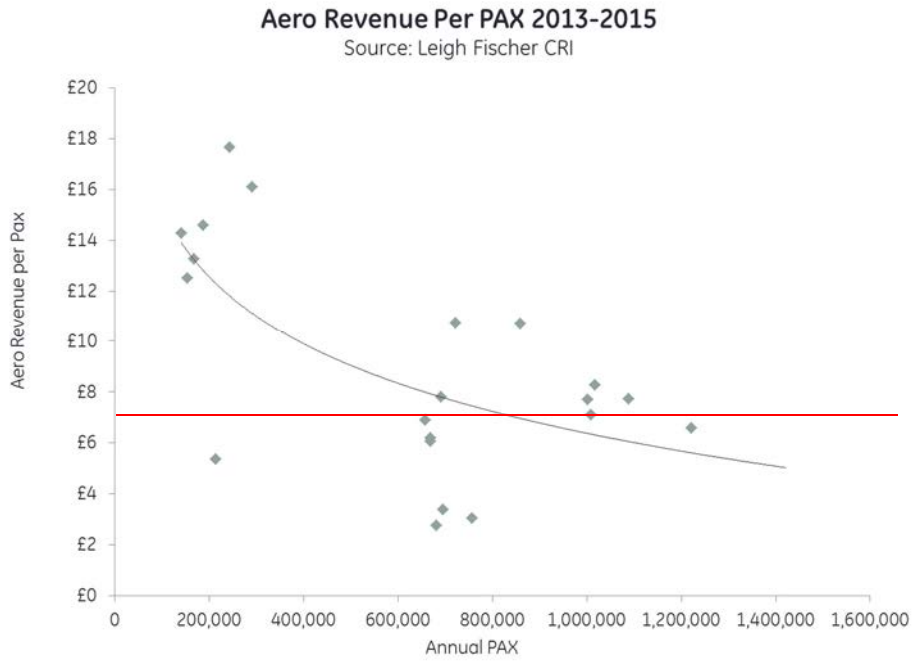
Aeronautical Revenue per Passenger

This revenue includes all airline related fees, including landing charges, passenger charges, and aircraft parking charges. However, it excludes Air Passenger Duty (APD), which is collected by the airline but passed on directly to the UK HMRC. It is normal industry practice, however, and for LCCs in particular to agree a fixed fee per passenger covering the entire range of airport operations (excluding any property rental).

Our experience is that the fees generated by the airport are greatly affected by the type of airline operating at the airport and the level of throughput achieved by the airline. Ryanair's airport charges, across its entire European network in 2015, amounted to €7.80 per total passenger (€15.60 per departing passenger) and during our stakeholder interview the airline indicated it would need to secure a highly competitive airport charge to base aircraft at Manston. The Ryanair average airport charge of €7.80 will include many capital city airports where the airline is very likely to be paying significantly above this average.

We also considered the average aeronautical revenue per passenger of airports that operate with a large share of LCC traffic, as would be expected at a re-opened Manston Airport. In the most recently published accounts (2015) Luton and Bristol airports reported aeronautical revenues of £5.66 and £4.24 per total passenger (£11.32 and £8.48 per departing passenger) respectively.

We have also assessed the aeronautical revenue per passenger achieved across a large sample of similar sized airports in the UK.



Based on these comparisons, we have concluded that a reasonable aeronautical revenue assumption for Manston Airport would be £3.50 per total passenger (£7 per departing passenger) for LCC traffic, and £7.00 per total passenger (£14 per departing passenger) overflowing from the London area.

Revenue per Tonne of Freight

The published accounts of Kent Airport Limited from 2013 identified revenues generated by freight activities. These revenues will reflect the landing charges from freighter movements, the use of the freight warehouses and the handling services provided to the airline. We have confirmed through an independent source that the historic revenue per tonne for freight achieved at Manston is consistent with market rates generally in the UK.

Commercial Aeronautical Revenue

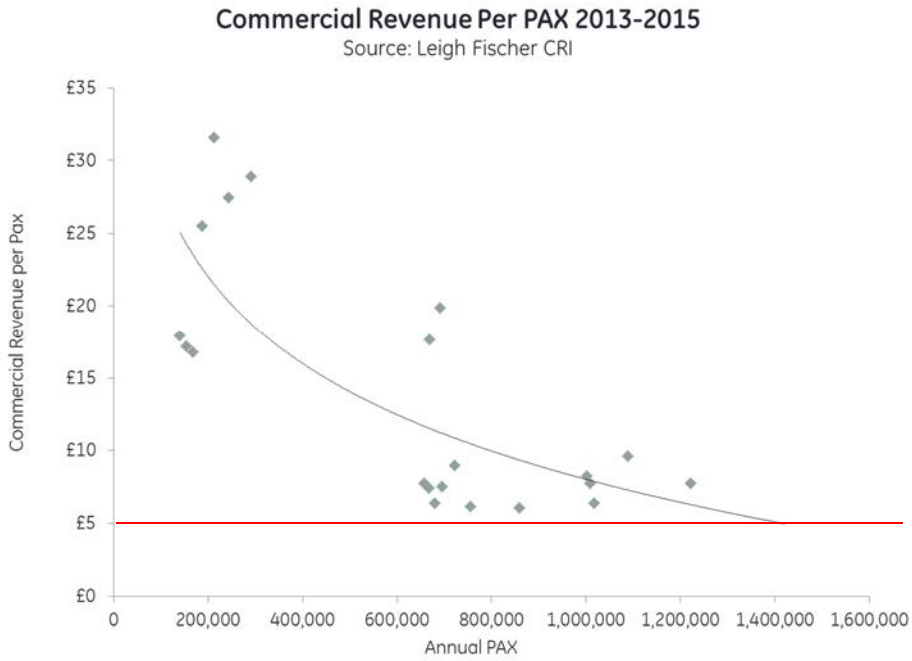
Commercial revenue is generated from passenger-facing services at the airport. One of the main sources of revenue are the airport concessions to operators of the retail shops (including duty free), food and beverage (F&B) outlets, car rental and currency exchange services. The operator will typically pay a percentage of turnover to the airport. Car parking is another source of revenue, with some airports managing operations in-house, whilst others out-source to specialist operators, such as APCOA or NCP.

Property revenue at Manston was £110,000 in 2014, and we have assumed that at a re-opened Manston Airport arrangements would continue on a similar basis.

We have built-up an estimate of potential commercial revenue per passenger by considering typical passenger spending and concession rates (turnover rent) that could be expected at a relatively small airport such as Manston.

In aggregate we have assumed that Manston could generate around £5.00 per total passenger (£10 per departing passenger).

We have also compared the unit commercial revenues generated at a number of smaller UK regional airports. It may be seen that there are a number of airports with low passenger throughputs which record high levels of commercial revenue per passenger. This is almost certainly caused by dividing a relative fixed rental income by a small number of passengers leading to an artificial inflation of the commercial revenue when measured on a per passenger basis.



We therefore conclude that a reasonable initial assumption for commercial revenue per passenger across all non-aeronautical activities is £5.00.

We have also considered the forecast expansion of the terminal to provide the necessary passenger capacity in later years under some scenarios. The terminal expansion would be expected to improve the retail and F&B offer and is assumed to contribute increased commercial revenue by £2 per passenger.

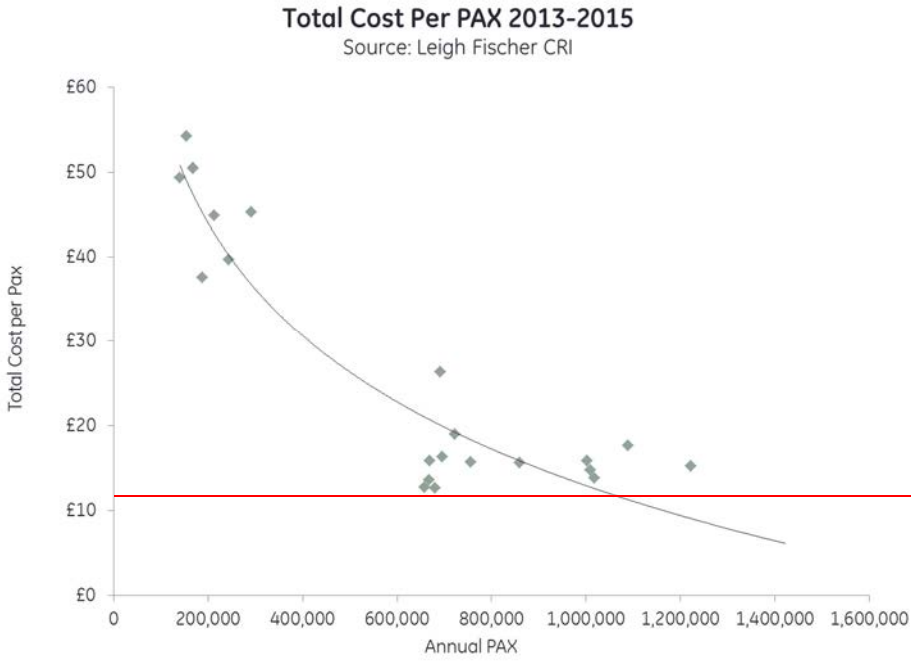
Aviation Fuel

The forecast for aviation fuel revenue is based on the net revenue after cost of fuel has been subtracted. The revenue is effectively the margin payable to the airport for fuel flowage. The margin has been estimated based on industry experience ranging from 3.5% - 7.5%. We have assumed Manston is able to achieve a margin of 5.5% and applied this to the total fuel revenue published in Kent Airport Limited's accounts (2014) to identify the fuel revenue per passenger or tonne of freight.

Total Operating Costs

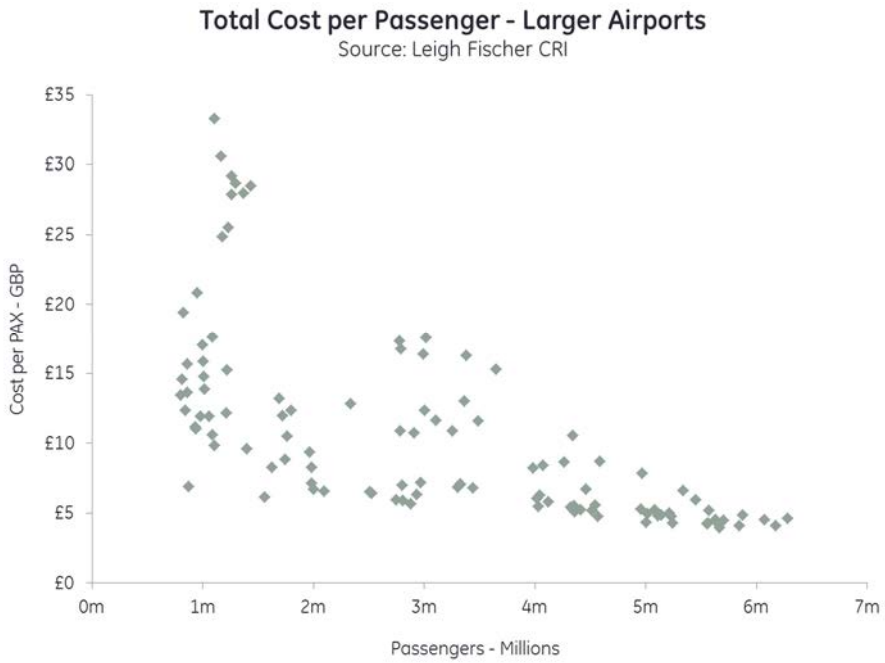
Airports with very low throughput have a high cost of operation per passenger: the fixed cost of airport operations can only be distributed across a low volume. Within a limited range, the marginal operating cost of an additional passenger is zero, but the marginal revenue of an additional passenger will be close to the average revenue per passenger.

This financial characteristic is common to capital intensive infrastructure assets. The chart below illustrates the relationship between volume and unit operating costs (per passenger) at a sample of small UK regional airports.



To reflect the expected evolution of the airport's operating costs over the forecast period we have assumed a fixed total operating cost of £7 million when annual passenger throughput is below 0.5 million. As passenger volume increases beyond 0.5 million we assume that the total operating cost per passenger will decline on a linear basis to reach £12 per passenger at around 1.0 million passengers. This would position Manston Airport amongst the best in class cost per passenger within its UK peer group.

It is reasonable to assume that unit operating costs will continue to decline with further increases in throughput leading to additional economies of scale, as illustrated below. We have linked unit costs to annual passenger throughput such that when annual throughput reaches 6.5 million passengers the unit cost would be £5.00.



Costs specifically associated with freight have been estimated at circa 60% of freight revenue based on the historic performance at Manston.

Overheads

Overheads have been obtained from the published accounts of Kent Airport Limited (2014) and exclude any restructuring costs. In a standard business plan these would often be linked with elasticity to revenue growth. However, as growth would come from a very low base AviaSolutions' view was this would have introduced too many additional costs into the business. Therefore, we estimated that these costs grew at a rate of 0.1x Work Load Units.

Other Assumptions

We have made several assumptions about the initial equity and purchase price of the airport. These assumptions have come from our stakeholder interviews and other research. They are for illustrative purposes only and may differ significantly from any actual investment.

Our estimate of the site purchase price is derived from the recognised value of the airport in Kent Facilities Limited's 2014 published accounts (£7 million) inflated by circa 50%. It is believed that this could be considered a conservative valuation of the site, dependent on the designation of the land at the time of acquisition. The current owners (Stone Hill Park) are seeking planning permission for up to 2,500 dwellings, should this permission be granted, we would assume the land to be valued far in excess of £10m.

We have developed our own estimate of the costs of re-establishing the site as an operational airport based on our industry experience and a site visit. The estimate includes the necessary work to return the airport to a serviceable condition that would satisfy the CAA and facilitate the handling of up to about 2 million passengers annually. We have excluded any advisory or legal fees associated with the Development Consent Order, though these may be considerable.

Cash Flow & Balance Sheet	
Initial Capital Injection	50,000,000
Airport Site Purchase Cost	10,000,000
Airport Site Development Costs	27,000,000
Debt Interest Rate P.A	3.0%
Straight Line Depreciation Years	60
Effective Tax Rate on Net Income	20%
Dividend Payment % of Profit / Cash	0%

We have also assumed that the investment in Manston is funded solely by equity with no debt facility. This is in part to reduce the assumed cash outflow in the early years of operations, but also because we believe that debt-financing would be difficult to secure and relatively expensive.

Additional Capital Expenditure (CAPEX)

Additional capital expenditure is assumed to be required at the point when the airport reaches 2.0 million passengers per annum and is forecast to remain at this level or above. Where the airport is growing rapidly (notably in the 'No Runway' scenario), the additional capacity investment is in two £50 million stages. Where the airport is expected to grow more slowly, additional capacity investment is assumed in a single £30 million stage.

Financial Statements

Taking the combined effect of the financial assumptions and the demand scenarios we have developed a number of illustrative financial statements. These include:

Profit and Loss:

- Operating Statistics
- Revenue Lines
- Direct Cost Lines
- Gross Income
- Overheads
- EBITDA (Earnings Before Interest, Tax, Depreciation and Amortisation)
- EBITDA Margin (EBITDA as a percentage of revenue)
- EBIT (Earnings Before Interest and Tax)
- Net Income (EBIT less Interest and Tax))

Cash Flow Statements:

- Opening Cash Balance
- Net cash flow from Operating activity
- Net cash flow from Investing activity
- Net cash flow from Financing activity
- Closing Cash Balance

Balance Sheet:

- Total Assets
- Long Term Liabilities
- Owner Equity
    - Retained Earnings (which in part determines the ability to dividends to equity investors)
    - Share Capital

7.3. Outputs for LHR Third Runway Scenario

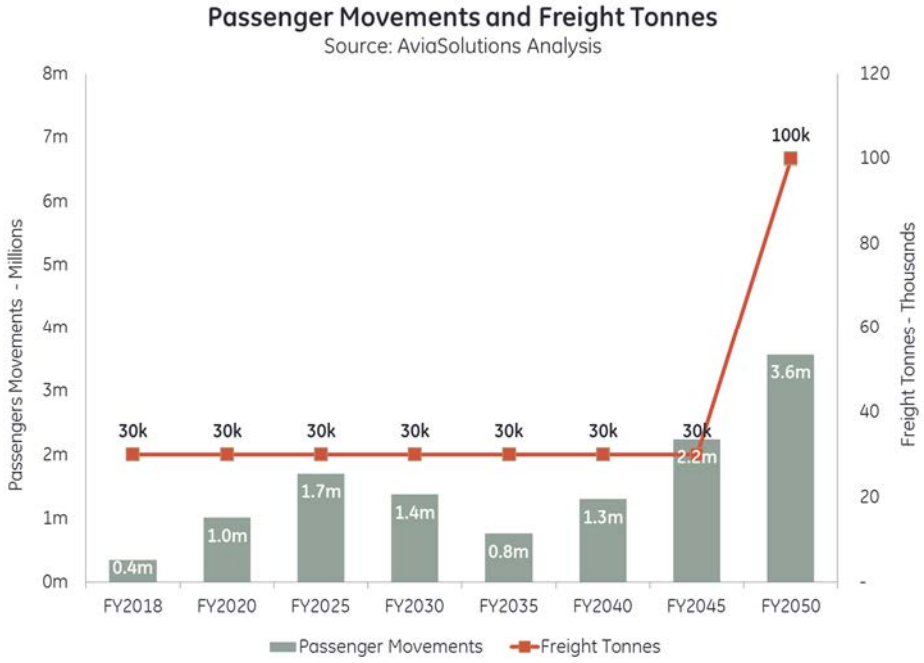
In the following paragraphs we explore the financial viability of Manston Airport based upon there being a third runway at Heathrow. This is the option which was recommended by the Davies Commission and therefore may be presumed to be the most likely outcome. However, the likelihood is that a runway at Heathrow would take longer to commission than one at Gatwick so consequently, Manston may have an initial boost to traffic before falling back and then growing again. This scenario takes spill from the London system in addition to a base level of activity generated from the presumed small LCC operation and freighters. This scenario is more favourable for Manston Airport than a development at Gatwick, and is perhaps the most likely.

7.3.1. Volume Profile

Passenger numbers are forecast to grow to nearly 2.5 million by 2029, the year before the assumed opening of the third runway at Heathrow Airport, but immediately fall back from 2030 and decline to a low of 0.5 million in 2033. From this low point, traffic volume grows as a result of the resumption of overflow, reaching 3.5 million passengers in 2050. Overall growth between FY2018 and FY2050 averages 10% annually.

Freight is not forecast to grow beyond the 30,000 tonnes of the core freighter operations until FY2040, but at that point, freight is assumed to spill from the London Area taking it to some 100,000 tonnes by FY2050.

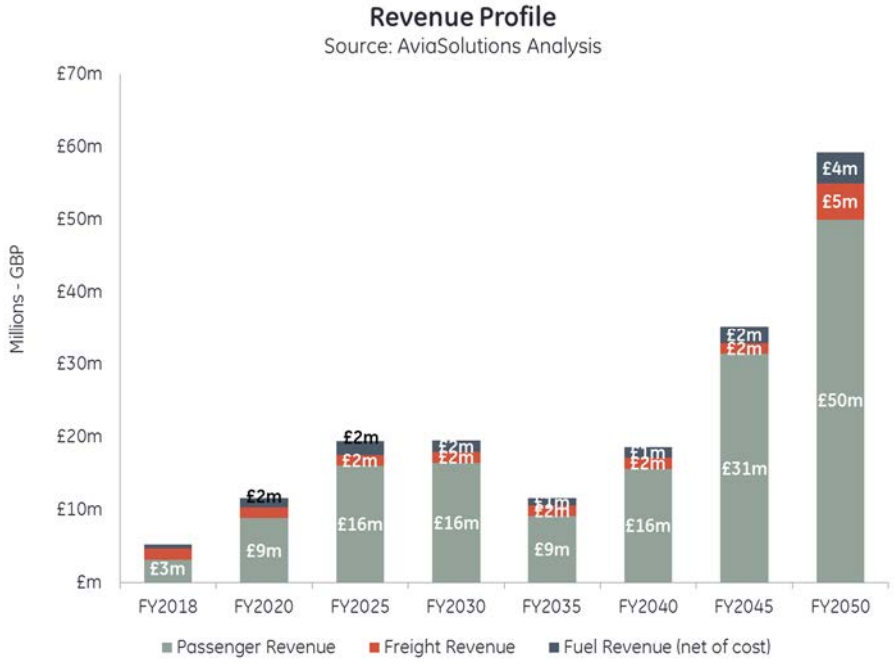
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Passenger Movements	350k	1,010k	1,700k	1,370k	760k	1,300k	2,240k	3,570k
Freight Tonnes	30k	30k	30k	30k	30k	30k	30k	100k
Total ATMs	1,100	2,900	6,400	9,600	5,300	9,200	15,800	28,000



7.3.2. Revenue Profile

Airport revenue is forecast to grow at CAGR 12% between FY2018 and FY2030, driving revenues to about £20m by FY2030, and at CAGR 8% between FY2018 and FY2050 to reach total annual revenues of around 0m by FY2050.

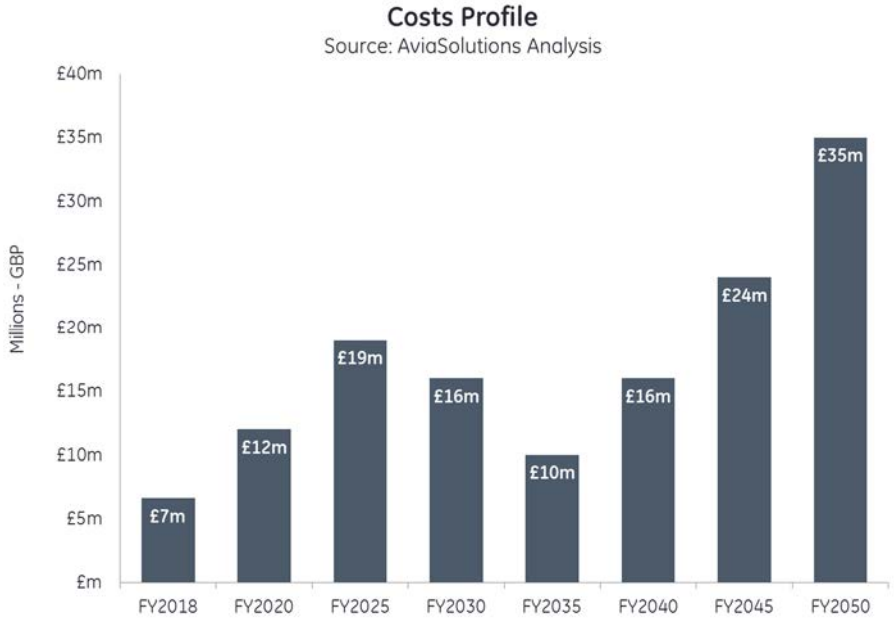
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Revenue	£5m	£12m	£19m	£19m	£12m	£19m	£35m	£59m

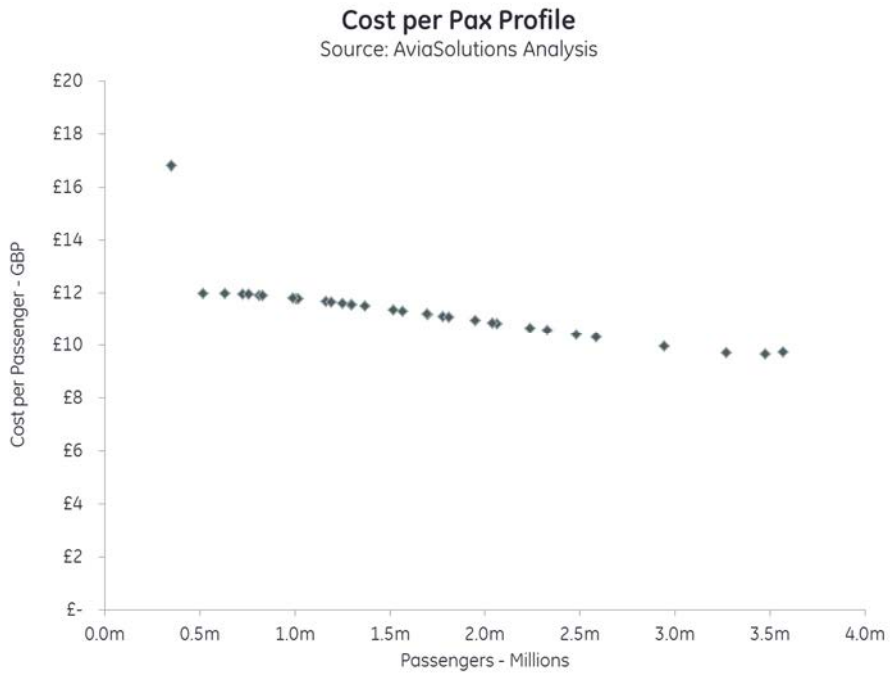


7.3.3. Cost Profile

Total Costs are forecast to grow at 8% per annum on average between FY2018 and FY2030, resulting in total costs of about £15m by FY2030, and at 5% per annum between FY2018 and FY2050 to produce total annual costs of £35m by FY2050.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Cost	£7m	£12m	£19m	£16m	£10m	£16m	£24m	£35m

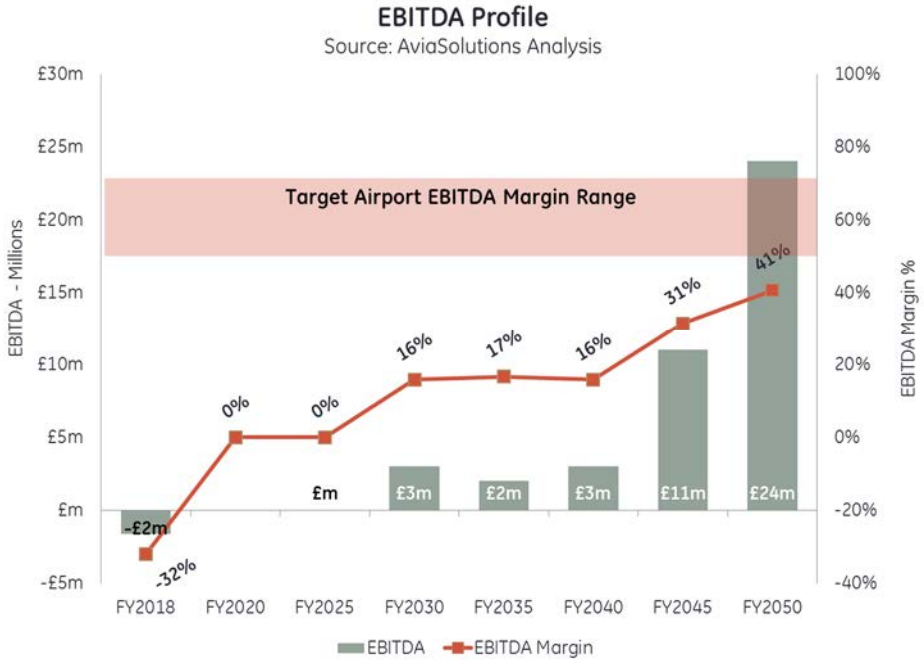




7.3.4. EBITDA Profile

EBITDA is initially forecast to be negative, indicating that the airport would be loss making in the early years at an operational level. It first returns an operating profit in FY2030, generating £9m of operating income and an EBITDA margin of 16%. As the third Heathrow runway comes on-stream, EBITDA at Manston would stagnate due to the lack of available volumes. The EBITDA margin in the long term is forecast to reach 41%, with an EBITDA of £24m in FY2050. This level of EBITDA is significantly below that which we would typically expect for an airport to be attractive to the investment community.

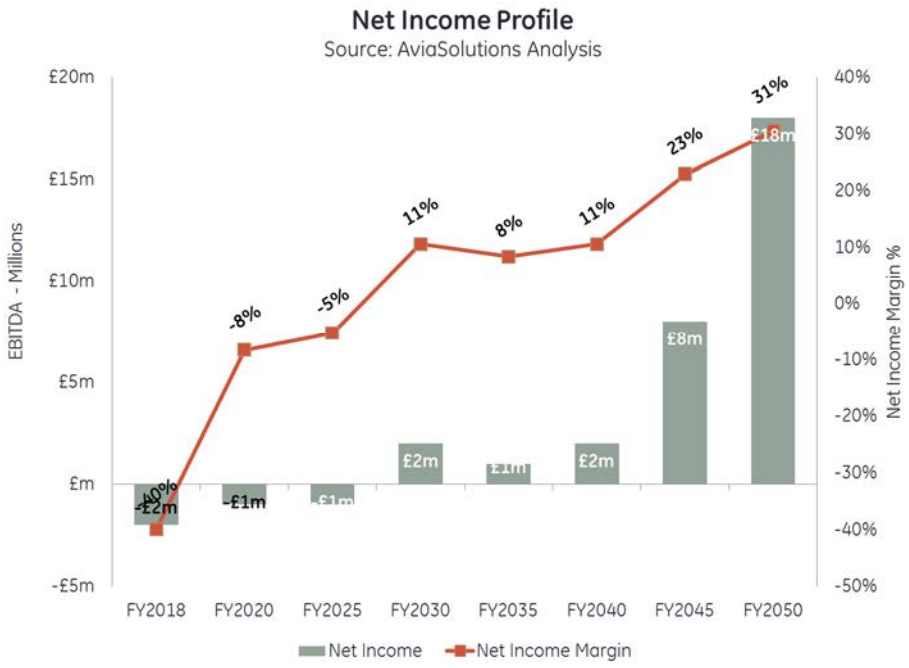
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
EBITDA	-£2m	£m	£m	£3m	£2m	£3m	£11m	£24m
EBITDA Margin	-32%	0%	0%	16%	17%	16%	31%	41%



7.3.5. Net Income Profile

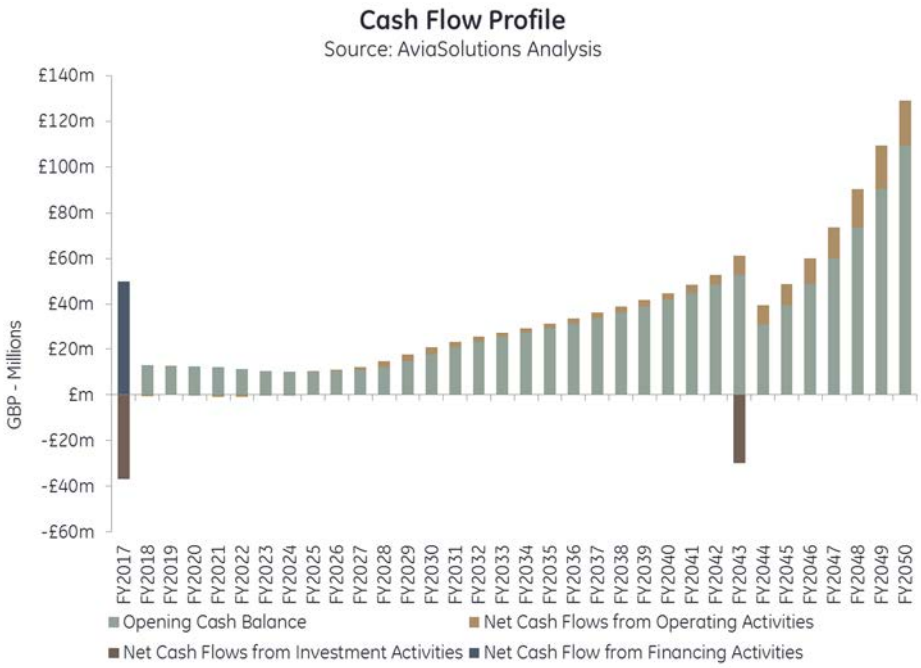
Net income, the profit after deductions, is forecast to be negative until FY2025. The first positive results are generated around FY2030 when the airport is expected to generate net income of £2m. The income stream remains constant for the following 15 years before increasing as capacity becomes constrained once more in the London system. It reaches £18m in FY2050.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Net Income	-£2m	-£1m	-£1m	£2m	£1m	£2m	£8m	£18m
Net Income Margin	-40%	-8%	-5%	11%	8%	11%	23%	31%



7.3.6. Cash Flow

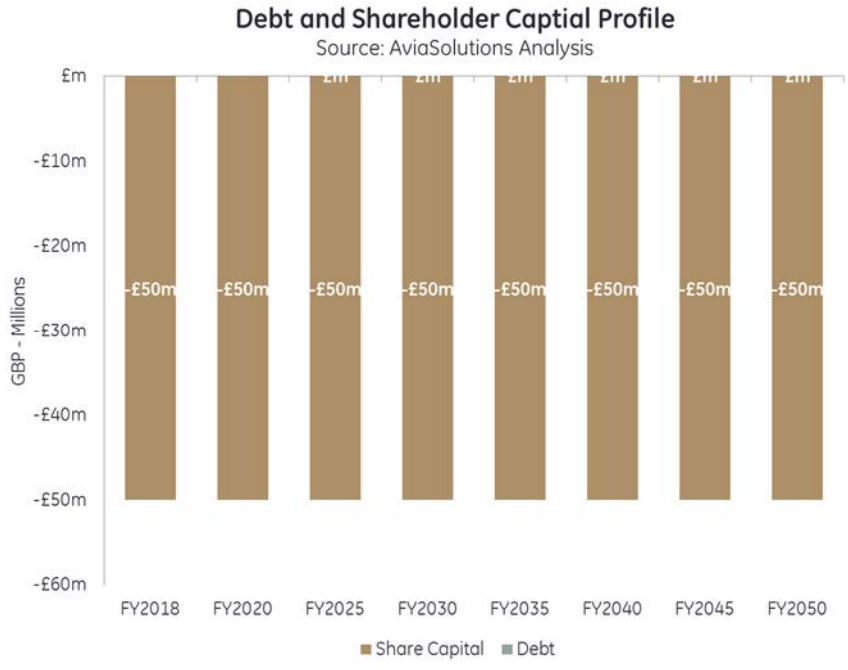
The airport is forecast to develop its cash position with limited additional capital requirements until FY2042 when there would be a requirement to expand the terminal. We have assumed that although demand would exceed terminal capacity in the late 2020s, new terminal capacity would not be provided in anticipation of the loss of traffic following the commissioning of the third runway on 2030. The position shown below excludes any dividend payments that the owner may wish to extract from the asset: such payments would reduce its cash position.



7.3.7. Debt and Shareholder Capital

Whilst the exact nature and mixture of debt and shareholder capital would be subject to complex financial optimisation, we have illustrated below a simple capital structure used in the analysis to illustrate the need for additional capital throughout the period. To maintain the business no further financing would be required. Whilst the business does not generate significant revenues or income, there is little requirement for significant CAPEX investments, thereby eliminating the requirements for additional financing

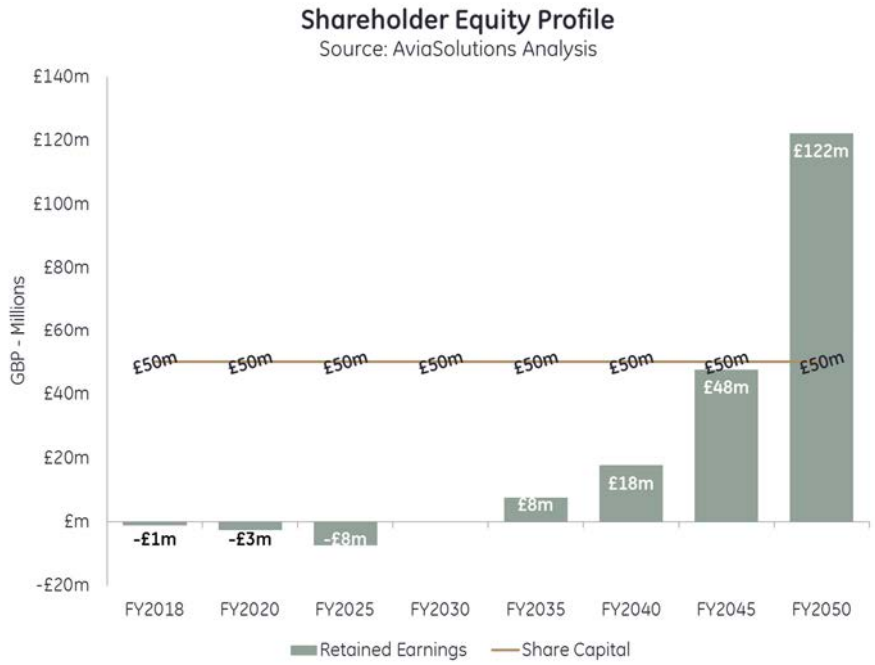
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Debt	£m	£m	£m	£m	£m	£m	£m	£m
Share Capital	£50m	£50m	£50m	£50m	£50m	£50m	£50m	£50m



7.3.8. Shareholder Equity

Considering the effects of earnings on shareholder equity, the business does not post positive retained earnings until nearly FY2035. This in effect limits the business's ability to pay dividends to shareholders until this point at the earliest.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Retained Earnings	-£1m	-£3m	-£8m	£m	£8m	£18m	£48m	£122m
Share Capital	£50m	£50m	£50m	£50m	£50m	£50m	£50m	£50m



7.3.9. Conclusion

The asset would require significant long term investment but would only generate a marginal return on the capital invested. These returns are also predicated on a large number of external variables over which the owner of Manston Airport has limited influence. It is AviaSolutions' view that based on this scenario there is no viable long term prospect of an economically viable airport being established at Manston. It should also be noted that the scenario outlined above excludes any return to the investor, and we have therefore effectively weighted the cost of equity at zero in our model. Investors will always be seeking to maximise the return on their investment in a manner appropriate to the risk they bear in the asset. Given the risks involved with Manston, it would be right to consider that any investor would be seeking the potential for above average returns, which, according to the analyses, may not materialise.

7.3.10. Non-Technical Summary

AviaSolutions' analysis indicates that the airport, operating as a standalone trading entity and in the scenario where a third runway is built at Heathrow, is unlikely to be a financially viable proposition. Airport operations are not anticipated to generate material profit until FY2040.

This is due to the relatively low level of revenue that can be generated and the high level of fixed costs required to operate the airport. This in turn means that the airport would not be able to distribute profits to investors in the airport for many years.

Generally, investors seek to achieve a return on their capital with an expected return commensurate with the risk of the investment. As the risks of investing in Manston are significant there would need to be reasonable prospects of a high return, which does not appear likely based on our analysis.

7.4. Summary of Other Scenarios

We have presented in this main body of text the scenario deemed most likely to occur e.g. LHR3. This is the current recommendation of the Davies Commission and therefore, at the time of writing, believed to be the Government's current preferred option. Details of the three other capacity development scenarios are given in Appendix C.

7.5. Comparison of Scenarios

We compare some key aspects of the four scenarios below.

Measure	LHR R3	LGW R2	Both	Neither
First year retained earnings positive	2031	2032	N/A	2029
Retained Earnings at 2050	£122m	109m	-£20m	£516m
Refinancing				
When?	None	None	None	2028, 2029
Why?	n/a	n/a	n/a	Capex
How much?	n/a	n/a	n/a	£40m
EBITDA Margin				
Year first greater than 50%	n/a	n/a	n/a	2043
or in 2050	41%	40%	34%	60%
Probability	40%	40%	10%	10%

8. Conclusions

8.1. Introduction

In this chapter we draw together the conclusions of our research and analysis to form our conclusions, specifically to opine on whether there is a realistic prospect of a financially viable airport operating on the Manston Site.

8.2. Summary

It is AviaSolutions view that having considered the stakeholder interviews and independent research and analysis into historic accounts and 'reasonable' adjustments for one-off costs that there is little prospect of a financially viable airport on the site.

The only circumstances in which we believe the airport may be viable is that in which no new runway were developed in the South East of England. However, this scenario presents extreme risk to the investor, as a decision to increase runway capacity at those not physically constrained (e.g. legally constrained LHR and STN) could be made at any time, or a new runway may be authorised at any time in the future.

8.3. Stakeholder Interviews

Our stakeholder interviews were split between those focused upon passenger development and those focused upon freight development. The range of interviews provided an understanding from the industry as to their position on the airport.

Our passenger service interviews suggested that overall there is little interest in serving the airport, in particular from airlines that had previously served the airport such as Flybe. There was some limited interest from airlines such as Ryanair and KLM, who would consider the airport as part of their standard UK market review, however they were not actively seeking to serve the airport. It is our view that we must consider this in light of its context; for an airline that bears no risk in an airport's reinstatement and for whom its reinstatement may present upside risk, it would be illogical to rule out the possibility of serving it. Overall, our interviews suggested there was very limited interest in the airport for passenger services thus suggesting a long term viable passenger service may be difficult to sustain.

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.

8.4. Simulations

AviaSolutions' models provided simulations of the financial performance of an airport on the site under different demand scenarios. These scenarios were developed with a positive view of the potential demand profile, unit revenue and unit cost and investment costs. Two simulations (LHR3 and LGW3) suggested that the airport was unlikely to generate profits at an operational level (EBITDA) until circa FY2025, and that these profits would remain muted through until FY2040. The EBITDA profile suggests that, based on recent industry exit multiples, it would not be possible to recover the initial equity through a sales process as this point. Furthermore, these scenarios suggest that retained earnings would not turn positive for 15 to 20 years, thus limiting the ability of an investor to recover their costs of equity. In summation, these scenarios present very large risks with small returns over a long time horizon.

Our 'Both' runway scenario, naturally, provides an even less favourable result for Manston airport. If this runway scenario were to materialise there would be no prospect of Manston operating on a sustainable basis.

Our 'No Runway' scenario presents some opportunity for the airport. As demand through the London System increases and capacity remains muted, this demand will be spill to alternative airports. Manston, located within reasonable distance to London could be an airport to benefit from this spill, along with airports such as Southampton and Birmingham who are well connected by train to London. In our simulation, this scenario generated sufficient operational income (EBITDA) to support itself, and only required additional financing to expand. However, we must caution that this scenario is balanced in a careful equilibrium, should this be disturbed through the introduction of additional capacity via a new runway or loosening of regulation, the prospects of Manston could be severely diminished.

9. Appendix A: Stakeholder Interviews

Throughout the study, AviaSolutions spoke to many companies and individuals to gather their feedback. Given that these companies operate in a competitive commercial environment, it is not unsurprising that many of those spoke on the condition of anonymity. This is not unusual, particularly given the particular sensitivities around the project. In the following section detailing our interviews, and summarising the comments made, any company or individual that spoke on the basis of anonymity has been identified by only their sector and seniority.

AviaSolutions spoke to the follow stakeholders and / or their representatives:

- Discovery Park / Stone Hill Park
- RiverOak Investment Corporation
- Ryanair Ltd
- Flybe
- KLM
- Mr. Stanley G. Wraight
- Sir Roger Gale MP

Anonymous Sources

- Major European LCC
- Freighter Operator at Stansted
- Air Cargo Charter Broker – UK
- Ex-Director of Network Planning – Major European LCC
- Manager, Flight Operations, Major UK Carrier
- Ex-Senior Executive DHL

Disclaimer: The following Stakeholder Interview notes are representative of the views and opinions of the stakeholders only and not that of AviaSolutions. The notes represent, in AviaSolutions view, an accurate account of the interview but are not a verbatim account of our interview.

Mr. Paul Barber, Managing Director, Discovery Park
Mr. Paul Barber is the Managing Director or Discovery Park, and represents the current owners of the airport site.

- Mr. Barber outlined the ownership structure of the airport site. The airport is owned by Lothian Shelf 718 which is ultimately owned by Chris Musgrave, Trevor Cartner and Ann Gloag.
- Paul Barber is Managing Director and responsible for the day-to-day running of Discovery Park which is the *de facto* administrator of the site.
- The current owners, Mr. Cartner and Mr. Musgrave, are specialists in the redevelopment of the brownfield sites; they have redeveloped Discovery Park and a second site in the north of England.
- Mr. Barber gave a frank view as to the difficulties PricewaterhouseCoopers had when attempting to dispose of the site. After two years the only offer made on the site was from Ann Gloag for £1. Thus, in the view of the current owners, demonstrating the lack of financial interest in the site as an airport.
- During the period of ownership by both Manston Skyport, and under Lothian Shelf 718, Mr. Alistair Welch was heavily involved in the airport. Whilst under Manston Skyport, Mr Welch was chairman of the airport. Later in his career Mr. Welch became Managing Director of Southend Airport and was responsible for introducing EasyJet to Southend.
- Throughout the period of ownership whilst the airport was open Mr. Welch made high-level contact with every reputable airline and not a single airline was interested in operating from Manston, even with aeronautical charges at zero. The only airline that even considered operations was Ryanair, but the option was declined within 48 hours.
- Whilst the airport was open for operations freight was the main source of income. This freight was predominantly import driven from Africa. Whilst the site was able to offer quick access from aircraft to road there was little value-add to clients.

- Thanet Parkway Railway Station will add little value. It is not certain if or when it will be operational, and costs appear to be overrunning already. There is a funding gap and it does not improve journey time to London by more than 10-12 minutes.
- Due to the lack of airlines operating from the airport, Mr. Barber stated that the airport losses were running at close to £5.0m per annum.
- Mr. Cartner and Mr. Musgrave bought into the airport site after the airport had closed. They had no stake in the business whilst it ran as an airport. The business men approached Ms. Gloag given their proximity to the airport and specialisms in the development of brown field sites.
- Stone Hill Park Ltd was formed with Ms. Gloag, Mr. Cartner and Mr. Musgrave. The company believe that Thanet District Council require an additional 15,600 homes. The development will offer around 2,500 of these homes, mixed between starter homes up to five bed executive homes. The planning application includes a provision for social infrastructure such as schools.
- At present there are some small costs associated with the site, but these are mainly the single employee and the security of the site, and utilities. The current owners are not fundamentally against the concept of an airport being run, however they see no credible business plan to evidence its possibility, nor do they believe it is best economical use of the site.
- When pressed on RiverOak's desire to reopen the airport, Discovery Park "don't know where RiverOak are coming from stating an airport is viable". Discovery Park has not had sight of any business plan from RiverOak and RiverOak have not made any credible offers for the site.

RiverOak Investment

AviaSolutions met with RiverOak Investment and its representatives:

- *Mr. Tony Freudmann*
- *Ms. Sally Dixon*
- *Mr. Richard Connelly*
- *Ms. Angela Schembri*

- RiverOak Investment (RiverOak) became interested in Manson airport due to a previous project in the U.S.A. A RiverOak Partner (Nial Oldman) had organised a bond for a U.S airport that was freight driven and found excellent returns on the investment, thus sought an investment of similar characteristics.
- With regards to the asses itself, RiverOak believes the airport is geographically well positioned to capture freight, being in the South East and near the Channel Tunnel. It acknowledges that considerable investment will be required to return the airport to an operational state. However, they are confident through their initial plans that this is feasible and the asset can quickly be returned to a state in which is can handle in excess of 10,000 freighter movements per annum.
- The total investment that RiverOak would seek to make is in the region of £300m over the course of a 12 year period. This would ensure the airport site delivers a high level product and service. Further to this investment, the group would need to sink costs in the DCO process, the DCO purchase cost (circa. £4m in RiverOak's view) and finally in compensation to the current owners (although RiverOak have a value in mind, they are unable to disclose). RiverOak believe the minimum investment needed to bring the airport back to viability is circa £20m, excluding DPO, site purchase and compensation.
- The driving force behind the business plan is air freight and is the vital link to secure a NSIP designation.
- The absence of a national freight strategy is an opportunity which RiverOak seek to influence and develop.
- When probed as to the previous failures at the airport, the RiverOak team held strong views as to the causes of this, and what could be done to overcome this situation in the future. The team had strong views that whilst the airport offered excellent service, the previous owners had done nothing to exploit the asset, or its niches, or to improve its market position. In particular, the team felt strongly that the airport had not made any efforts to promote the airport to Freight Forwarders.
- It is RiverOak's understanding that the airport should be heavily involved in the sale of capacity on board freighters. They believe the previous owners were satisfied to allow freighters to depart with unutilised capacity, and this is an area they would seek to address as owners. ***(Note, AviaSolutions understand this to be an irregular market position to take and pressed to clarify this point during our interview).***
- RiverOak have also considered the geographic location of Manston airport and how it feeds into the ATC systems. They believe Manston is ideally located for aircraft to plug in and out of the national ATC

network. Furthermore, they would expect to receive an EASA license and have had discussions with the CAA to understand the processes required to re-license the airport.
- Further to passenger and freight traffic, RiverOak believe the airport would offer additional services as a diversionary airport within the UK system. There may also be revenue streams from permitting the airport to be used for training purposes.

Traffic

The team talked to AviaSolutions briefly on their Traffic forecast, this area of the business plan has been developed by Ms. Sally Dixon.

- Initially, Ms. Dixon began by reviewing the currently available literature. York Aviation's report of January 2015 suggested that due to capacity constraints 2.1m tonnes of freight will be lost from the London system if no runway is built. RiverOak estimate that this is the equivalent to 100,000 truck movements across the Channel, should this freight all be lost to Europe.
- With regards to capacity type, RiverOak stated that capacity is 70/30 split in the UK with only 30% of capacity offered on Maindeck-freighter services. In Europe, it is stated that this is much closer to 60/40. It is RiverOak's belief that this is caused through a lack of slot availability for freighters in the UK, thus the demand is being constrained.
- The business plan forecast that Manston would achieve 10,000 freighter ATMs in the fifth year of service, these ATMs would be predominantly wide-body aircraft. This level of freighter movement is supported, in RiverOak's view by the wider industry.
- The airport would also seek to develop a passenger business and seek volume from several sources. RiverOak believe that KLM would be keen to return to the airport (despite low load factors). They also state that they are in advance discussions with Ryanair over the potential to base two to three aircraft at the airport. RiverOak are also in preliminary discussions with EasyJet. Finally they believe there is a potential to develop Charter traffic, in particular with the cruise markets and Dover port.
- Taking all these considerations together RiverOak state that they would 2m passengers per annum in the second year of operations.

Ms. Kate Sherry, Deputy Director of Route Development, Ryanair

- Ryanair have recently discussed with RiverOak potential future operations at Manston airport. These conversations have been on the same basis as Ryanair is open to discussions with any airport wishing to obtain services from the airline.
- Previous to these discussions, Ryanair held talks with the owners of Manston airport prior to its closure. These talks were halted when the airport closed and therefore not concluded.
- If Manston were to become an operational airport once again, it is not a foregone conclusion that Ryanair would serve the airport. The airline would look to base any decision on a multitude of factors, including the size and depth of the catchment area and also the commercial terms proposed. Securing a low cost base to the airline is a core aspect of the analysis; this includes the handling and airport charges, effects of APD, operating economics of the route, and in the case of the UK, FX rates to Euros.
- When considering the Catchment delivered from population size Ryanair would look to the airport to sell the benefits of their specific catchment. It is difficult to comment at present on the quality of the Catchment.
- When considering the effects of the London System, Ryanair are not currently concerned with spillage from the London System to periphery airports. The airline is comfortable that there is room for expansion at Stanstead.
- If Ryanair were to serve the airport, the depth of the network would permit the airline to serve it without necessarily basing aircraft at Manston. However, it is possible in the future that the airline could choose to base a single aircraft at the station.
- Once a decision to operate had been reached, generally a lead time is permitted to allow the sales and marketing processes to embed. This also ensures the airline can plan its schedule appropriately, working approximately six to nine months in advance.
- As has been recently stated in the media, BREXIT remains a concern for Ryanair and any effects of the UK's exit from Europe would be factored in to a decision to operate.
- In summary, Ryanair are constantly reviewing their network and remain open to approaches from any airport. If the airport became operational, the airline would review its potential and fit within the wider airline network in due course, and is available to discuss terms with the owners at any time.

Mr. Martin Pearce, Flybe

- Europe's largest regional airline, Flybe, operated several routes from Manston in the years' preceding its closure. The airline did not base aircraft at Manston. In their experience the service offered was excellent with no issues arising from handling or passenger services. The passengers traffic was were mainly leisure and VFR, with very few business passengers.
- Mainly outbound e.g. Manston to the destination, very little in terms of other end originating
- These routes closed predominantly due to poor load factors, there was insufficient demand for the service from the local catchment area and very little demand for inbound traffic to Manston. Furthermore, the yield profile of the traffic did not meet with the airlines expectations.
- In normal circumstances the airline would permit a two to three year ramp up period following a route opening, however given the operating conditions the airline ceased operations within 12 months.
- The reasons the route performed below expectations are varied, but these are believed to have been exacerbated by the relatively small local catchment, less favourable average economic development and poor public transport infrastructure links to London.
- The airlines have reservations as to whether the airport could serve the South East catchment, and do not believe that the airport could realistically serve spilled traffic from the London system.
- It is unlikely that, even if Manston should reopen, the airline would choose to serve the airport.

Major European LCC

- Manston is not an airport the airline is considering. The company focuses on core catchment areas with less than 60 minute travel to the airport, and at most 90 minutes.
- Manston has a weak demand and the local catchment area is not overtly wealthy.
- Alternative airports offer better options, Southend and Stansted tap the London catchment area and can be really cost-effective airports
- Manston would have to tap into Gatwick's catchment and price would need to be very low (no more than a few pounds per passenger.
- The airport is probably not for the LCC in question. If there was no runway capacity available in the South East, the LCC would opt for a larger aircraft type before selecting Manston and would probably consider alternatives such as Southampton and Bournemouth first.
- Other carriers without a footing in Gatwick might consider Manston, as might freighters.

Ex-Director of Network Route Development for Major European LCC

- Following the BREXIT vote many airlines will be considering their approach to the UK. During a period of uncertainty it will be difficult for Manston to convince carriers to open routes to the airport.
- LCC's would look to secure deals with minimal aeronautical charges. Without an extremely competitive rate there is no possibility an LCC would locate services at an airport. In some cases, LCC's have walked away from airports offering negative aero-charge deals due to poor volumes.

Manager, Flight Operations, Major UK Carrier

- The individual plays a key role in the Flight Operations team at a major UK carrier.
- It is the individual's view that Manston does not offer any safety or resilience benefits of a material nature to the UK system. The airport is located in close proximity to six London airports which offer excellent resilience already.
- The airline would also not consider using Manston airport as diversion airport except in an on-board Mayday emergency (which are extremely rare).
- When considering diversion airports the airline considers multiple factors such as; does the airline already offer services at the airport, the size of the airport, the facilities at the airport to handle passengers, the local facilities to provide hotel and accommodation, the equipment at the airport to handle all types of aircraft required e.g. GSE equipment, and other legal requirements such as the provision of sufficient Fire Cover. On these measures, it is considered unlikely that Manston would be selected as an alternative airport, when Gatwick, Heathrow and Stanstead can all provide superior services within London.
- In the individuals view, whilst Manston would be used in an absolute emergency, it would be very unlikely to receive regular diversions for routine operational reasons, such as weather or runway closures.

KLM Position

- We are evaluating our network to the UK on a yearly basis. We are constantly being approached by airports who would like us to operate to their airports. These opportunities that arise are being looked into and MSE could be one of them.
- It is not possible to say how likely the chance would be that this would materialize in a new operation in the next 5 years in case MSE airport would be operational again

Senior Executive in Cargo Division for Airline Operating Freighters at Stanstead

- Airlines base the decision on where to operate their freighters based on a multitude of factors. However, the overriding factor is based on where investments in infrastructure have been made by their clients, Freight Forwarders. These CAPEX investments by Freight Forwarders are required to ensure they maintain economies of scale through their transit facilities and distribution centres. In the UK, these investments are centred at Heathrow, and more recently Stanstead.
- The airlines first choice of destination was Heathrow, as the majority of Freight Forwarders have their major infrastructure in and around Heathrow. The airline was unable to access slots at Heathrow and so selected Stanstead due to runway length, a mature offering including infrastructure development and third party handlers
- Stanstead operates a world class facility and has the competencies to handle freighters. It is questionable whether this would be possible, at least initially, at Manston.
- The airline would be extremely unlikely to consider moving services to Manston, even if they were no longer able to serve Stanstead, regardless of the commercial terms offered. If the airline had to move services they would consider East Midland and Manchester or other centrally located airports over Manston.
- The individual also believes that there is virtually no chance that a Freight Forwarder would choose to relocate services to Manston.
- Furthermore, as air cargo is a commodity virtually all operators offer the same service and compete on prices. Therefore, most operators implement similar strategies and business models. The result of this is that, in the individual's opinion, other freighter operators would also take a similar stance.

Air Cargo Charter Broker – UK

- The company had made use of Manston Airport in the past (circa. Up to 2 x flights per week) and found it to be a reliable and efficient airport that was well placed for access to the South East of England. The airport had the facilities to handle many aircraft gauges, from small freighters right through to B747F operations. The airport provided good access and the company had no difficulty in obtaining slots. The cost of operating from Manston was more effective than at Stansted, this included the aeronautical landing fees and associated handling costs.
- The company's over riding view was that Manston was an easy airport to use, it provided a good service and gave priority to freight.
- The airport provided all services on the ground, including ramp handling for freight.
- The company was aware that many of its competitors also used the airport along with scheduled operators such as Cargolux and ANA.
- The company was cognizant that, whilst the inbound demand for freight existed, there was little demand for outbound freight, which resulted in aircraft departing with unutilised capacity. The inbound demand was largely from West Africa, with strong volumes of fresh flowers and produce imported. Manston was particularly efficient at handling this cargo and permitted road feeder services to access the apron which resulted in quick access to the UK road network.
- Alongside produce, the airport had a reputation as being able to handle outsized freight such as engines and turbines.
- The airport's location prohibited its use for more northern destinations, East Midlands and Doncaster were favourable in these instances
- The Air Cargo Charter Broker confirmed that they would certainly be interested in using the airport again if it re-opened but in order to do so they would be looking to secure competitive rates for landing, parking and screening charges.

Ex-DHL Aviation Senior Sales Executive

The individual has held senior positions in the cargo industry for over 15 years.

- Whilst Manston may offer an opportunity for some it is unlikely that DHL would relocate its operations. The setup at East Midlands is tuned to its needs. Further, East Midlands is geographically well located for quick access to the UK road network which is exceptionally important for the courier business model.
- In their experience, they believe it unlikely that any integrator would be interested in moving their operations to Manston.
- Generally, more and more freight is being shipped as General Cargo from Heathrow. Given the six hour close out period, it is reasonable to assume carriers could then use road feeder services to distribute this via Manston.
- Regarding other freight uses, Charter operators and scheduled all cargo operators may wish to locate services at Manston but this is highly dependent on the commercial offer. The sole purpose of utilising Manston would be to reduce cost, either through reduced flight operations or lower airport charges.
- One point of note is that the UK is a lot cheaper to export form at present. Thus, a lot of freight originates in continental Europe and moves via belly hold.
- Overall the individual's view was that whilst Manston would undoubtedly attract some business it is unlikely to be significant volumes.

Mr. Stanley G. Wraight – Senior Executive Director Strategic Aviation Solutions Limited

Mr. Wraight is an industry veteran with over 40 years' experience in the air cargo industry. Previously, Mr. Wraight held the positon of CEO at AirBridgeCargo, and Senior Executive roles at Atlas Air and KLM.

- The airport offered a good location for freight being imported from Africa; this was the predominant origin market. Generally, the freight that was imported was pre-packed shop-ready fruit and vegetables that could be transported directly into the supply chain.
- When the airport closed, Doncaster and Stanstead tried to win the business from Manston, whilst some gains were made, the majority of the business relocated to European hubs as they are more closely located to the final destination, thus reducing overall cost.
- There are few all-cargo operators who would consider locating operations at the airport. Operators will be tied into their networks, in part due to their clients locating their facilities at the main airports (Heathrow and Stanstead). One opportunity could be Cargo Logistics, an off chute of AirBridgeCargo.
- In order to secure freighters movements at the airport, it will be necessary to demonstrate a cost advantage over competitors. This could be through a reduction in the overall Flight Hours required for operations, however the ability to do this is limited given much of the freight is destined for Europe. The ideal origin market for freight, on minimum Flight Hours basis is the USA.
- With regards to Integrators basing operations at Manston, the probability of this is viewed as slim. The Integrators have committed large capital expenses to existing operations at Stanstead and East Midlands, these barriers to exit are substantial and would be difficult to overcome, in particular given Manston's inferior geographical positon within the UK.
- It would be difficult for Manston to compete with East Midland or Stanstead. EMA in particular offers 24/7 cargo operations with customs available 24/7. They have developed economies of scale in both service and cost.
- Further to this, the saturation of regional airports in the UK and Scotland in conjunction with additional wide-body passenger aircraft create difficult trading conditions for a new regional airport.
- Finally, the centre of power within the industry is held by Freight Forwarders, the majority of whom are based at LHR. As the industry is ever increasingly commoditised, Forwarders refuse to divert their business from Heathrow, instead choosing to truck cargo in from the regions to feed the facilities and consolidation business centred there and achieve the necessary economies of scale required to compete.
- The conclusion being that there is virtually no incentive for operators to move operations to Manston, there are alternative UK airports that offer competitive services on reasonable terms. The UK doesn't need another airport for freight that has no USP. If Manston were to be developed it would be essential for it gain a niche market such as becoming an Amazon or Alibaba e-commerce base.

AviaSolutions Meeting with Sir Roger Gale MP – 13th Sept 2016

As part of the stakeholder engagement process AviaSolutions has, at his request, interviewed Sir Roger Gale (MP for North Thanet) to seek his perspective on the commercial viability of and political support for, Manston Airport. The following comments are intended to reflect the substance of the meeting, rather than a verbatim transcript.

- Sir Roger Gale MP ("SRG") stated that Manston Airport and its associated runway are national assets of strategic importance to UK PLC.
- SRG noted that he does not support any particular group wishing to use the asset as an airport and that his interest is in solely in keeping the airport open. He notes, however, that to date RiverOak offers the only sustained and viable interest in operating Manston as an airport. SRG noted that he had seen the outline River Oak business plan which in his view was credible. SRG was not surprised that River Oak did not disclose the plan to AviaSolutions, and was not willing to divulge any of the details for reasons of commercial confidentiality. However, SRG also added that all of RiverOak`s case would be made public when the company submitted its` application for a Development Consent Order to a Planning Inspectorate that was qualified to subject the submission to detailed public scrutiny and inquiry.
- SRG said that it was clear that the intentions of those currently in control of the site were to develop the land for residential and commercial purposes, rather than invest in the airport facilities and expand the air service network.
- SRG provided a brief summary of the historical evolution of the airport, including services by Silver City to Jersey and Clive Bourne, a logistics operator.
- With regards to the development of a railway service to the airport SRG noted the scope to develop the railway is limited by the physical constraints of laying the line and precludes a link directly into the airport. The practical alternative is a Thanet Parkway station, which would initially be linked by a shuttle bus service, and ultimately could be linked by a Gatwick-style monorail.
- SRG is of the view that the primary reason that the airport has not been financially sustainable in the past is the nature of the business model that has been pursued. Previous operators have focussed on developing the passenger business, rather than the freight capacity of the airport, which is the reverse of the model that SRG believes, would be more sustainable.
- SRG noted that UK PLC is losing business to Europe already, with freight being switched from the UK to other European hubs (Frankfurt, Amsterdam, and Paris). SRG also noted that a major courier has expressed an interest in relocating to Manston. He was of the view that the UK has reached maximum capacity for London originating freight services and that excess demand was being lost to other hubs.
- SRG observed that post-Brexit it was going to be vital that the UK develops additional and alternative markets outside the European Union. These greater distances will inevitably mean an increase in the demand for air freight capacity between Britain and the rest of the world if the country is not to lose still more aviation business to mainland Europe.
- In terms of runway capacity, SRG suggested that freighter traffic currently using Heathrow could be relocated to Manston, freeing these slots to facilitate additional passenger services to the Far East. SRG also noted that operators that were forced to re-locate following the closure of Manston were waiting for the airport to reopen and would be keen to return.
- SRG stated that Low Cost Carriers are very interested in operating from the airport, and that if the airport were to re-open, would be very likely to start services at the appropriate time in the airport`s re-development. However, SRG was not willing, for reasons of commercial confidentiality, to disclose the source of this information nor the airline in question.
- SRG was keen to stress the importance of ancillary businesses to the airport's viability, which included aircraft dismantling and engineering firms. SRG also noted the Search & Rescue operations which had recently been permanently located at Lydd. Further options for the airport would include General Aviation (GA) which would be able to access London via Battersea Heliport.
- SRG noted the widespread political support for Manston Airport, including Sir Patrick McLoughlin, the former Transport Minister, The Minister of State for Aviation, John Hayes and David Cameron when Prime Minister. He indicated that that political support at national and local levels was, particularly in the light of the Brexit decision, on-going. SRG also noted that there would not be any need for financial support from Central Government and that the airport should be able to attract sufficient private capital to exist as a standalone business.
- SRG spoke at length on the alternative proposal by Stone Hill Park for the site, noting that that the ability to develop the site for residential and commercial purposes was questionable, with several potential challenges including the likely presence of a war grave, buried low level radio-active waste,

archaeological interests, and issues with the effect upon Thanet`s aquifers all needing to be addressed prior to any redevelopment. He indicated that any alternative development would, prior to change of use, require the same intensive Environmental Impact Assessment as that currently being undertaken by RiverOak for airport purposes. Furthermore, SRG noted that there is limited demand for additional industrial space in the area, that there is already a more than adequate supply of industrial land available in East Kent and that the number of new jobs generated at Discovery Park is, contrary to the claims made by the Leader of Kent County Council, low.

- With regard to a new runway in the South East, Sir Roger indicated that he believed that a runway decision would be made fairly soon but that any actual new runway would not be operational for at least 15 years. It is his belief that, even with a new runway in the London airport system, the Manston Airport remains a viable facility with freight as its primary purpose supported by passenger traffic.

Non-Reply

- The following airlines were sent a request for their positon on Manston airport but chose not to submit a response.
    - Monarch
    - Thomas Cook
    - Tui

10. Appendix B: Condition Report Manston Airport

Introduction

The following section contains our report on the condition of the airport assets, it should not be read as a definitive summary of the asset condition. Our report is based on a visual inspection of the airport on 3 August 2016 under the supervision of the current airport owner's representative.

Terminal Building

Summary

The current facility has an approximate footprint of 1,900m^2 and in general would have been suitable for single and dual aircraft operations simultaneously. On balance we would suggest that the building in its current configuration could be re-instated but that the cost of such modifications may make it more economically viable to demolish it and erect a purpose built low cost facility. In general the basic fabric of the building was intact, although there is evidence of water entering the building via the roof at various locations.

General

We observed that the drop off/pickup area was located adjacent to the front of the terminal building. This is in contravention to current security requirements and would necessitate the offsetting of the drop off pickup area. In-turn, this would require the transforming some land currently allocated to parking. The current site could facilitate this change through lateral expansion of the parking area.

We note that the current configuration of the terminal building, along with the apron, limits lateral expansion. To accommodate significant traffic volume would require a significant change to the current layout.

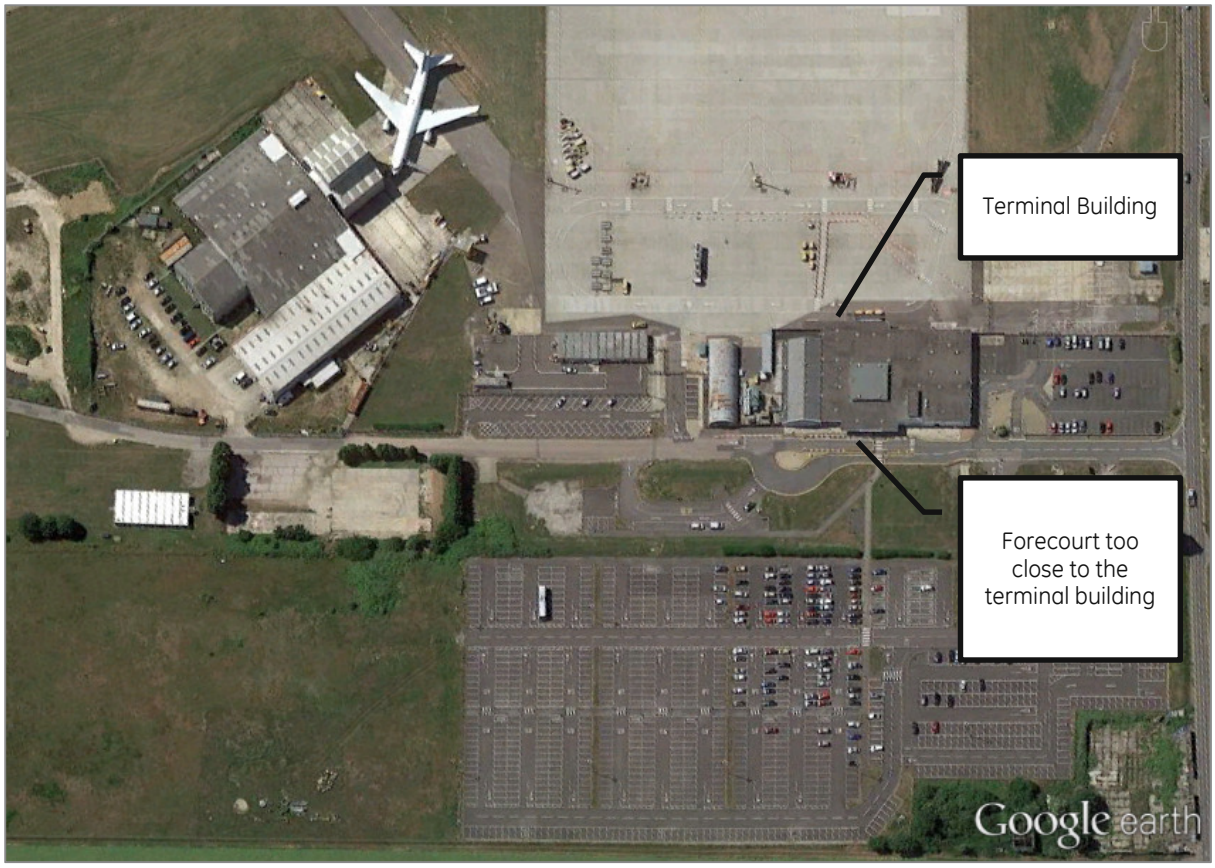


Figure 1: Google Earth image of aircraft maintenance hangar, terminal, parking area and apron (prior to the closure of the airport)

Figure 2: Evidence of water entering terminal building

Figure 3: Main foyer of terminal building from arrivals. Check-in area to the left of the image.

Figure 4: Evidence of water damage in may foyer.

Figure 5: Check in hall (desks removed)

Movement Areas

Apron

Summary

The fabric of the apron appeared to be in relatively good condition with space for up to four simultaneous Code C or two Code E operations.

General

Of note was the significant depth of the apron which accommodated a large GSE storage area at the head of the stand. To become compliant the apron marking would need to be re-established, which is relatively straight forward to accomplish.

Figure 6: Apron as viewed from terminal

Figure 7: Apron Drainage. Some growth of plants which will need to be addressed.

Taxiways

Summary

In general we observed that the taxiways were of relatively good condition with only minor spot repairs required. To re-stablish services appropriate lighting and marking would be required.

Runway

Summary

A visual inspection of the runway indicated that overall it is in very good condition. There is evidence of some vegetation appearing. Discussions with the current owner's representatives identified a surface friction issue. We note that there were plans to address this through surface treatment issues but to our knowledge this work was not carried out.

General

The runway approach and edge lighting has been removed and require re-installing to permit operations. Additionally, the runway has been painted to accommodate 'Operation Stack'. Considerable work is required to remove the current markings from the runway and repaint it with appropriate aviation markings. However, it is our understanding that this work will be completed as part of the current agreement with the Department for Transport.

Figure 8: Runway (Rwy) 29 Threshold

Figure: 9 Large aggregate used for wearing course may be impacting surface friction characteristics

Figure 10: Shoulders of runway are paved. Evidence of plants establishing a presence in cracks

Figure 11: Runway 27 and evidence of plants establishing presence in cracks

Systems

Navigation

Summary

It is our understanding that the Instrument Landing System and supporting systems were sold upon the airport's closure. These systems, including backup power supply, would need to be re-instated.

Figure 12: Radar tower with radar removed

Lighting

Summary

It is our understanding that the approach, runway, taxiway and apron lighting systems and supporting elements were sold upon the airport's closure. These systems including backup power supply would need to be re-instated.

Control Tower

Summary

No appreciable control tower facilities were available to inspect. To facilitate commercial operations it would be necessary to install a new control tower and associated support systems, including appropriate radar systems.

Rescue & Fire Fighting

Summary

The current Fire Station is unsuitable for use. We believe it would require demolishing and the construction of a new Fire and Rescue Station.

Figure 13: Dilapidated Rescue & Fire Fighting Facility

Ancillary Buildings

Maintenance Hangar

Summary

Adjacent to the primary apron is a large aircraft maintenance hangar with a unique addition allowing it to accommodate aircraft larger than what it was originally designed for. It is our understanding that this building is currently under lease by a maintenance company undertaking limited maintenance work. The building fabric appeared to be in reasonable condition.

Figure 14: Maintenance hangar

Figure 15: Interior of maintenance hangar

Figure 16: Bespoke tail enclosure of hangar

Cargo Hangars

Summary

During the visit we undertook a preliminary inspection of several cargo facilities on the airport site. The location of the facilities was ideal for this type of operation, having access to the local road network and the taxiway system. In general the buildings appeared to be in reasonably good condition. We foresee no reason as to why they could not be re-instated as cargo facilities.

Figure 17: First cargo hangar exterior

Figure 18: First cargo hangar interior

Figure 19: Second cargo hangar exterior

Figure 20: Second cargo hangar interior

Re-Establishment Cost Estimate

The following is an estimate of costs associated with re-establishing the required infrastructure to operate commercial services from the airport.

For the avoidance of doubt, these costs do not include the costs associated with any acquisition of the airport site.

Element	Cost Estimate £	Note
Old Terminal Demolition	400,000	Demolition of existing terminal building
Terminal Building	7,500,000	Construction of new modular single story terminal
Approach Road	750,000	Relocation of approach road to accommodate security requirements
Apron Repairs	200,000	Repairs to apron surface
Airport Lighting	3,000,000	Complete airport navigation lighting system
Navigation Systems	2,500,000	ILS/DME/DVOR
Radar	3,500,000	Secondary Radar System
Runway Treatment	1,500,000	Grooving of runway to address low friction characteristics
Cargo Building Repair	400,000	Minor repair to cargo buildings
Power System	2,500,000	Complete power back up system to accommodate CATI ILS approaches
Mobilisation	1,200,000	Ancillary mobilisation costs of re-instating airport operations
Contingency	3,517,500	15% contingency
	£ 26,967,500	

11. Appendix C

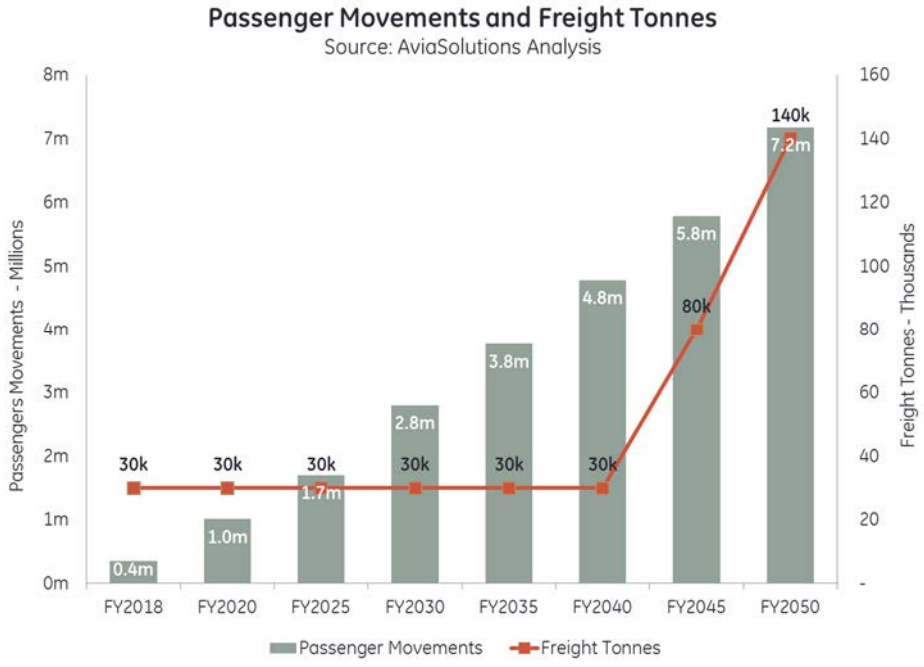
11.1. Outputs for No Runway Development Scenario

In the following paragraphs, we explore the financial viability of the airport based upon there being no new runway in the South East. This scenario takes spill from the London system in addition to a base level of activity generated from the presumed small LCC operation and freighters. Whilst this scenario is the most favourable for Manston airport, as it generates the largest number of passengers and freight, it is perhaps the least likely.

11.1.1. Volume Profile

Passenger movements are forecast to grow at CAGR 19% between FY2018 and FY2030, totalling circa 2.8m passengers by the close of FY2030, growth FY2018 to FY2050 is estimated to be at CAGR of 10%. Freight is not forecast to grow beyond the 30,000 tonnes of the core freighter operations until FY2040, but at that point, freight is assumed to spill from the London Area taking it to some 140,000 tonnes by FY2050.

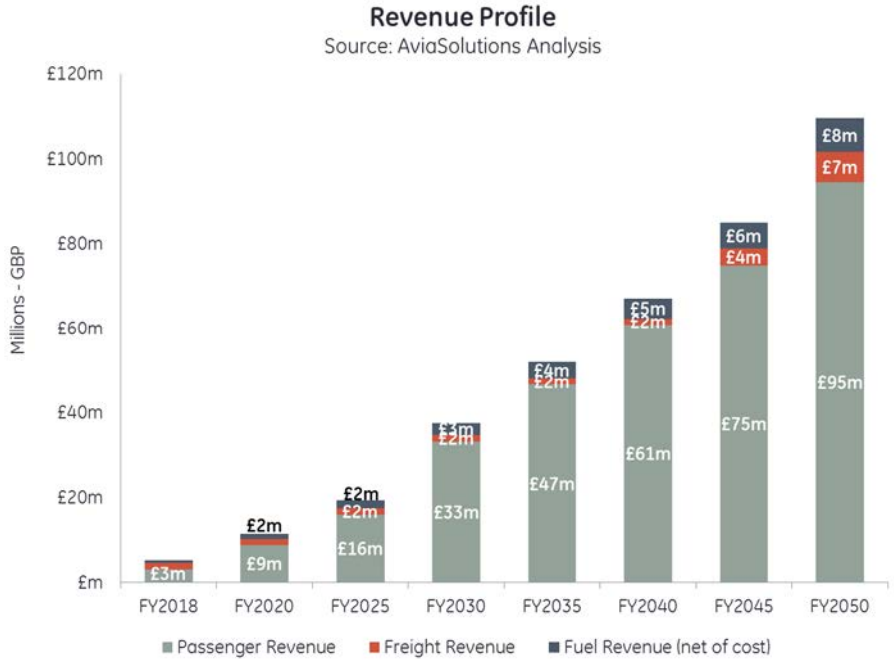
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Passenger Movements	350k	1,010k	1,700k	2,800k	3,770k	4,780k	5,790k	7,180k
Freight Tonnes	30k	30k	30k	30k	30k	30k	80k	140k
Total ATMs	1,100	2,900	6,400	14,100	20,900	28,100	37,200	49,500



11.1.2. Revenue Profile

Revenue generation is forecast to grow at a CAGR of 18% between FY2018 and FY2030, driving revenues to £38m by FY2030, and at a CAGR of 10% between FY2018 and FY2050 to reach total annual revenues of £110m by FY2050. The revenue profile is exponential in nature due to the increasingly constrained London System environment permitting increasing spill to Manston.

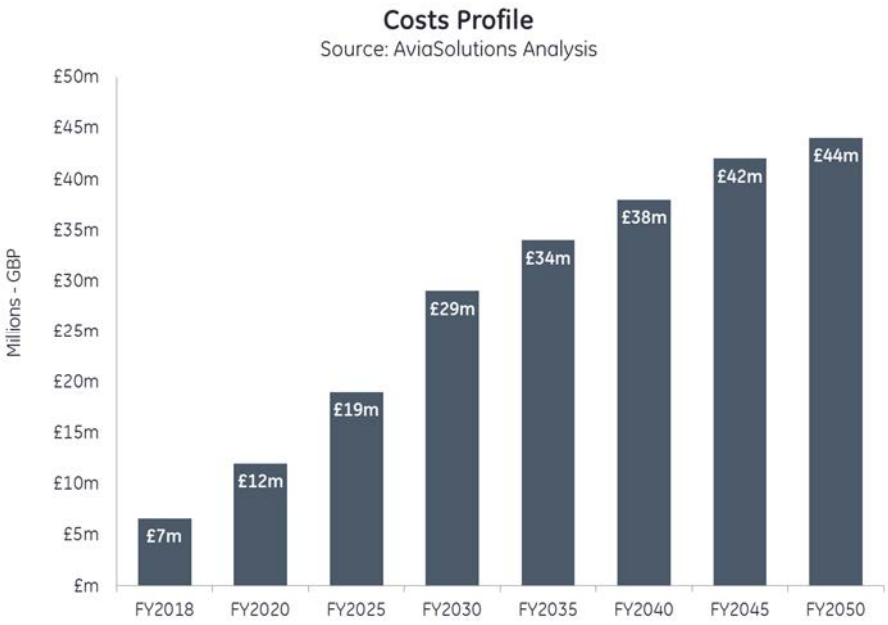
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Revenue	£5m	£12m	£19m	£38m	£52m	£67m	£85m	£110m

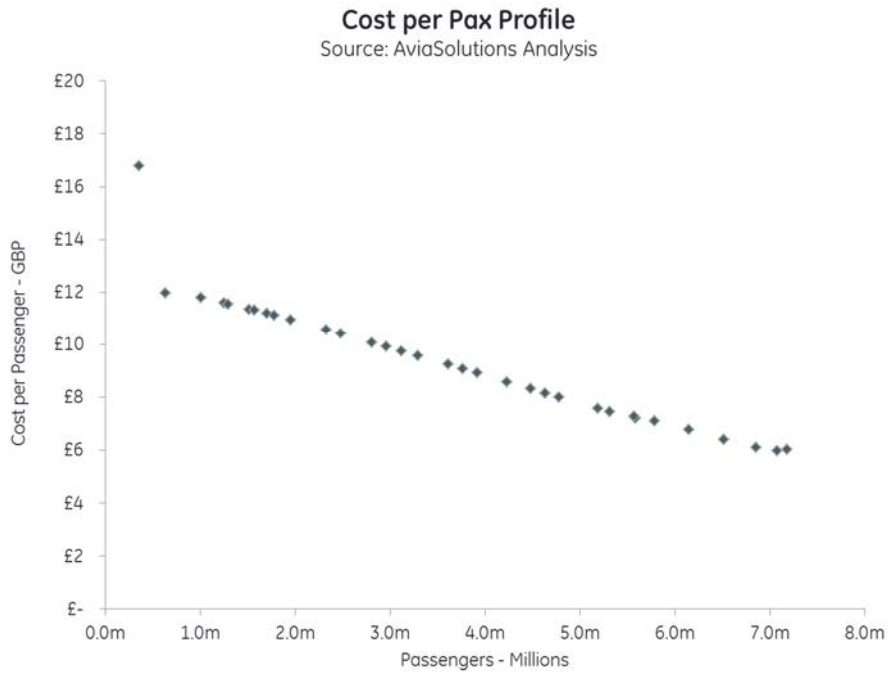


11.1.3. Cost Profile

Total Costs are forecast to grow at 13% per annum on average between FY2018 and FY2030, resulting in total costs of £29m by FY2030, and at 6% per annum between FY2018 and FY2050 to produce total annual costs of £44m by FY2050. Costs are increasing more slowly than revenue, leading to greater margin generation. We consider that as the airport generates increased volumes of traffic, it is able to achieve increasing economies of scale, in particular within its passenger operation. Furthermore, as the passenger volume increases, the non-unit driven costs are distributed over an increased base, thereby reducing the average cost per passenger to the airport, an essential element in increasing margin.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Cost	£7m	£12m	£19m	£29m	£34m	£38m	£42m	£44m

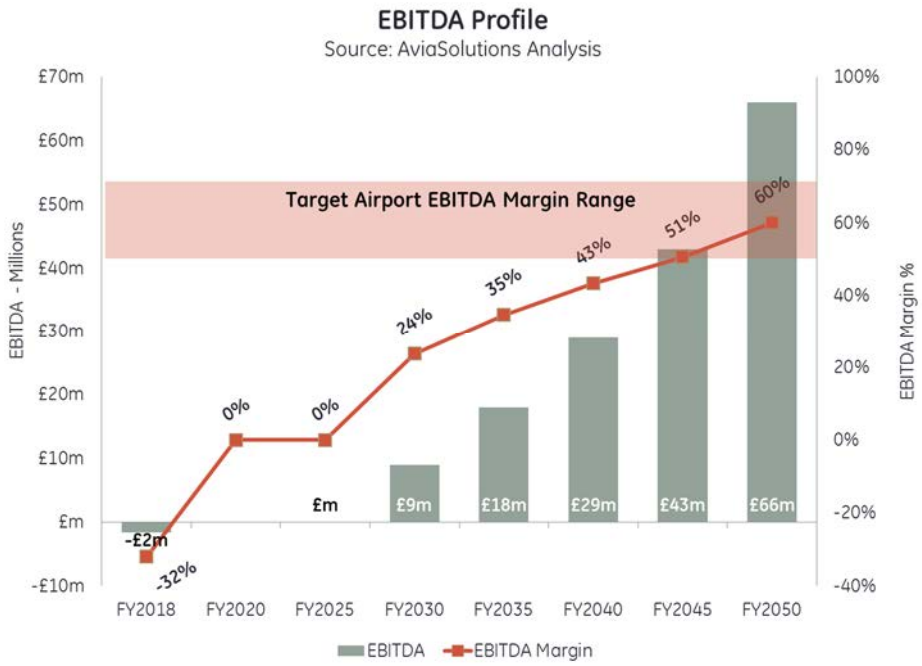




11.1.4. EBITDA Profile

EBITDA is initially forecast to be negative, indicating that the airport would be loss making in the early years at an operational level. It first turns an operating profit in FY2030, generating £9m of operating income and an EBITDA margin of 24%. The EBITDA margin in the long term is forecast to reach 60%, generating £66m of EBITDA in FY2050. This level of EBITDA is much more akin to a typical airport which requires sufficiently high EBITDA margins to cover the ongoing costs and CAPEX of a large asset base.

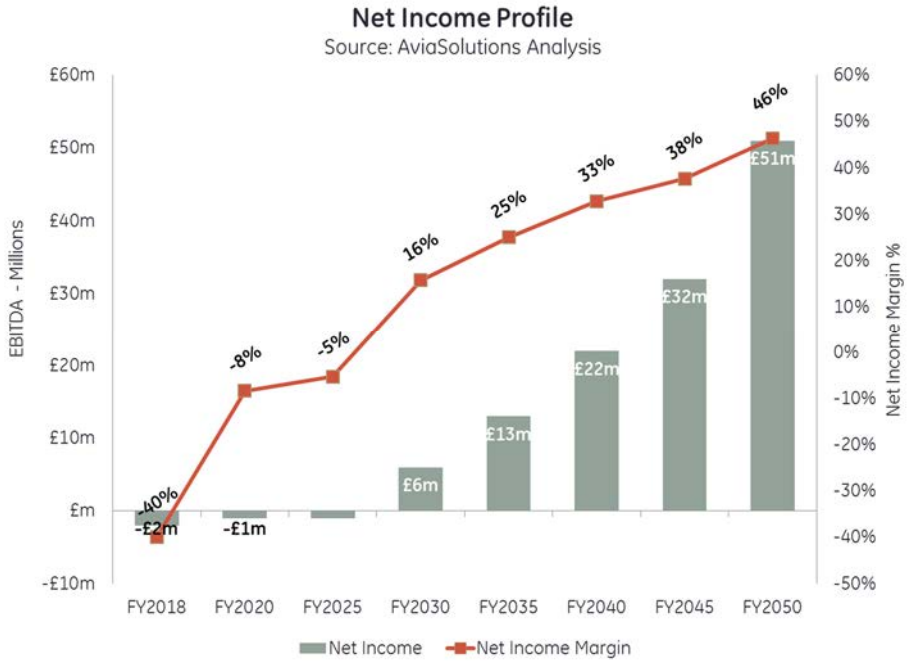
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
EBITDA	-£2m	£m	£m	£9m	£18m	£29m	£43m	£66m
EBITDA Margin	-32%	0%	0%	24%	35%	43%	51%	60%



11.1.5. Net Income Profile

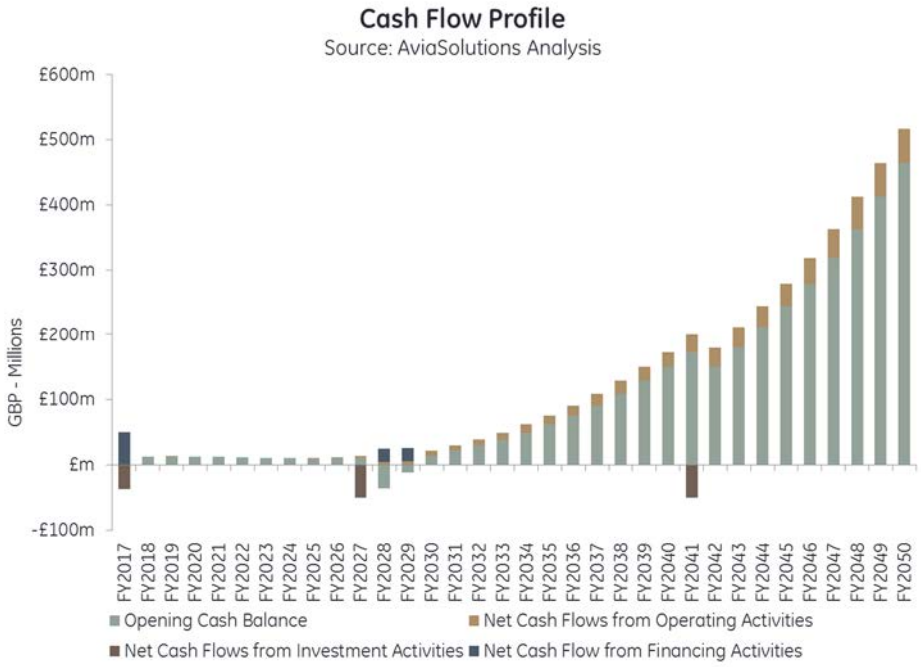
Net income, the profit left after all deductions, is forecast to be negative until FY2025. The first positive results fall circa FY2030 when the airport is expected to generate net income of £6m. This income stream steadily increases through to FY2050 at which point it is expected to be circa £51m per annum.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Net Income	-£2m	-£1m	-£1m	£6m	£13m	£22m	£32m	£51m
Net Income Margin	-40%	-8%	-5%	16%	25%	33%	38%	46%



11.1.6. Cash Flow

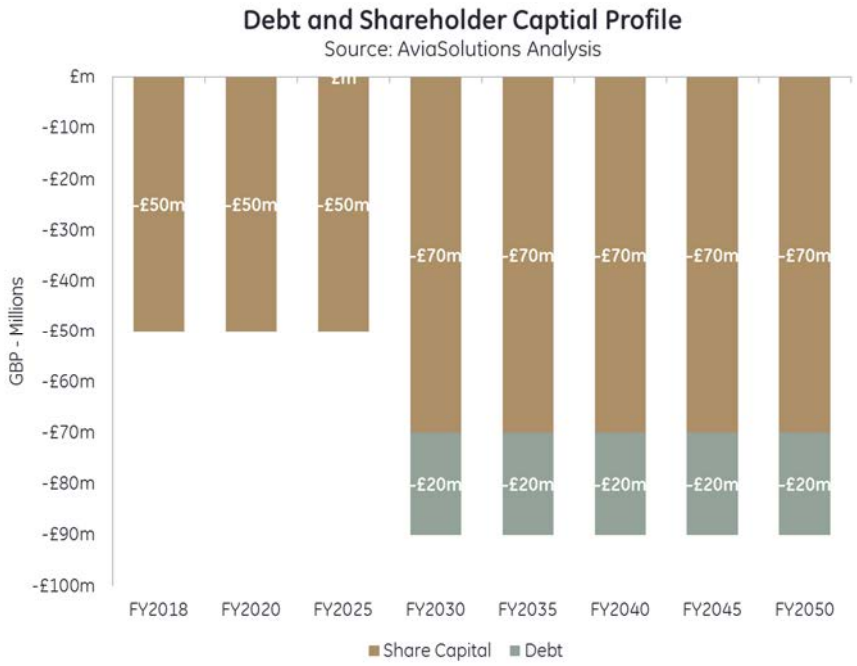
The airport is forecast to develop its cash position with limited additional capital requirements except those required to expand the terminal in FY2027. The position shown below is excludes any dividend payments that the owner may wish to extract from the asset: such payments would reduce its cash position.



11.1.7. Debt and Shareholder Capital

Whilst the exact nature and mixture of debt and shareholder capital would be subject to complex financial optimisation, we have illustrated below a simple capital structure used in the analysis to illustrate the need for additional capital throughout the period. To maintain the business it would be necessary to acquire circa £40m in additional capital around FY2027. For the purposes of modelling this additional capital has been split between debt and equity.

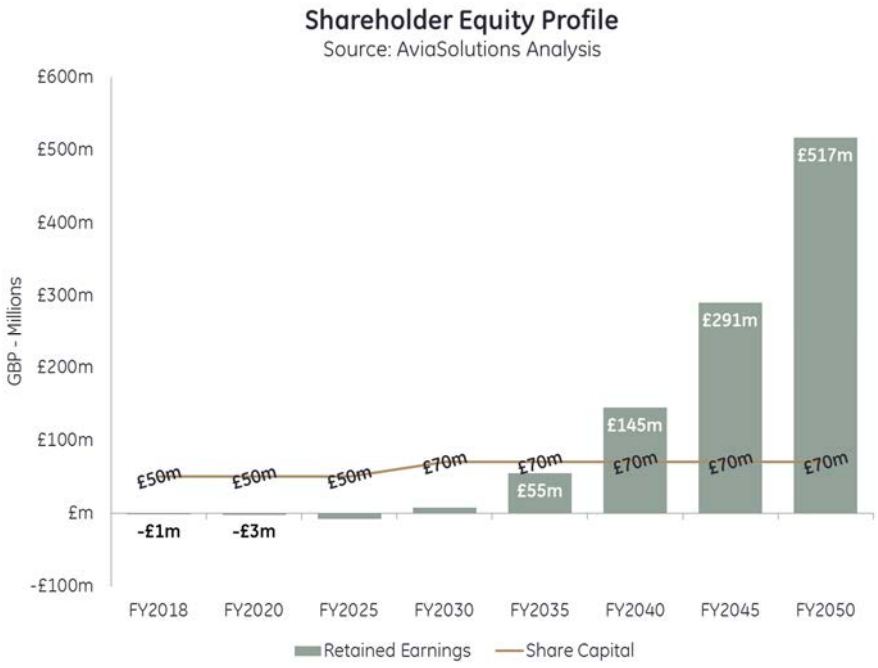
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Debt	£m	£m	£m	£20m	£20m	£20m	£20m	£20m
Share Capital	£50m	£50m	£50m	£70m	£70m	£70m	£70m	£70m



11.1.8. Shareholder Equity

Considering the effects of earnings on shareholder equity, the business does not post positive retained earnings until circa FY2030. This in effect limits the business's ability to pay dividends to shareholders until this point at the earliest.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Retained Earnings	-£1m	-£3m	-£8m	£8m	£55m	£145m	£291m	£517m
Share Capital	£50m	£50m	£50m	£70m	£70m	£70m	£70m	£70m



11.1.9. Conclusion

Given the parameters of this specific scenario it could be feasible to operate a commercially viable airport on the site. However, the risks in doing so are high and many of the elements that cause the proposal to payback can be reversed (such as a new runway being authorised) and are out of the control of the asset manager.

Whilst we believe an airport on the site may be feasible in this scenario, the probability of there being no new runway in the South East is very low, even if a decision is delayed, it is still expected that a new runway will be required at some point. If Manston were to become an established airport it would need many years to reach a point of maturity where it would be able to withstand a new runway becoming operational. The probability of this occurring, given the Government's current position on runway capacity, is uncertain at best. Therefore we conclude that whilst potentially feasible, this scenario is improbable.

11.2. Outputs for LGW Second Runway Scenario

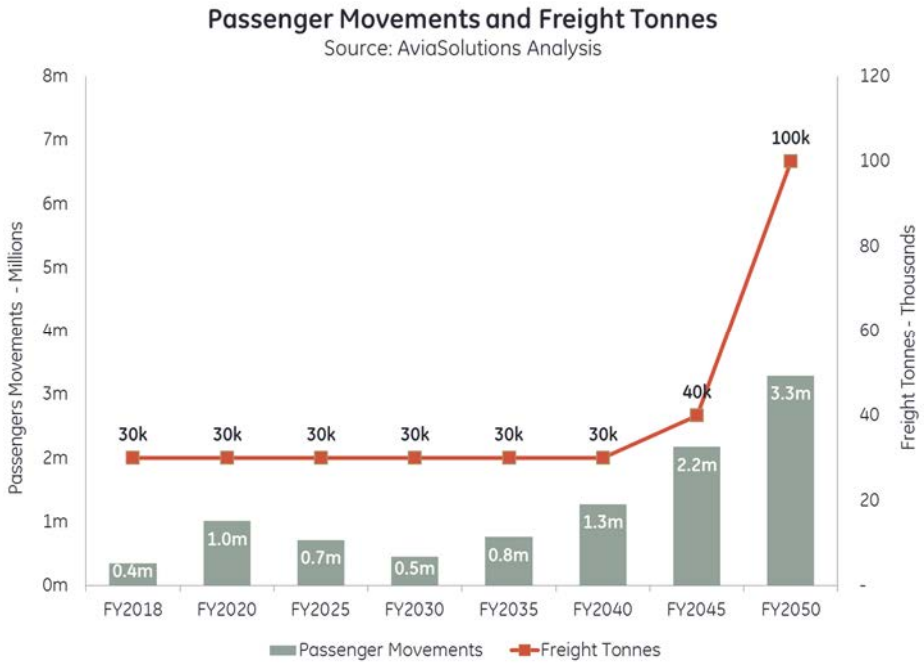
In the following paragraphs, we explore the financial viability of Manston Airport based upon there being a second runway at Gatwick. This was an option short-listed by the Davies Commission and while not finally recommend has a body of support based on its lower environmental impacts and the consequent ability to be delivered earlier (assumed here to be 2025). Manston may have a short initial boost to traffic before the second runway becomes available but then traffic falls before growing again. This scenario takes spill from the London system in addition to a base level of activity generated from the presumed small LCC operation and freighters. This scenario is less favourable for Manston Airport than would be a development at Heathrow.

11.2.1. Volume Profile

Passenger numbers are forecast to grow to more than 1.5 million in 2024, the year before the assumed opening of the second runway, but immediately fall back starting in 2025 and declines to a low of 0.5 million in 2033. From this low point, it grows as a result of the resumption of overflow, reaching 3.5 million passengers in 2050. Overall growth between FY2018 and FY2050 averages 7% per annum.

Freight is not forecast to grow beyond the 30,000 tonnes of the core freighter operations until FY2040, but at that point, freight is assumed to spill from the London Area taking it to some 100,000 tonnes by FY2050.

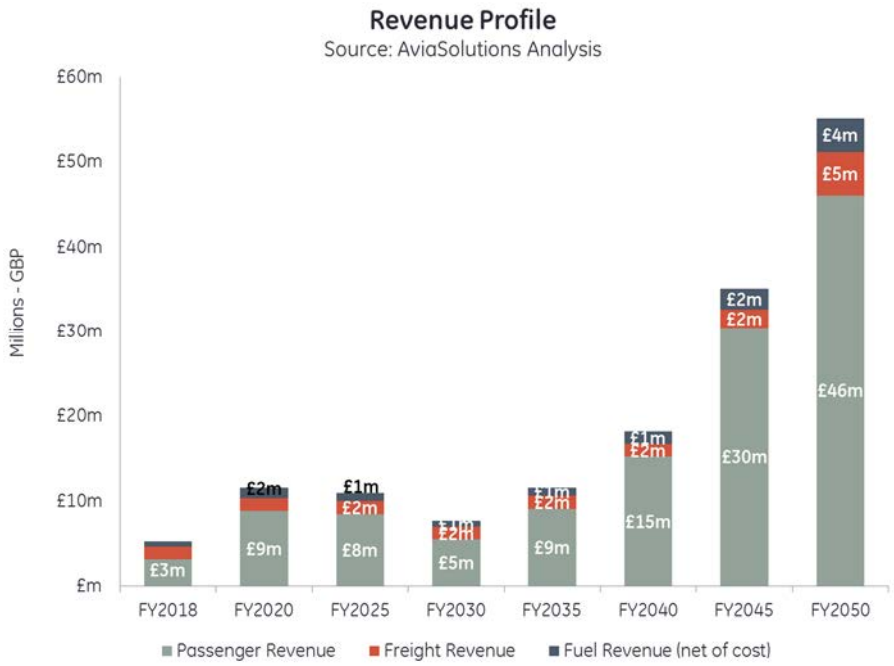
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Passenger Movements	350k	1,010k	710k	450k	760k	1,270k	2,170k	3,290k
Freight Tonnes	30k	30k	30k	30k	30k	30k	40k	100k
Total ATMs	1,100	2,900	5,000	3,200	5,300	8,900	15,900	26,000



11.2.2. Revenue Profile

Revenue generation is forecast to grow at a CAGR of 4% between FY2018 and FY2030, driving revenues to £8m by FY2030, and at a CAGR of 8% between FY2018 and FY2050 to reach total annual revenues of some £55m by FY2050.

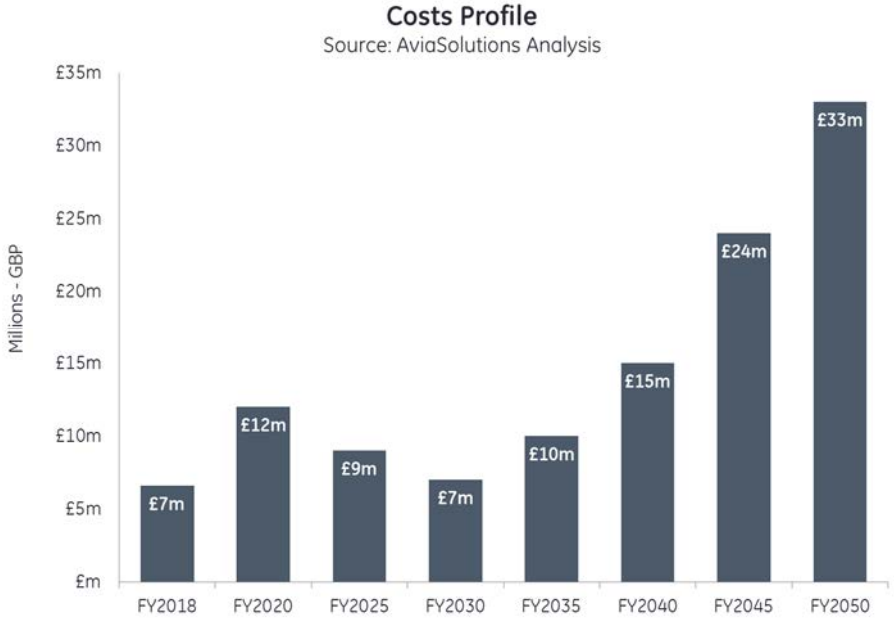
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Revenue	£5m	£12m	£11m	£8m	£12m	£18m	£35m	£55m

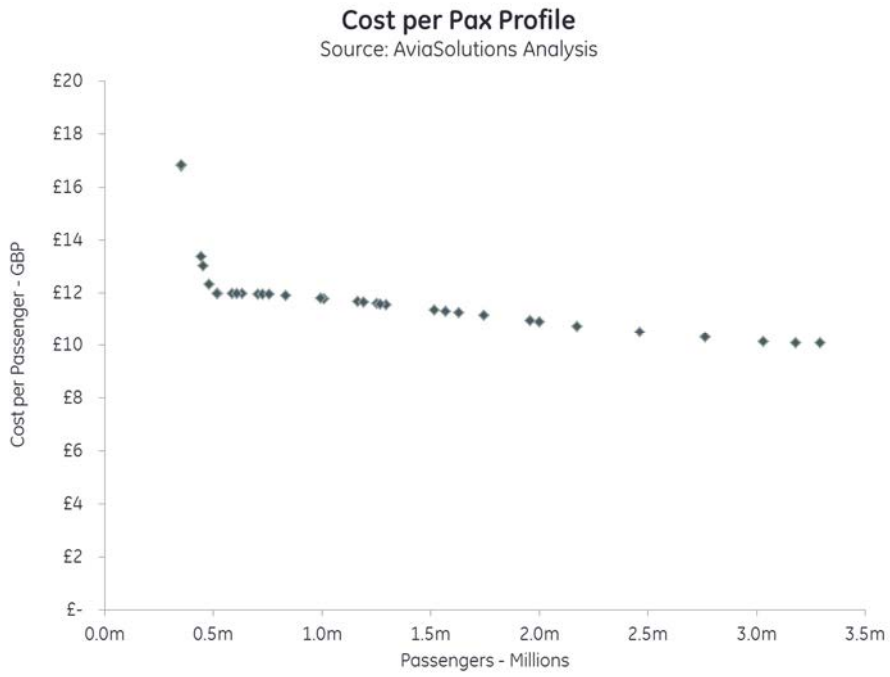


11.2.3. Cost Profile

Total Costs rise prior to the opening of the second runway, but then fall back to £7 million in FY 2030. Thereafter, they increase to nearly £35 million in 2050, representing an average increase between FY2018 and FY2050 of 5% per annum. Cost per passenger falls over the period of the projections.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Cost	£7m	£12m	£9m	£7m	£10m	£15m	£24m	£33m

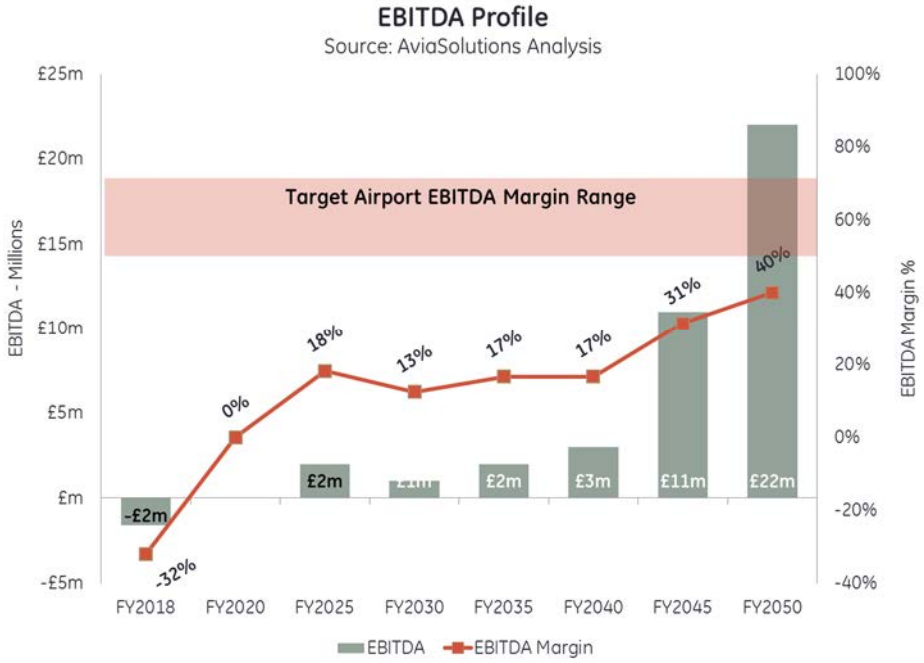




11.2.4. EBITDA Profile

EBITDA is initially forecast to be negative, indicating that the airport would be loss making in the early years at an operational level. It first returns an operating profit in FY2025, generating £2m of operating income and an EBITDA margin of 18%. As the second runway at Gatwick comes on-stream, EBITDA at Manston would stagnate due to the lack of available traffic volumes. The EBITDA margin in the long term is forecast to reach 40%, with an EBITDA of £22m in FY2050. This level of EBITDA is significantly below that which we would typically expect for an airport to be attractive to the investment community.

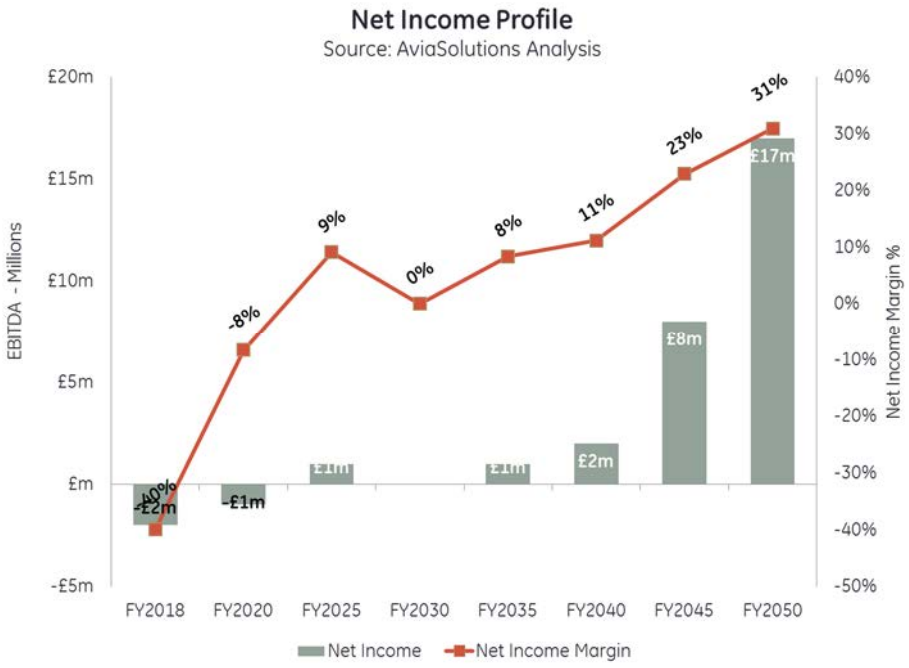
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
EBITDA	-£2m	£m	£2m	£1m	£2m	£3m	£11m	£22m
EBITDA Margin	-32%	0%	18%	13%	17%	17%	31%	40%



11.2.5. Net Income Profile

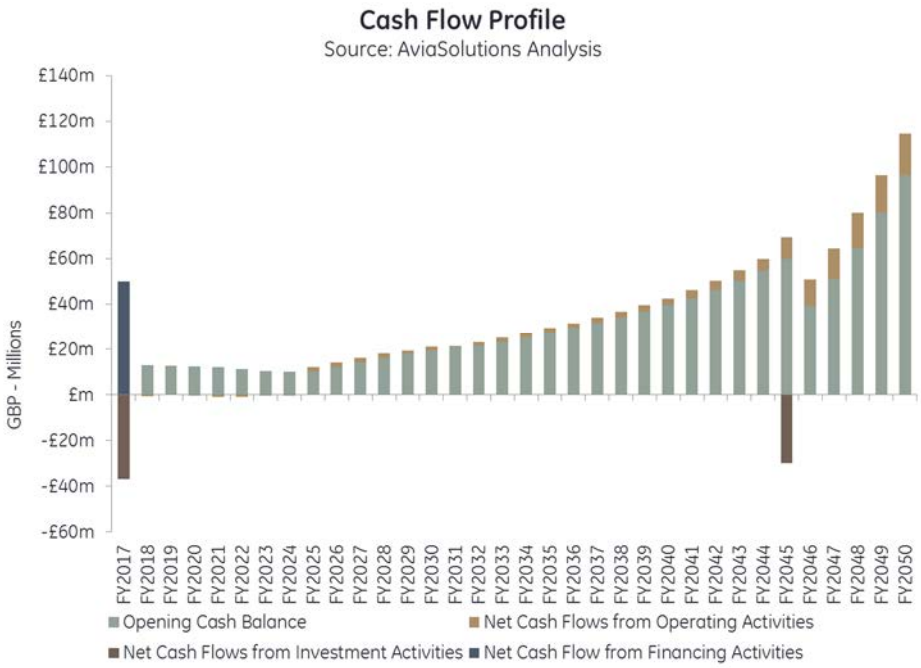
Net income, the profit left after all deductions, is forecast to be negative until after FY2020. The first positive results are generated around FY2025 when the airport is expected to generate net income of £2m, although it falls slightly thereafter as Gatwick's new runway absorbs traffic. The income stream then remains broadly constant for the following 15 years before increasing as capacity becomes constrained once more in the London system. It reaches £17m in FY2050.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Net Income	-£2m	-£1m	£1m	£m	£1m	£2m	£8m	£17m
Net Income Margin	-40%	-8%	9%	0%	8%	11%	23%	31%



11.2.6. Cash Flow

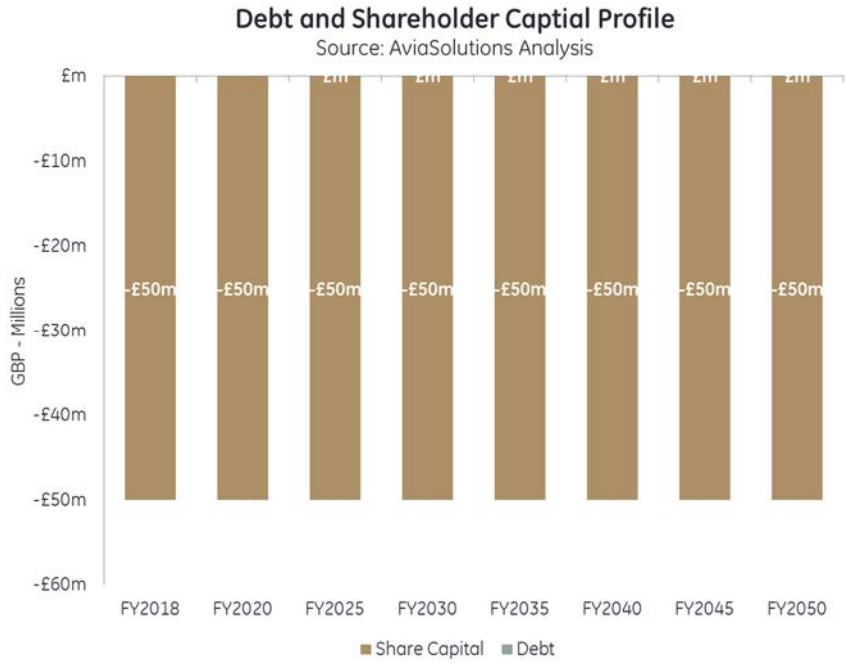
The airport is forecast to develop its cash position with limited additional capital requirements until FY2045 when there would be a requirement to expand the terminal, by which time the company could have built up sufficient cash to be able to finance the CAPEX from reserves. The position shown below excludes any dividend payments that the owner may wish to extract from the asset: such payments would reduce its cash position.



11.2.7. Debt and Shareholder Capital

Whilst the exact nature and mixture of debt and shareholder capital would be subject to complex financial optimisation, we have illustrated below a simple capital structure used in the analysis to illustrate the need for additional capital throughout the period. To maintain the business no further financing would be required. Whilst the business does not generate significant revenues or income, there is little requirement for significant CAPEX investments, thereby eliminating the requirements for additional financing

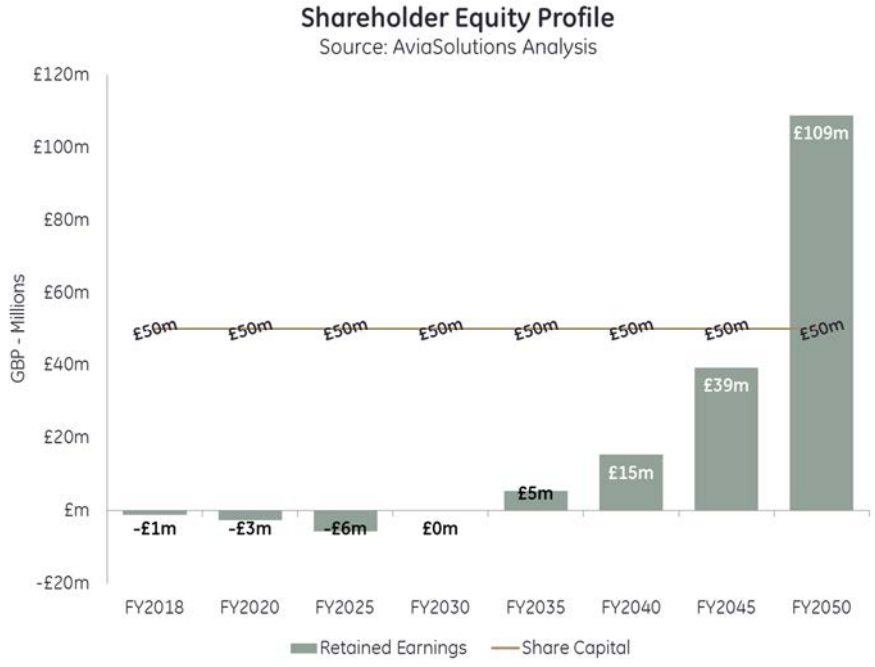
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Debt	£m	£m	£m	£m	£m	£m	£m	£m
Share Capital	£50m	£50m	£50m	£50m	£50m	£50m	£50m	£50m



11.2.8. Shareholder Equity

Considering the effects of earnings on shareholder equity, the business does not post positive retained earnings until nearly FY2035. This in effect limits the business's ability to pay dividends to shareholders until this point at the earliest.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Retained Earnings	-£1m	-£3m	-£6m	£m	£5m	£15m	£39m	£109m
Share Capital	£50m	£50m	£50m	£50m	£50m	£50m	£50m	£50m



11.2.9. Conclusion

The asset would require significant long term investment but would only generate a marginal return. These returns are also predicated on a large number of external variables over which the owner of Manston Airport has very little influence. It is AviaSolutions' view that based on this scenario there is no viable long term prospect of an economically viable airport being established on the site.

11.3. Outputs for Both Runways Scenario

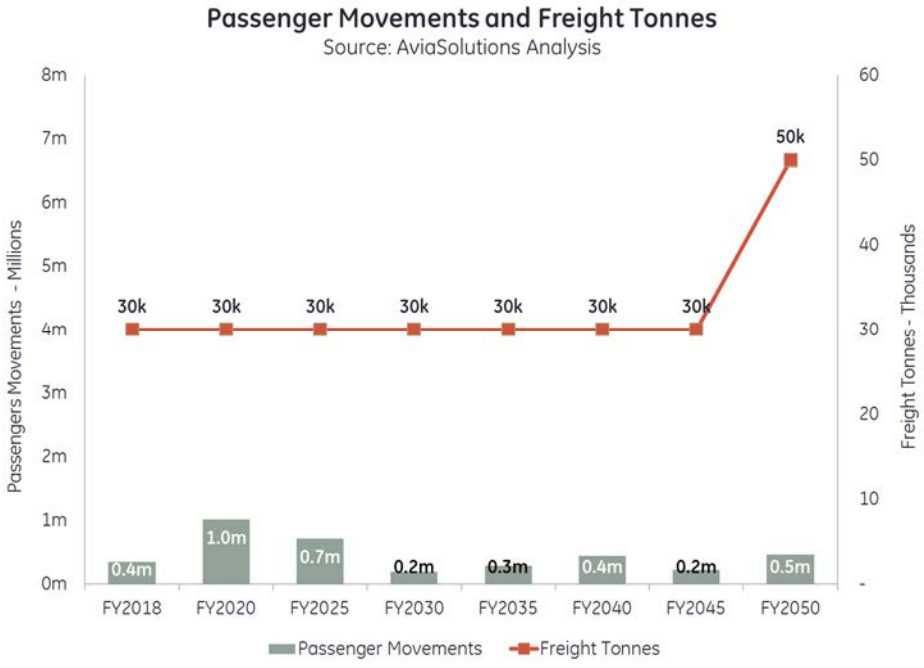
In the following paragraphs, we explore the financial viability of Manston Airport based upon there being two runways constructed in the South East, one at Gatwick and the other at Heathrow. It is clear from this assessment that in the longer term there is forecast to be sufficient demand to require two additional runways. In our assessment, we have assumed that the runway at Gatwick would be opened first, followed later by that at Heathrow. It is though possible that Gatwick might decide to postpone its second runway given its likely loss of traffic Manston would have a short initial boost to traffic before the first of the runways becomes available but then traffic falls and only resumes growth towards the end of the forecasting period. This scenario is the least favourable for Manston Airport.

11.3.1. Volume Profile

Passenger numbers are forecast to grow to more than 1.5 million in 2024, the year before the assumed opening of the first of the runways, but immediately fall back starting in 2025. Passenger traffic remains minimal for the remainder of the forecasting period.

Freight is not forecast to grow beyond the 30,000 tonnes of the core freighter operations until after FY2045, but might reach some 50,000 tonnes by FY2050.

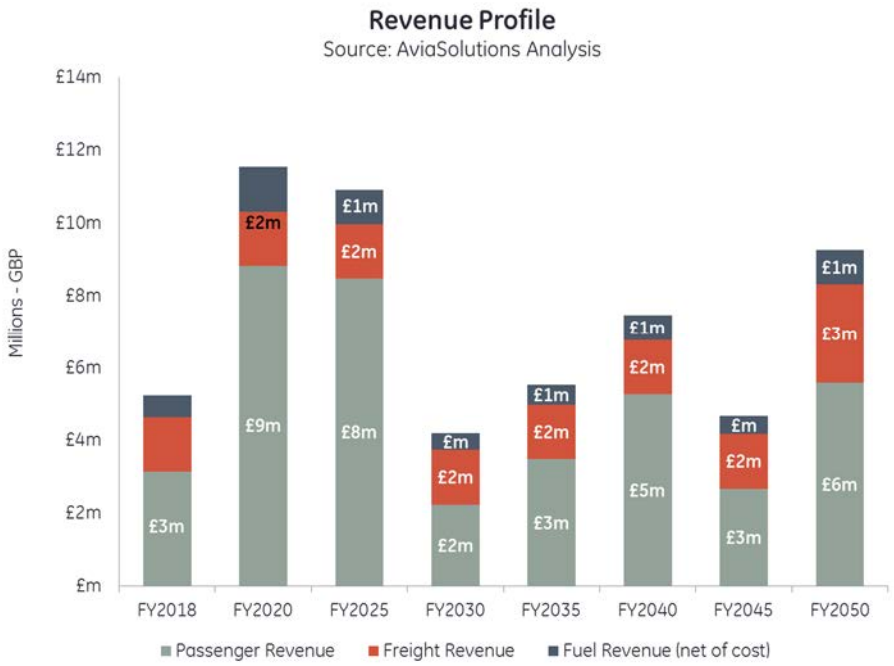
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Passenger Movements	350k	1,010k	710k	190k	290k	440k	220k	460k
Freight Tonnes	30k	30k	30k	30k	30k	30k	30k	50k
Total ATMs	1,100	2,900	5,000	1,300	2,000	3,100	1,600	4,300



11.3.2. Revenue Profile

Revenue generation reflects the lack of traffic volume and peaks in the period up to FY2025.

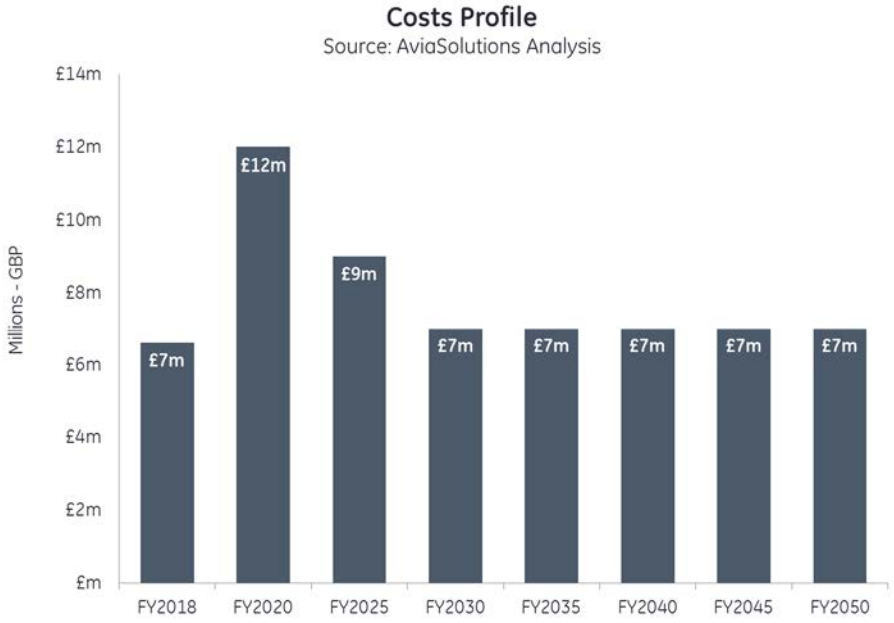
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Revenue	£5m	£12m	£11m	£4m	£6m	£7m	£5m	£9m

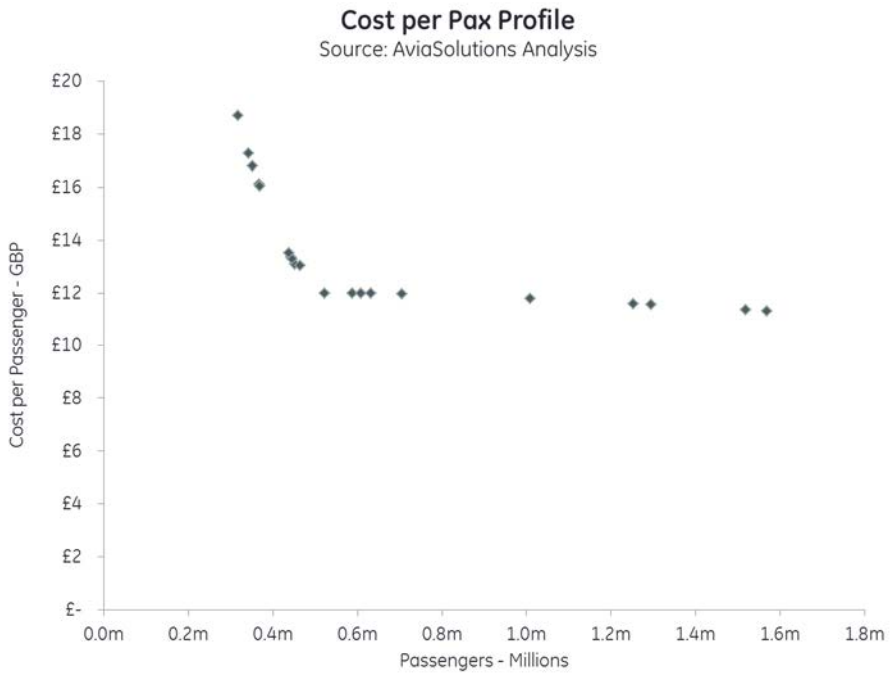


11.3.3. Cost Profile

Total Costs rise a little before the opening of the first of the runways, but then fall back to the core essential fixed costs associated with having the airport open

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Total Cost	£7m	£12m	£9m	£7m	£7m	£7m	£7m	£7m

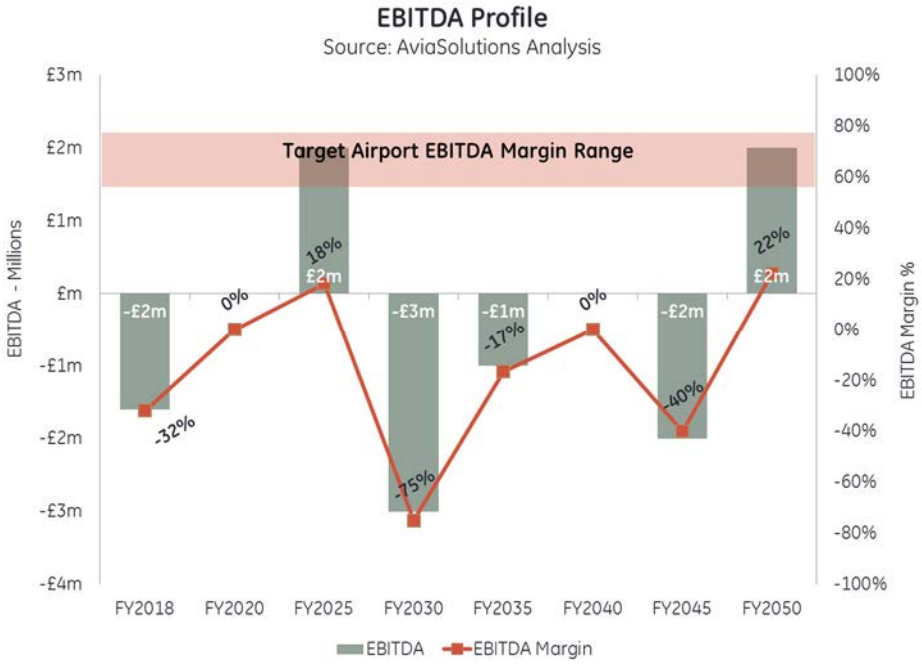




11.3.4. EBITDA Profile

EBITDA is forecast to be negative for the majority of the forecast period, except for the period up to FY2025 and at the very end

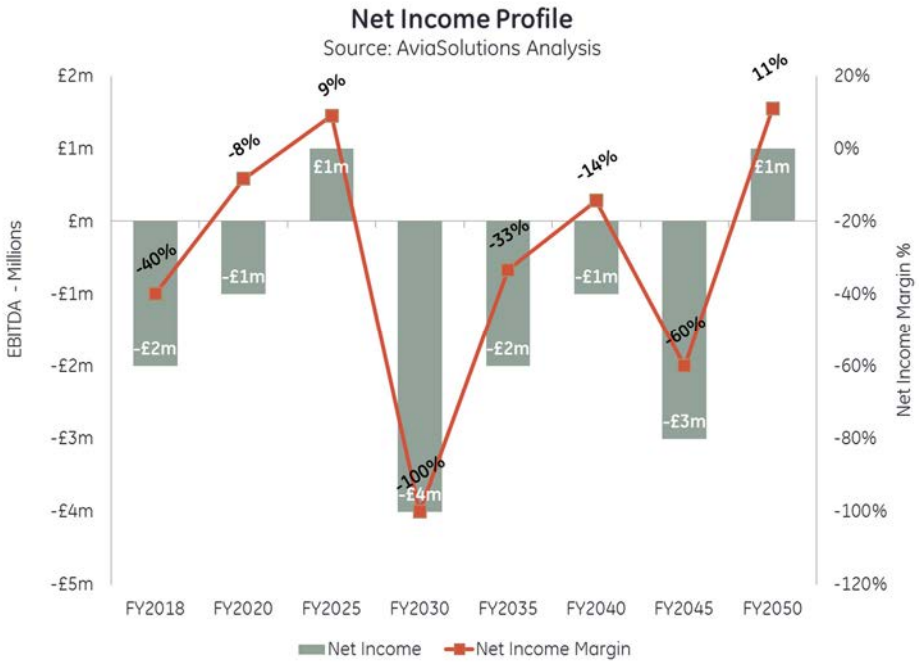
	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
EBITDA	-£2m	£m	£2m	-£3m	-£1m	£m	-£2m	£2m
EBITDA Margin	-32%	0%	18%	-75%	-17%	0%	-40%	22%



11.3.5. Net Income Profile

Net income, the profit left after all deductions, is forecast to be negative for almost the entire period.

	FY2018	FY2020	FY2025	FY2030	FY2035	FY2040	FY2045	FY2050
Net Income	-£2m	-£1m	£1m	-£4m	-£2m	-£1m	-£3m	£1m
Net Income Margin	-40%	-8%	9%	-100%	-33%	-14%	-60%	11%



11.3.6. Conclusion

If two runways were to be constructed in the South East, then it is clear that there is no realistic prospect of long term viability for a re-opened Manton Airport. The potential profits in the period to FY2025 would not be adequate to justify the costs of acquiring and re-commissioning the airport, and prospects thereafter would be exceptionally poor.

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.

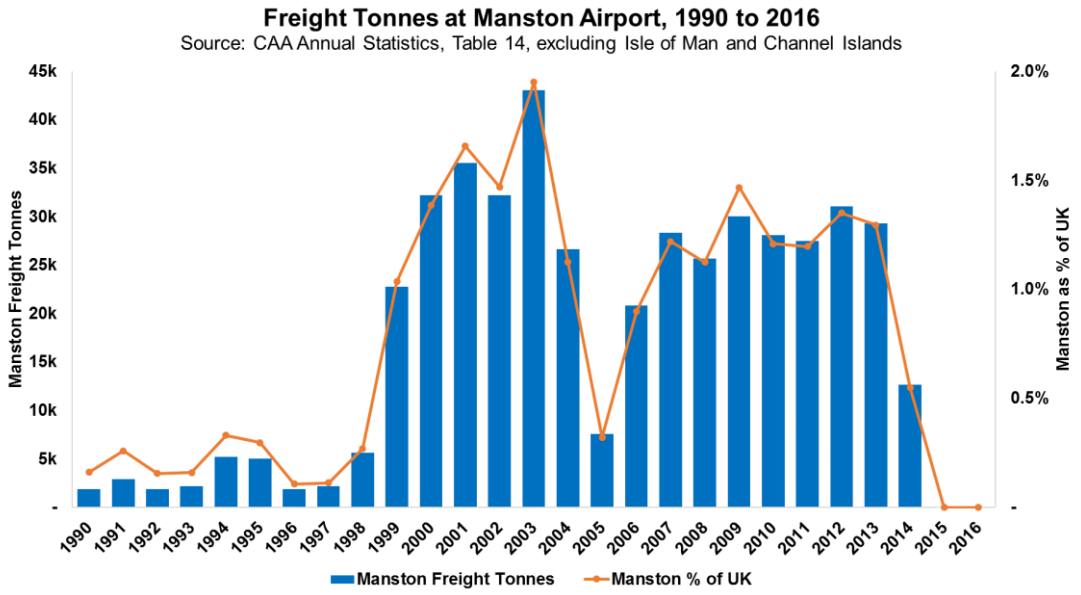

Figure 1 - Manston Airport Freight Tonnes 1990-2016

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.

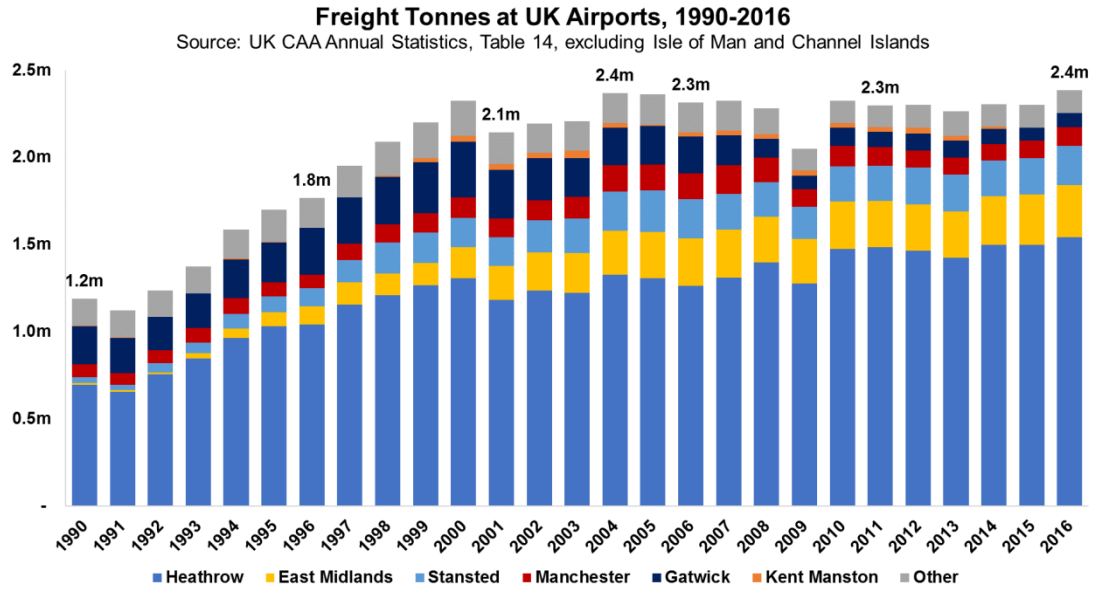

Figure 3 – Timeseries of UK freight tonnage

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].

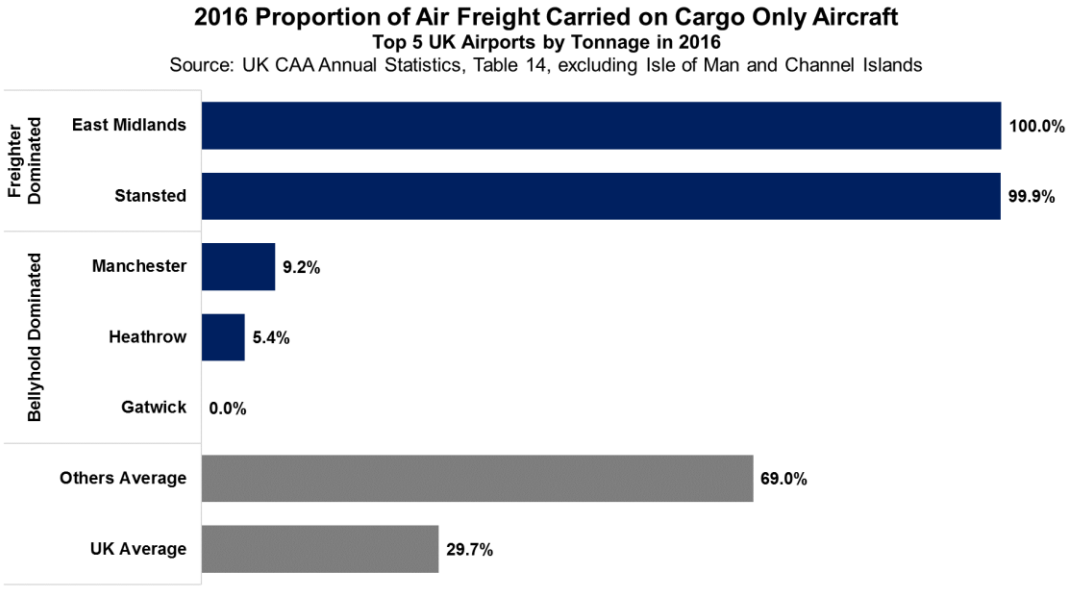

Figure 4 – Freighter/Bellyhold split at selected UK airports

[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.

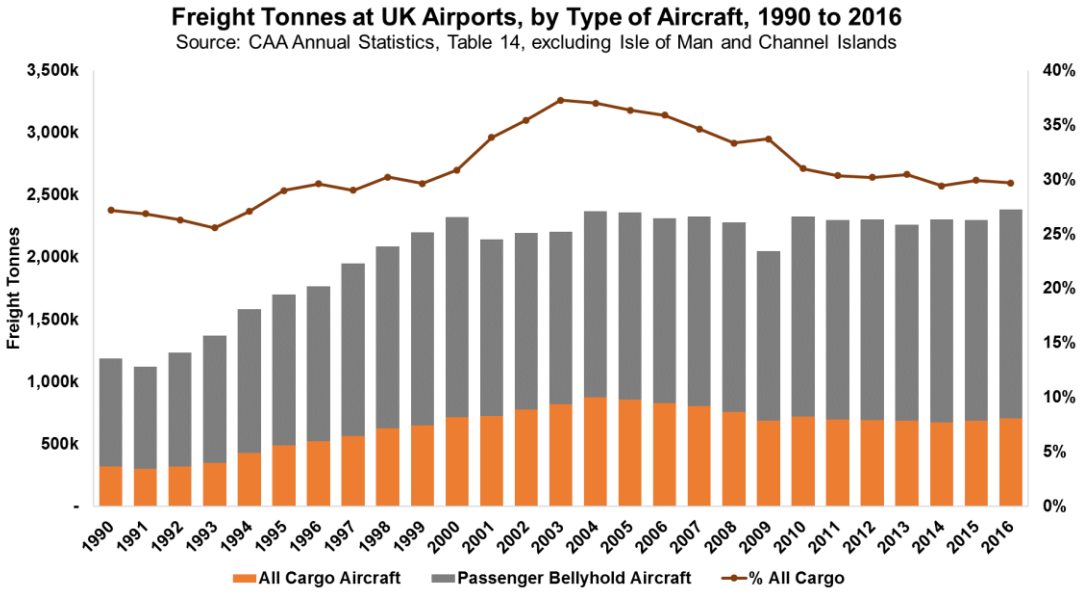

Figure 5 – Split of UK air freight between bellyhold and dedicated freighter aircraft

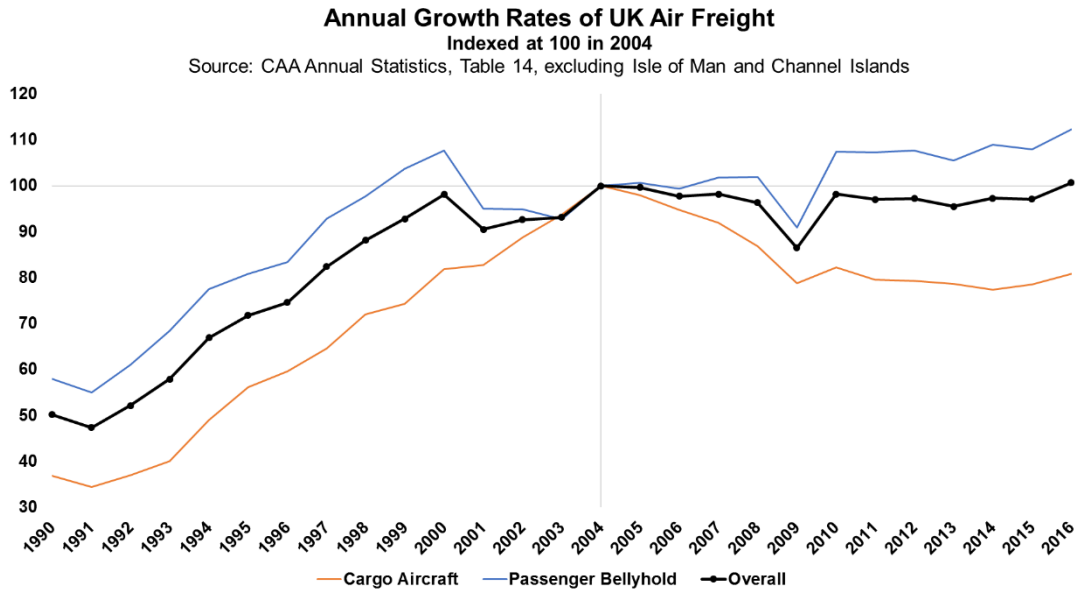

Figure 6 – Annual growth rates of UK freight

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.

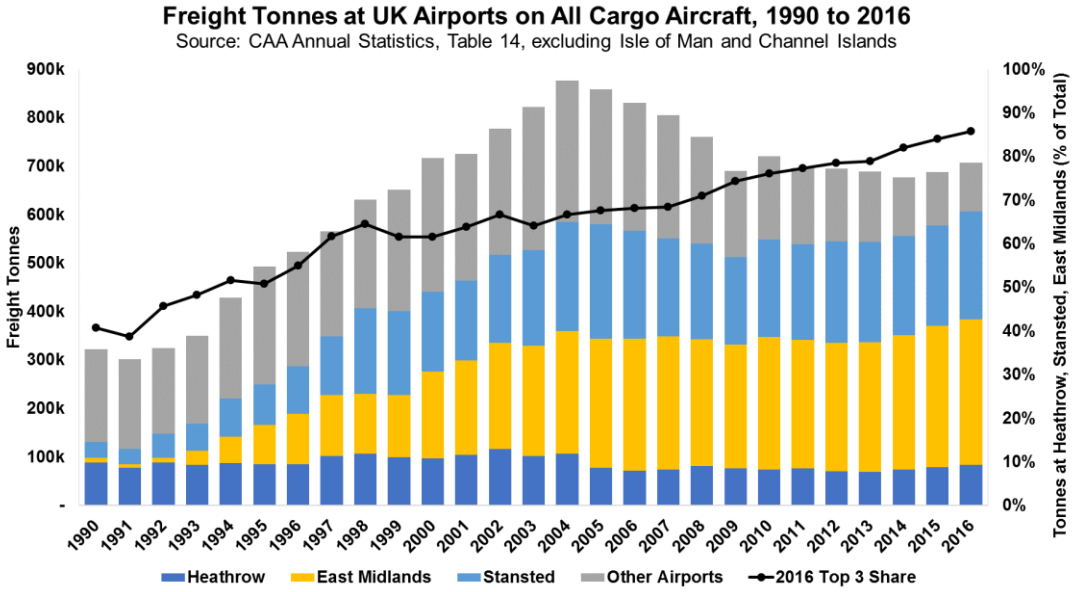

Figure 7 – Timeseries of UK freight on cargo-only aircraft

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).

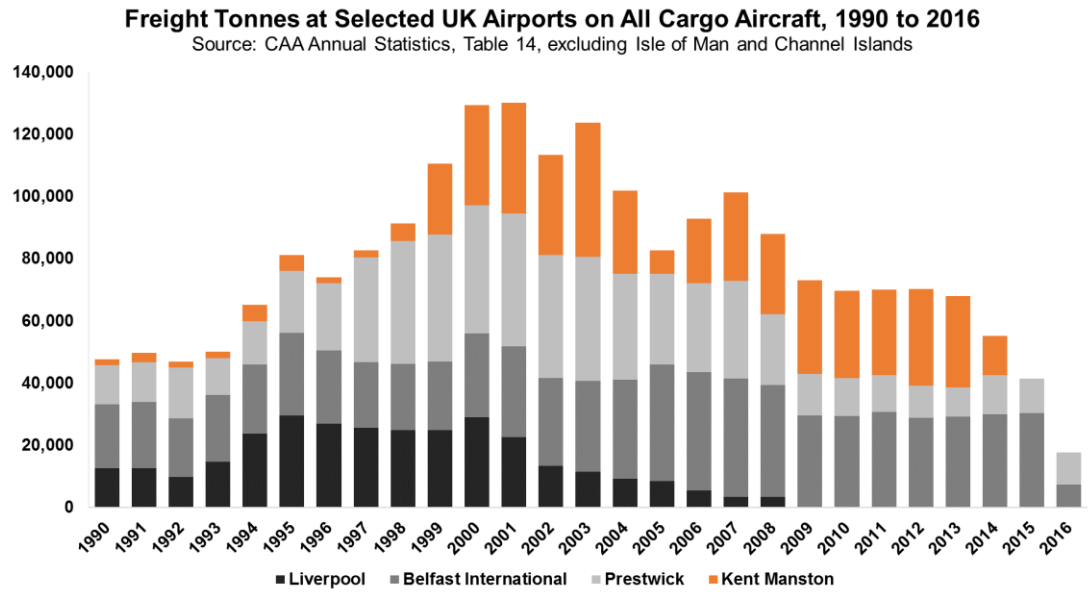

Figure 8 – Reduction of freight on cargo-only aircraft at selected airports

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.

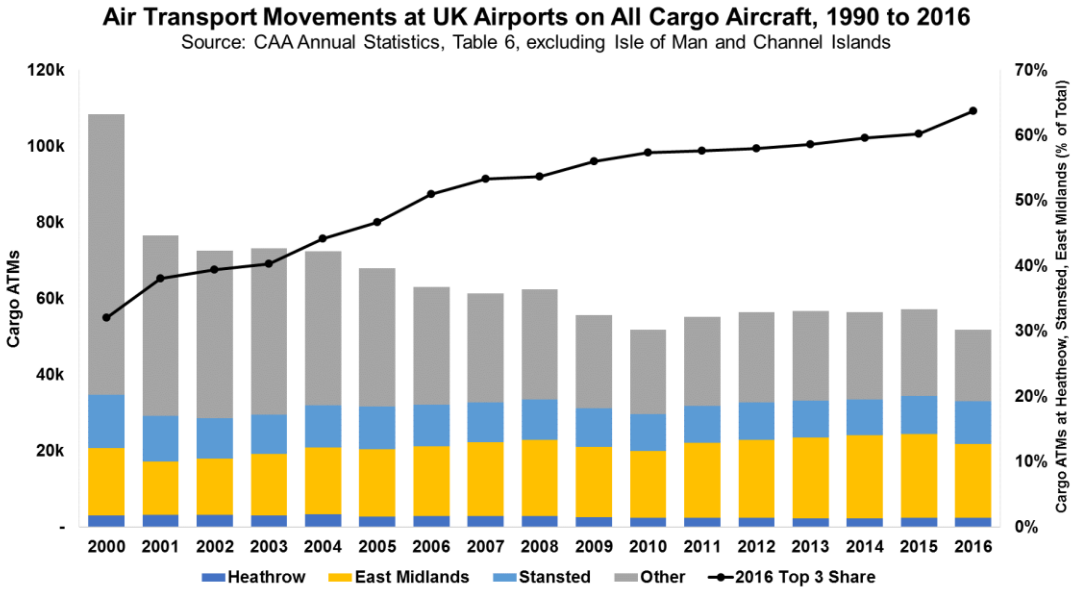

Figure 9 – Consolidation of freight on cargo-only aircraft at Heathrow, East Midlands and Stansted

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.

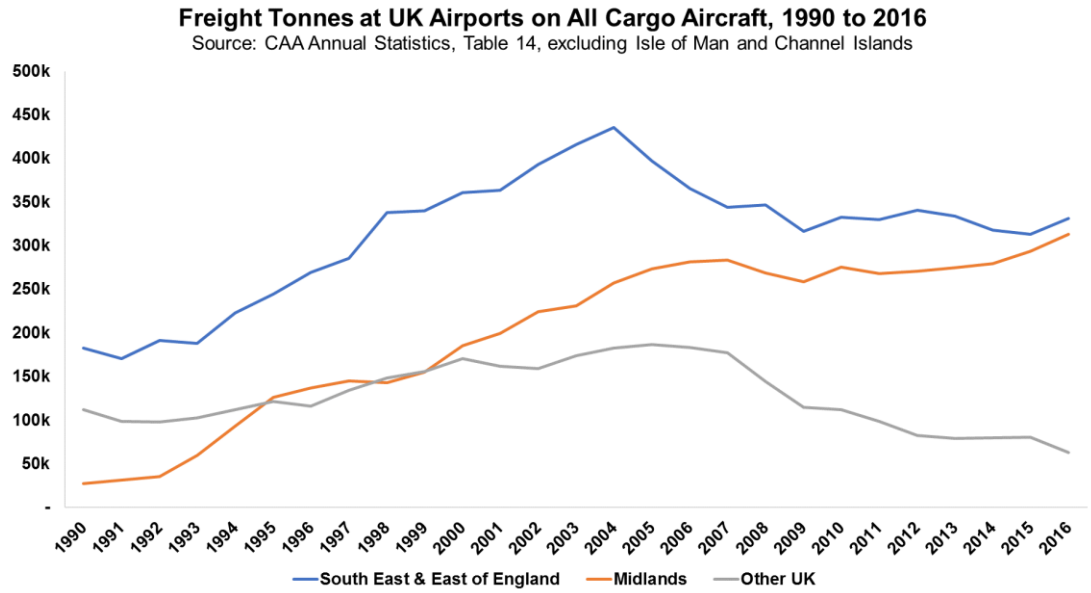

Figure 10 – Breakdown of UK freight on cargo-only aircraft, by region.

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.

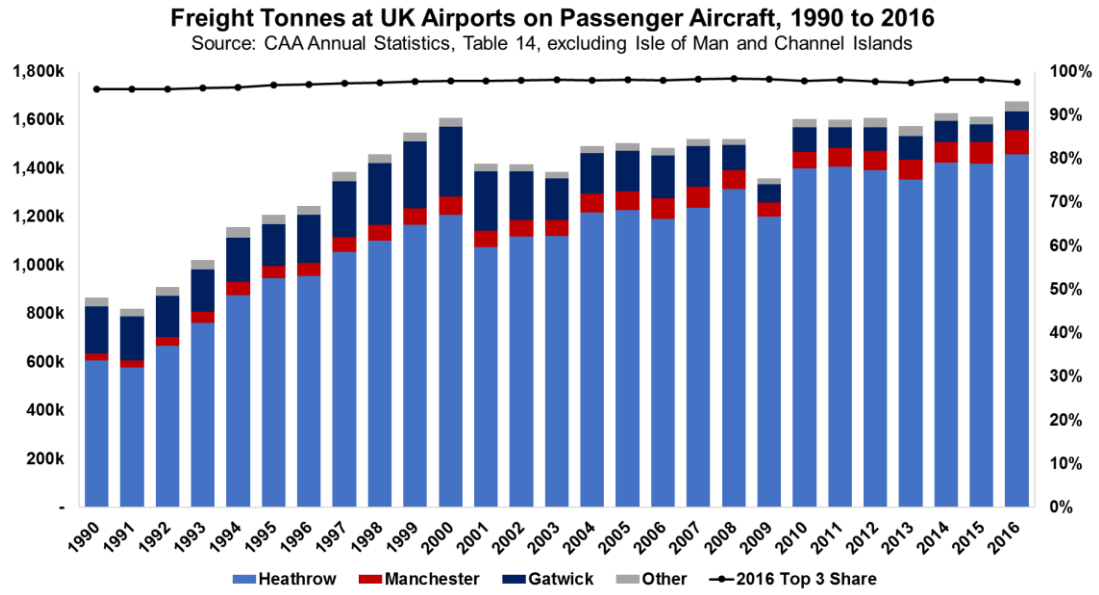

Figure 11 - Timeseries of UK freight on passenger aircraft

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.

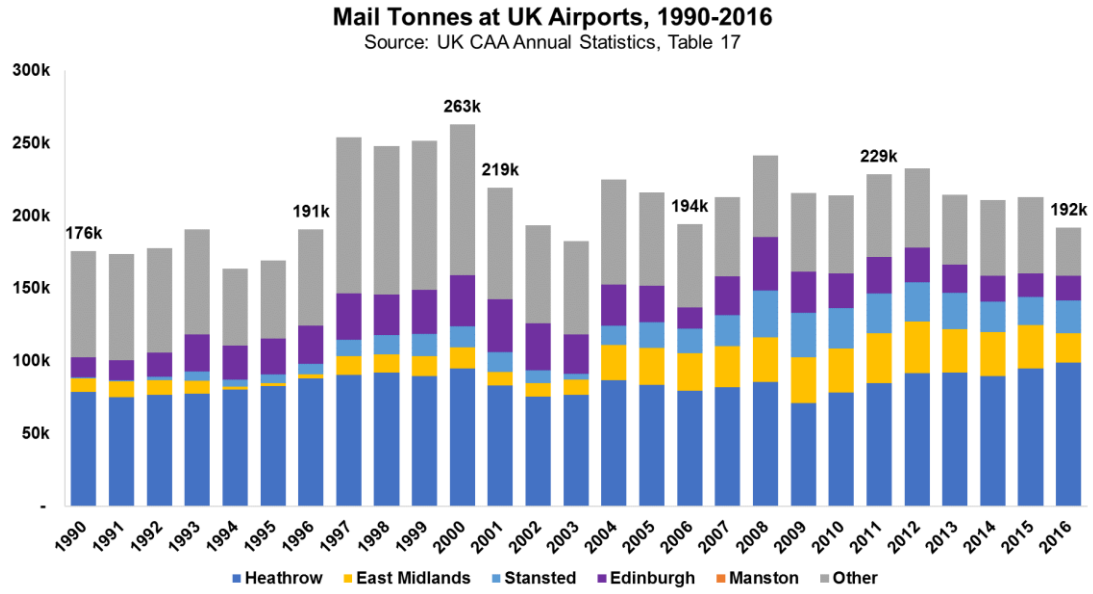

Figure 12 – Timeseries of UK Mail tonnage

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).

[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.

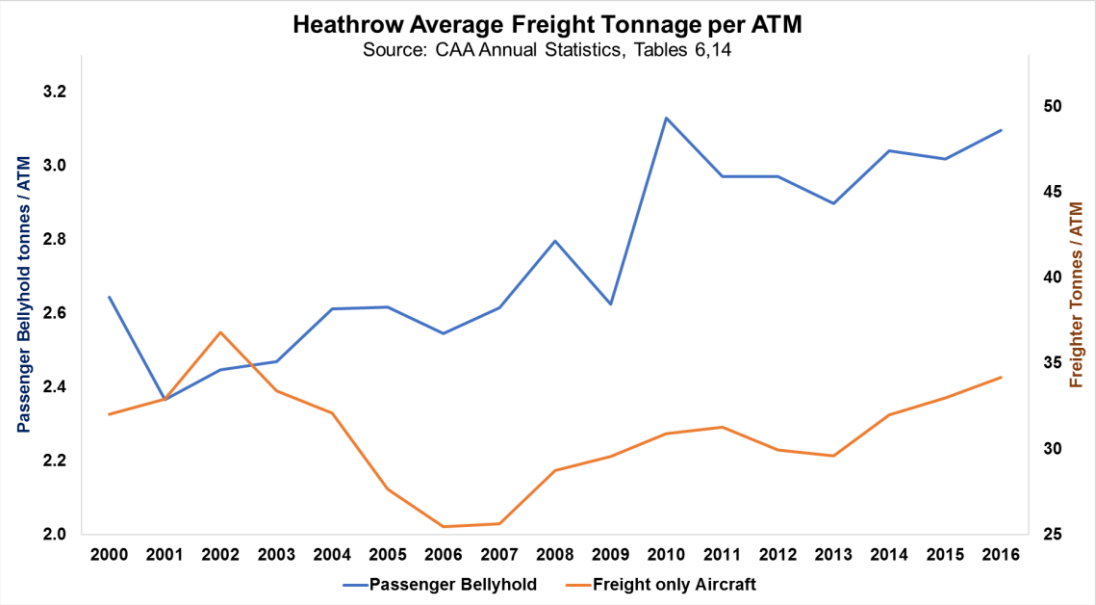

Figure 13 – Change over time of average tonnage per ATM at Heathrow

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.

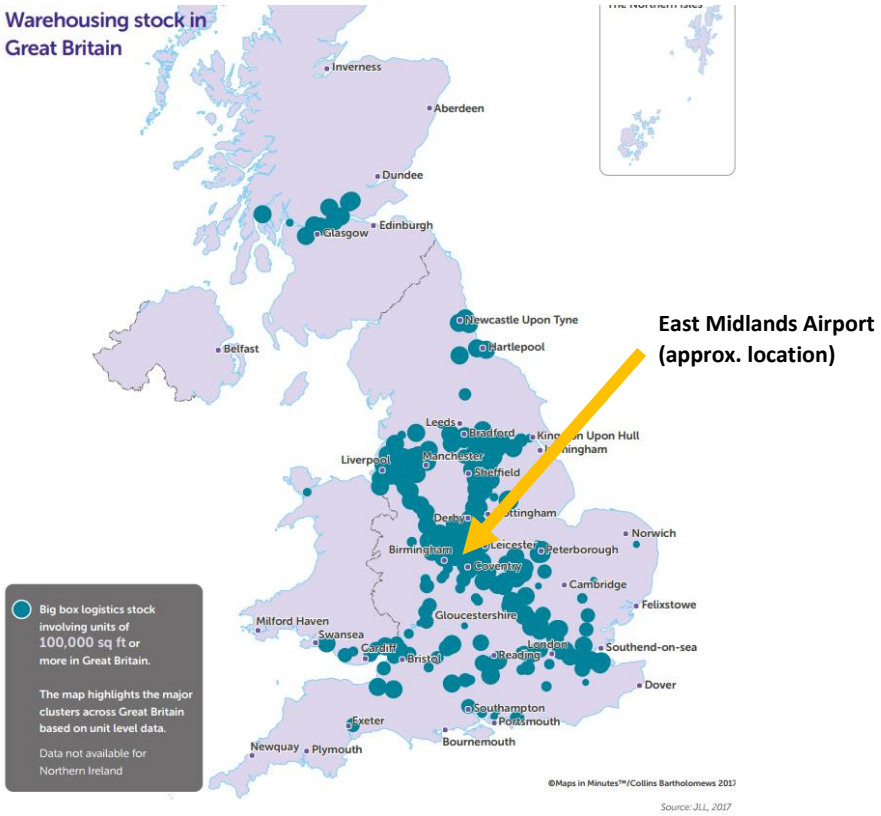

Figure 14 – Locations of large warehousing units in the UK, Source: Freight Transport Association

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%.

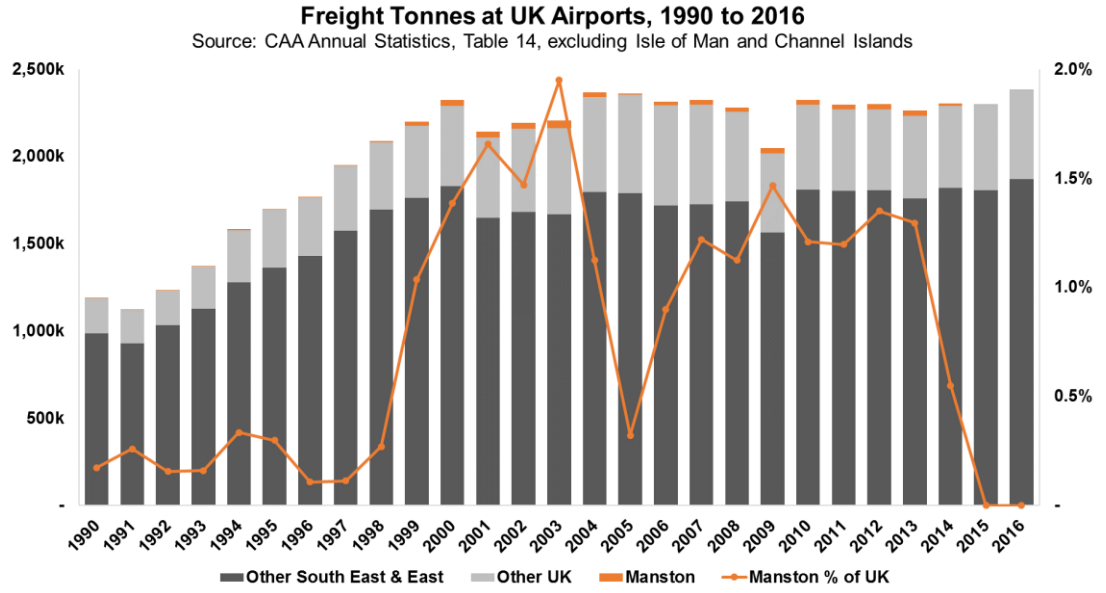

Figure 15 – Timeseries of UK freight, including that handled at Manston

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.

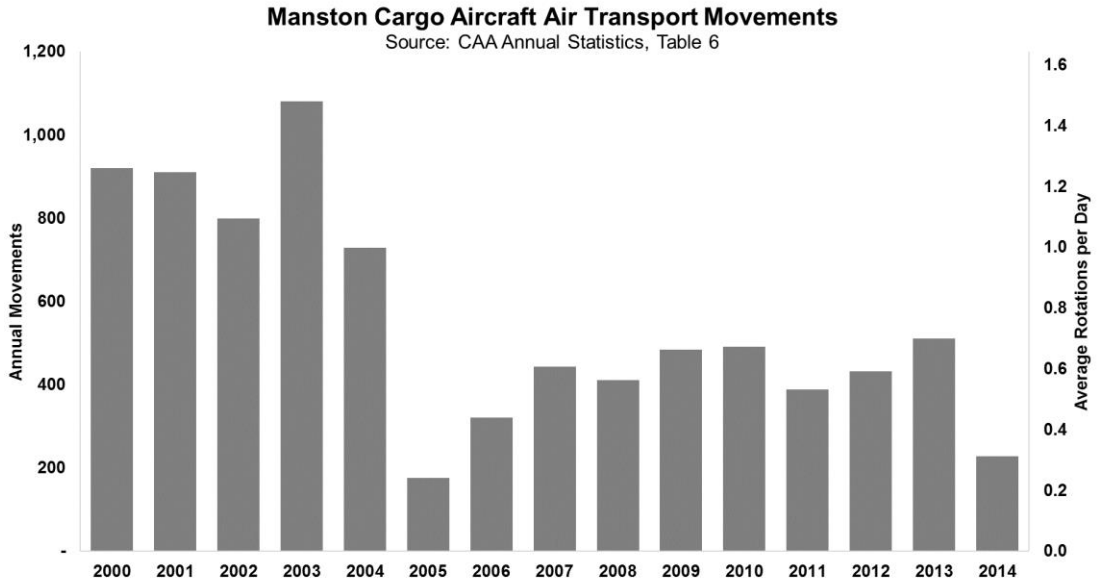

Figure 16 – Manston cargo-only aircraft movements

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.

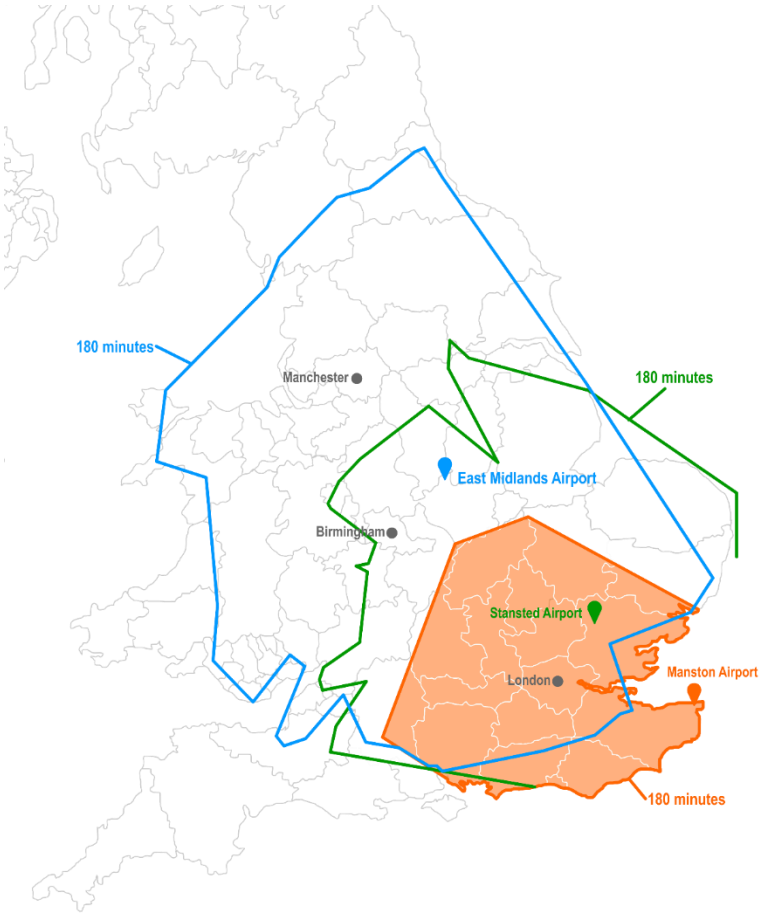

Figure 17 – 3-hr catchment region of Manston in comparison with those of East Midlands and Stansted
Source: Altitude analysis, Google Maps (truck speed set at 55 miles per hour)

[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)

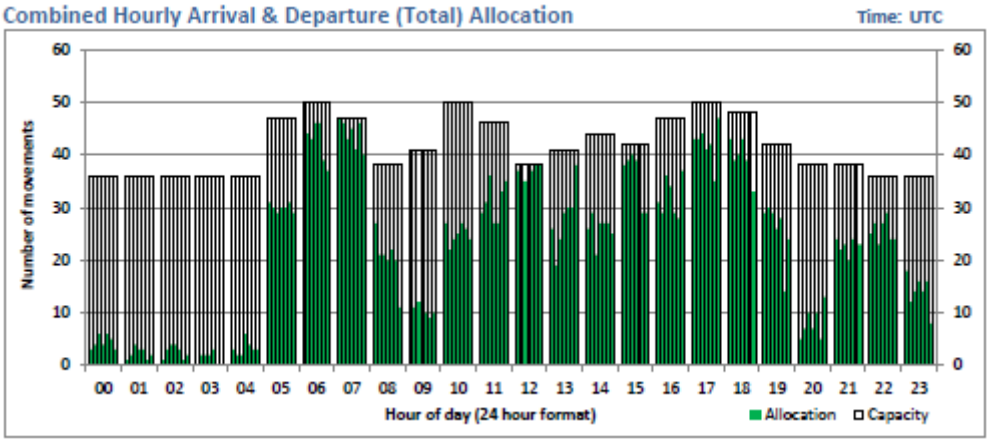

Figure 18 - Peak Week, Hourly Runway Allocation, Stansted Airport, Summer 2017. Source Airport Coordination Limited[78]

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:

[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).

[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].

[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.

[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)

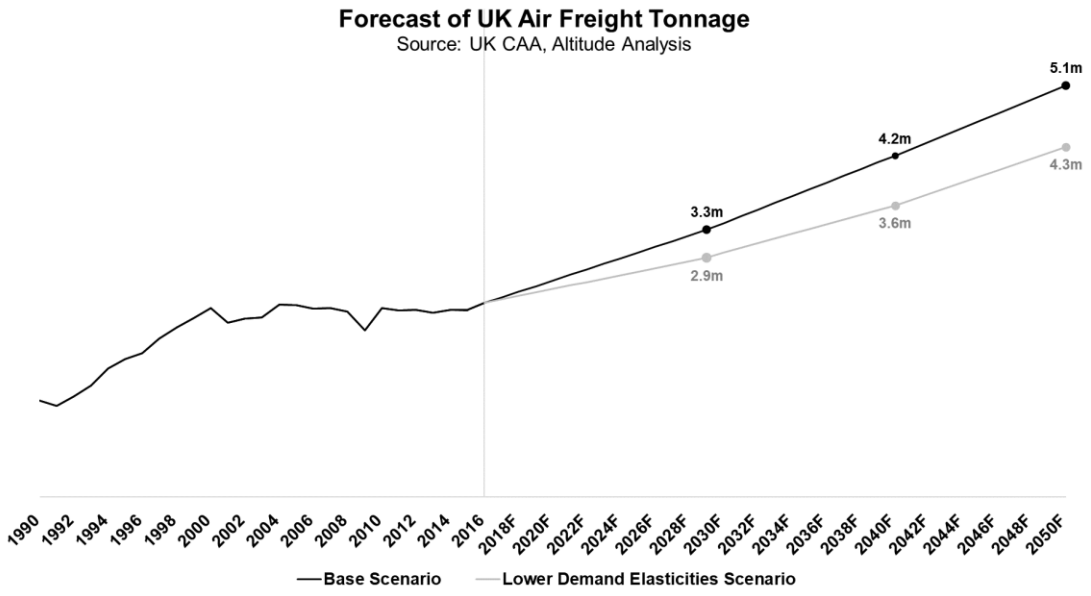

Figure 19 – Altitude forecast of UK air freight demand to 2050

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)

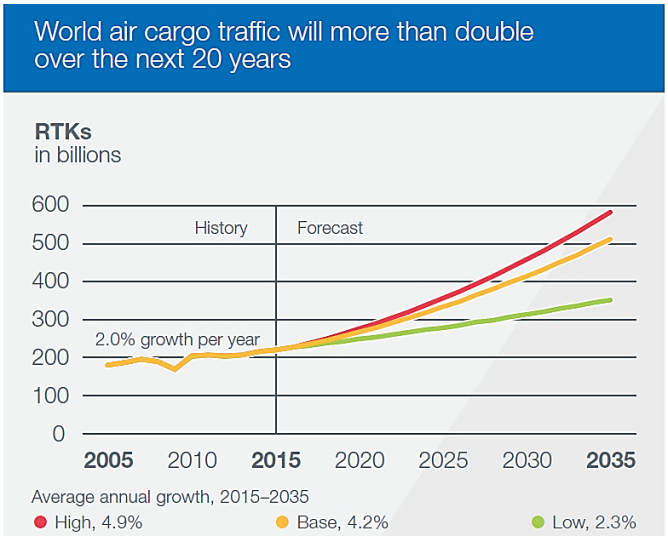

Figure 20 – Global 20-year air cargo forecast - timeseries of high, base and low forecasts

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.

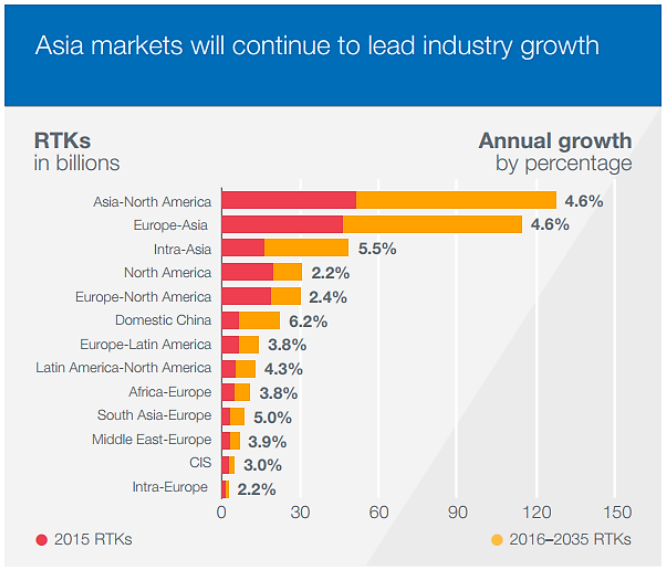

Figure 21 –Global 20-year air cargo forecast – size, and growth rates, of key flows

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)

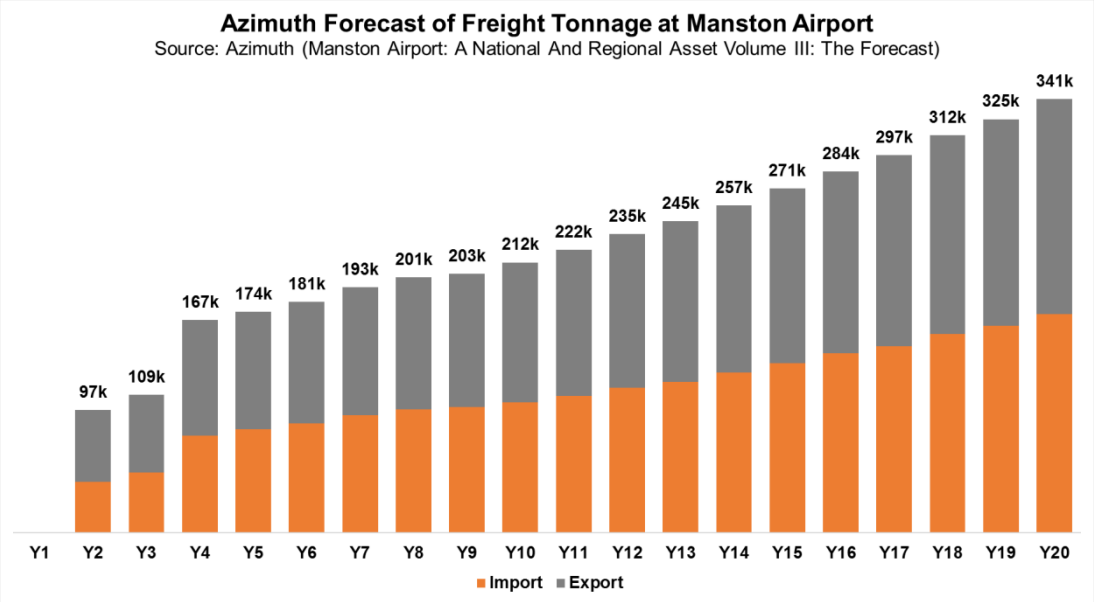

Figure 22- Azimuth Forecast of Freight Tonnage at Manston Airport

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.

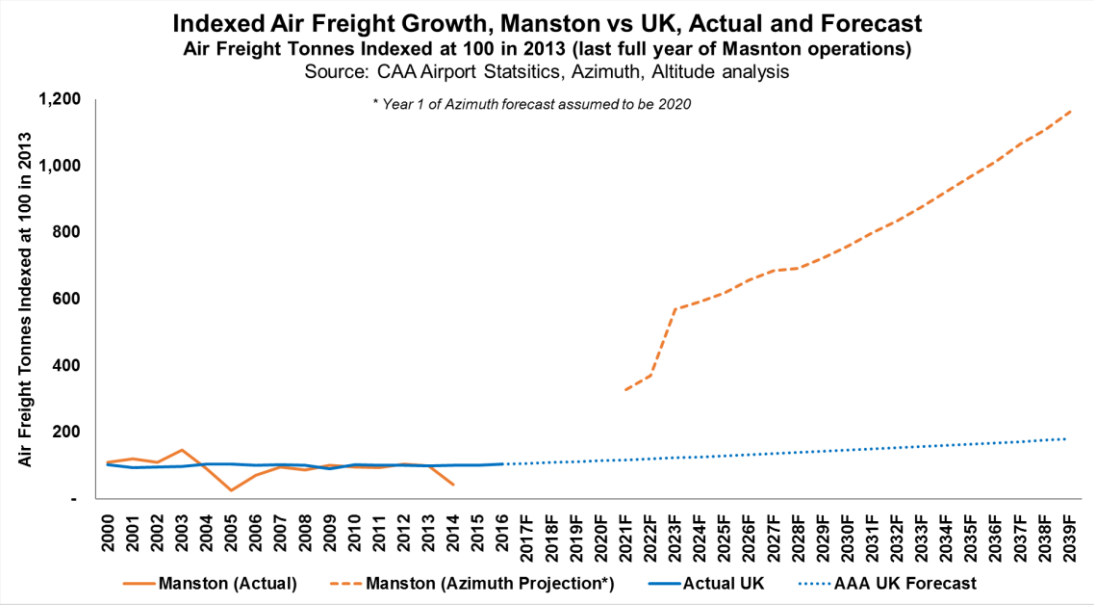

Figure 23- Azimuth Forecast Compared to Historic Growth and UK Forecast

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.

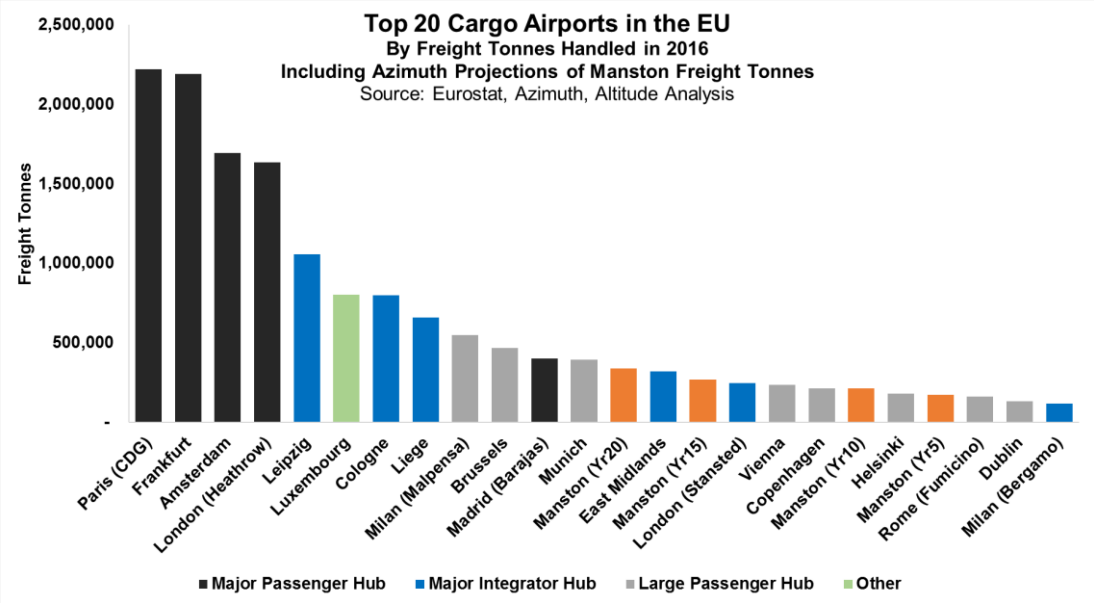

Figure 24- Azimuth Forecast Compared to EU Air Freight Benchmarks

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.

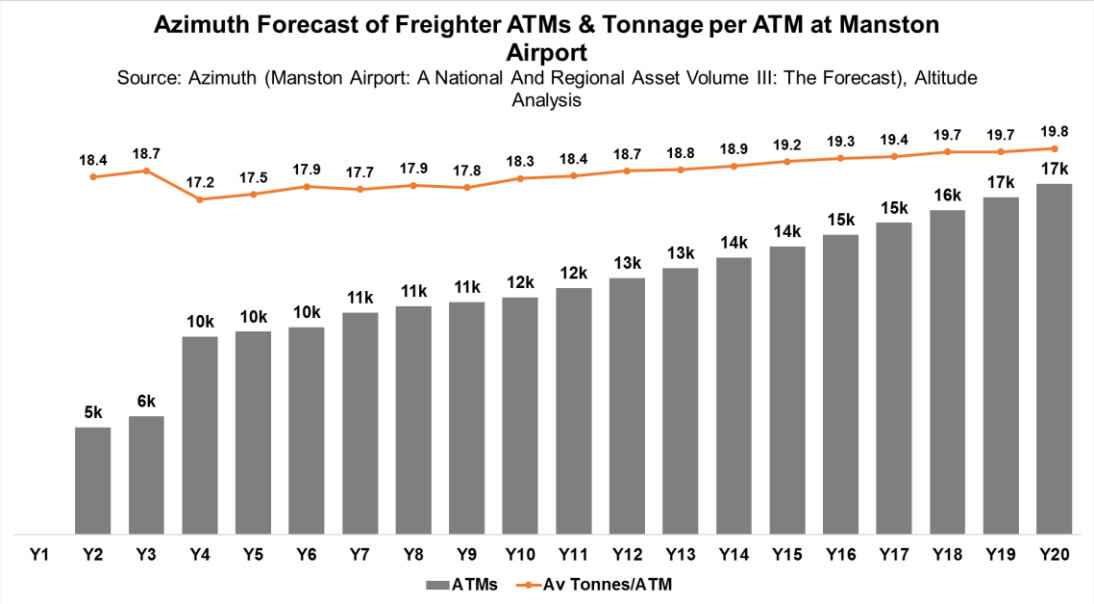

Figure 25- Azimuth Forecast of Freighter ATMs & Tonnage per ATM at Manston Airport

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.

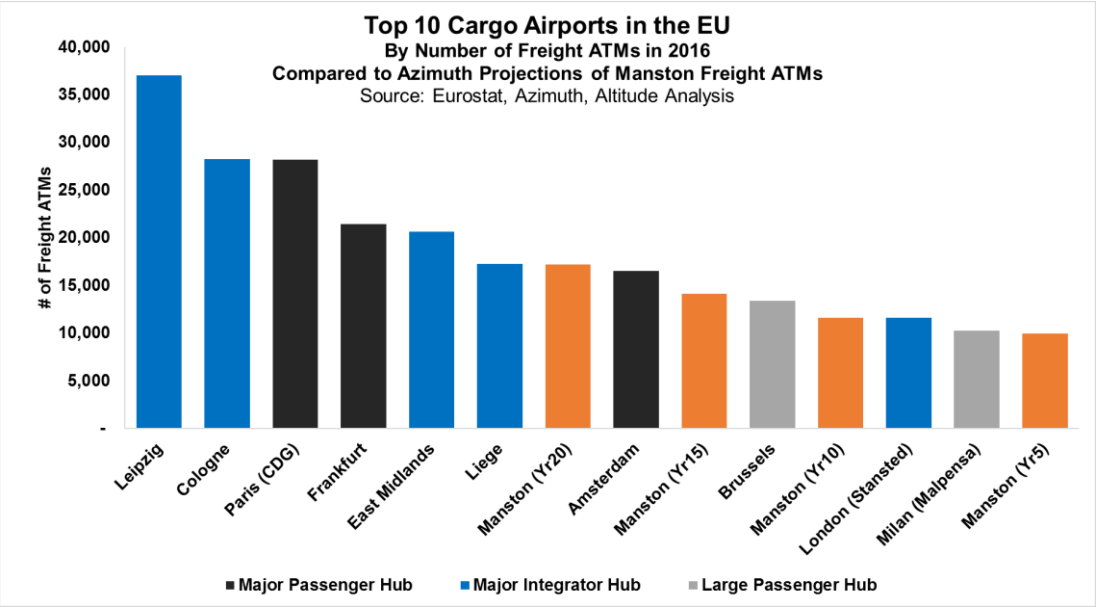

Figure 26- Azimuth Forecast Compared to EU Freighter ATM Benchmarks

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.

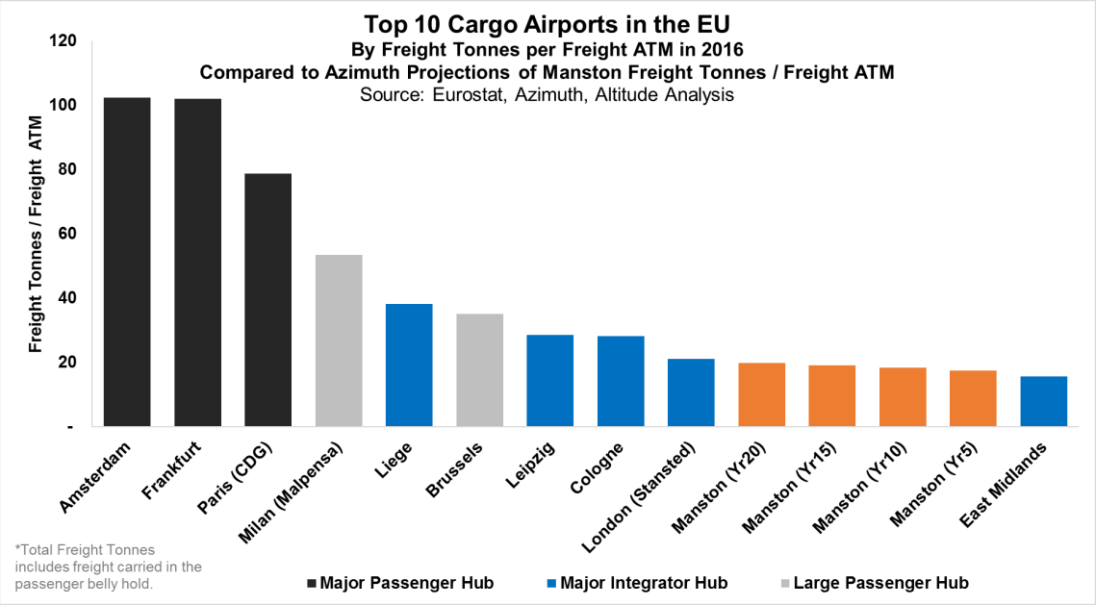

Figure 27- Azimuth Forecast Compared to EU Air Freight Tonnes per Freighter ATM Benchmarks

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].

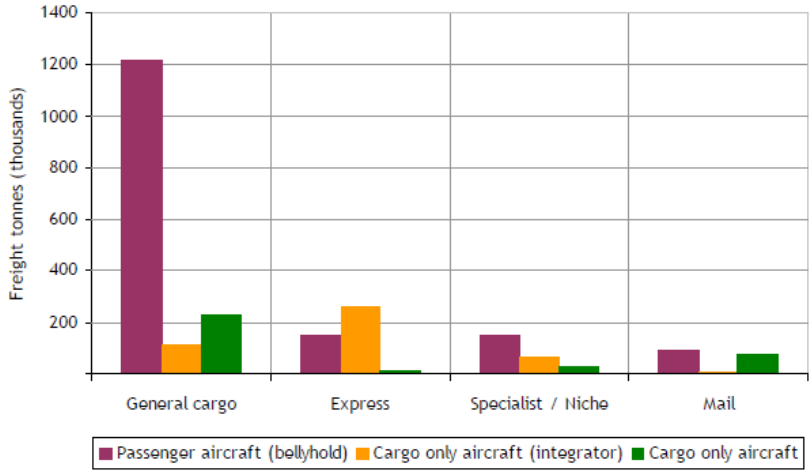

Figure 28 - UK air cargo in 2008 by type of cargo and type of carrier

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).

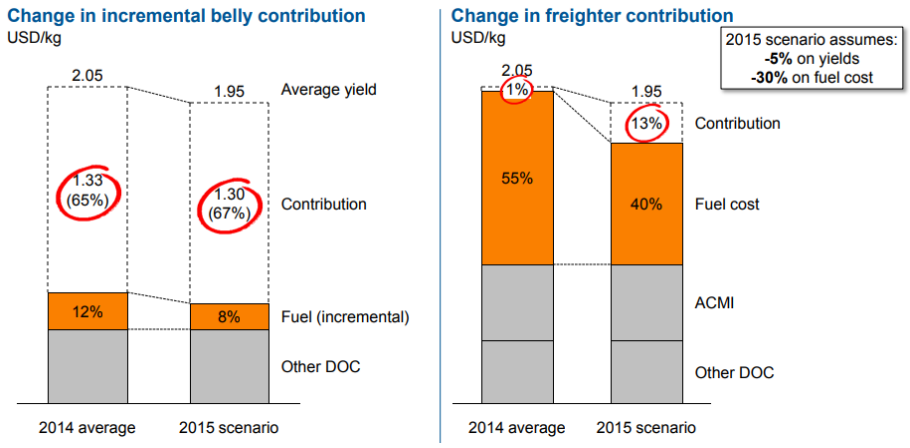

Figure 29 - Freighter vs bellyhold profitability, and impact of fuel price

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%.

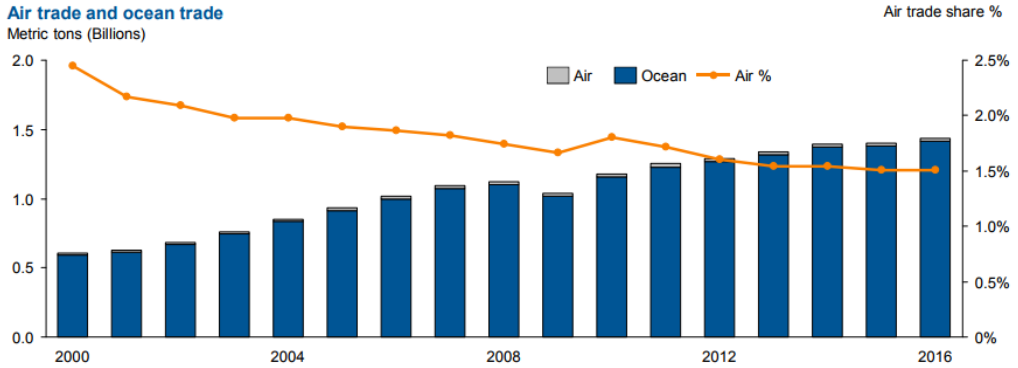

Figure 30 – Evolution of air and ocean freight tonnage with time

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].

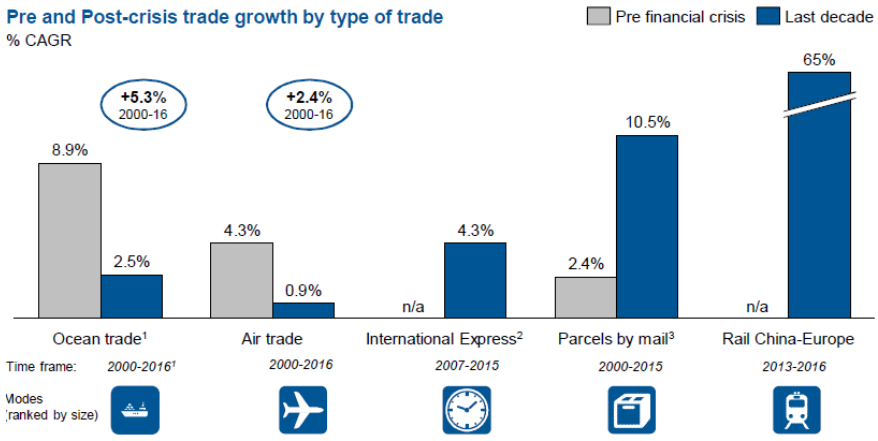

Figure 31 – Cargo growth rates by mode (pre- and post- financial crisis)

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"*

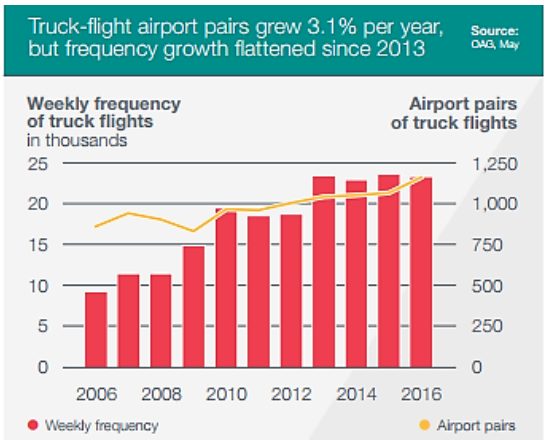

Figure 32 – Example of the growth of trucking within Europe

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]:

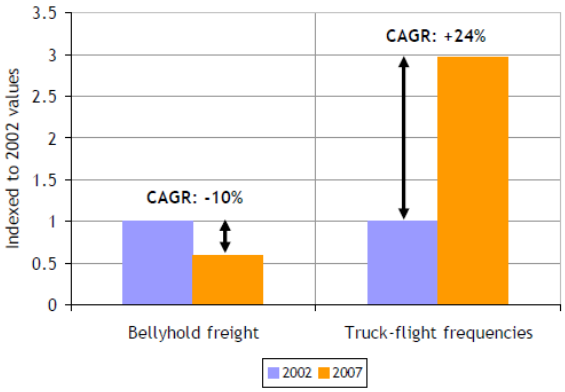

Figure 33 – Comparison of bellyhold airfreight tonnage and truck-flight frequency growth

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).

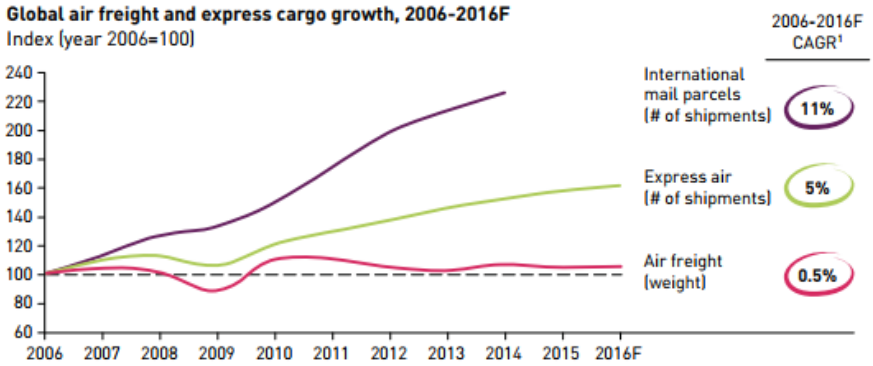

Figure 34 – Air cargo growth rates by type of cargo

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]:

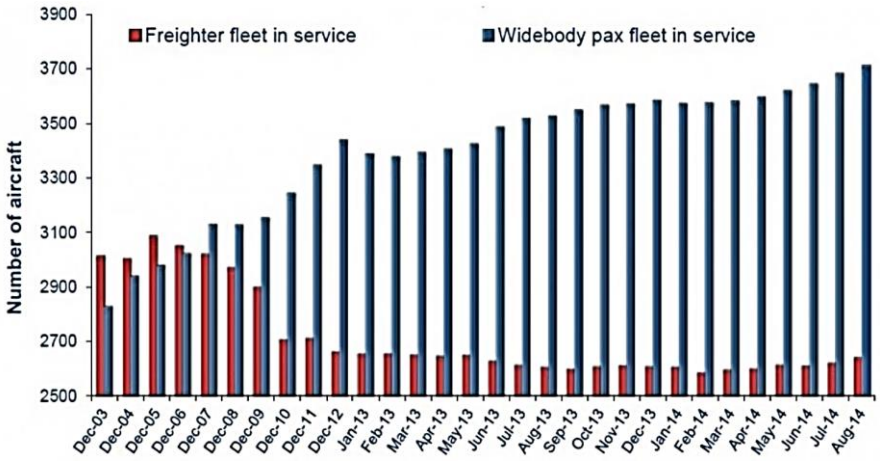

Figure 35 – Number of freighters and widebody passengers aircraft in service globally, Source: CAPA

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].

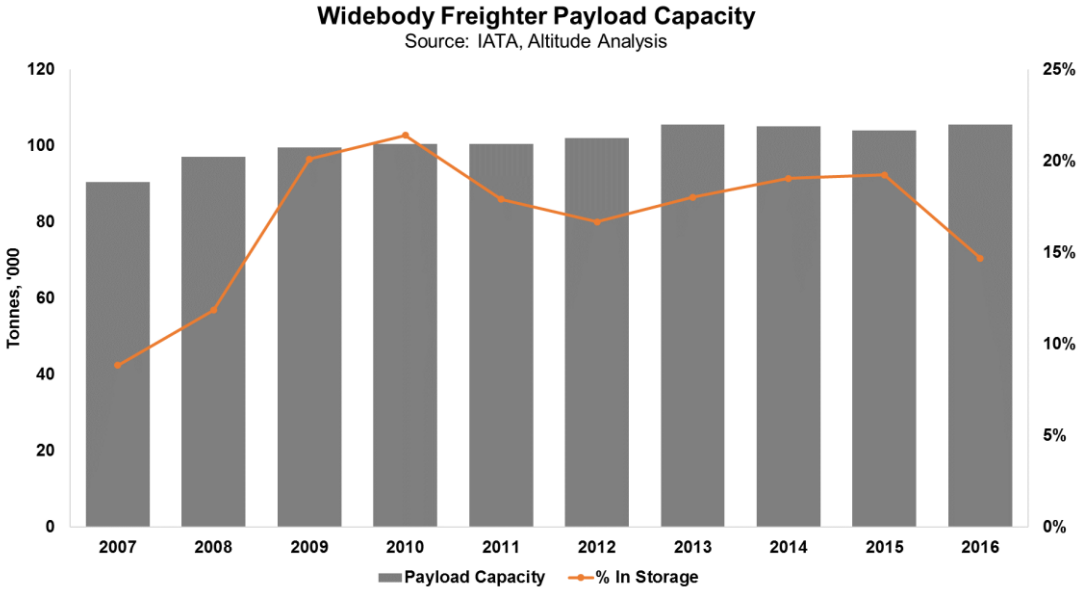

Figure 36 – Change in widebody freighter payload capacity with time

[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.

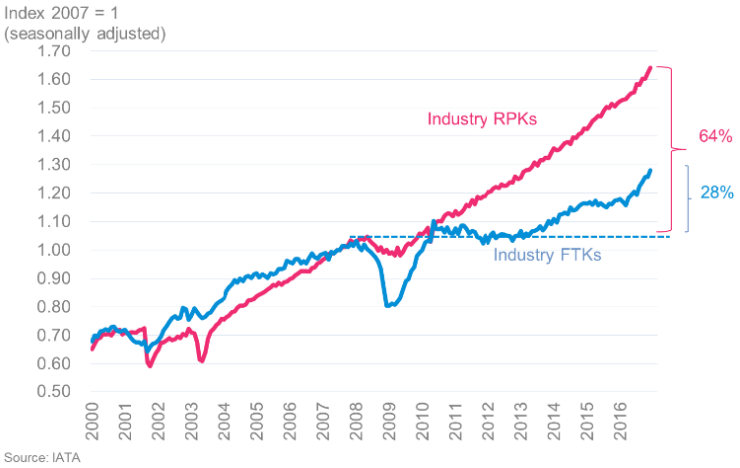

Figure 37 – Passenger growth compared with air freight growth, Source: IATA

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.

[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)	Indicative Cargo Capacity 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 10-15m^3, capable of storing loose-loaded items. At IAG Cargo, this space was primarily used for blankets and newspapers for passengers, with around 2-4m^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."*

[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.

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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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.

[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.

[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 not 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/2002073007004526862/
[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 <u>may</u> 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.

Long Term (10-20 years)

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.

[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.

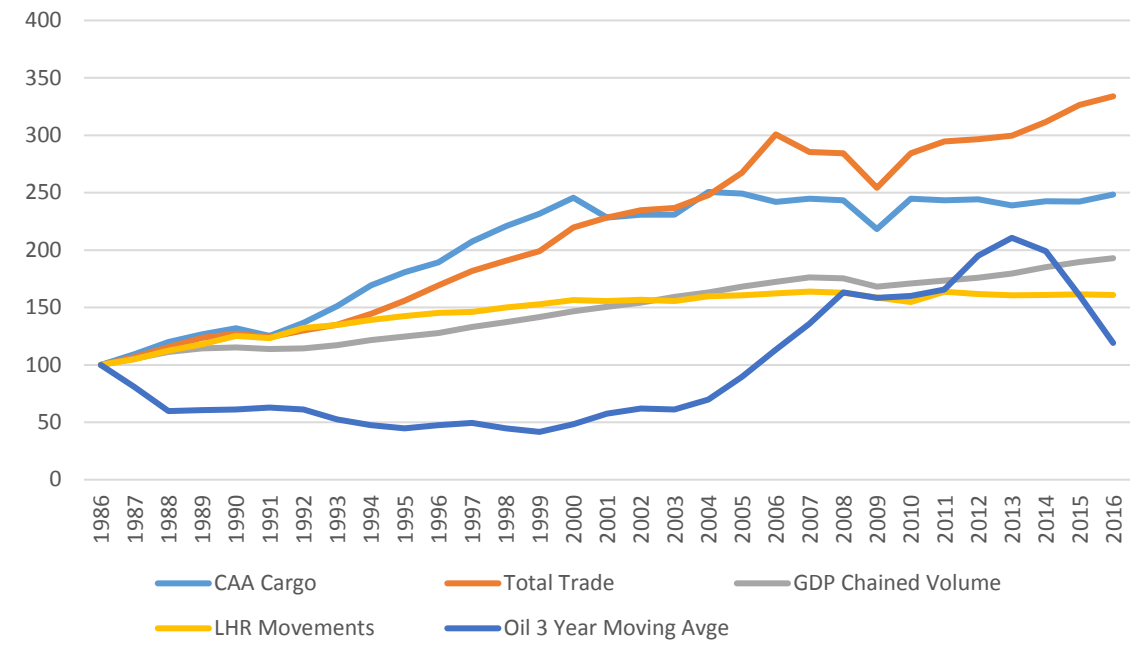
3.4 In this report, we now consider specifically the potential role for Manston by way of a scenario analysis that draws on the analysis of the overall market and the past performance of the Airport. The use of scenarios rather than a single forecast is intended to show a range of possible outcomes for 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.

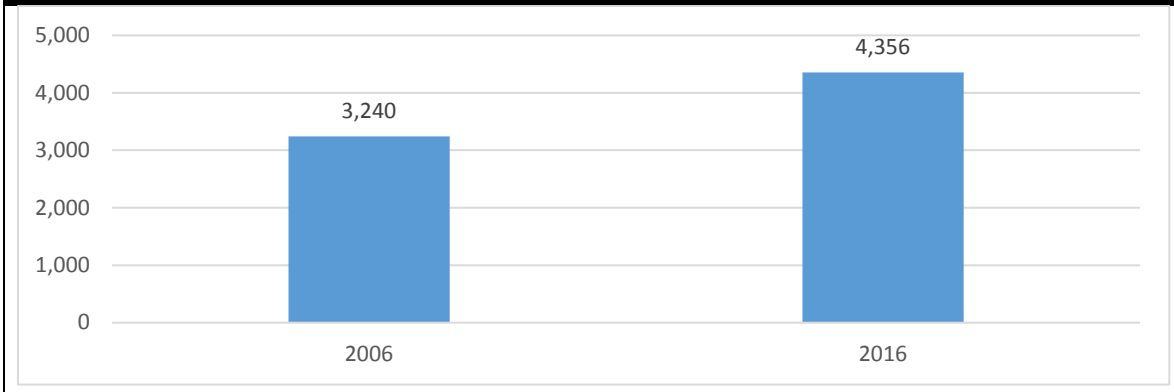
3.10 This is particularly important as it suggests that the market for bellyhold freight is different from that for pure freighter traffic. This is a function of price and urgency in relation to general air freight, as opposed to either express freight or niche products. For express freight or niche 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.

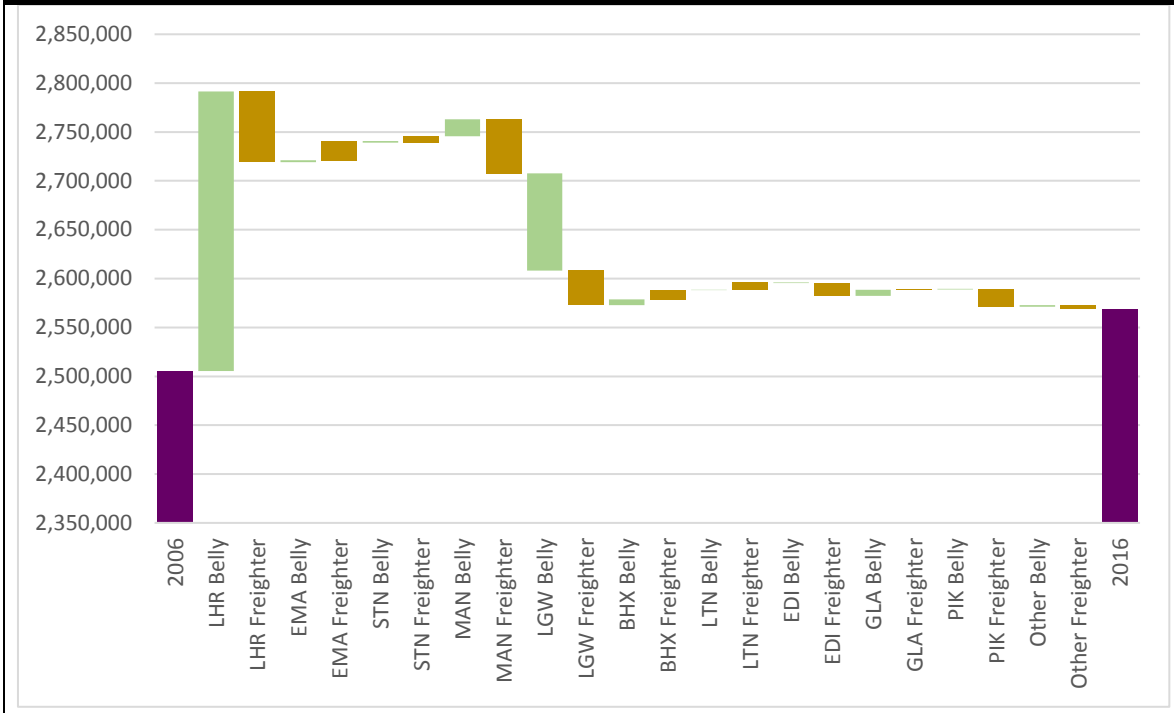
Figure 3.2: UK Air Cargo Market Herfindahl-Hirschman Index of Market Concentration



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.

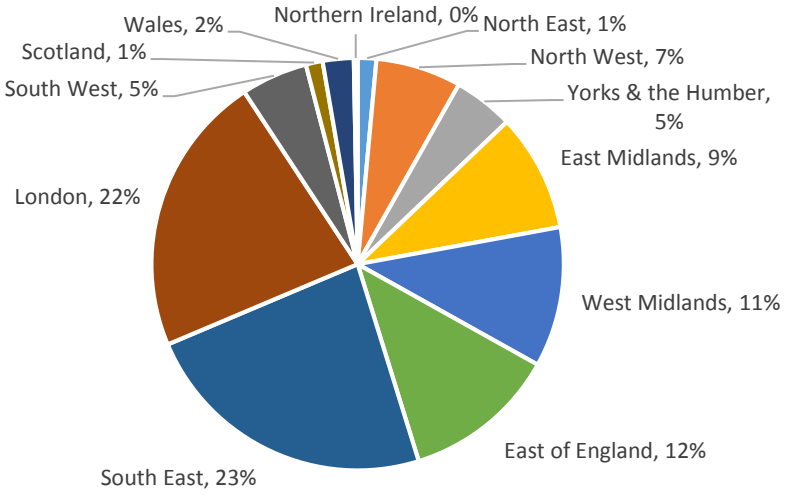
3.17 We have, therefore, developed a simple gravity model that distributes air cargo regionally across the UK based on:

- 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

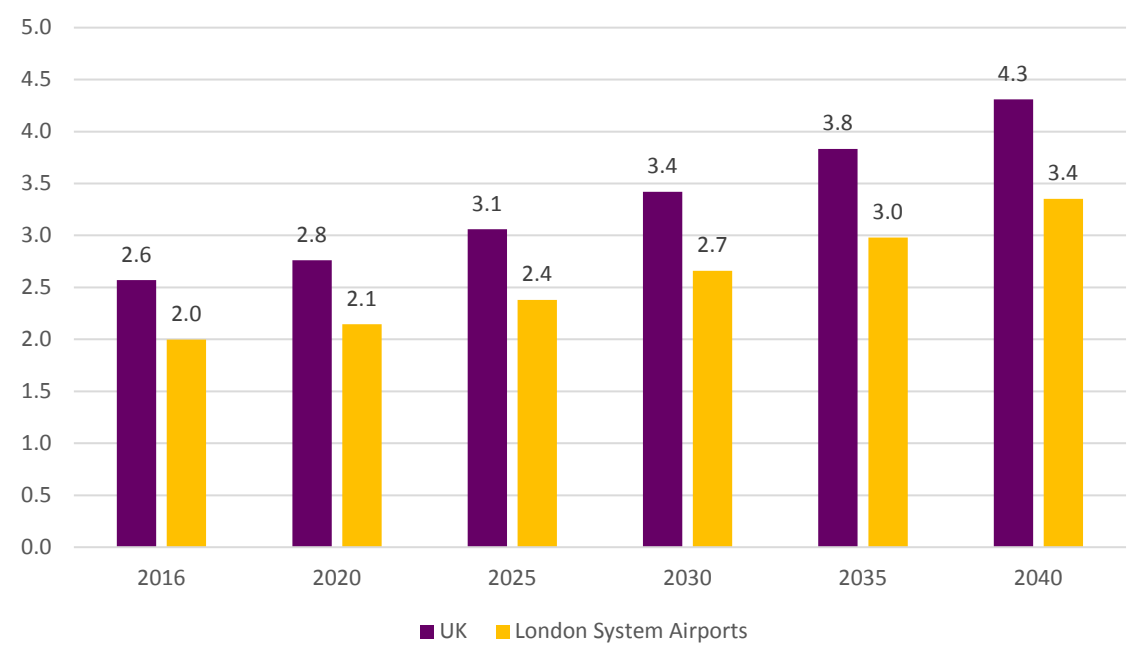
3.20 The initial step in producing our cargo forecasts for Manston is to consider the likely size of the London system and UK air cargo markets in the period to 2040. This is an unconstrained forecast and does not, at this stage, consider whether capacity will be available to deliver this demand.

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;

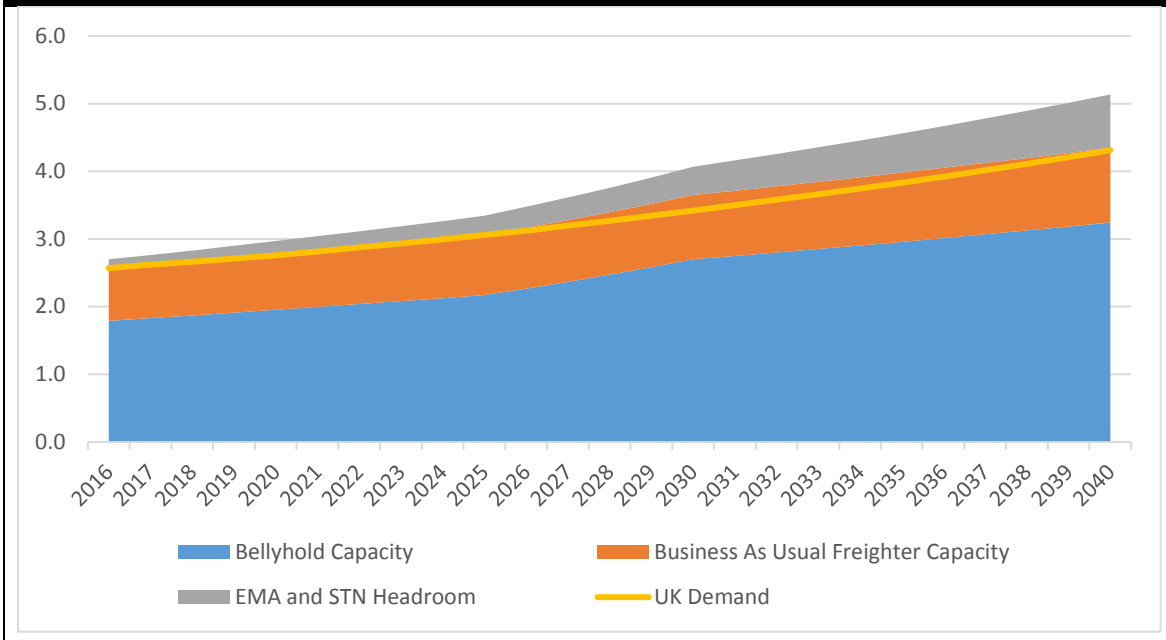
[45] https://www.gov.uk/government/publications/airports-commission-documents-and-data.
[46] The exception to this is the small number of freighter movements at Heathrow, which are not allowed to grow until the Third Runway is opened.
[47] Department for Transport, *UK Aviation Forecasts*, October 2017, 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

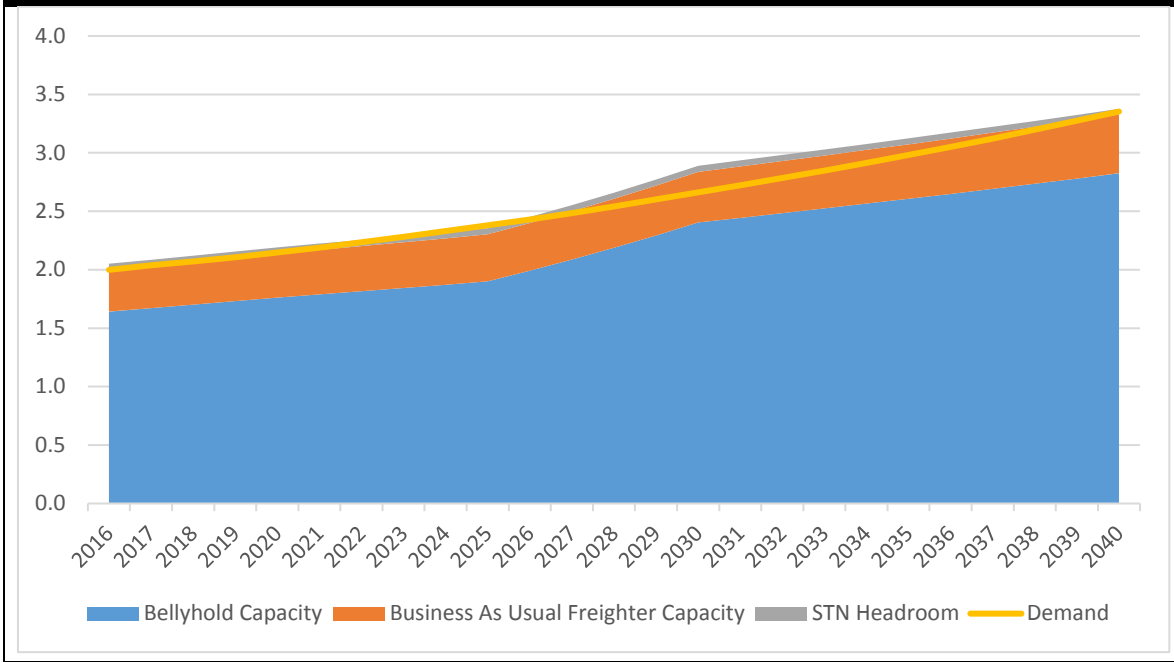


Source: York Aviation

[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

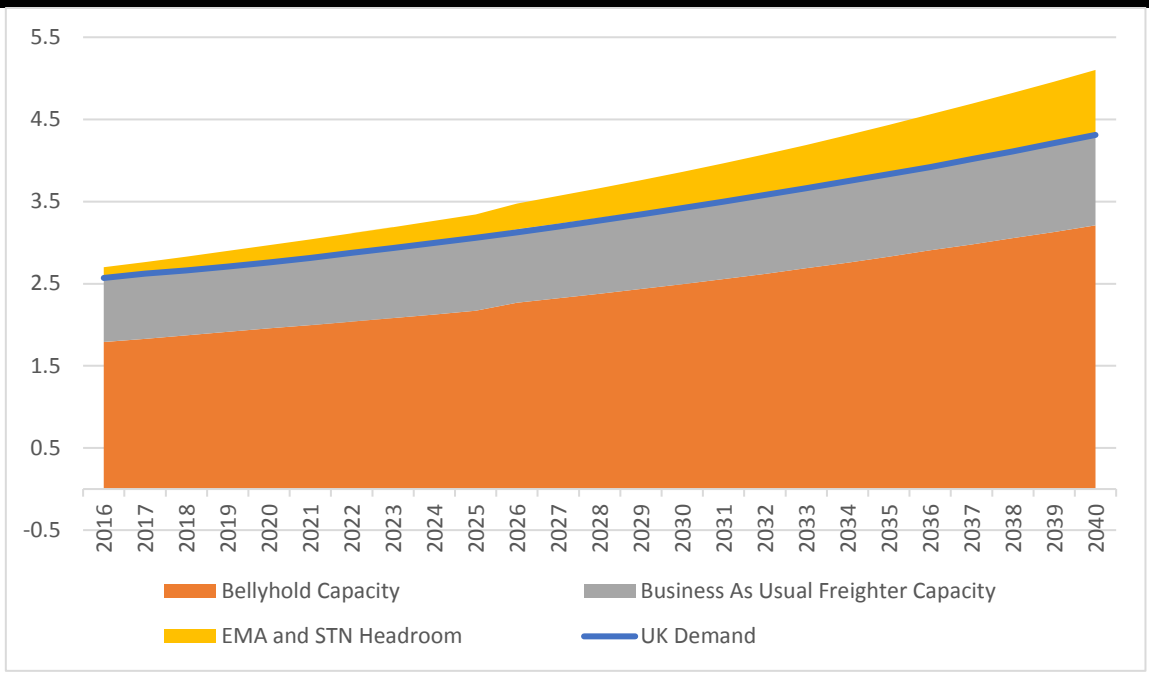
3.32 The situation at the London airports is slightly different if we assume that London maintains its market share of the overall market and there is no natural 'clawback' to the regions. With Heathrow's bellyhold growth relatively constrained, there are potentially some limited capacity constraints 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.

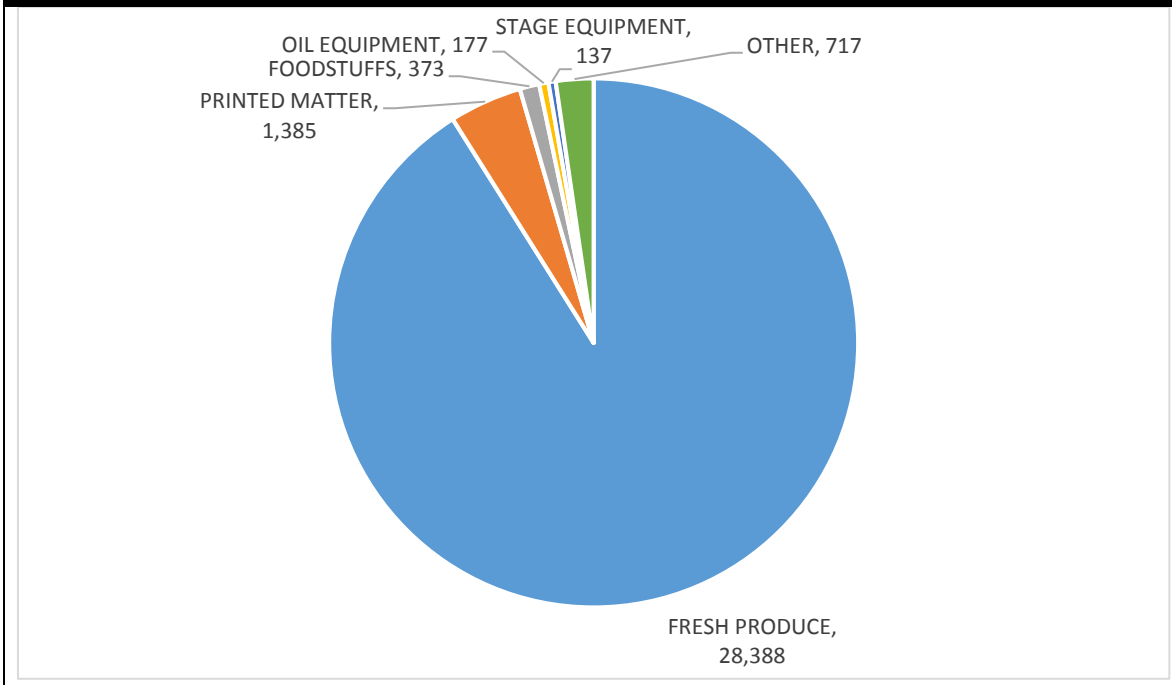
Figure 3.8: UK Air Cargo Capacity with No Third Runway at Heathrow



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

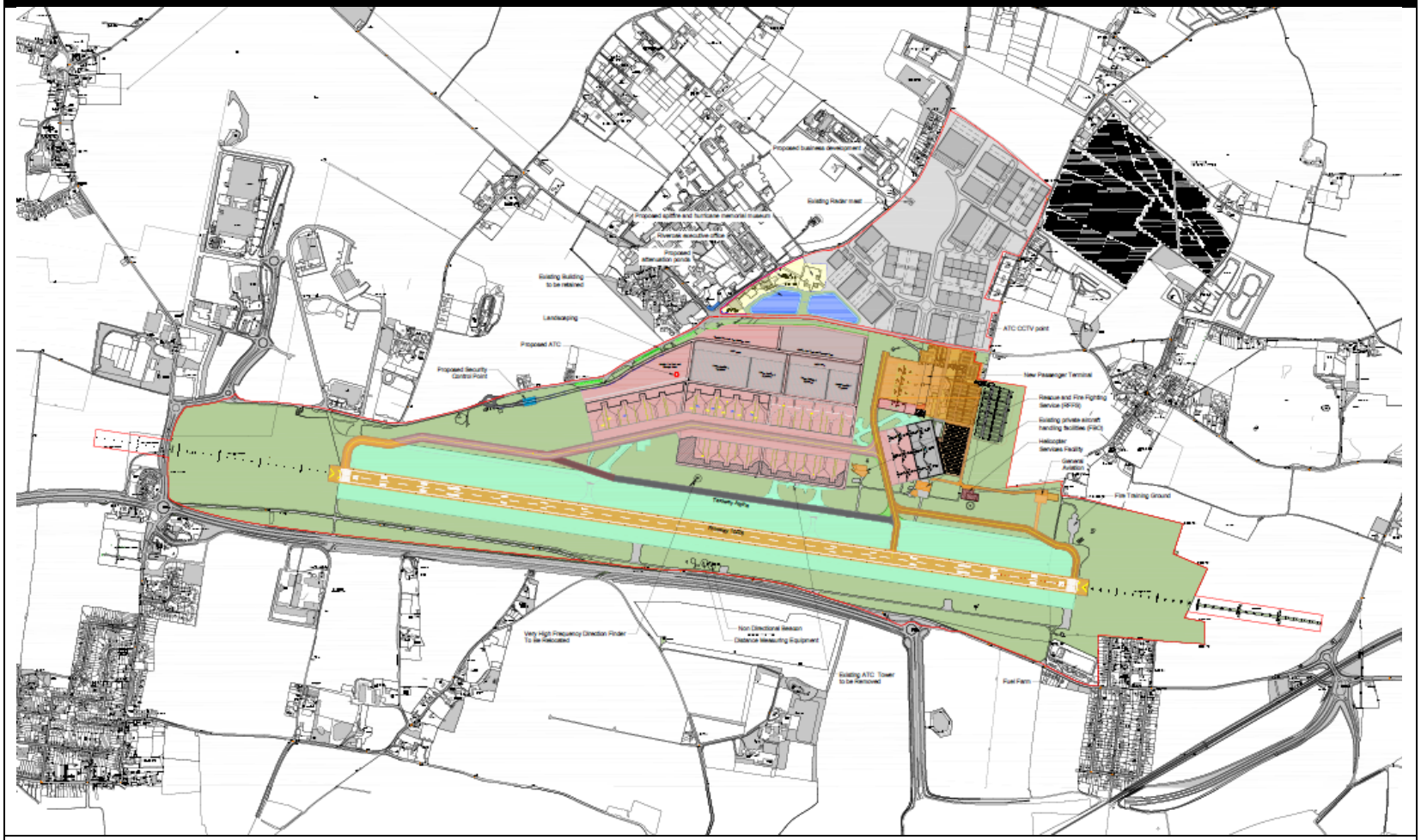
4.8 The Master Plan presented by RSP for the Manston Airport site is shown at **Figure 4.1**. It makes use of the full length of the runway and provides a full length parallel taxiway. The western side of the site is dedicated to freight handling activity and has 19 Code E aircraft stands for cargo flights 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.

[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.

[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

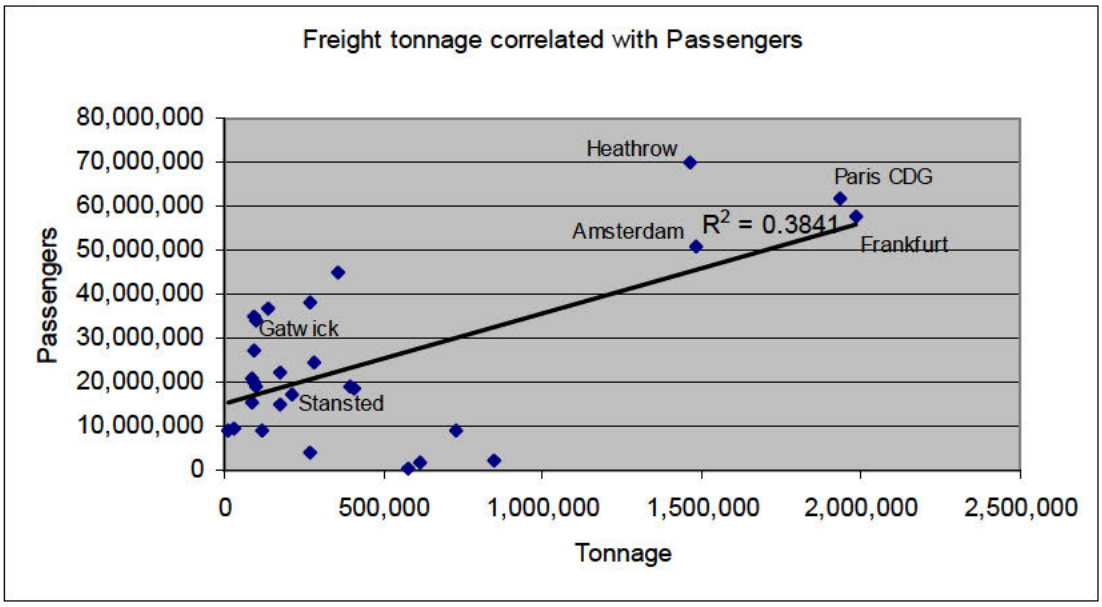
	Tonnes
Manchester	97,215
East Midlands	267,350
Cologne	730,040
Munich	272,203
Dusseldorf	86,729
Leipzig	846,086
Rome	135,777
Liege	577,226

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

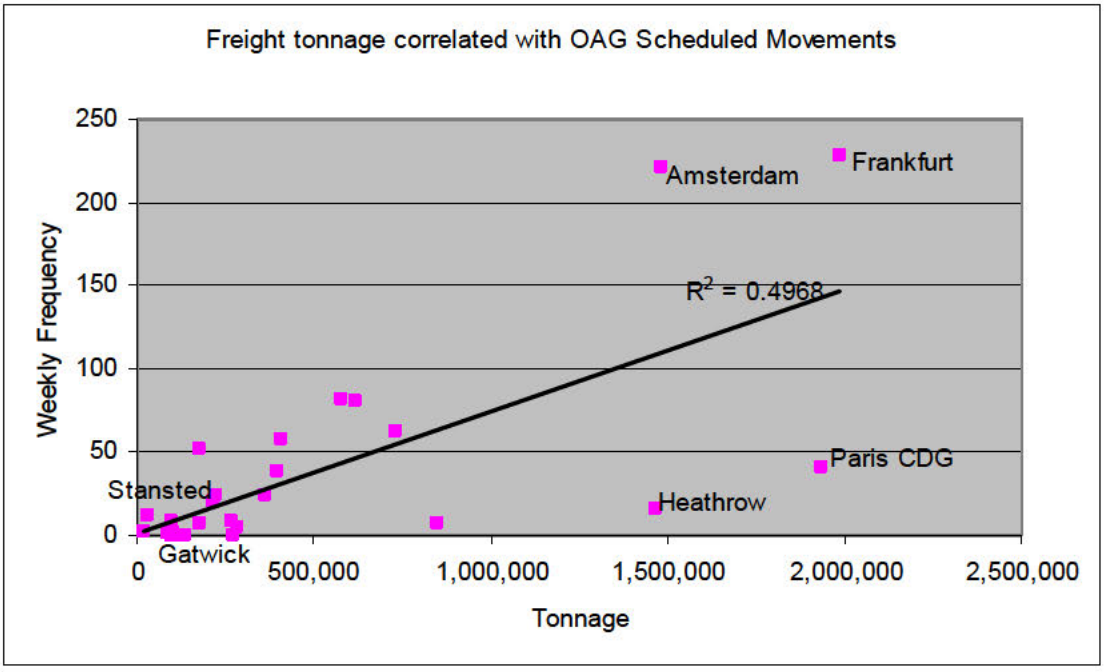


Table 3

	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			

			originates in			
	Milan	1	Jeddah			
	Mumbai	1	orginates in Los Angeles and Chicago, onwards to Singapore			
	New Guinea	1	onwards to Seoul			
			originates in			
	New York	1	Jeddah			
			originates in Jeddah, onwards to			
	New York	1	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			
			originates in Dallas, onwards to			
	Sharjah	2	Singapore			
	Sharjah	1	originates in Chicago and Dallas, onwards to Singapore			
	Taipei	1				
	Tianjin	1	onwards to Seoul			
			originates in			
	Vienna	2	Riyadh	36	36	118
Liege	Accra	2	onwards to Lagos and Addis Ababa			
	Addis Ababa	5				
	Bahrain	11	originates in New York			
			onwards to Tel			
	Bucharest	1	Aviv			
	Dubai	12	onwards to Hong Kong			
			onwards to			
	East Midlands	4	Keflavik			
	Entebbe	1				
	Istanbul	5				
	Keflavik	4				
			onwards to New			
	Keflavik	1	York			
	Lagos	2	onwards to Addis Ababa			
	Lagos	1	onwards to Ougadougou			
	Lagos	1	onwards to Port Harcourt			

	Lome	2	onwards to Congo, Addis Ababa			
	Luxembourg	1	originates in Tel Aviv			
	New York	1	originates in Tel Aviv			
	New York	2				
	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	onwards to Chicago			
	Atlanta	1				
	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			

			onwards to Amman and
	Beirut	1	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

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)

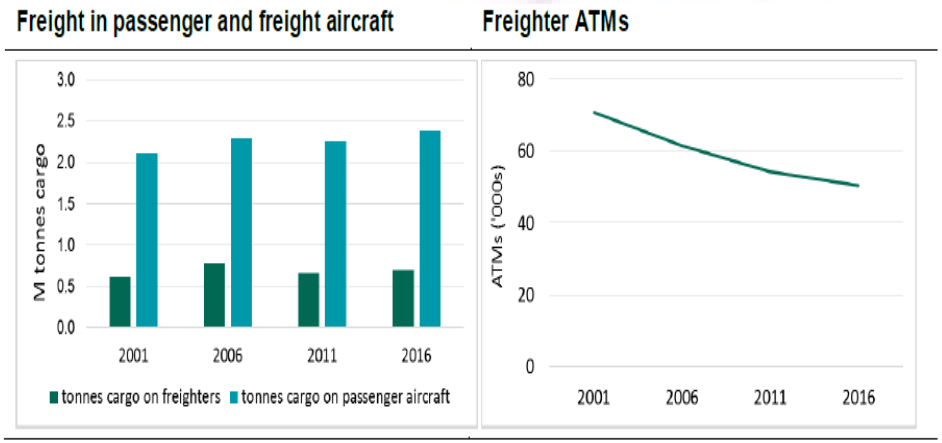


Figure 4.5 Historic freight carried at all modelled airports

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.

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 AJrport 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.

The English Index of Multiple Deprivation (IMD 2015): Headline findings for Kent

Related information

The Deprivation and Poverty web page contains more information which you may find useful.

- *Fuel poverty*
- *Households in poverty*
- *Children in Poverty*
- *Homelessness*
- *Unemployment and benefits claimants*

***NOTE**: within this bulletin 'Kent' refers to the Kent County Council (KCC) area which excludes Medway*

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The English Index of Multiple Deprivation 2015 (IMD2015) was released 30 September 2015 by The Department for Communities and Local Government. This bulletin presents the initial findings for Kent.

Summary

- On the National rank of the IMD2015 Kent is ranked at 100th out of 152 Counties and Unitary Authorities in England. This places Kent within the least deprived 50% of all counties and unitary authorities in England.
- Within the 19 Counties and Local Authorities in the South East, Kent is ranked at 9. This places Kent just within the most deprived 50% of all Counties and Unitary Authorities in the South East.
- The level of deprivation in eight out of 12 Kent local authority districts has increased since ID2010 relative to other areas in England.
- Thanet continues to rank as the most deprived local authority in Kent.
- Tunbridge Wells ranks as the least deprived local authority in Kent
- Ashford and Swale have experienced the largest increase in deprivation relative to other areas.
- Tunbridge Wells has experienced the largest decrease in deprivation relative to other areas.

Introduction

The Index of Multiple Deprivation 2015 (IMD 2015) is the official measure of relative deprivation for small areas (or neighbourhoods) in England.

The IMD ranks every small area in England from 1 (most deprived area) to 32,844 (least deprived area).

The small areas used are called Lower-layer Super Output Areas, of which there are 32,844 in England. They are designed to be of a similar population size with an average of 1,500 residents each and are a standard way of dividing up the country. They do not have descriptive place names (in the way that local wards do), but are named in a format beginning with the name of the local authority district followed by a 4 character code eg Ashford 001A.

It is common to describe how relatively deprived a small area is by saying whether it falls among the most deprived 10 per cent, 20 per cent or 30 per cent of small areas in England (although there is no definitive cut-off at which an area is described as 'deprived').

To help with this, deprivation 'deciles' are published alongside ranks. Deciles are calculated by ranking the 32,844 small areas in England from most deprived to least deprived and dividing them into 10 equal groups. These range from the most deprived 10 per cent of small areas nationally to the least deprived 10 per cent of small areas nationally.

The Index of Multiple Deprivation is part of the Indices of Deprivation and it is the most widely used of these indices. It combines information from seven domain indices (which measure different types or dimensions of deprivation) to produce an overall relative measure of deprivation. You can use the domain indices on their own to focus on specific aspects of deprivation. There are also supplementary indices concerned with income deprivation among children (IDACI) and older people (IDAOPI).

The Index of Multiple Deprivation is designed primarily to be a *small-area* measure of deprivation. But the Indices are commonly used to describe deprivation for higher-level geographies including local authority districts. A range of summary measures are available allowing you to see where, for example, a local authority district is ranked between 1 (the most deprived district in England) and 326 (the least deprived district in England). Summary measures are also available for upper tier local authorities, local enterprise partnerships and clinical commissioning groups.

All of the Indices of Deprivation measure relative deprivation at small area level as accurately as possible, but they are not designed to provide 'backwards' comparability with previous versions of the Indices (2010, 2007, 2004 and 2000). However, because there is a broadly consistent methodology between the Indices of Deprivation 2015 and previous versions, you can compare the rankings as determined at the relevant time point by each of the versions.

When looking at changes in deprivation between the Indices of Deprivation 2015 and previous versions, users should therefore be aware that changes can only be described in relative terms, for example, the extent to which an area has changed rank or decile of deprivation.

This bulletin presents the IMD 2015 for Kent, Kent local authorities and the 10% most deprived LSOAs in Kent. A comparison with the IMD2010 (and IMD2007 at County level) is also presented.

County Level

The overall IMD2015 ranks Kent at 100 out of 152 local authorities in England This places Kent within the least 50% deprived local authorities in England.

This position is two places higher than the IMD2010 and six places higher than the IMD2007 which indicates that Kent has become more deprived in 2015 relative to all other areas.

Kent's position amongst the local authorities within the South East region is nine out of 19. This position has not changed between the IMD2007 and IMD2010. This places Kent just within the 50% most deprived areas in the region.

Table 1: South East Counties and Unitary Authorities by national and regional ranks: IMD2007, IMD2010, IMD2015

South East Counties and Unitary Authorities by national and regional ranks: IMD2007, IMD2010, and IMD2015
Source: Indices of Deprivation 2007; 2010; and 2015 Communities and Local Government
Table presented by Strategic Business Development & Intelligence, Kent county Council
A rank of 1 is the most deprived

	IMD2007		IMD2010		IMD2015		Change in rank* 2010 to 2015	
Authority	National rank (out of 152)	South East rank (out of 19)	National rank (out of 152)	South East rank (out of 19)	National rank (out of 152)	South East rank (out of 19)	National position	South East position
Portsmouth U.A.	67	3	60	2	50	1	10	1
Southampton U.A.	66	2	65	3	54	2	11	1
Brighton and Hove U.A.	59	1	53	1	74	3	-21	-2
Isle of Wight U.A.	88	5	86	5	76	4	10	1
Slough U.A.	79	4	69	4	78	5	-9	-1
Medway U.A.	92	6	88	7	81	6	7	1
Reading U.A.	94	7	87	6	93	7	-6	-1
East Sussex	95	8	90	8	99	8	-9	0
Kent	**106**	9	**102**	9	**100**	9	**2**	0
Milton Keynes	118	10	119	10	106	10	13	0
West Sussex	132	11	130	11	131	11	-1	0
Hampshire	141	13	141	13	141	12	0	1
Oxfordshire	139	12	135	12	142	13	-7	-1
Bracknell Forest U.A.	147	15	148	16	145	14	3	2
West Berkshire U.A.	149	17	147	15	146	15	1	0
Buckinghamshire	146	14	145	14	148	16	-3	-2
Surrey	150	18	150	18	150	17	0	1
Windsor & Maidenhead U.A.	148	16	149	17	151	18	-2	-1
Wokingham U.A.	152	19	152	19	152	19	0	0

Table sorted by ID2015 lowest rank

* A minus change in rank illustrates that an area has moved down the rankings and is therefore less deprived in ID2015 than ID2010 relative to other areas

*A positive change in rank illustrates an area is more deprived in ID2015 than ID2010 relative to other areas

Local Authority Level

Thanet was the most deprived local authority in the IMD2010 and remains Kent's most deprived local authority district in IMD2015. Nationally, Thanet is ranked at 21 out of 326 authorities placing it within England's 10% most deprived of authorities.

Kent's least deprived local authority district in the IMD2015 is Tunbridge Wells with a rank of 282 out of 326 authorities. This rank places Tunbridge Wells within the least 20% deprived areas in England.

Deprivation levels have increased in eight out of the 12 local authority districts relative to all other areas between IMD2010 and IMD2015.

Ashford and Swale have seen the greatest change in national rank, both moving up 22 places between 2010 and 2015. This indicates that these areas are more deprived in 2015 than in 2010 relative to all other local authorities in England.

Canterbury, Shepway, Tonbridge & Malling and Tunbridge Wells have all moved down in the rankings which indicates that levels of deprivation have reduced between 2010 and 2015 relative to other local authorities in England.

Table 2: Kent Local Authorities by national and Kent ranks: IMD2010, IMD2015

Kent local authorities by national and Kent ranks: IMD2010 and IMD2015

Source: Indices of Deprivation 2010 and 2015, Communities and Local Government
Table presented by Strategic Business Development & Intelligence, Kent county Council
A rank of 1 is the most deprived

	IMD2010			IMD2015			Change in rank* 2010 to 2015	
Authority	IMD2010 national rank (out of 326)	Kent Rank (out of 12)		IMD2015 national rank (out of 326)	Kent Rank (out of 12)		National position	Kent position
Thanet	49	1		28	1		21	0
Swale	99	3		77	2		22	1
Shepway	97	2		113	3		-16	-1
Gravesham	142	5		124	4		18	1
Dover	127	4		126	5		1	-1
Dartford	175	7		170	6		5	1
Ashford	198	8		176	7		22	1
Canterbury	166	6		183	8		-17	-2
Maidstone	217	9		198	9		19	0
Sevenoaks	276	12		268	10		8	2
Tonbridge & Malling	268	11		274	11		-6	0
Tunbridge Wells	249	10		282	12		-33	-2

Table ranked by highest IMD 2015 Score

* A minus change in rank illustrates that a district has moved down the rankings and is therefore now less deprived relative to other areas in England.

*A positive change in rank illustrates an area is more deprived in ID2015 thank ID2010 relative to other areas

Deprivation at small area level in Kent's Lower Super Output Areas

Kent has 902 Lower Super Output Areas, 51 (6%) fall within the top 10% most deprived LSOAs in England in the IMD2015. In the IMD2010 the number of LSOAs within the most deprived 10% nationally was 32 (4%).

These LSOAs are spread within seven of Kent's local authorities with Thanet having the highest number and proportion of LSOA within the top10% most deprived LSOAs in England.

Ashford, Canterbury, Sevenoaks, Tonbridge & Malling and Tunbridge Wells do not have any LSOAs ranked within the top 10% most deprived in England.

Table 3: The number and proportion of LSOAs in Kent Authorities within the 10% most deprived Lower Super Output Areas in England

IMD2015 Number and proportion of LSOAs in Kent authorities within the top 10% most deprived in England

Source: Indices of Deprivation 2010 and 2015, Communities and Local Government
Table presented by Strategic Business Development & Intelligence, Kent county Council

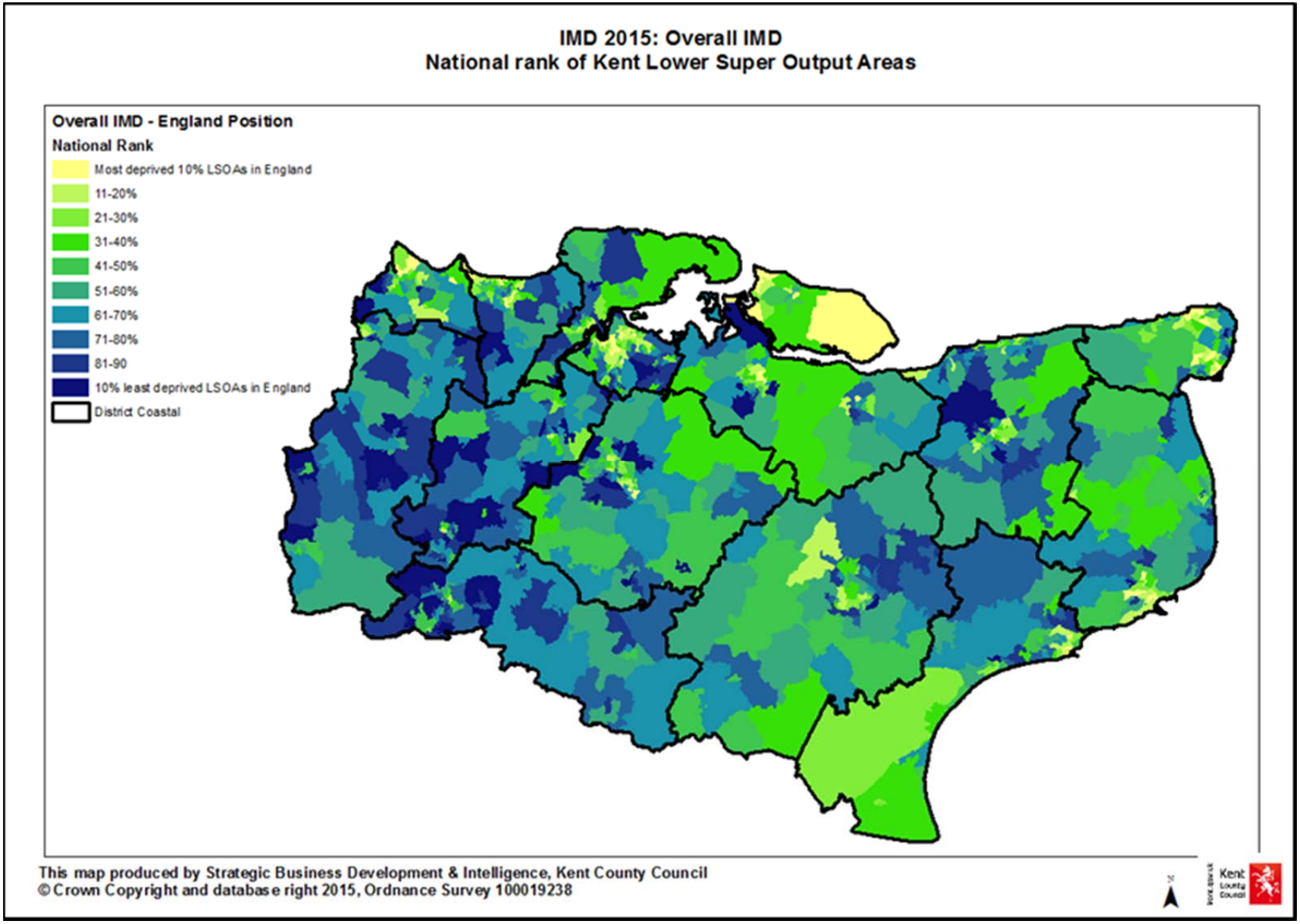
Authority	Total LSOAs in each Local Authority	Top 10% most deprived National Rank:IMD 2010			Top 10% most deprived National Rank:IMD 2015			Change
		Number of LSOAs	%		Number of LSOAs	%		Number of LSOAs
Thanet	84	14	*16%*		18	*20%*		4
Swale	85	8	*9%*		14	*16%*		6
Gravesham	64	3	*3%*		6	*7%*		3
Dover	67	1	*1%*		4	*4%*		3
Shepway	67	5	*6%*		4	*4%*		-1
Dartford	58	0	*0%*		3	*3%*		3
Maidstone	95	1	*1%*		2	*2%*		1
Canterbury	90	0	*0%*		0	*0%*		0
Ashford	78	0	*0%*		0	*0%*		0
Sevenoaks	74	0	*0%*		0	*0%*		0
Tonbridge & Malling	72	0	*0%*		0	*0%*		0
Tunbridge Wells	68	0	*0%*		0	*0%*		0
Kent	902	32	*36%*		51	*57%*		19

Table ranked by highest number of LSOAs in top 10% most deprived by IMD 2015 Score

The highest ranking LSOA in Kent is in Thanet District, within Cliftonville West ward. This LSOA is ranked 4th out of 32,844 LSOAs in England placing it within England's most deprived 1% of small areas.

The lowest ranking LSOA in Kent is in Tunbridge Wells Borough, within Speldhurst & Bidborough ward. This LSOA is ranked 32,728th out of 32,844 LSOAs in England placing it within England's most deprived 1% of small areas.

Map 1 illustrates the pattern of deprivation across Kent at LSOA level. The map shows there is an east/west divide, with the east of the county having higher levels of deprivation than the west.


IMD 2015: Overall IMD
National rank of Kent Lower Super Output Areas
Overall IMD - England Position
National Rank
Most deprived 10% LSOAs in England
11-20%
21-30%
31-40%
41-50%
51-60%
61-70%
71-80%
81-90
10% least deprived LSOAs in England
District Coastal
This map produced by Strategic Business Development & Intelligence, Kent County Council
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Kent County Council

A ward level measure of deprivation is not published as part of the official IMD2015. However, there is high demand for a ward level measure and we will issue ward level ranks based on averages of LSOA scores at a later date. Table 4 indicates the wards in which the top 10% most deprived LSOAs in Kent are situated. This table also shows the national rank and South East rank.

Table 4: The 10% most deprived Lower Super Output Areas in Kent

The 10% most deprived Lower Super Output Areas in Kent: (Rank 1 to 45 out of 90)

Source: Indices of Deprivation 2015, Communities and Local Government

A rank of 1 is the most deprived

Table presented by Strategic Business Development & Intelligence, Kent county Council

		National rank		South East rank		Kent Rank	
2011 LSOA Name	2011 Ward Name	position out of 32,844 LSOAs	Within top 10% most deprived	position out of 5,382 LSOAs	Within top 10% most deprived	Position out of 902 LSOAs	Within top 10% most deprived
Thanet 001A	Cliftonville West	4	Yes	1	Yes	1	Yes
Thanet 001E	Margate Central	21	Yes	2	Yes	2	Yes
Thanet 003A	Margate Central	35	Yes	3	Yes	3	Yes
Swale 001A	Sheerness East	46	Yes	4	Yes	4	Yes
Thanet 001D	Cliftonville West	117	Yes	7	Yes	5	Yes
Thanet 001B	Cliftonville West	233	Yes	10	Yes	6	Yes
Swale 010C	Murston	329	Yes	14	Yes	7	Yes
Swale 006A	Leysdown and Warden	366	Yes	18	Yes	8	Yes
Thanet 016D	Eastcliff	423	Yes	22	Yes	9	Yes
Thanet 006D	Dane Valley	452	Yes	24	Yes	10	Yes
Thanet 013B	Newington	486	Yes	26	Yes	11	Yes
Shepway 014A	Folkestone Harbour	572	Yes	29	Yes	12	Yes
Swale 002C	Sheerness West	626	Yes	31	Yes	13	Yes
Swale 002A	Sheerness West	674	Yes	32	Yes	14	Yes
Thanet 003E	Westbrook	692	Yes	33	Yes	15	Yes
Swale 002B	Sheerness West	739	Yes	36	Yes	16	Yes
Thanet 013E	Northwood	968	Yes	42	Yes	17	Yes
Swale 006D	Sheppey Central	1013	Yes	44	Yes	18	Yes
Swale 004E	Sheppey Central	1036	Yes	46	Yes	19	Yes
Swale 005C	Queenborough and Halfway	1053	Yes	48	Yes	20	Yes
Thanet 006E	Dane Valley	1065	Yes	52	Yes	21	Yes
Thanet 004A	Cliftonville West	1171	Yes	54	Yes	22	Yes
Shepway 014B	Folkestone Harvey Central	1343	Yes	63	Yes	23	Yes
Dover 011F	St Radigunds	1358	Yes	64	Yes	24	Yes
Swale 015D	Davington Priory	1649	Yes	74	Yes	25	Yes
Shepway 003C	Folkestone East	1751	Yes	76	Yes	26	Yes
Gravesham 011D	Singlewell	1876	Yes	81	Yes	27	Yes
Gravesham 001C	Northfleet North	1877	Yes	82	Yes	28	Yes
Dartford 001A	Joyce Green	1951	Yes	85	Yes	29	Yes
Maidstone 013A	Park Wood	1979	Yes	86	Yes	30	Yes
Gravesham 002E	Riverside	2017	Yes	89	Yes	31	Yes
Dover 012F	Castle	2065	Yes	94	Yes	32	Yes
Swale 006B	Leysdown and Warden	2109	Yes	97	Yes	33	Yes
Thanet 003D	Salmestone	2224	Yes	102	Yes	34	Yes
Swale 001B	Sheerness East	2240	Yes	104	Yes	35	Yes
Thanet 016E	Eastcliff	2319	Yes	107	Yes	36	Yes
Dover 013B	Maxton, Elms Vale and Priory	2330	Yes	108	Yes	37	Yes
Gravesham 011C	Singlewell	2533	Yes	118	Yes	38	Yes
Swale 001C	Sheerness East	2564	Yes	121	Yes	39	Yes
Thanet 013A	Newington	2633	Yes	123	Yes	40	Yes
Gravesham 007A	Westcourt	2730	Yes	128	Yes	41	Yes
Thanet 001C	Cliftonville West	2739	Yes	129	Yes	42	Yes
Thanet 016C	Central Harbour	2751	Yes	130	Yes	43	Yes
Thanet 015D	Eastcliff	2850	Yes	134	Yes	44	Yes
Maidstone 013B	Park Wood	2857	Yes	137	Yes	45	Yes

Table 4 continued: The 10% most deprived Lower Super Output Areas in Kent

The 10% most deprived Lower Super Output Areas in Kent: (Rank 46 to 90 out of 90)

Source: Indices of Deprivation 2015, Communities and Local Government

A rank of 1 is the most deprived

Table presented by Strategic Business Development & Intelligence, Kent county Council

		National rank		South East rank		Kent Rank	
2011 LSOA Name	2011 Ward Name	position out of 32,844 LSOAs	Within top 10% most deprived	position out of 5,382 LSOAs	Within top 10% most deprived	Position out of 902 LSOAs	Within top 10% most deprived
Swale 001D	Sheerness East	2887	Yes	140	Yes	46	Yes
Dartford 004C	Swanscombe	3010	Yes	147	Yes	47	Yes
Dover 011D	Buckland	3071	Yes	151	Yes	48	Yes
Shepway 014D	Folkestone Harvey Central	3125	Yes	154	Yes	49	Yes
Dartford 001D	Littlebrook	3199	Yes	156	Yes	50	Yes
Gravesham 002A	Central	3222	Yes	158	Yes	51	Yes
Ashford 008C	Stanhope	3285	No	163	Yes	52	Yes
Shepway 014C	Folkestone Harvey Central	3296	No	164	Yes	53	Yes
Ashford 008B	Stanhope	3315	No	165	Yes	54	Yes
Thanet 005A	Garlinge	3332	No	167	Yes	55	Yes
Swale 002D	Sheerness West	3474	No	174	Yes	56	Yes
Swale 010B	Milton Regis	3609	No	183	Yes	57	Yes
Dover 012D	Tower Hamlets	3627	No	185	Yes	58	Yes
Thanet 006C	Dane Valley	3643	No	188	Yes	59	Yes
Canterbury 019A	Wincheap	3751	No	195	Yes	60	Yes
Maidstone 013D	Shepway South	3768	No	198	Yes	61	Yes
Thanet 012C	Sir Moses Montefiore	3779	No	199	Yes	62	Yes
Canterbury 007B	Gorrell	3814	No	202	Yes	63	Yes
Sevenoaks 002A	Swanley St Mary's	3820	No	203	Yes	64	Yes
Thanet 003B	Margate Central	3834	No	204	Yes	65	Yes
Thanet 004B	Dane Valley	3884	No	208	Yes	66	Yes
Maidstone 013E	Shepway South	3928	No	212	Yes	67	Yes
Shepway 004E	Folkestone Harbour	3953	No	214	Yes	68	Yes
Canterbury 001B	Heron	3968	No	215	Yes	69	Yes
Dover 013A	Maxton, Elms Vale and Priory	4019	No	218	Yes	70	Yes
Dover 013D	Tower Hamlets	4137	No	225	Yes	71	Yes
Dover 011A	Buckland	4155	No	226	Yes	72	Yes
Sevenoaks 002B	Swanley St Mary's	4324	No	234	Yes	73	Yes
Dover 013E	Town and Pier	4397	No	241	Yes	74	Yes
Dartford 009A	Princes	4464	No	245	Yes	75	Yes
Canterbury 001C	Heron	4469	No	246	Yes	76	Yes
Maidstone 009C	High Street	4490	No	249	Yes	77	Yes
Gravesham 002F	Pelham	4555	No	253	Yes	78	Yes
Canterbury 009D	Seasalter	4715	No	263	Yes	79	Yes
Canterbury 001A	Heron	4726	No	266	Yes	80	Yes
Dover 011H	Tower Hamlets	4848	No	271	Yes	81	Yes
Canterbury 011A	Northgate	4869	No	273	Yes	82	Yes
Shepway 003A	Folkestone East	4936	No	279	Yes	83	Yes
Thanet 016A	Central Harbour	5057	No	288	Yes	84	Yes
Ashford 007F	Victoria	5083	No	290	Yes	85	Yes
Shepway 004B	Folkestone Foord	5084	No	291	Yes	86	Yes
Ashford 005A	Aylesford Green	5117	No	294	Yes	87	Yes
Dover 006C	Aylesham	5134	No	296	Yes	88	Yes
Swale 014F	Watling	5242	No	301	Yes	89	Yes
Swale 003A	Minster Cliffs	5251	No	302	Yes	90	Yes

Further information about the English Indices of Deprivation can be found from the Department for Communities and Local Government website

Isle of Thanet – Margate, Broadstairs & Ramsgate

Margate, Broadstairs, Ramsgate and surrounding villages - a great all season coastal destination with lots of heritage and culture to discover and explore.

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The Isle of Thanet Shared Story

Londoners have been **escaping** to the Isle of Thanet for more than 200 years … for the **laid back** seaside vibe … breathtaking sandy beaches … fresh sea air … and romantic Turner skies …

Here at the very **edge** of the **Garden of England**, three Georgian and Victorian resorts, each with its own distinctive character – Margate, Broadstairs and Ramsgate – cluster around the **bays** at the far end of the **peninsula.**

There's a **retro** feel to these harbour towns, with their remarkable 18th and 19th century **architecture**, their **classic seaside heritage** and kitsch, their eclectic attractions and live arts and music venues. And there is a variety of **independent** places to shop, eat, drink and stay.

Miles of low **chalk cliffs** edge the peninsula, sheltering a string of **secluded, unspoilt sandy bays**. Chalk **rockpools**, chalk stacks and rare chalk reefs teem with **wildlife**. These are the closest surfing beaches to the capital city: a popular choice with southeast boarders.

Artists, writers and musicians have long been inspired by this almost-island … and continue to be drawn here. **Turner** said Thanet had "**the loveliest skies in all Europe**" … for Dickens, Broadstairs was "**the freshest, freest place**" … and Tracey **Emin** declares in green neon on Margate seafront: "**I never stopped loving you".**

The Isle's a **historic landing place** steeped in symbolism for the story of Britain …the **first Saxons, Hengist and Horsa**, arrived and settled here … and **St Augustine** first stepped onto these shores on his way to nearby **Canterbury.**

For this is the **furthest** south east you can go in Britain … almost touching mainland **Europe** … yet these days only 75 minutes from central London …

And now with the **Turner Contemporary gallery**, the return of the iconic amusement park **Dreamland**, reimagined for the 21st century, and **high-speed trains** from the capital … **a new generation** is discovering this **original seaside escape**.

The Shared Story was developed with local stakeholders as part of the Destination Management Plan (DMP) process. It is a short story that makes it clear what is special and different about the place, focussing on the distinctive qualities that capture the essence of Thanet, it isn't a list of everything that's on offer.

Thanet was the first district in Kent to produce a DMP, which sets out the priorities to help Thanet achieve its potential as a visitor destination under three key elements - Telling and Sharing Our Stories; Beach Management and Development and Coastal Regeneration. Further information on the Thanet DMP can be found on the Visit Thanet Business website and the achievements of the plan

The website www.visitthanetbusiness.co.uk describes how Thanet's Tourism Team is working with local businesses, investors, residents and industry partners to deliver the Destination Management Plan. You will find out more about the people in the team, business support services, training opportunities, investment in the area, different ways to get involved in on and offline promotional activities and campaigns, and how to keep in touch.

Facts about the Isle of Thanet

Did you know…??

Margate

- Margate was formerly known as Meregaet with 'Mere' being the Saxon name for lake and 'gaet' the Saxon name meaning track or pathway.

- Margate has been a leading seaside resort for over 200 years and its history as a holiday town dates back to the 18th Century. Its accessibility from London made it an ideal destination for sea bathing, when bathing in and consuming seawater was thought to be beneficial to health.

- Margate was the first resort to have donkey rides, in 1890, and the first to introduce deck chairs, in 1898.

Broadstairs

- Originally a small fishing village near the larger and busier farming community of St Peters, Bradstow, an Anglo-Saxon word meaning a broad place, grew to become Broadstairs.

- The town has a rich maritime history, with shipbuilding dominating local industry during the 16th and 17th Centuries. So established was the reputation of local boat builders, that in the 18th Century they were commissioned to build ships for the Royal Navy as well as merchant firms.

- Another thriving, yet clandestine, trade in the area was smuggling. The caves and tunnels that lined the coast, running inland to cellars in the village, were ideal for the contraband of teas, spirits and tobacco. So common was this activity that the most famous of the smugglers, Joss Snelling (1741-1837) was once presented to Queen Victoria.

Ramsgate

- Ramsgate began as a fishing and farming hamlet. Ramsgate as a name has its earliest reference as Hraefn's ate, later to be rendered 'Ramisgate' around 1225 and 'Ramesgate' from 1357. The Viking leaders Hengist and Horsa landed in the 5th Century. A full-size replica Viking Ship at Pegwell Bay commemorates the arrival of Hengist and Horsa in AD 449. The Christian missionary St. Augustine landed in Ramsgate in 597 which marked the beginning of Christianity in England.

- Ramsgate's harbour is a defining characteristic of the town. The construction of Ramsgate Harbour began in 1749 and was completed in about 1850. The harbour has the unique distinction of being the only Royal Harbour in the UK, a title it earned from King George IV.

- Because of its proximity to mainland Europe, Ramsgate was a chief embarkation point both during the Napoleonic Wars and for the Dunkirk evacuation in 1940. Three out of five of the most important invasions of Britain landed at Pegwell Bay.

Thanet

- In the days of stage coaches the journey, in good weather, from London to Thanet, took 12 hours, but in the mud of early Spring it could take as long as a week. However, with today's High Speed rail link the journey from London can take just 75 minutes (to Ramsgate).

- In 1901, the Isle of Thanet saw the introduction of an electric tram service which was one of the few inter-urban tramways in Britain. The towns of Margate, Broadstairs and Ramsgate were linked by 11 miles of track.

- In 1915-1916 early aircraft began to use the open farmlands at Manston as a site for emergency landings. The location near the Kent coast gave Manston some advantages over other previously established aerodromes. By 1917 the Royal Flying Corps was well established and taking an active part in the defence of England. The aerodrome played an important role in the Second World War, and it was the most bombed British airfield during this time. Until closure in 2014 it was a civilian airport known as Kent International Airport.

Regeneration:

Since its opening in April 2011 Turner Contemporary, Margate's international art gallery has welcomed over 2 million visitors to the gallery and generated over £50 million for the local economy through tourism and inward investment. www.turnercontemporary.org

19 June 2015 saw the reopening of Dreamland Margate, the UK's original pleasure park re-imagined with retro rides, amusements, roller room, Octopus's Garden and events programme. www.dreamland.co.uk

Future developments include the opening of 'Hall by the Sea' events space and within the Grade II* listed Cinema complex the 'Sunshine Café', with views out across Margate's Main Sands www.thanet.gov.uk/dreamland

Broadstairs' East Kent College has expanded with the opening of The Yarrow Hotel (July 2016), offering a 4-star experience, 23 bedrooms and 5 suites, luxury spa, hair and beauty salon and a 64 seat restaurant. It is the only hotel in the country run by a further education college and will act as a training ground for the hospitality industry's future leaders. www.yarrowhotel.co.uk

A new visitor centre planned for St. Augustine's Church in Ramsgate is due to open June 2017. This will house the 'Pugin and St Augustine Visitor Centre and Shrine'. An education, research, and visitor centre, aiming to increase knowledge and accessibility around two themes: the Victorian architect Augustus Pugin, and St Augustine of England, who brought Christianity to southern English for the first time. www.augustine-pugin.org.uk

Towns & Villages:

Acol is one of the smallest communities in Kent. The village's name comes from Acollt which goes back to old English, with the word 'ac' meaning oak and 'holt' meaning wood. It has a fine gothic-style church dedicated to St. Mildred and it is reputed the village is haunted by 'Smuggler Bill'.

Birchington-on-Sea lies on the coast of the Thames Estuary, between the seaside resorts of Herne Bay and Margate. As a large seaside resort, the village is a notable tourist and retirement destination. The famous artist and poet Dante Gabriel Rossetti was buried at All Saints Church in the village in 1882. His tombstone in the shape of an Irish Cross was designed by his friend Ford Maddox Brown and two windows in his memory can be seen at the church.

Broadstairs is a coastal town between Margate and Ramsgate, offering 7 sandy beaches and bays. The town is famous for its connections to the author Charles Dickens who holidayed in the town and got inspiration for David Copperfield. The town crest motto is 'Stella Maris - Star of the Sea'.

Manston is famous for being one of the nation's earliest aerodromes and the role it played as a Battle of Britain airbase. Spitfire and Hurricane aircraft, plus other great memorabilia are on display at the two museums here.

Margate is a seaside resort, with a rich maritime history and once a limb to Dover in the confederation of the Cinque Ports. The town has seen much regeneration since the opening of Turner Contemporary in April 2011 and Dreamland in June 2015. Margate's Old Town has welcomed independent galleries, shops and eateries

Minster-in-Thanet lies to the west of Ramsgate and to the north east of Canterbury. The village is home to one of England's oldest inhabited buildings, Minster Abbey.

Monkton has a nature reserve and an observatory with the largest optical telescope south of London.

Ramsgate is a member of the ancient confederation of Cinque Ports. The town has one of the largest marinas on the English south coast and the only Royal harbour in the country.

Sarre village is situated on the old road from Margate to Canterbury.

St. Peter's was the original settlement from which Broadstairs was a fishing outlet to the sea. It was once home to one of the first pleasure gardens in England. Local volunteers run the award-winning St. Peter's Village Tour, where costumed characters bring tales of the past to life.

St Nicolas at Wade derives its name from its location near the border between the Isle of Thanet and the mainland, as before the channel silted up to form the rivers Wantsum and Stour, one would have to wade across. The village is also known for its 13th Century church.

Westgate-on-Sea was the subject of a famous poem by Sir John Betjeman and the first place in England to test electric street lighting. It is an elegant Edwardian resort with stunning sunsets over the sea.

The Thanet Coast and Beaches

The Thanet coast is included on the list of the best wildlife sites in Europe. Together with Pegwell Bay it is an internationally important place for wintering birds and the marine life associated with the chalk cliffs, caves, reefs and sandy bays. It is also nationally important for the geology, the chalk stacks and arch, and some of the area's coastal plants.

Chalk talk:

- Thanet is the eastern-most outcrop of chalk in Britain and one of the eastern-most in Europe.
- Thanet contains some of the best chalk sea caves in Britain and chalk reefs in the south-east.
- The Thanet Coast has the longest continuous stretch of coastal chalk in Britain.
- It represents 20% of UK and 12% of European coastal chalk

The chalk cliff, cave habitats and some of the species are very uncommon in Europe and therefore of international importance

Bird Facts:

- The intertidal reef, together with the mudflats and sandflats, provide valuable feeding grounds for wintering birds, which roost on shingle and sand above the high-water mark. Of these the Turnstone and Golden Plover can be found here in internationally important numbers.
- Wintering Golden Plover roost on mudflats in Pegwell Bay.

The Thanet Coast Project, a leader in its field, was set up in 2001 as a result of workshops held with stakeholders to drive forward the priorities which people had identified.

The project aims to:

- **raise awareness** of the area's important marine and bird life
- **work with people to safeguard coastal wildlife**
- **promote wildlife events or activities**
- be a **one-stop shop for coastal information**

The Thanet coast is covered by numerous bird and marine nature conservation designations, collectively known as the North East Kent Marine Protected Area

For further information on the Thanet Coast Project and the North East Kent Marine Protected Area, visit the website www.nekmpa.org.uk

Thanet has a unique coastline with 15 beautiful sandy beaches and bays, 6 with Blue Flag Awards and 4 with Seaside Awards. (Awards applied for and awaiting confirmation 2017)

For full information on our beaches and bays, please visit www.visitthanet.co.uk/beaches-bays

Margate:

Minnis Bay - The Parade, Birchington, Kent, CT7 9LX
This long, rural sandy bay features rocky and shingle areas as well as a promenade and crabbing/paddling pool.

West Bay - Sea Road, Westgate-on-Sea, Kent, CT8 8QG
This sandy bay with rocky areas and cliffs is great for sandcastles and exploring rock pools.

St Mildred's Bay – Sea Road, Westgate-on-Sea, Kent, CT8 8AD
A sandy bay with a promenade, cliffs and tidal pool, with a small amount of beach at high tide.

Westbrook Bay - Royal Esplanade, Margate, Kent, CT9 5DL
A great family sandy beach with promenade and nearby adventure golf.

Margate Main Sands - Marine Terrace, Margate, Kent, CT9 1XJ
Golden sands galore, perfect for family fun and bathing with children's rides. Close to shops, amusements and attractions

Walpole Bay - Eastern Esplanade, Cliftonville, Margate, Kent, CT9 2JN
Long bay with a small area of sand at high tide. Enjoy one of the last Victorian tidal swimming pools to be built.

Broadstairs:

Botany Bay - Marine Drive, Broadstairs, Kent, CT10 3LG
Hidden gem with stunning chalk stacks and great for finding fossils at low tide.

Kingsgate Bay - Whiteness Road, Broadstairs, Kent, CT10 3QH
A quiet and secluded sandy beach with some of the best examples of sea caves in the country.

Joss Bay - Joss Gap Road, Broadstairs, Kent, CT10 3PG
Surfers paradise with surf school on the beach. Smuggler Joss Snelling was named after this bay.

Stone Bay - Eastern Esplanade, Broadstairs, Kent, CT10 1DU
A quiet sandy bay rarely discovered by visitors with chalk cliffs, rocks pools and a promenade

Viking Bay - Victoria Parade, Broadstairs, Kent, CT10 1EU
Magnificent horse shoe shaped bay with clifftop promenade, gardens, surf school and children's ride.

Louisa Bay - West Cliff Road, Broadstairs, Kent, CT10 1QE
A small, quiet sandy bay, great for rock pooling with popular café along the promenade.

Dumpton Gap - Dumpton Gap Road, Broadstairs, Kent, CT10 1TD
Quiet, sandy bay, ideal for low tide walking routes to Ramsgate.

Ramsgate:

Ramsgate Main Sands - Wellington Crescent, Ramsgate, Kent, CT11 8LX
Popular long stretch of beach right next to the beautiful Royal Harbour, marina and cosmopolitan waterfront with children's rides

Pegwell Bay - Sandwich Road, Cliffsend, Ramsgate, Kent, CT12 5JB
This stretch of unprotected sea cliffs has great geological interest and a sandy bay used by a large numbers of seashore birds. The bay is part of Kent's largest National Nature Reserve.

Walking & Cycling Routes:

- **The Viking Coastal Trail** a 51.4km (32m) long circular route running from Reculver to Pegwell Bay. It is one of the most attractive leisure cycling routes in Kent and forms part of regional route 15 of the national cycle network. There are six shorter themed routes to explore between 5km (3.25miles) and 15.25km (9.5miles) long. See details on www.vikingcoastaltrail.co.uk

© Thanet District Council

- **Kent Greeters** inspired by the Big Apple greeters of New York, are a non-profit organisation that enable visitors to meet with local people who are friendly and enthusiastic about the area in which they live. Visitors can be shown around one of the local surrounding areas, taking in aspects or topics important to them, by a friendly local volunteer. Walking Greeters are available to. To book your free greet please go to www.kentgreeters.co.uk

Self-Guided Walks – downloadable pdfs available from our website.

- **Active Ramsgate** programme of cycling routes, walking trails, geocaching, boat rides, golf courses and canoe trail www.ramsgatetown.org/activeramsgate

- **Broadstairs Town Trail** exploring history, buildings and famous residents

- **Cliff Top Delights**, stroll along the prom and discover the charming buildings and restored gardens between Balmoral Gardens and Louisa Bridge, Broadstairs

- **Discover Margate** town map and heritage trail exploring some of Margate's heritage spaces and landscapes

- **Minnis Bay to Reculver Country Park Walk** passes a salt-water lagoon, a working oyster farm, and the Reculver Towers and Fort. It is a linear walk of 6km (3.7miles) one-way, or 12km (7.4 miles) returning to the start. The entire length of the route is flat running alongside the sea wall with the coast on one side and countryside the other.

- **Ramsgate Montefiore Heritage Trail**, explore Ramsgate's connections with Jewish philanthropist and activist Sir Moses Montefiore

- **The Pugins – A Ramsgate Town Trail** from the east to the west cliff highlighting architecture by the Pugin family and links to the town. Leaflets available from Visitor Information Centre

- **Turner and Dickens Walk** a 4 mile walk between Turner's Margate and Dickens Broadstairs, much via an ancient footpath. For further details, visit www.turneranddickenswalk.co.uk or pick up a leaflet.

Guided Walks

- **Broadstairs Town Walks** run every Saturday & Sunday (weather permitting) Easter to end of August. Starting at 2pm from the Broadstairs Information Kiosk on the seafront and lasts about an hour. Exploring 600 years of Broadstairs history from Roman time's right up to the 20th Century.

- **East Kent Health Walks** provide many different guided walks throughout the year within the Margate, Broadstairs and Ramsgate area. For current locations and times, telephone 0300 123 1220

- **Ramsgate Costumed Walks** – a series of four costumed guided historic walks around Ramsgate running July and August – East Cliff, West Cliff, Town Centre and Royal Harbour Walk. For more details, telephone 01843 580832

- **Ramsgate Blitz Walks** two hour walks reliving the dark days of WWII. Four different walks (1st Sunday of month and Fridays July and August)

- **St Peter's Village, Churchyard, WW1 and WW2 War Graves Tours** a series of guided walks around the grounds of the church and village telling of the stories associated with the area. See the website for walking times and dates www.villagetour.org.uk

Places to Visit

Historical Houses & Sites

Ramsgate Tunnels
Marina Esplanade,
Ramsgate, Kent CT11 8NB
(01843) 588123
admin@ramsgatetunnels.org
www.ramsgatetunnels.org

The Viking Ship "Hugin"
Pegwell Bay, Ramsgate,
Kent, CT12 5HY
(01843) 577577
visitorinformation@thanet.gov.uk
www.visitthanet.co.uk

The Grange
St Augustine's Road,
Ramsgate, Kent, CT11 9PA
(01843) 596401 (Monday – Friday 6-8pm)
bookings@landmarktrust.org.uk
www.landmarktrust.org.uk

© Thanet District Council

Dickens House Museum
2 Victoria Parade,
Broadstairs, Kent, CT10 1QS
(01843) 861232
visitorinformation@thanet.gov.uk
www.dickensmuseumbroadstairs.org.uk

Italianate Greenhouse
King George VI Memorial Park,
Montefiore Avenue, Ramsgate,
Kent, CT11 8BD
[redacted]
enquiries@italianateglasshouse.co.uk
www.italianateglasshouse.co.uk

Walpole Bay Hotel and Museum
Fifth Avenue, Cliftonville,
Margate, Kent, CT9 2JJ
(01843) 221703
info@walpolebayhotel.co.uk
www.walpolebayhotel.co.uk

Powell-Cotton Museum, Quex House & Gardens
Quex Park, Birchington, Kent, CT7 0BH
(01843) 842168
enquiries@quexmuseum.org
www.quexpark.co.uk

Tudor House
King Street, Margate,
Kent, CT9 1HB
(01843) 231213
friendsofmargatemuseum@gmail.com
www.margatemuseum.org

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St Augustine's Cross
Cottington Road, Cliffsend,
Ramsgate, Kent, CT12 5JN
(01843) 577577
visitorinformation@thanet.gov.uk
www.visitthanet.co.uk

Pugin and St Augustine Visitor Centre and Shrine
St Augustine's Church, St Augustine's Road,
Ramsgate, Kent CT11 9PA
(01843) 592071
office@augustineshrine.co.uk
www.augustine-pugin.org.uk

Bleak House
Fort Road, Broadstairs,
Kent CT10 1EY
(01843) 865338
enquiries@bleakhousebroadstairs.co.uk
www.bleakhousebroadstairs.co.uk

Minster Abbey
Church Street, Minster,
Nr. Ramsgate, Kent, CT12 4BX
(01843) 821254
minsternuns@gmail.com
www.minsterabbeynuns.org

Attractions

Dreamland Margate
Hall by the Sea Road, Margate
Kent CT9 1XJ
(01843) 295887
www.dreamland.co.uk

Rascal Bay Adventure Golf
Manston Road, Manston Kent CT12 5BE
(01843) 447964
manston@rascalbay.co.uk
www.rascalbay.co.uk

Shell Grotto
Grotto Hill, Margate, Kent, CT9 2BU
(01843) 220008
info@shellgrotto.co.uk
www.shellgrotto.co.uk

Strokes Adventure Golf
Westbrook Promenade
(below Sea View Terrace)
Margate Kent CT9 5BJ
(01843) 294970
info@strokesadventuregolf.com
www.strokesadventuregolf.com

Lillyput Mini Golf
Victoria Parade, Broadstairs
Kent CT10 1QL
(01843) 861500
www.minigolfbroadstairs.com

Pick n Paint a Pot
68 Northdown Road,
Cliftonville, Margate, Kent, CT9 2RL
(01843) 297778
studio@picknpaintapot.co.uk
www.picknpaintapot.co.uk

Theatres/Entertainment

Carlton Cinema
St Mildred's Road, Westgate-on-Sea,
Kent CT8 8RE
(01843) 832019
www.carltoncinema.com

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Sarah Thorne Theatre Company
Memorial Theatre, Hilderstone,
St Peter's Road, Broadstairs,
Kent CT10 2JW
(01843) 863701
info@sarahthorne-theatrecompany.co.uk
www.sarahthornetheatre.co.uk

Tom Thumb Theatre
Eastern Esplanade, Cliftonville,
Margate, Kent, CT9 2LB
(01843) 221791
info@tomthumbtheatre.co.uk
www.tomthumbtheatre.co.uk

Theatre Royal Margate
Addington Street, Margate, Kent, CT9 1PW
(01843) 292795
boxoffice@yourleisure.uk.com
www.theatreroyalmargate.com

Vue Cinema
Westwood Cross, Broadstairs, Kent CT10 2BF
(08712) 240240
www.myvue.com

Ramsgate Music Hall
13 Turner Street, Ramsgate, Kent CT11 8NJ
(01843) 591815
info@ramsgatemusichall.com
www.ramsgatemusichall.com

Winter Gardens
Fort Crescent, Margate, Kent CT9 1HX
(01843) 292795
boxoffice@yourleisure.uk.com
www.margatewintergardens.co.uk

Palace Cinema
Harbour Street, Broadstairs, Kent CT10 1ET
(01843) 865726
bookings@thepalacecinema.co.uk
www.thepalacecinema.co.uk

Granville Theatre and Cinema
Victoria Parade, Ramsgate,
Kent CT11 8DG
(01843) 591750
granvilletheatre@btconnect.com
www.granvilletheatre.com

Museums

Powell-Cotton Museum, Quex House and Gardens
Quex Park, Birchington, Kent, CT7 0BH
(01843) 842168
enquiries@quexmuseum.org
www.quexpark.co.uk

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RAF Manston History Museum
Manston Road, Ramsgate, Kent, CT12 5DF
(01843) 825224
info@rafmanston.co.uk
www.rafmanston.co.uk

The Micro Museum
11 Church Hill, Ramsgate, Kent CT11 8RA
07876 271255
ramsandgates@gmail.com
www.themicromuseum.org

Margate Museum
Old Town Hall, Market Place, Margate,
Kent, CT9 1ER
(01843) 231213
friendsofmargatemuseum@gmail.com
www.margatemuseum.org

RAF Spitfire & Hurricane Memorial Trust
The Memorial Building, The Airfield, Manston Road, Ramsgate, Kent, CT12 5DF
(01843) 821940
enquiries@spitfiremuseum.org.uk
www.spitfiremuseum.org.uk

Hornby Visitor Centre
Hornby Hobbies LTD, Westwood Industrial Estate,
Margate, Kent, CT9 4JX
(01843) 233524
visitorcentre@hornby.com
www.hornby.com/hornby-visitor-centre

Defence of the Nation Museum
Monkey House, Royal Esplanade,
Ramsgate, Kent CT11 0HE
07591 049788
dotnec.org@gmail.com
www.defenceofthenationeducationcentre.org

Ramsgate Maritime Museum
Clock House, Pier Yard, Ramsgate
Kent CT11 8LS
(01843) 570622
www.ramsgatemaritimemuseum.org

Art, Crafts and Galleries

Turner Contemporary
Rendezvous, Margate, Kent, CT9 1HG
(01843) 233000
info@turnercontemporary.org

www.turnercontemporary.org

Margate Art
6 Duke Street, Margate, Kent CT9 1EP
(01843) 316042
www.margateart.uk

York Street Gallery
22 York Street, Ramsgate, Kent CT11 9DS
[redacted]
mike@yorkstreetgallery.co.uk
www.yorkstreetgallery.co.uk

Crate
1 Bilton Square, High Street, Margate CT9 1EE
www.cratespace.co.uk

Pie Factory Gallery
5-9 Broad Street, Margate, Kent, CT9 1EW
(01843) 294175
hello@piefactorymargate.co.uk
www.piefactorymargate.co.uk

Lovelys Gallery
248 Northdown Road, Cliftonville,
Margate, Kent CT9 2PX
(01843) 292757
www.lovelysgallery.co.uk

New Kent Art Gallery
49a Albion Street, Broadstairs,
Kent CT10 1NE
(01843) 319184
www.newkentart.com

Lombard Street Gallery
2 Lombard Street, Margate, Kent, CT9 1ES
(01843) 292779
janet@lombardstreetgallery.co.uk
www.lombardstreetgallery.co.uk

Resort Studio
Pettman Building, 50 Athelstan Road,
Cliftonville, Margate, Kent CT9 2BH
(01843) 449454
www.resortstudios.co.uk

Little Art Gallery
Unit 1, Eldon Place (off Harbour Street)
Broadstairs, Kent, CT10 1NA
(01843) 600611
www.thelittleartgallerybroadstairs.com

Broadstairs Gallery
10 Charlotte Street, Broadstairs, Kent CT10 1LR
(01843) 865849
www.broadstairsgallery.com

Community Pharmacy Gallery
16 Market Place, Margate, Kent, CT9 1ES
(01843) 223800
www.beepingbush.co.uk

Marine Studios
17 Albert Terrace, Margate, Kent, CT9 1UJ
(01843) 282219
www.marinestudios.co.uk

King Street Studio and Gallery
11-13 King Street, Margate, Kent, CT9 1DD
[redacted]

Hantverk and Found Gallery
18 King Street, Margate, Kent CT9 1DA
(01843) 280454
www.hantverk-found.co.uk

Viking Gallery
Cliftonville Avenue, Cliftonville, Margate CT9 2AH
[redacted]
www.vikinggallery.co.uk

Limbo
2 Bilton Square, High Street,
Margate, Kent CT9 1EE
www.limboarts.co.uk

Silverland Studios
18 Military Road, Ramsgate, Kent CT11 9LG
(01843) 589275
www.joe-allen.de

Clayspace Studios
61 Northdown Road, Cliftonville,
Margate, Kent CT9 2RJ
[redacted]
www.clayspace.org.uk

Something Fishy
2 Military Road, Ramsgate, Kent CT11 9LG
(01843) 599020

Water Sports & Boat Trips

RIB Request
Pier Yard, Ramsgate Royal Harbour,
Kent, CT11 8LS
[redacted]
info@ribrequest.co.uk
www.ribrequest.com

© Stuart Barnes @ RIB Request

Kent Surf School
Viking Bay, Broadstairs, Kent CT10 1EU
(01843) 871093
[redacted]
info@kentsurfschool.co.uk
www.kentsurfschool.co.uk

Sea Searcher Boat Trips
The Kiosk, Pier Yard, Ramsgate Harbour,
Ramsgate, Kent, CT11 8LS
[redacted]
seasearcher-boat@live.co.uk
www.seasearcher.co.uk

Joss Bay Surf School
Joss Bay Beach, Joss Gap Road,
Broadstairs, Kent, CT10 3PG
[redacted]
info@jossbay.co.uk
www.jossbay.co.uk

Active Ramsgate – Canoe Trail
www.ramsgatetowm.org/activeramsgate

Industrial Heritage

Draper's Windmill
St Peters Footpath (off College Rd),
Margate, Kent, CT9 2SP
(01843) 291696
www.draperswindmill.org.uk

Steam Tug Cervia
Ramsgate Harbour, Pier Yard,
Ramsgate, Kent, CT11 8LS
www.cervia-volunteer-crew.com

Crampton Tower Museum
The Broadway, High Street,
Broadstairs, Kent, CT10 2AB
(01843) 871133
cramptontower@hotmail.com
www.cramptontower.co.uk

Gardens and Parks

Sandwich & Pegwell Bay National Nature Reserve
Cliffsend, Ramsgate, Kent, CT11 5DR
(01622) 662012
info@kentwildlife.org.uk
www.kentwildlifetrust.org.uk

Monkton Nature Reserve
Canterbury Road, Monkton,
Ramsgate, Kent, CT12 4LH
(01843) 822666
monktonnaturereserve@hotmail.com
www.monkton-reserve.org

Powell-Cotton Museum, Quex House and Gardens
Quex Park, Birchington, Kent, CT7 0BH
(01843) 842168
enquiries@quexmuseum.org
www.quexpark.co.uk

Shopping & Markets

Margate Old Town
A place for creativity and the arts with a range of galleries, cafes and niche shops
Margate CT9 1ER

© Thanet District Council

Westwood Cross Shopping Centre
Margate Road, Broadstairs, Kent, CT10 2QJ
(01843) 867273
enquiries@westwoodx.co.uk
www.westwoodx.co.uk

Cliftonville Farmers' Market
Held last Sunday each month 10am - 1pm
Oval Lawns, Eastern Esplanade, Margate
(01843) 226033
k.chadband@btinternet.com
www.kfma.org.uk

Petticoat Lane Emporium
47 Dumpton Park Drive,
Ramsgate, Kent CT11 8AD
(01843) 599005
petticoatemporium@hotmail.com
www.petticoatemporium.com

RG Scott Furniture Mart
Old Ice House, Bath Place, Margate,
Kent, CT9 2BN
(01843) 220653
info@scottsmargate.co.uk
www.scottsmargate.co.uk

Thanet Farmers Market
Held 2nd Sunday of month 9.30am-1pm
St George's School Westwood Road,
Broadstairs, Kent CT10 2LH
[redacted]
info@thanetfarmersmarket.co.uk
www.kfma.org.uk/thanet

Leisure Centres / Indoor Leisure

Bugsy's Bowling Centre
Ethelbert Crescent, Cliftonville,
Margate, Kent, CT9 2DY
(01843) 228632
bugsysbowling@hotmail.co.uk
www.bugsys.co.uk

Hartsdown Leisure Centre
Hartsdown Road, Margate, Kent, CT9 5QX
(01843) 226221
info@leisureforce.co.uk
www.leisureforce.co.uk

Quex Adventure Golf
Quex Park,Birchington, Kent, CT7 0BH
(01843) 200014
info@quexpaintball.com
www.quexadventuregolf.co.uk

Ramsgate Sports Centre
High Street, Ramsgate, Kent, CT11 9TT
(01843)585111
info@leisureforce.co.uk
www.leisureforce.co.uk

Ramsgate Market
Held every Friday & Saturday 9am-5pm
High Street, King Street and Queen Street
(01189) 451799
www.hughmark.co.uk

Revolution Skate Park
Oakwood Industrial Estate, Dane Valley Road,
St Peter's, Broadstairs, Kent, CT10 3JJ
(01843) 866707
info@revolutionskatepark.co.uk
www.revolutionskatepark.co.uk

Broadstairs Leisure
Harbour Street, Broadstairs, Kent, CT10 1ET
(01843) 861075

Quex Activity Centre
Quex Park, Park Lane,
Birchington, Kent, CT7 0BH
(01843) 866023
info@quexpaintball.com
www.paintballingatquex.com

Children Activity Centres

Jungle Jim's Limited and Build a Base
Quex Park Estate, Birchington, Kent, CT7 0BH
(01843) 846305
Lawrie@jungle-jims.co.uk
www.jungle-jims.co.uk

The Boating Pool
Royal Esplanade, Ramsgate, Kent, CT11 0HE
(01843) 581999

Bumble Beez and Reload Ecombat
Pysons Road, Ramsgate, Kent CT12 6QG
(01843) 570913
info@bumble-beez.co.uk
www.bumble-beez.co.uk

The Octopus's Garden
Dreamland, Hall by the Sea Road,
Margate, Kent, CT9 1XJ
(01843) 295887
www.dreamland.co.uk

Ollies Play Centre
Hartsdown Leisure Cente,
Hartsdown Park, Margate, Kent CT9 5QX
(01843) 226221
www.yourleisure.uk.com

Viking Adventure Playground
Ethelbert Crescent, Cliftonville,
Margate, Kent, CT9 2DY
(01843) 577577
visitorinformation@thanet.gov.uk
www.visitthanet.co.uk

Club World Play Area
18-21 Marine Terrace, Margate, Kent, CT9 1XJ
(01843) 298752
clubworld22@ymail.com
www.clubworldkids.co.uk

Culture:

J. M.W Turner, the artist lived at Miss Booth's House in Cold Harbour in Margate. The area inspired many of his seascapes. Turner once said "The loveliest skies in Europe are over the Isle of Thanet". Margate's Turner Contemporary gallery is named after him.

Charles Dickens holidayed in Broadstairs. It was in Broadstairs that Charles Dickens got the inspiration for David Copperfield. Dickens House Museum on the seafront, was once the home of Miss Mary Pearson Strong, on whom Dickens based the character of Miss Betsey Trotwood. Broadstairs' Dickens Festival takes place each year in June.

Augustus Welby Northmore Pugin, famous architect and known to most people for the magnificent interiors, furnishings and fittings of the Houses of Parliament, lived in and made substantial architectural contributions to the townscape of Ramsgate. His home, The Grange, has been fully restored by the Landmark Trust and is available for holidays and to visit. Available is a leaflet – "The Pugins, A Ramsgate Town Trail" self-guided walk.

Queen Victoria spent many summers in Broadstairs as a child, staying at Pierremont Hall and in Ramsgate at Albion House, which has been converted into a hotel

Thomas Russell Crampton, the great Victorian engineer, was born in Broadstairs and the resort's Crampton Tower Museum is dedicated to him. He brought gas and water works to Broadstairs and was the first to succeed in laying an effective telegraph cable under the English Channel.

Tracey Emin, the well-known modern artist, grew up in Margate. Her works have included the famous embroidered tent 'Everyone I Have Ever Slept With 1963-95 (1995)'; the book about her childhood 'Exploration of the Soul (1994)' the 'Tracey Emin Museum' in a shop on Waterloo Road (1995-98) and her bed, 'My Bed (1998)'. In 2012 Tracey Emin held her first solo exhibition at Turner Contemporary 'She Lay Down Deep Beneath the Sea' including recent and new works

Authors with connections to the area include Hans Christian Andersen, Richard Harris Barham, Robert Bridges, John Buchan, Wilkie Collins, George Eliot, T. S. Eliot, Alfred Charles Harmsworth (Lord Northcliffe), Karl Marx, Frank Richards, William Makepeace Thackeray, Jane Austen, Samuel T. Coleridge, George Bernard Shaw, Charles Lamb and Baroness Orczy.

VisitEngland has designated 2017 as the 'Year of Literary Heroes'. A literary information sheet is available and on our website www.visitthanet.co.uk/literary

Artists with connections to the area include Dante Gabriel Rossetti, Sir Samuel Luke Fildes, William Powell Frith, Vincent Van Gogh, Walter Richard Sickert, Joseph Turner and William Dyce.

Architects include Augustus Welby Northmore Pugin and Edward Welby Pugin.

Tourism figures: Key headline figures for Thanet for 2015

3.9 million trips were made to Thanet in 2015. Of the 3.9 million trips, 3.4 million were day trips which was a 17% increase from 2013. And 0.5 million were overnight trips. Of the overnight trips, 351,000 were domestic visitors and 143,000 were overseas visitors which was an increase of 21% from 2013.

The total value of tourism including associated and indirect spending was £293 million. In Thanet, direct visitor spend was a total of £250 million.

In 2015, overnight trips generated a total of £122 million and day trips generated a total of £119 million. It is estimated that 34% of total trip expenditure was spent in the retail sector. Approximately 27% was spent on food and drink and 16% went towards the cost of accommodation. Approximately 12% went on visits to attractions and other entertainment. Finally, the remaining 11% of total trip expenditure was spent in the transport sector.

Tourism supports 7,312 jobs in Thanet, a 23% increase from 2013. Tourism and tourism related jobs are 17% of all jobs in Thanet, which is an increase of 23% since 2013.

* Figures from Cambridge Model 2015

Visitor Accommodation provision in Thanet:

Margate		
	Properties	Rooms
Hotels	5	175
B&Bs / Guest houses	17	117
Self Catering	21	
Total Rooms	292	
Broadstairs		
	Properties	Rooms
Hotels	4	88
B&Bs / Guest houses	21	77
Self Catering	18	
Total Rooms	165	
Ramsgate		
	Properties	Rooms
Hotels	6	229
B&Bs / Guest houses	9	31
Self Catering	5	
Total Rooms	260	
Out of town		
	Properties	Rooms
Hotels	4	251
B&Bs / Guest houses	8	20
Self Catering	3	
Total Rooms	271	

Accommodation shown is Quality Assessed and Kent Accommodation Scheme

Airbnb Accommodation in Thanet:

	Room	Flat / Apartment	House / Cottage	Alternative Accommodation
Margate	22	18	6	1
Ramsgate	21	15	9	0
Broadstairs	9	10	5	0
Villages	1	0	2	0

Population figures:

Population in Thanet was 139,800 based on 2015 data, a 5% increase from 2010.

Source: Population Estimates Unit, Office for National Statistics (ONS) © Crown Copyright

Useful Tourism Contacts:

Thanet Tourism
Covering Margate, Broadstairs, Ramsgate and surrounding villages.
Thanet District Council, PO Box 9, Cecil Street, Margate, Kent, CT9 1XZ
(01843) 577637
tourism@thanet.gov.uk
www.visitthanet.co.uk
www.visitthanetbusiness.co.uk

Visit Kent
28-30 St Peter's Street, Canterbury, Kent, CT1 2BQ
(01227) 812900
www.visitkent.co.uk
www.visitkentbusiness.co.uk

Thanet Visitor Information Centre
The Droit House, Stone Pier, Margate, Kent, CT9 1JD
(01843) 577577
visitorinformation@thanet.gov.uk
www.visitthanet.co.uk
Facebook, Twitter and Instagram @Visitthanet www.visitthanetblog.com

To find out more visit your local Visitor Information Centre:

Margate Visitor Information Centre
The Droit House, Stone Pier, Margate, Kent CT9 1JD
(01843) 577577
visitorinformation@thanet.gov.uk
www.visitthanet.co.uk

Broadstairs Information Kiosk (Seasonal)
Royal Albion Hotel Garden Kiosk, Victoria Parade, Broadstairs, Kent CT10 1AN
www.broadstairsinfokiosk.co.uk

Ramsgate Visitor Information Centre
Customs House,
Harbour Parade, Ramsgate, Kent, CT11 8LP
(01843) 598750
www.ramsgatetown.org

KENT PUBLIC HEALTH OBSERVATORY

THANET CCG

Analysis of Deprived Areas

In the most deprived decile for Kent

January 2016

KCC Public Health is taking a new approach to reducing health inequalities in the county, by producing focussed analysis of LSOAs in the most deprived decile. Multivariate segmentation techniques have been used to identify different 'types' of deprivation in Kent. This report shows our analysis of the most deprived areas in the Thanet CCG area. For more information on the rationale of this approach and our methods, please see the full report:

Produced by

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Natasha Hobbs: Public Health Information Officer (natasha.hobbs@kent.gov.uk)

Correspondence to: Rachel Kennard

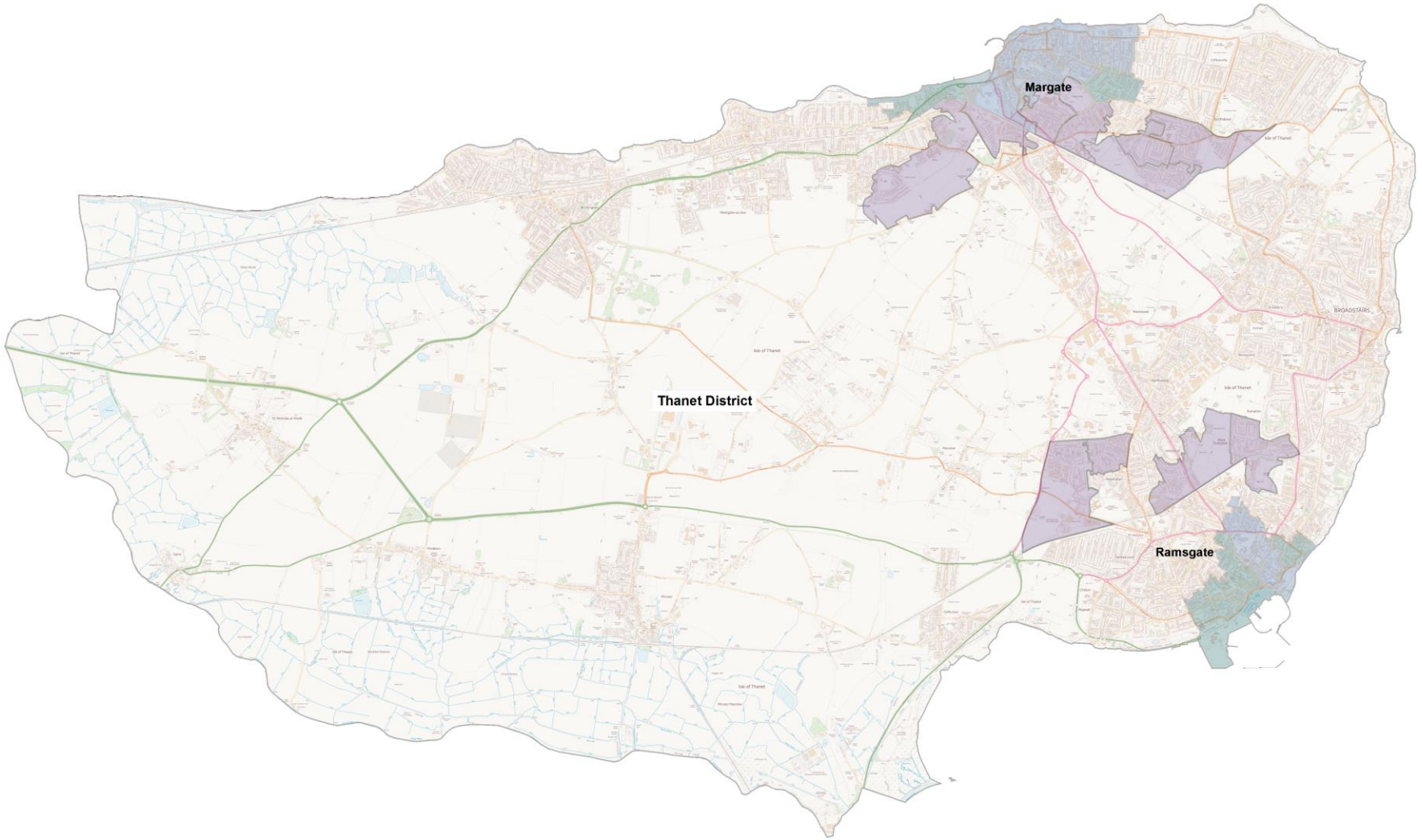
Kent County Council kent.gov.uk

Background

Thanet is an area in east Kent that includes the coastal towns of Margate, Ramsgate and Broadstairs and surrounding village areas. The Thanet CCG area is coterminous with the district boundaries. Deprivation, crime and unemployment are all statistically higher than the England average, with higher proportions of vulnerable populations. There are limited skilled employment opportunities in the area, although there are good transport links to Kent and London. Health outcomes are worse than for Kent and England, and inequalities are wider than in any other Kent district. A number of Thanet LSOAs feature in the most deprived decile for deprivation in Kent, mainly around the towns of Margate and Ramsgate.

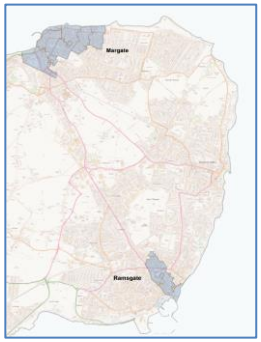
Deprived Areas

Ward Code	Ward Name	LSOA Code	LSOA Name	LSOA rank	GP Practice Code Serving LSOA			Type
		E01024678	**Thanet 001E**	2	G82052			1
E05005093	Margate Central	**E01024676**	**Thanet 003A**	3	G82052	G82649		1
		E01024677	**Thanet 003B**	65	G82052	G82066	G82105	3
		E01024657	**Thanet 001A**	1	G82105	G82052		1
		E01024660	**Thanet 001D**	5	G82105			1
E05005088	Cliftonville West	**E01024658**	**Thanet 001B**	6	G82105			1
		E01024661	**Thanet 004A**	22	G82052	G82105		1
		E01024659	**Thanet 001C**	42	G82105	G82066		4
		E01024663	**Thanet 006D**	10	G82066			3
E05005089	Dane Valley	**E01024666**	**Thanet 006E**	21	G82066			3
		E01024662	**Thanet 006C**	59	G82066			3
		E01024664	**Thanet 004B**	66	G82105	G82066	G82052	3
E05005091	Garlinge	**E01024672**	**Thanet 005A**	55	G82810	G82052		3
		E01024667	**Thanet 016D**	9	G82126			1
E05005090	Eastcliff	**E01024670**	**Thanet 015D**	44	G82126	G82020		1
		E01024671	**Thanet 016E**	36	G82126			4
E05005085	Central Harbour	**E01024649**	**Thanet 016C**	43	G82126	G82064	G82020	4
		E01024646	**Thanet 016A**	84	G82126	G82064	G82020	4
E05005095	Newington	**E01024683**	**Thanet 013B**	11	G82150			3
		E01024682	**Thanet 013A**	40	G82150	G82046		3
E05005096	Northwood	**E01024687**	**Thanet 013E**	17	G82046	G82150	G82020	3
E05005099	Sir Moses Montefiore	**E01024699**	**Thanet 012C**	62	G82126			3
E05005098	Salmestone	**E01024697**	**Thanet 003D**	34	G82052	G82066	G82649	3
E05005102	Westbrook	**E01024710**	**Thanet 003E**	15	G82810	G82052		4


Margate
Thanet District
Ramsgate
BROADSTAIRS

Young people lacking opportunities

Thanet CCG
Type 1 Deprived LSOAs
Margate Central, Cliftonville West, Eastcliff



MAIN ISSUES

Characteristics

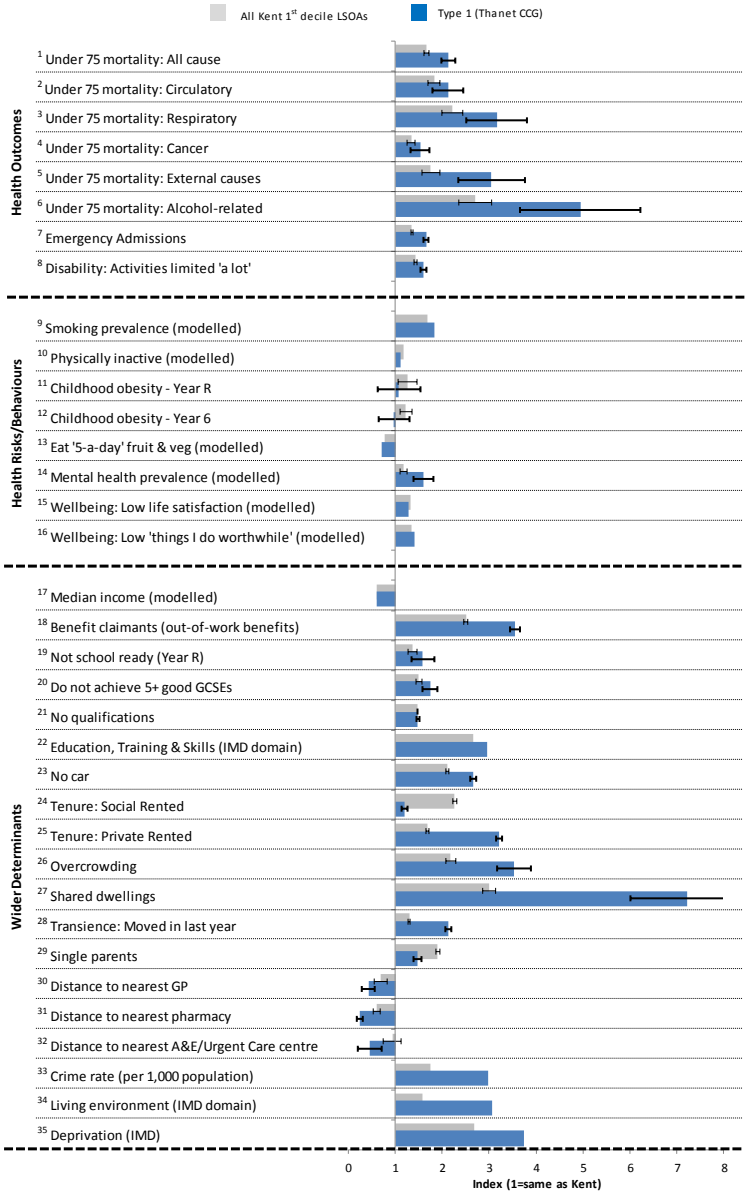
- Young adults in private rented accommodation
- Particularly high levels of shared dwellings and overcrowding
- Particularly poor living environment with particularly high crime rates
- Low incomes
- Particularly high levels of out-of-work benefit claimants
- Poor scores for education
- Particularly high levels of movement/ transiency

Health Risks/Behaviours

- High smoking prevalence
- Low levels of wellbeing

Health Outcomes

- Particularly high premature mortality rates
- Alcohol-related premature mortality and from 'external causes' and respiratory conditions particularly high
- Particularly high emergency hospital admission rates
- High rates of disability ('activities limited a lot')



Prepared by KPHO (RK), Jan 2016

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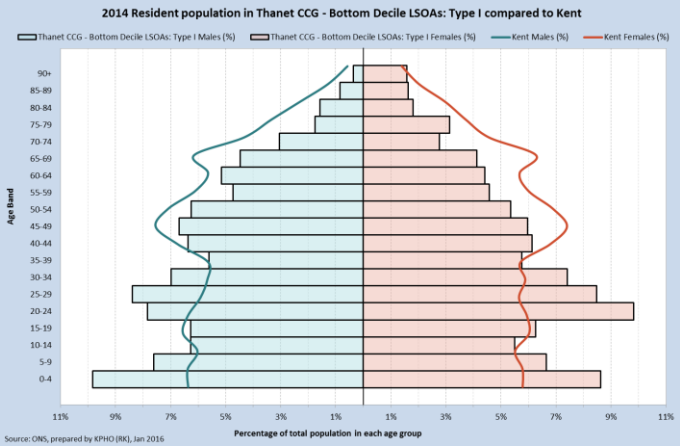
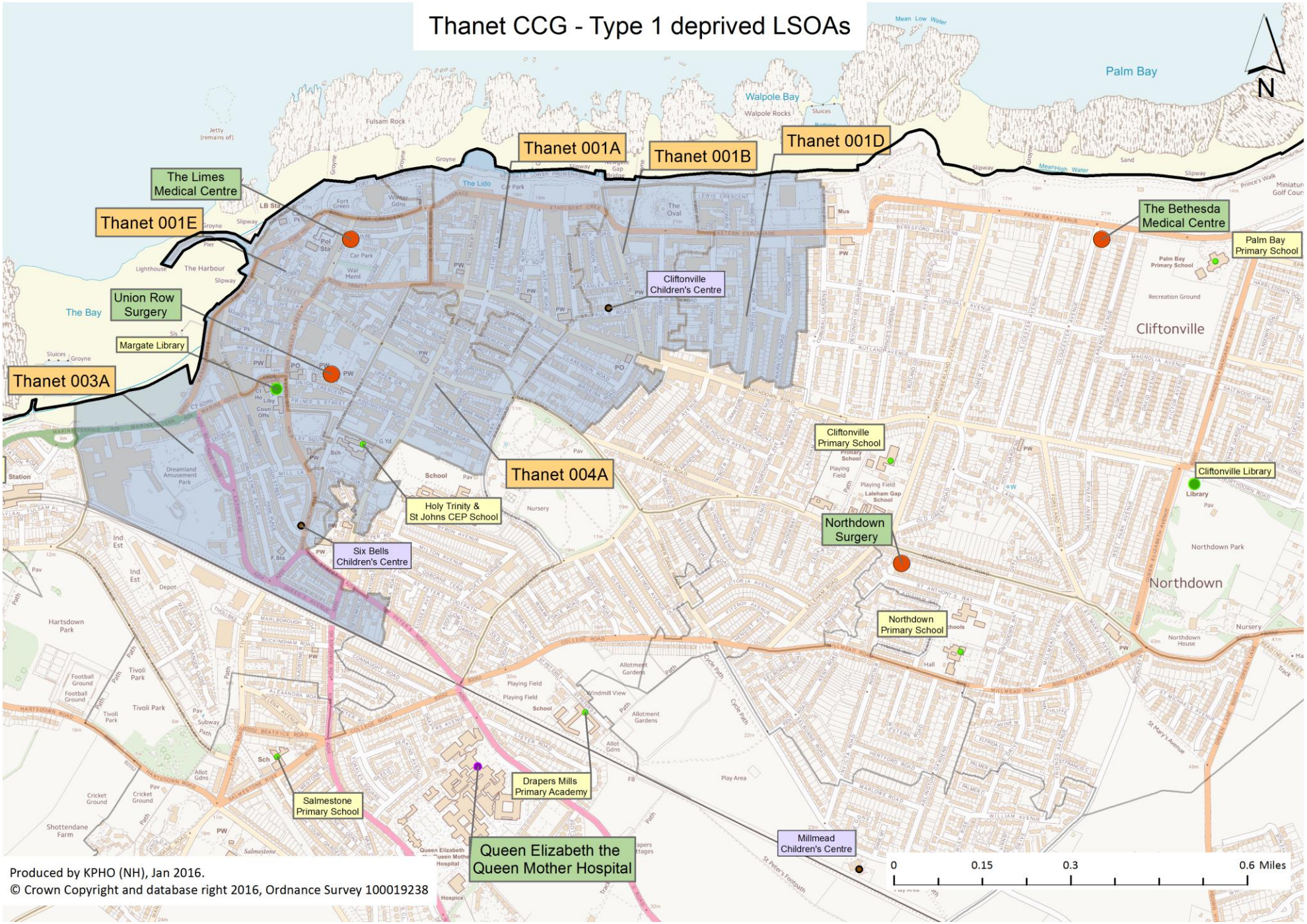


- High numbers young adults and young children

KEY FOCUS AREAS:

Education and employment opportunities for young people

Thanet CCG - Type 1 deprived LSOAs



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Thanet CCG - Type 1 deprived LSOAs
Newington Road Surgery
Wickham Surgery
Thanet 015D
St Ethelberts Catholic Primary School
1. The Grange Medical Practice
2. East Cliff Practice
St Laurence in Thanet C of E Junior School
Ellington Infant School
Chatham & Clarendon Grammar School
Dashwood Medical Centre
Priory Infant School
Priory Children's Centre
Ramsgate Library
Icelands
Thanet 016D
Christ Church CEJ School
St Lawrence
Nethercourt
Chilton
Pegwell
RAMSGATE
N
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0
0.15
0.3
0.6 Miles

Thanet CCG
Type 3 Deprived LSOAs
Dane Valley, Garlinge, Newington

Families in social housing

MAIN ISSUES

Characteristics

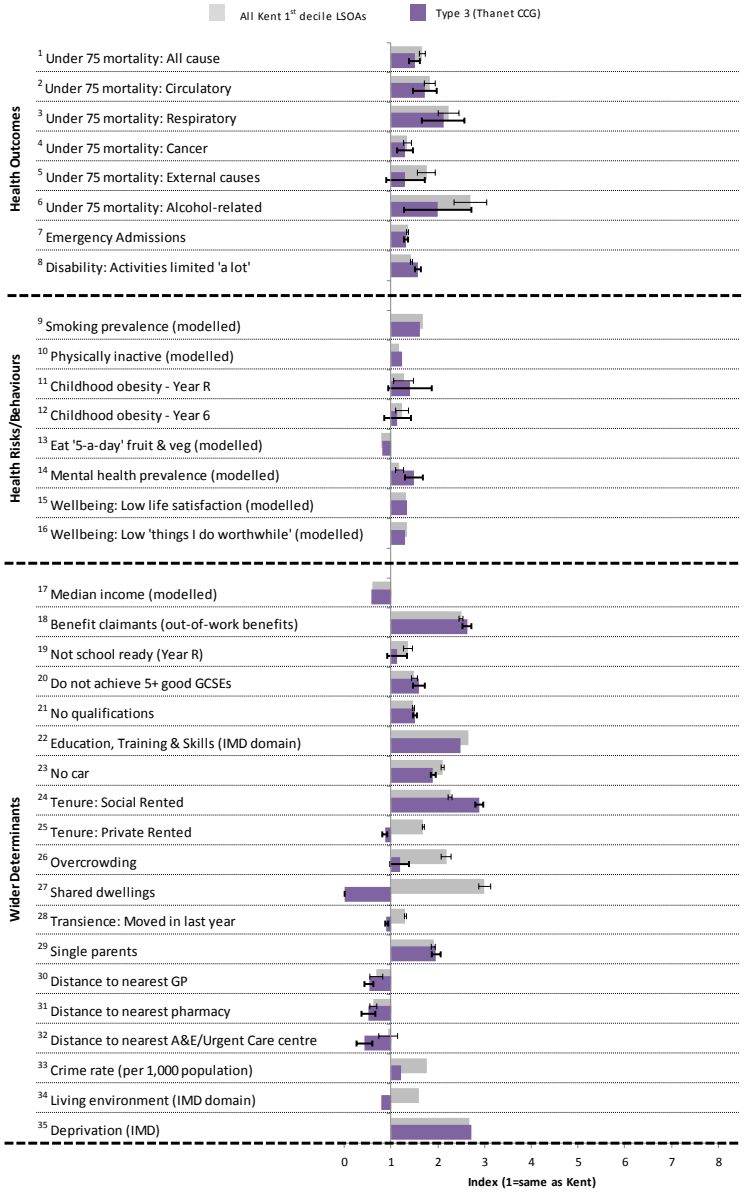
- Families with children in social housing
- Low incomes
- Poor scores for education
- High numbers of out-of-work benefits claimants
- High number of single parents
- Better living environment and lower crime rates than other deprived areas.

Health Risks/Behaviours

- High smoking prevalence
- Low levels of wellbeing.

Health Outcomes

- Fairly high premature mortality rates
- High emergency hospital admission rates
- High rates of disability ('activities limited a lot')



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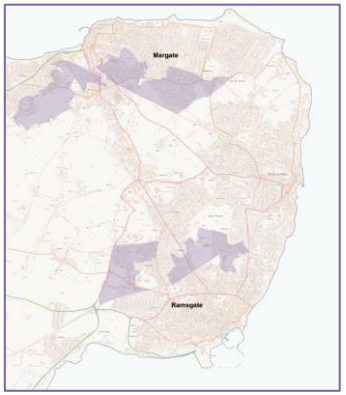

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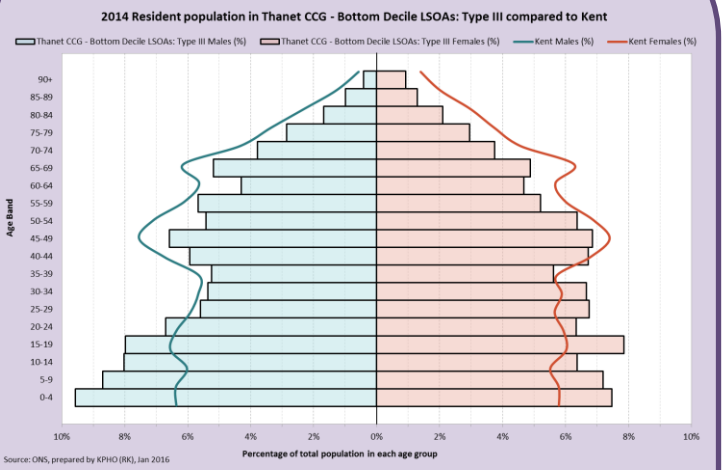


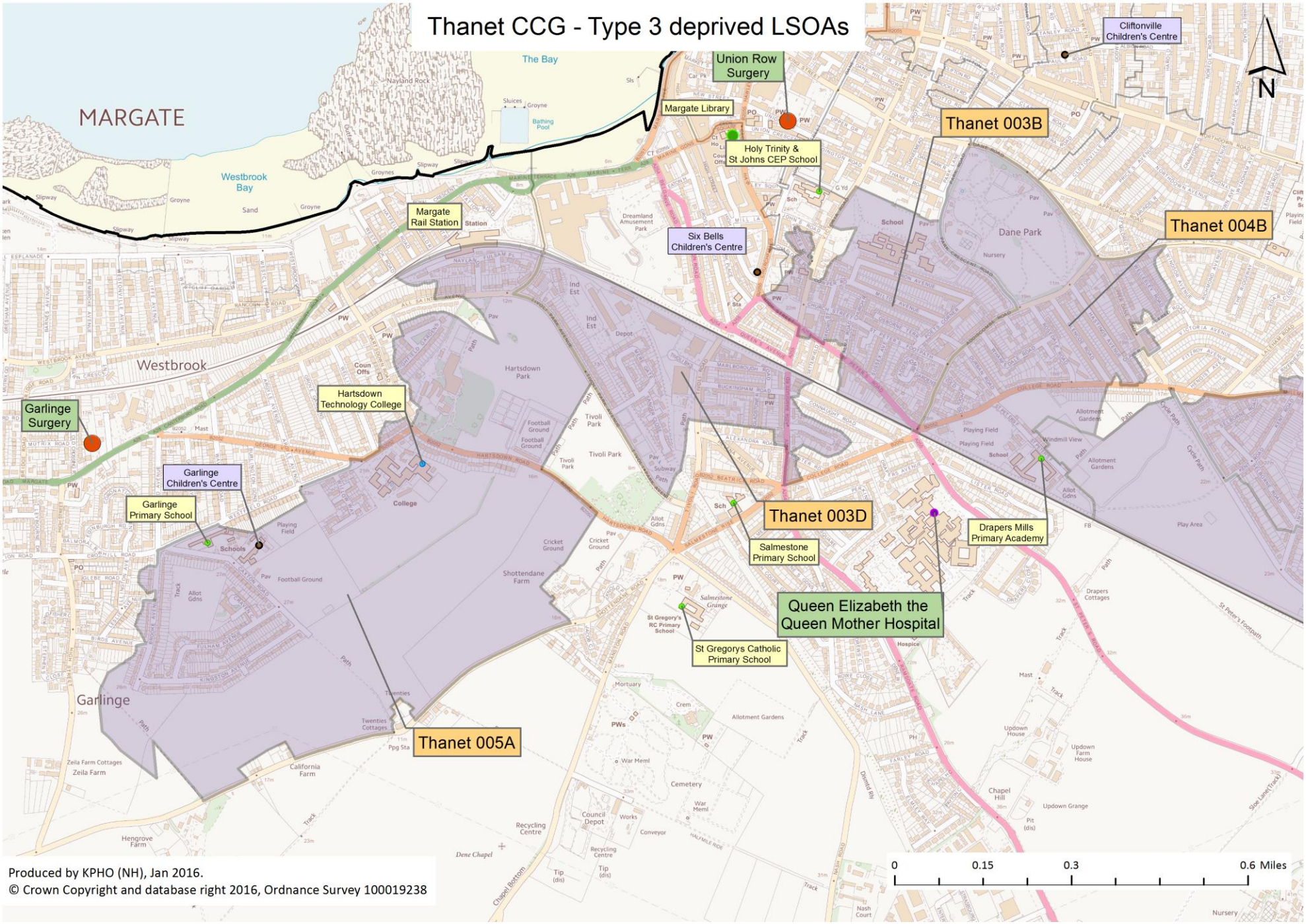
- Very high numbers of children
- Slightly lower numbers of over 50s

KEY FOCUS AREAS:

Training, qualifications and employment for parents

Child health and education

Thanet CCG - Type 3 deprived LSOAs



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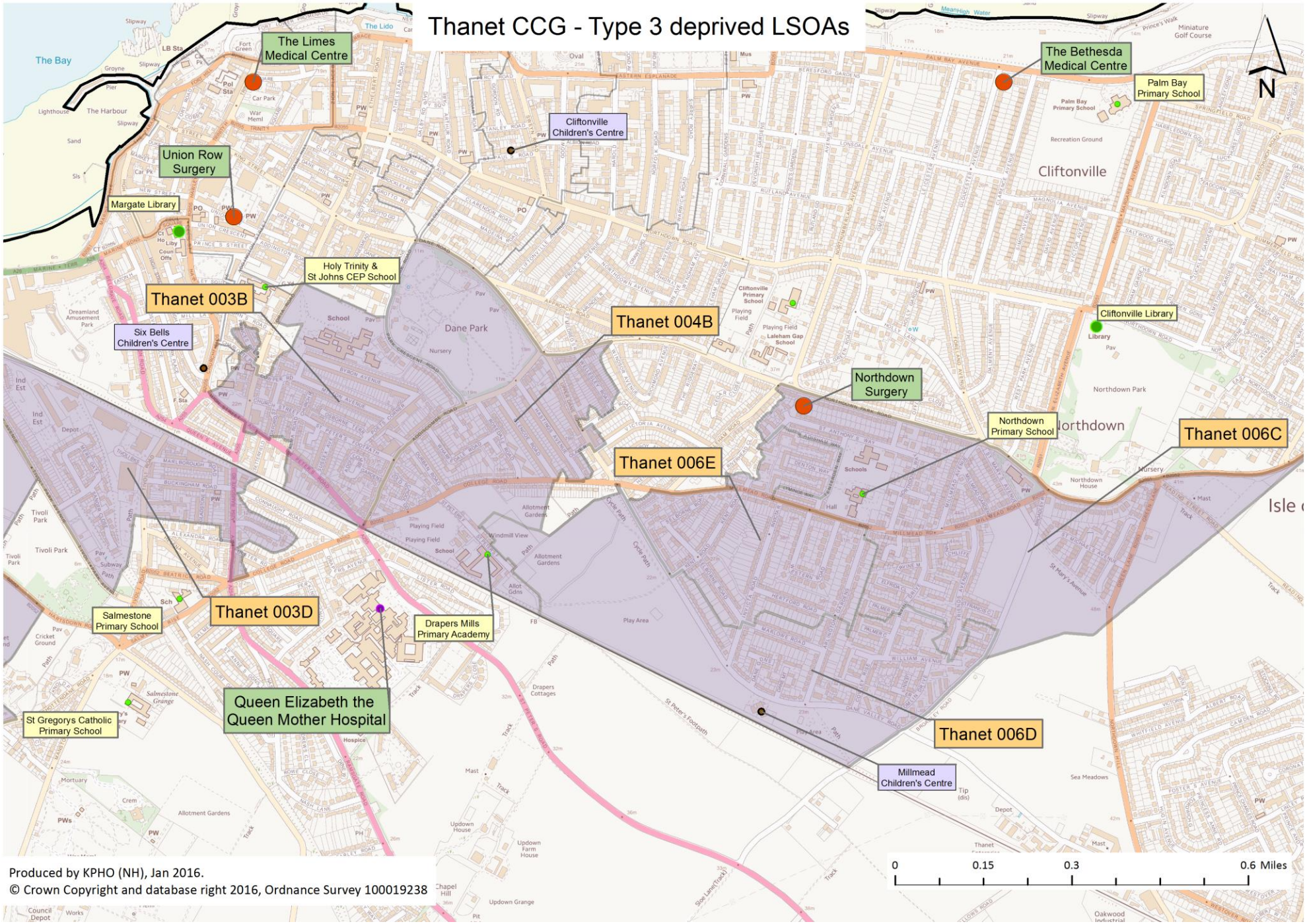
Thanet CCG - Type 3 deprived LSOAs
The Limes Medical Centre
The Bethesda Medical Centre
Palm Bay Primary School
Cliftonville Children's Centre
Union Row Surgery
Margate Library
Holy Trinity & St Johns CEP School
Thanet 003B
Six Bells Children's Centre
Thanet 004B
Cliftonville Library
Northdown Surgery
Northdown Primary School
Thanet 006C
Thanet 006E
Thanet 003D
Salmestone Primary School
Drapers Mills Primary Academy
Queen Elizabeth the Queen Mother Hospital
St Gregorys Catholic Primary School
Thanet 006D
Millmead Children's Centre
N
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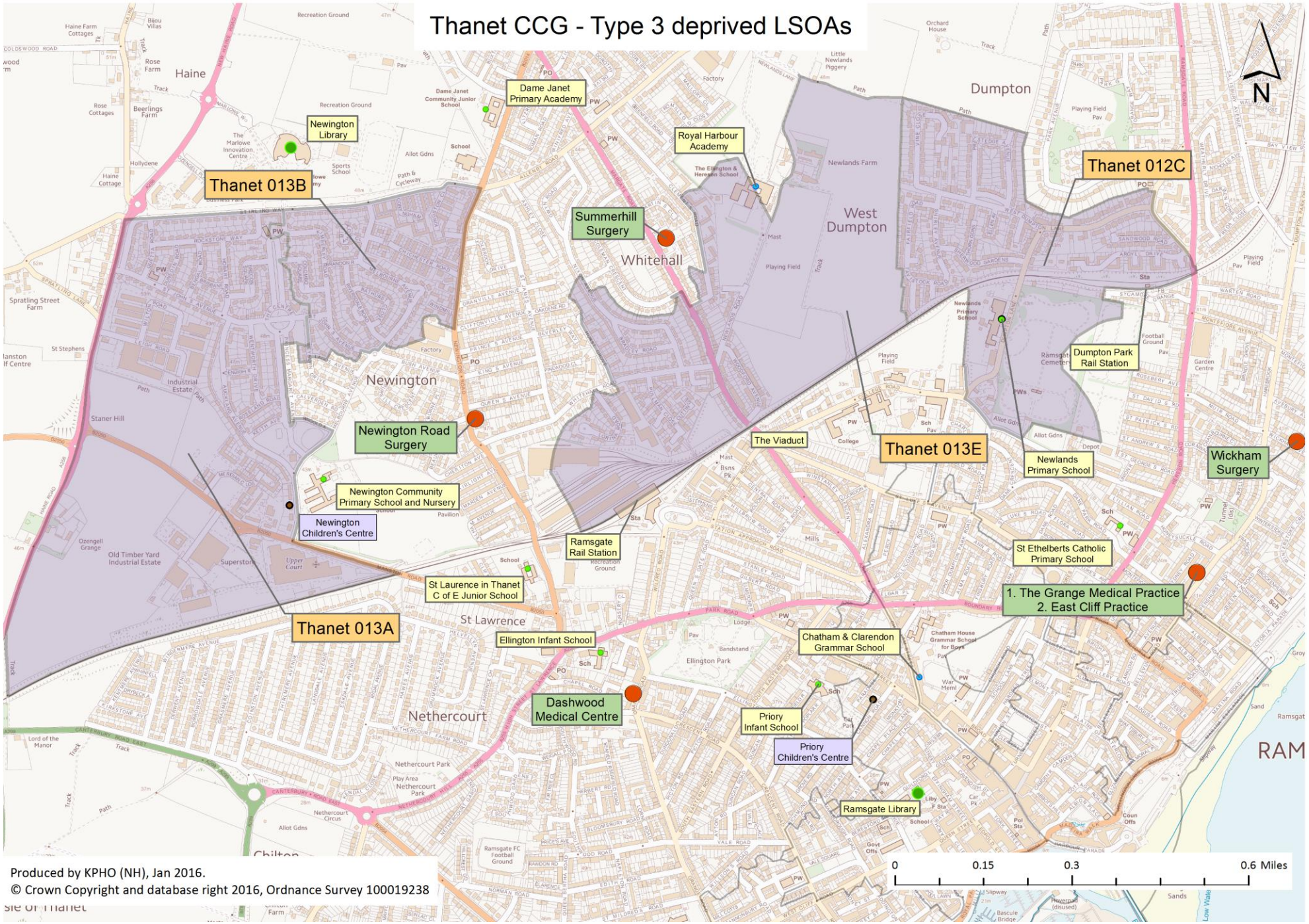
Thanet CCG - Type 3 deprived LSOAs



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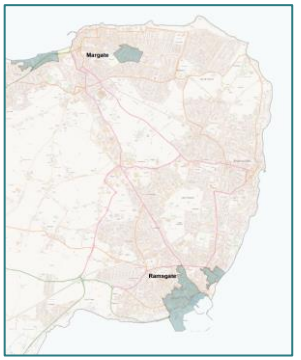
Young people in poor quality accommodation

Thanet CCG
Type 4 Deprived LSOAs
Central Harbour, Westbrook, Eastcliff, Clinftonville West



MAIN ISSUES

Characteristics

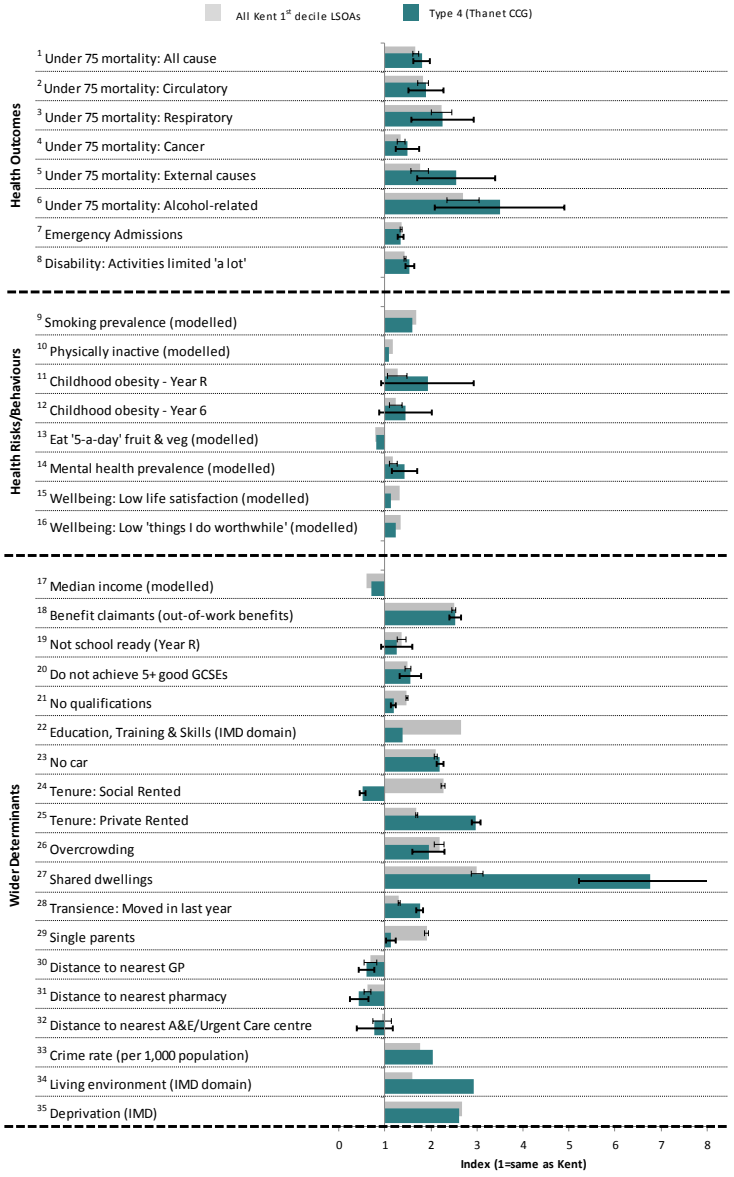
- Young adults in private rented accommodation
- High levels of shared dwellings and overcrowding
- Better educated than the other deprivation types
- Particularly poor living environment with high crime rates
- Low incomes, but not as low as other deprivation areas
- High levels of out-of-work benefit claimants, but not as high has Type I areas
- Particularly high levels of movement/ transiency

Health Risks/Behaviours

- High smoking prevalence

Health Outcomes

- High premature mortality rates
- High emergency hospital admission rates
- High rates of disability (‘activities limited a lot’)



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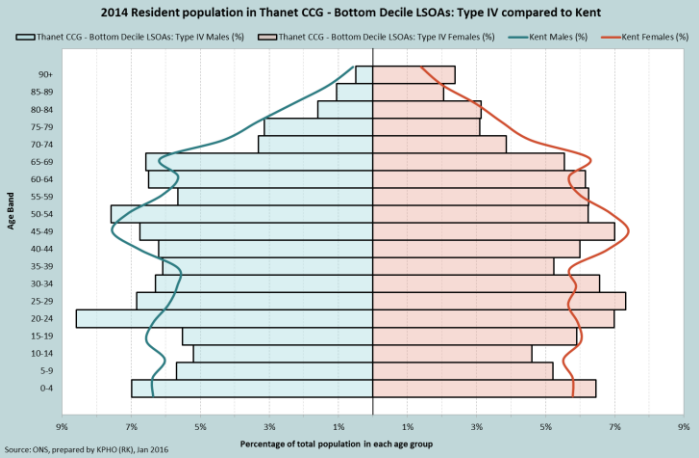
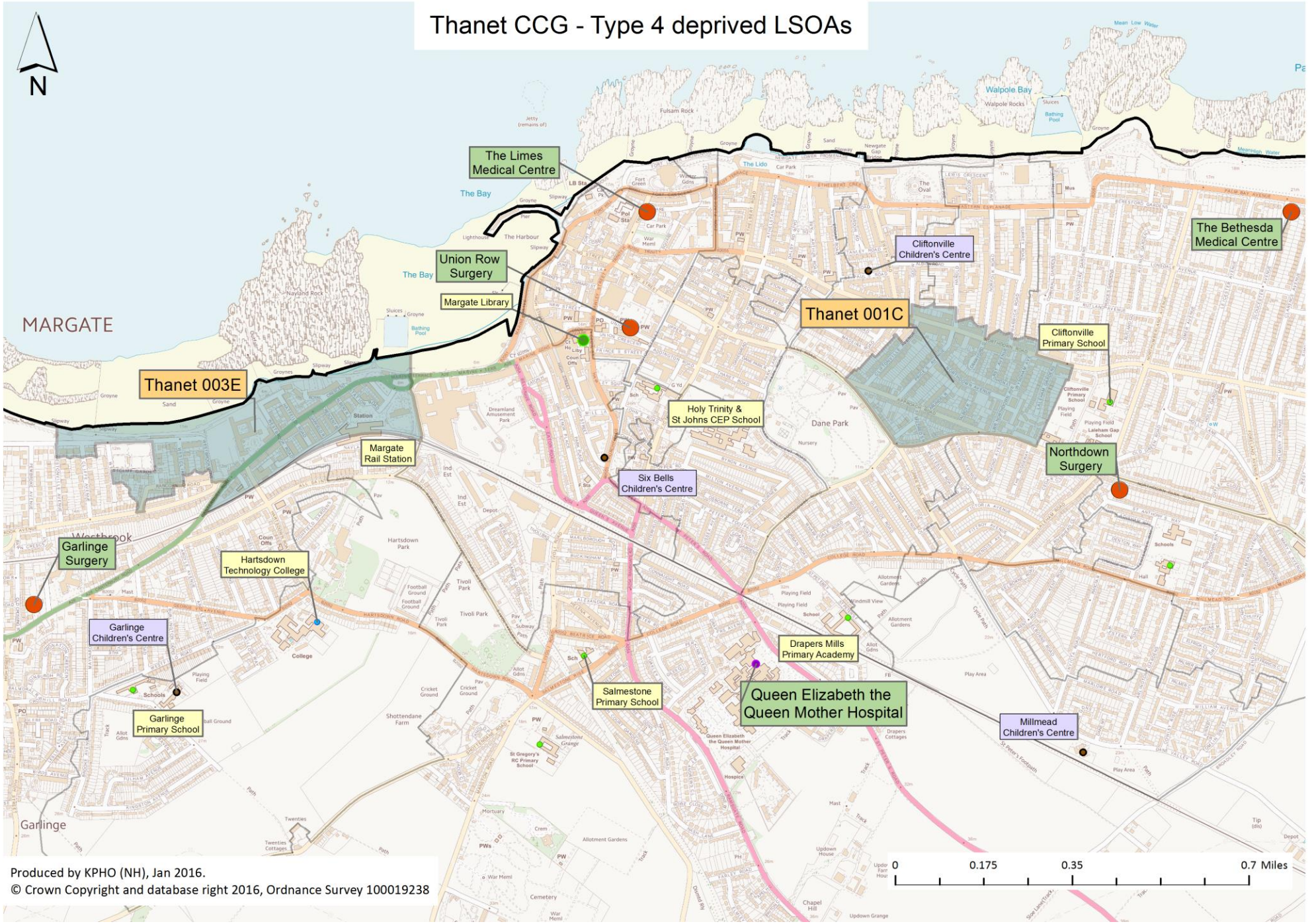


- High numbers of young adults
- Low numbers of children and teenagers

KEY FOCUS AREAS:

Improve living environment and good affordable housing



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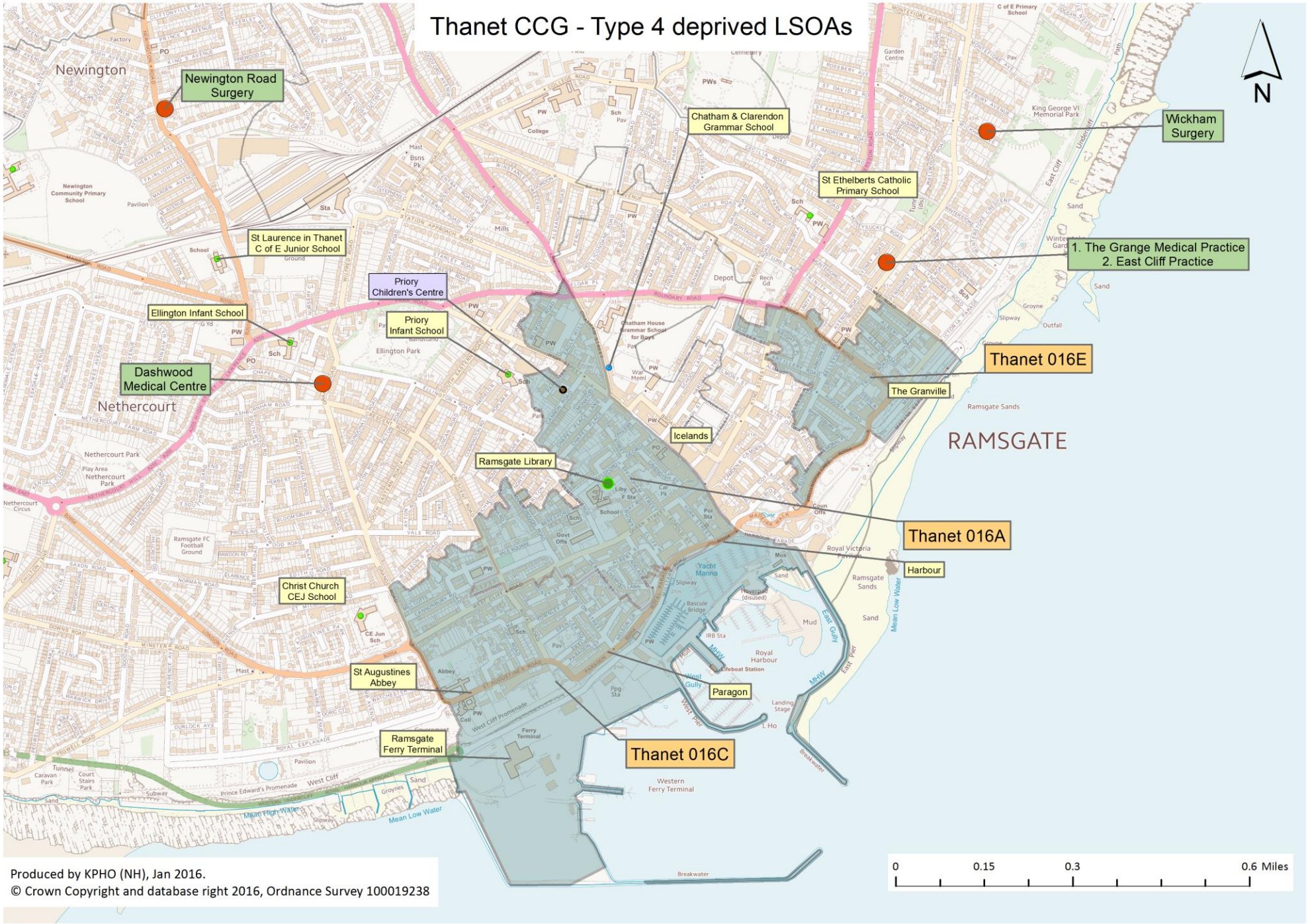

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GP Practices

GP Practices Serving Deprived LSOAs: Recorded Disease Prevalence

For the GP practices that serve LSOAs in the most deprived decile, we have analysed the recorded disease prevalence from QOF data (Quality Outcomes Framework). Note that the data shows recorded disease prevalence, and does not account for undiagnosed disease in the community.

- Generally high recorded prevalence of Chronic Kidney Disease, COPD, depression and mental illness.
- Summerhill Surgery, Garlinge Surgery and Northdown Surgery appear to have high recorded disease prevalence across a large number of conditions.

GP Practice		Asthma	Atrial Fibrillation	Cancer	Coronary Heart Disease	Chronic Kidney Disease	COPD	Diabetes	Heart Failure	Hyper-tension	Stroke & TIA	Mental health	Dementia	Epilepsy	Depression	Learning Disabilities
G82020	The Grange Practice	6.2	2.2	2.7	4.1	4.6	2.8	6.8	0.9	16.2	2.0	1.1	0.7	1.2	7.6	0.4
G82046	Summerhill Surgery	7.2	2.0	3.7	4.2	8.7	4.7	8.1	1.0	19.9	1.9	1.1	0.6	1.0	13.3	0.7
G82052	The Limes Medical Centre	8.0	1.5	2.0	2.8	4.6	3.1	7.5	0.7	15.6	2.0	1.4	0.5	1.0	14.9	0.5
G82064	Dashwood Medical Centre	5.3	1.6	2.7	2.9	6.1	2.4	6.0	0.7	16.3	1.7	1.2	0.4	1.0	10.0	0.5
G82066	Northdown Surgery	6.3	2.2	2.7	3.5	6.2	3.2	7.7	1.0	15.9	2.1	1.3	0.9	1.1	9.9	1.2
G82105	The Bethesda Medical Centre	4.6	2.0	2.1	3.8	5.4	2.1	7.4	0.7	13.5	2.0	1.2	1.4	1.0	5.8	0.5
G82126	East Cliff Medical Practice	6.6	2.0	2.7	3.7	6.8	2.6	6.8	0.5	16.2	2.0	0.9	0.7	0.8	11.3	0.9
G82150	Newington Road Surgery	5.5	1.3	1.7	2.7	7.3	3.4	7.6	0.8	15.7	1.3	0.7	0.6	0.8	11.9	0.2
G82649	Union Row Surgery	4.8	1.0	1.7	2.5	2.6	4.3	5.4	0.6	9.3	1.5	0.9	0.2	0.8	7.5	1.1
G82810	Garlinge Surgery	5.4	1.7	1.9	4.1	8.5	3.2	8.2	1.1	16.3	1.6	1.5	0.9	0.7	9.8	1.0

Denotes value is in the upper quartile for GP practices in Kent

Denotes value is in the lower quartile for GP practices in Kent

Figures for chronic kidney disease (CKD), epilepsy and depression related to patients aged 18+, figures for diabetes to patients aged 17+. Other measures (including learning disability) related to all ages

Source: HSCIC - Quality and Outcomes Framework (QOF) for April 2014 - March 2015, prepared by KPHO (RK), December 2015

Data Sources

1-6 Age-standardised mortality rates, 2006-2014. Source: PCMD. **2** ICD10: I00-I99. **3** ICD10: J00-J99. **4** ICD10: C00-C97. **5** ICD10: U00-Y99. **6** ICD10: F10, G31.2, G62.1, I42.6, K29.2, K70, K73, K74, K86.0, X45, X65, Y15.

7 Emergency admissions, 2012/13-2013/14. Source: SUS.

8 % self-reporting day-to-day activities 'limited a lot', 2011. Source: Census.

9 Modelled based on smoking prevalence data by Mosaic type. Source: Experian (TGI: 'Heavy', 'Medium' & 'Light' smokers combined).

10 Modelled based on % who do not exercise by Mosaic type. Source: Experian (TGI).

11-12 % children measured who were obese, 2013/14. Source: NCMP.

13 Modelled based on % who claim to eat '5-a-day' fruit and vegetables by Mosaic type. Source: Experian (TGI).

14 Modelled mental health prevalence based on GP practice-level data, 2014/15. Source: QOF.

15-16 Modelled wellbeing based on ONS Annual Population Survey (APS) data by Acorn type, 2011/12. Source: DCLG. **15** % scoring 0-6 for 'Overall, how satisfied are you with your life nowadays?' **16** % scoring 0-6 for 'Overall, to what extent do you feel the things you do in your life are worthwhile?'

17 Modelled based on median household income data by Mosaic type. Source: Experian (ConsumerView).

18 % claiming out of work benefits (defined as all those aged 16-64 who are jobseekers, claiming ESA & incapacity benefits, lone parents claiming Income Support and others on income related benefits), February 2015. Source: DWP (from Nomis).

19 % Year R pupils not achieving a good level of development, 2015. Source: KCC, MIU.

20 % pupils not achieving 5+ A*-C GCSEs (including English & Maths) at the end of Key Stage 4, 2015. Source: KCC, MIU.

21 % with no qualifications (based on persons aged 16+), 2011. Source: Census.

22 Education, Training & Skills IMD domain (average score), 2015. Source: DCLG.

23 % of households with no car or van, 2011. Source: Census.

24 % of households living in social rented accommodation, 2011. Source: Census.

25 % of households living in private rented accommodation, 2011. Source: Census.

26 % of households with an occupancy rating of -2 (i.e. with 2 too few rooms), 2011. Source: Census.

27 % of households with accommodation type 'shared dwellings', 2011. Source: Census.

28 % of households not living at the same address a year ago, 2011. Source: Census. Please note that OAs E00124937 & E00166800 have been removed from this analysis due to the undue influence of Eastchurch prison on levels of transience.

29 % of households with no adults or one adult and one or more children, 2011. Source: Census.

30-32 Distance to nearest GP/pharmacy/A&E or Urgent Care centre (in miles, as the crow flies from population weighted centroid of LSOA), 2015. Source: KCC Business Intelligence.

33 Crime rate (recorded crime per 1,000 population), Oct 2013 - Sept 2015. Source: data.police.uk.

34 Living Environment IMD domain (average score), 2015. Source: DCLG.

35 Index of Multiple Deprivation (IMD) (average score), 2015. Source: DCLG.

Public Hearing 11 Jan. Georgina Rooke (Personal). Summary

RSP's Ability to Deliver NSIP, vs Legal Owner's Plans

Assuming the Examining Authority is minded to accept 'need' for the proposed scheme, there are two important questions that I would like to raise at this hearing:

> Can RSP grow and operate something of the scale of a nationally significant infrastructure programme? Do they have the funding; the expertise; do they have a successful track record in airfreight operations at NSIP scale; in short do they have the profile and does the Secretary of State have confidence that they have the attributes of successful NSIP applicants?
>
> How does this proposal compare to the Legal owners' own plans for the site and the area? And does the Legal owner have a track record of delivery? Would their plans supplement and complement the existing local economy rather than put it at risk, and looking at net numbers of jobs and taking a risk-based view would their proposals likely offer a better outcome?

In answer to the first question, I found myself investigating the evidence of what the profile is of an organisation with the financial strength, leadership and operational capability and track record to be awarded a DCO. For this I have turned to PINS own data, and more specifically Transport DCO applications. What you find is the following (please see separate file for Evidence: **PINS Transport NSIP Applications**):

Lots of applications from Highways England; various County Councils; operational Port owners; Network Rail; Transport for London.

There are relatively few private enterprises such as Roxhill Developments Group and Goodman. When you investigate these companies on Companies House, you find evidence of trading history; filed accounts; accounts that show significant positive net assets. Taking Roxhill Development Groups Limited, you see for example net assets of over £37M in 2018, and Cash at Bank and in hand of over £5M.

ROXHILL DEVELOPMENTS GROUP LIMITED

GROUP STRATEGIC REPORT (CONTINUED)
FOR THE YEAR ENDED 31 MARCH 2018

The groups biggest challenge continues to be the achievement of satisfactory planning permissions and funding the significant infrastructure requirements that are often required to open up a site for occupation. The partnership with SEGRO will bring with it the scale of balance sheet that can overcome such funding challenges. The group manage planning risk by working closely with key stakeholders, and local and central government to understand requirements to ensure financial investment is proportionate.

The company manages it financial risk by engaging only with reputable customers and contractors. Financial risk is further hedged by managing its working capital and liquidity through forward funding agreements and retaining an adequate cash reserve. This enables the group to fund any unforeseen short or medium term working capital requirements and provides the ability to capitalise on any new development opportunities.

Speculative development of units remains a strategy of the group that carries risk of empty rates and holding (direct and financial) costs in the absence of an occupier lease. This is closely monitored by understanding the competition in the market and strength of location.

FINANCIAL KEY PERFORMANCE INDICATORS

The group monitor performance using the following key performance indicators:

	2018	2017
	£	£
Profit before tax	5,148,594	27,423,613
Preference debt (including interest)	13,425,604	40,513,397
Net assets	37,537,707	33,642,153
Cash at bank and in hand	5,423,413	12,780,100

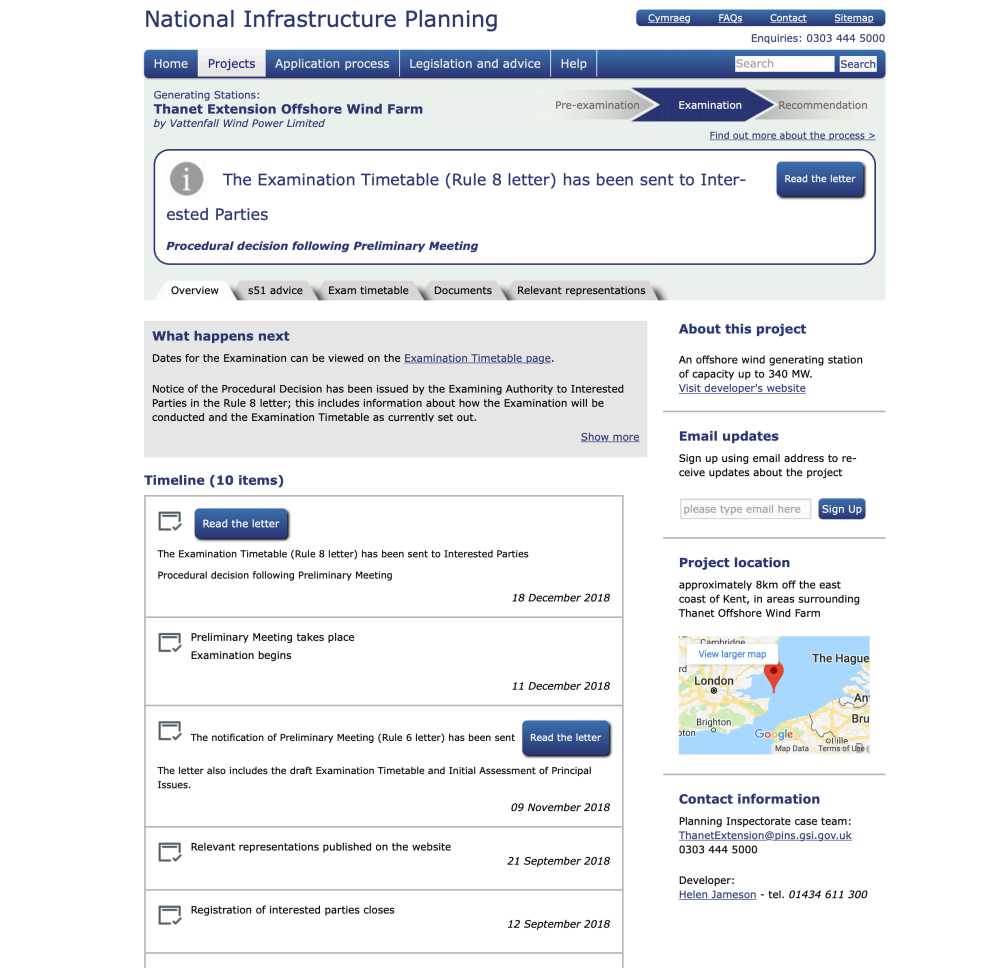
This report was approved by the board on 26 July 2018 and signed on its behalf.

[redacted]

A J Hollinshead
Director

And looking beyond Transport DCO applications to Energy, you find private companies like Vattenfall. Vattenfall has been operating the Thanet Offshore Wind Farm (one of the largest wind farms in Europe) for over seven years. When it was built it was the largest windfarm and built enough renewable energy to power around 220,000 UK homes per year. Now they are looking to extend the offshore windfarm by adding a further 34 turbines. The examination for this project started in December 2018. As an aside, the evidence suggests windfarms and airports make for awkward neighbours: See **CAA Policy and Guidelines on Wind Turbines CAP 764** who say,

"It is anticipated that wind energy will provide a significant contribution to renewable energy targets. In order to harness this energy supply, both on- and offshore wind turbine developments are being constructed, which range in size from single structures to developments encompassing many hundreds of wind turbines. Moreover, the installation of Micro Wind Turbines (MWT) is becoming increasingly prevalent. The physical characteristics of wind turbines, coupled with the size and siting of the developments, can result in effects that can have a negative impact on aviation. […]. As such, the aviation community must engage positively in the process of developing solutions to potential conflicts of interest between wind energy and aviation operations. In a similar vein, wind turbine developers must understand the potential impact of developments on aviation, both at a local and a national level, and to fully engage with the aviation industry to develop suitable mitigation solutions."



National Infrastructure Planning

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Home | Projects | Application process | Legislation and advice | Help | Search

Generating Stations:
Thanet Extension Offshore Wind Farm
by Vattenfall Wind Power Limited

Pre-examination | Examination | Recommendation

Find out more about the process >

The Examination Timetable (Rule 8 letter) has been sent to Interested Parties

Read the letter

Procedural decision following Preliminary Meeting

Overview | s51 advice | Exam timetable | Documents | Relevant representations

What happens next

Dates for the Examination can be viewed on the Examination Timetable page.

Notice of the Procedural Decision has been issued by the Examining Authority to Interested Parties in the Rule 8 letter; this includes information about how the Examination will be conducted and the Examination Timetable as currently set out.

Show more

Timeline (10 items)

Read the letter

The Examination Timetable (Rule 8 letter) has been sent to Interested Parties

Procedural decision following Preliminary Meeting

18 December 2018

Preliminary Meeting takes place
Examination begins

11 December 2018

The notification of Preliminary Meeting (Rule 6 letter) has been sent — Read the letter

The letter also includes the draft Examination Timetable and Initial Assessment of Principal Issues.

09 November 2018

Relevant representations published on the website

21 September 2018

Registration of interested parties closes

12 September 2018

About this project

An offshore wind generating station of capacity up to 340 MW.
Visit developer's website

Email updates

Sign up using email address to receive updates about the project

please type email here — Sign Up

Project location

approximately 8km off the east coast of Kent, in areas surrounding Thanet Offshore Wind Farm

Contact information

Planning Inspectorate case team:
ThanetExtension@pins.gsi.gov.uk
0303 444 5000

Developer:
Helen Jameson - tel. *01434 611 300*

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VATTENFALL

Communities | Projects | Supply Chain and Skills

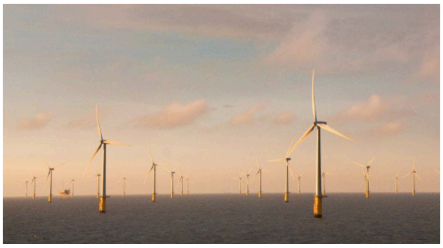
Home / Projects / Wind energy projec ... / Thanet Extension / About the project

Wind energy projects

- Aultmore, Banffshire
- Clashindarroch II Wind Farm Proposal
- Hirddywel, Powys
- Llanbadarn Fynydd, Powys
- Mynydd Lluest y Graig, Powys
- Ourack – Exploring the Wind Energy Potential
- South Kyle Wind Farm
- Thanet Extension
  - About the project
  - Statutory Consultation - What did the public tell us?
  - The planning process
  - Get involved
  - News and media
  - Documents
- Vattenfall in Norfolk

Operational wind farms
Solar projects
Battery@PyC
Wind - Power Purchase Agreements
iSupplyEnergy

About the project



Vattenfall has been operating Thanet Offshore Wind Farm for over 7 years. When it was built it was the world's largest wind farm, and since that time it has produced enough renewable energy to power around 220,000 UK homes per year.*

Why extend Thanet Offshore Wind Farm?

We know that extension projects can deliver many benefits:

- They can deliver lower cost renewable energy because we can benefit from:

- shared operations and maintenance approaches,

- our knowledge of constructing and operating in the area,

- the latest turbine technology.

- They allow us to build on our existing investment – in the local community and in a local workforce

Project Figures	
Number of turbines	Up to 34
Installed capacity	Up to 340MW
Turbine height	250m maximum
Individual turbine capacity	Dependent on technology. 10MW and 12MW used as assumptions for EIA
Cables onshore (number and length)	Up to 4 circuits, each comprised of 3 individual cables. Onshore cable route distance of 2.5km
Cables offshore (number and length)	4 cables at 28km maximum distance
Landfall location	Pegwell Bay
Grid connection and substation	Substation at Richborough Port, up to two 400kV connection cables between substation and grid connection at Richborough Energy Park

Screenshot

Contact

Melanie Rogers
Vattenfall Wind Power, Local Liaison Officer
info@thanetextension.com
[redacted]

Share

Documents

Project documents and newsletters can be found here

Notices to Mariners

- updated TE NTM 09 METOCEAN MEASUREMENT CAMPAIGN KR.pdf
- TE NTM 05 METOCEAN MEASUREMENT CAMPAIGN.pdf
- TE NTM 03 SHIPPING SURVEY.pdf
- TE NTM 02 BEAM AND OTTER TRAWLER SURVEY.pdf
- TE NTM 01 SHIPPING SURVEY.pdf
- TOW Notice to Mariners No 69 Metocean Campaign.pdf
- TE NTM 06 METOCEAN MEASUREMENT CAMPAIGN.pdf

Further information

- Scoping Report
- Kent Wind Farms_The story so far.pdf
- Kent Wind Farms_Working with local suppliers.pdf

Thanet Extension Planning Inspectorate Portal

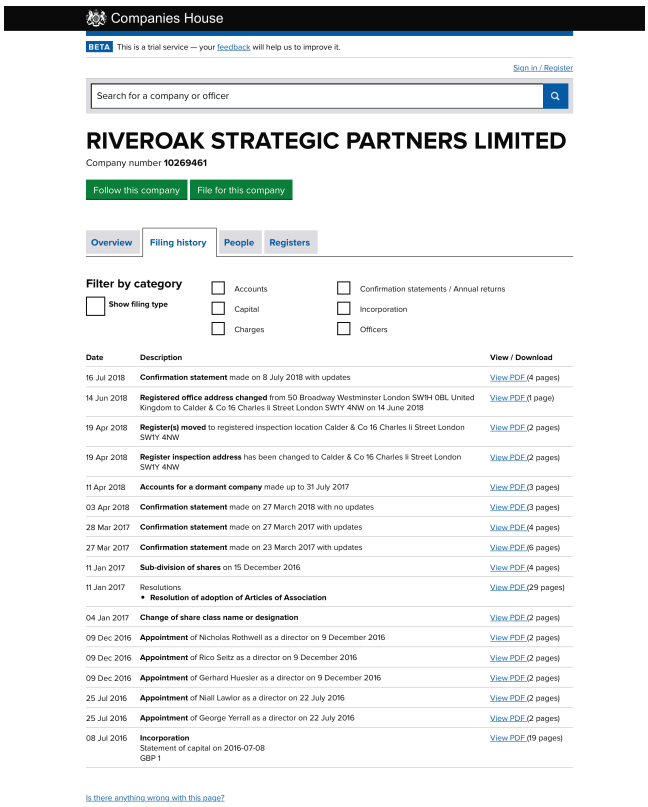
RSP's Ability to Deliver NSIP

What you don't find on the list of NSIP DCO applicants, are start-ups.

In the case of RSP's application for a DCO, the start-up in question does not own the site on which they have set their sights. This Examination will result in a binary outcome: the right to compulsorily purchase the site from the current legal owners, or not. In such case there is no opportunity for the Secretary of State to rely on sets of milestones building up to the successful delivery of RSP's business plan; showing steady and significant numbers of ATMs; taking business and market share from existing operators; proving that thousands of local people have been up-skilled and now benefit from incomes that they lacked previously; indeed showing an improvement in Thanet's **English Index of Multiple Deprivation** score.

Instead, PINS is contemplating the forced transfer of legal ownership of a site from its current British legal owner, to a start-up with negligible net assets; a number of limited companies set-up in 2017 and 2018 for which accounts have yet to be filed; with a business plan that fails to pass the scrutiny of Council appointed aviation experts and lacks credibility when assessed within the context of the existing UK freight operator market.

Here is Riveroak Strategic Partner Limited's filing history: Accounts for a dormant company made up to July 31, 2017 and nothing since.



Companies House

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RIVEROAK STRATEGIC PARTNERS LIMITED

Company number **10269461**

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Date	Description	View / Download
16 Jul 2018	**Confirmation statement** made on 8 July 2018 with updates	View PDF (4 pages)
14 Jun 2018	**Registered office address changed** from 50 Broadway Westminster London SW1H 0BL United Kingdom to Calder & Co 16 Charles II Street London SW1Y 4NW on 14 June 2018	View PDF (1 page)
19 Apr 2018	**Register(s) moved** to registered inspection location Calder & Co 16 Charles Ii Street London SW1Y 4NW	View PDF (2 pages)
19 Apr 2018	**Register inspection address** has been changed to Calder & Co 16 Charles Ii Street London SW1Y 4NW	View PDF (2 pages)
11 Apr 2018	**Accounts for a dormant company** made up to 31 July 2017	View PDF (3 pages)
03 Apr 2018	**Confirmation statement** made on 27 March 2018 with no updates	View PDF (3 pages)
28 Mar 2017	**Confirmation statement** made on 27 March 2017 with updates	View PDF (4 pages)
27 Mar 2017	**Confirmation statement** made on 23 March 2017 with updates	View PDF (6 pages)
11 Jan 2017	**Sub-division of shares** on 15 December 2016	View PDF (4 pages)
11 Jan 2017	Resolutions • **Resolution of adoption of Articles of Association**	View PDF (29 pages)
04 Jan 2017	**Change of share class name or designation**	View PDF (2 pages)
09 Dec 2016	**Appointment** of Nicholas Rothwell as a director on 9 December 2016	View PDF (2 pages)
09 Dec 2016	**Appointment** of Rico Seitz as a director on 9 December 2016	View PDF (2 pages)
09 Dec 2016	**Appointment** of Gerhard Huesler as a director on 9 December 2016	View PDF (2 pages)
25 Jul 2016	**Appointment** of Niall Lawlor as a director on 22 July 2016	View PDF (2 pages)
25 Jul 2016	**Appointment** of George Yerrall as a director on 22 July 2016	View PDF (2 pages)
08 Jul 2016	**Incorporation** Statement of capital on 2016-07-08 GBP 1	View PDF (19 pages)

Is there anything wrong with this page?

There's:

- Riveroak MSE Limited incorporated on 10 December 2018
- Riveroak Fuels Limited incorporated on 24 August 2018
- Riveroak Operations Limited; unaudited financial statements for the period ended 31 August 2017 showing net liabilities of (£3.8M)

- Riveroak AL Limited; unaudited financial statements for the period as at 31 July 2017 showing net liabilities of (£46K)
- Freudmann Limited; unaudited accounts as at 31 March 2018 showing net current assets of £30K
- Freudmann Tipple International Limited; unaudited accounts as at 30 March 2018 showing net current assets of £88K

RIVEROAK OPERATIONS LIMITED
REGISTERED NUMBER: 10311804

STATEMENT OF FINANCIAL POSITION
AS AT 31 AUGUST 2017

	Note		2017 £
Fixed assets			
Investments			**1,000,000**
			1,000,000
Current assets			
Debtors: amounts falling due within one year	5	**555,169**	
Cash at bank and in hand		**45,251**	
		600,420	
Creditors: amounts falling due within one year		**(912,076)**	
Net current (liabilities)/assets			**(311,656)**
Total assets less current liabilities			**688,344**
Creditors: amounts falling due after more than one year			**(4,458,285)**
Net (liabilities)/assets			**(3,769,941)**
Capital and reserves			
Called up share capital	10		**1**
Profit and loss account	11		**(3,769,942)**
			(3,769,941)

The directors consider that the Company is entitled to exemption from audit under section 477 of the Companies Act 2006 and members have not required the Company to obtain an audit for the period in question in accordance with section 476 of Companies Act 2006.

The directors acknowledge their responsibilities for complying with the requirements of the Companies Act 2006 with respect to accounting records and the preparation of financial statements.

The financial statements have been prepared in accordance with the provisions applicable to companies subject to the small companies regime and in accordance with the provisions of FRS 102 Section 1A - small entities.

The financial statements have been delivered in accordance with the provisions applicable to companies subject to the small companies regime.

The Company has opted not to file the statement of income and retained earnings in accordance with provisions applicable to companies subject to the small companies' regime.

Is this the profile of a company that can be entrusted to deliver a NSIP? In a deprived area of the country that depends on tourism for over 7,000 jobs? Where cargo planes will fly in/out at a mere 150m from the tops of rooves interrupting sleep, conversation, leisure activity? Where the only growing Industry could be adversely impacted?

And should this proposal be approved taking account of the close proximity of Ramsgate, Herne Bay and the Villages to the runway; the impact of low-flying aircraft and noise on the poorest in our community, and the number and proximity of children's schools with the negative consequences on educational attainment that you will find covered in other objections:

Schools on Flightpath	Number of Pupils	Distance from Runway	Height of Aircraft Overhead
Chilton Primary School	422	1.8km	150m (land dips)
Christ Church Primary School	253	2.75km	185m
Chatham & Clarendon Grammar	1372	3.5km	209m

It is well documented and established that it is the poorest that are worst affected by aircraft noise, who are unable to pay for triple-glazing and adequate sound insulation; who can't afford to move; whose children's life chances are already lower than their peers and whose educational attainment will be affected; who already suffer poorer physical and mental health than the less deprived.

Queen Mary University of London: Aircraft noise effects on health. Prepared for the Airports Commission, May 2015

"The health effects of environmental noise are diverse, serious, and because of widespread exposure, very prevalent (Basner et al, 2014). For populations around airports, aircraft noise exposure can be chronic. Evidence is increasing to support preventive measures such as insulation, policy, guidelines, & limit values. Efforts to reduce exposure should primarily reduce annoyance, improve learning environments for children, and lower the prevalence of cardiovascular risk factors and cardiovascular disease (Basner et al, 2014)."

Concluding Remarks:

In weighing up the likelihood of RSP delivering on its plans; the

- Negligible net contribution to UK Plc due to incumbent operators better placed to meet UK airfreight demand who can meet the UK's airfreight requirements for the next 15 years (MAG Airports);
- Government backing for the London Heathrow third runway that will provide preferred bellyhold freight to/from long-haul destinations;
- The operational expertise needed to deliver a NSIP and track record of successful, relevant, similar business operations to the proposed scheme, and
- The fragility of the Thanet economy and the disproportionate adverse risk that this proposal presents

Can PINS and the British Government allow a start-up with no successful track record of airfreight operations, including at NSIP scale, to compulsorily purchase this site from its current legal owner and embark on a journey where partial delivery will unleash the downsides associated with a 24/7 cargo hub, and fail to deliver the upsides?

Further, how does this proposal compare to the Legal owners' own plans for the site and the area? The opportunity cost of 2,000 secondary manufacturing jobs that will be lost with the CPO? The loss of a scheme that doesn't present a risk to the existing economy, but complements it with green space, leisure facilities, and heritage aviation? A Legal owner with a track record of delivery locally?

We believe Holiday Homes Against Manston have presented an evidence-based view of the reasons why RSP's proposal should be rejected. There is no need for 17,000 – 83,000 net additional cargo airfreight ATMs in the UK. We believe this paper demonstrates that RSP does not present the characteristics of a company able to deliver a nationally strategic infrastructure programme; with dormant companies, no proof of funds, net liabilities of £3.8M, no proof of future customers, no demonstration of local businesses requiring outbound airfreight services of the proposed scale, no relevant or related trading history of similar scale.

It is for these reasons that we hope that PINS will protect the interests of the current UK cargo operator industry; protect the interests of one of the poorest and most disadvantaged areas in England and protect the interests of the current legal owner of this site, by rejecting RSP's proposals.

Evidence Base:

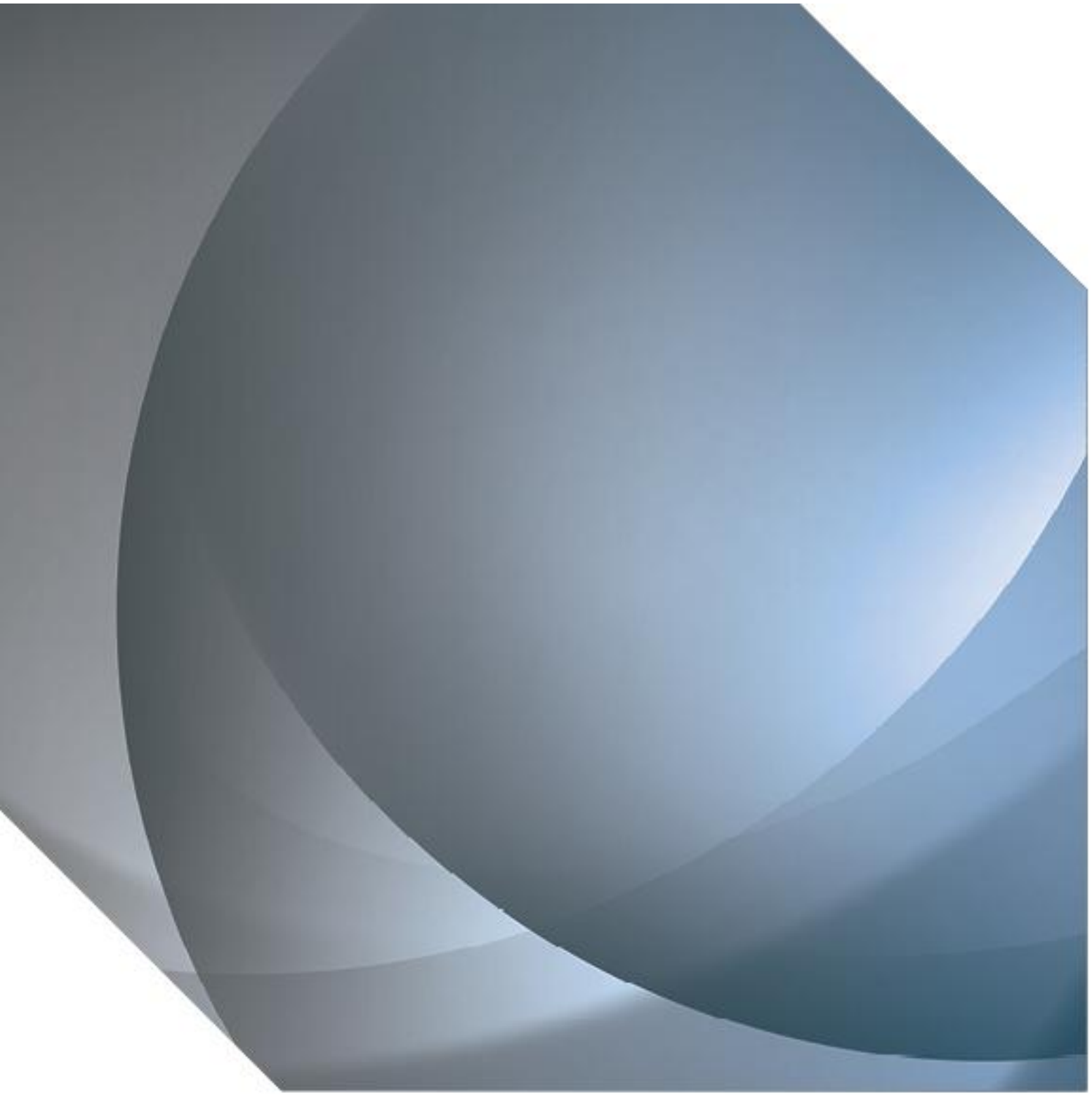
Other Risks:

- CAA Policy and Guidelines on Wind Turbines . CAP 764. Safety & Airspace Regulation Group Sixth Edition, February 2016
- Thanet Extension Offshore Wind Farm NSIP Application (examination begins 11 Dec 2018) https://infrastructure.planninginspectorate.gov.uk/projects/south-east/thanet-extension-offshore-wind-farm/
- Thames Estuary 2050 Growth Commission. 2050 Vision. June 2018
- Aircraft Noise Effects On Health. Queen Mary University of London. May 2015
- Other Evidence
    - PINS
        - https://infrastructure.planninginspectorate.gov.uk/projects/
        - infrastructure.planninginspectorate.gov.uk_projects.doc
        - Goodman NSIP Application
        - Vatenfall NSIP Application
    - Companies House records
        - Riveroak Strategic Partners Limited (various); Riveroak MSE Ltd
        - Roxhill Holdings

Civil Aviation Authority

CAA Policy and Guidelines on Wind Turbines

CAP 764



Published by the Civil Aviation Authority, 2016

Civil Aviation Authority,

Aviation House,

Gatwick Airport South,

West Sussex,

RH6 0YR.

You can copy and use this text but please ensure you always use the most up to date version and use it in context so as not to be misleading, and credit the CAA.

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Enquiries regarding the content of this publication should be addressed to:

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The latest version of this document is available in electronic format at www.caa.co.uk, where you may also register for e-mail notification of amendments.

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Revision History

Issue 1 July 2006

Neither aviation nor the wind energy industry is at a steady state and both can be expected to evolve in ways that may impact the other. Combining the current drive for renewable energy and the increasing number of wind farms with the finite land resource in the UK, means that wind turbines and aviation are being required to operate closer and closer together. However, providing a suitable environment that allows the co-existence of wind turbines and aviation is extremely complicated and new or improved mitigation solutions are being developed all the time. Therefore, it is expected that this CAP will be a living document, which will be updated periodically to reflect the outcome of any further research into the interaction between wind turbine developments and aviation. It will also be revised to take account of changes in regulations, feedback from industry, and recognised best practice.

Issue 2 February 2009

The way in which Aviation Stakeholders and Wind Turbine Developers interact has matured since the initial release of CAP 764 in 2006. This revision includes updates on Government renewable energy policy and details of how all interested parties interact. Additionally, the scope of the document has been widened to include all aspects of aviation that may be affected by Wind Turbines. The appendix detailing the method for determining if a wind turbine is in line of sight of an aeronautical radar station has been simplified.

Issue 3 May 2010

This revision is published to update references to the Air Navigation Order which has been completely re-numbered and to incorporate editorial corrections.

Issue 4 July 2011

This revision follows extensive consultation amongst the aviation and renewable energy communities. Whilst remaining an aviation stakeholder-focused document, CAP 764 has been amended in an attempt to broaden its appeal to all interested wind energy parties with the intention of becoming the ‘go to’ document for aviation and wind energy stakeholders alike. It is important that this document is read in conjunction with the CAA Wind Energy web pages, which provide amplifying information, and which will enable currency and relevancy to be maintained in between the biennial revisions of CAP 764.

A re-issue to issue 4 was made in August 2011 incorporating corrections to the Glossary, Chapter 2, Pages 4, 8 and 9, Chapter 3, Pages 6 and 7.

Revisions included in Amendment 1 to Issue 4

This revision includes changes to Offshore Helicopter Operations, Consultation Zones around Offshore Helidecks, Helicopter Main Routes and Facilitation of Helicopter Support to Offshore Installations.

Issue 5 June 2013

This revision is in the new CAA format and as such paragraph numbering has been updated. In addition, previous paragraphs detailing the impact of wind turbines on aviation and specifically radar have been updated. This is supplemented by an updated overview and analysis of the various mitigation techniques available. It replaces Issue 4 completely.

Issue 6 February 2016

Issue 6 is publicised following a lengthy consultation with both external and CAA stakeholders. It simplifies radar effects paragraphs and returns the more complicated radar detail to the CAP 670. Potential Mitigation Measures were also taken directly from the CAP 670 therefore detailed explanations are removed from the CAP 764 with only a summary retained. Issue 6 also incorporates CAA Policy Statements on the 'Lighting of Wind Turbine Generators in United Kingdom Territorial Waters (22 November 2012)' and the 'Failure of Aviation Warning Lights on Offshore Wind Turbines (27 April 2012)'. CAA Policy Statement 'Lighting of En-Route Obstacles and Onshore Wind Turbines (1 April 2010)' remains extant. Appendices concerning radar assessment methodology and references are removed, the latter being comprehensively covered by hyperlinks and footnotes within the document. It should be noted that hyperlinks were verified on publication. Issue 6 has been comprehensively reviewed and updated where necessary to reflect current information and practices. It replaces Issue 5 completely.

Foreword

Introduction and background

The Department for Transport (DfT) 'Aviation Policy Framework[1], presented to Parliament in March 2013, provided a high level strategy setting out Government objectives for aviation. The aviation sector is seen as a major contributor to the economy and the Government seeks to support its growth within a framework which maintains a balance between the benefits of aviation and its costs, particularly its contribution to climate change and noise.

Whilst recognising the need for further aviation capacity in the UK in order to promote economic growth, the strategy is also based on the requirement for a balanced approach which addresses the wider impacts of aviation and the need for sustainable development.

The Government is also committed to reducing greenhouse gas emissions within the UK and, in turn, this means there is now a shift towards economically viable renewable energy sources rather than carbon fuels. The 2008 Climate Change Act established the world's first legally binding climate change target which aims to reduce the UK's greenhouse gas emissions by at least 80% (from the 1990 baseline) by 2050. In addition, Directive 2009/28/EC of the European Parliament and of the Council set the national overall target for the share of energy from renewable energy by 2020 as 15% for the UK. However, it is UK Government policy that 30% of the UK's electricity supply should come from renewable sources by 2020; the Scottish parliament has adopted a more ambitious 100% electricity demand equivalent from renewables by 2020.

It is anticipated that wind energy will provide a significant contribution to renewable energy targets. In order to harness this energy supply, both on- and offshore wind turbine developments are being constructed, which range in size from single structures to developments encompassing many hundreds of wind turbines. Moreover, the installation of Micro Wind Turbines (MWT) is becoming increasingly prevalent. The physical characteristics of wind turbines, coupled with the size and siting of the developments, can result in effects that can have a negative impact on aviation.

Both wind energy and aviation are important to UK national interests and both industries have legitimate interests that must be balanced carefully. Therefore it is important that the aviation community recognises the Government aspiration for wind turbine developments to play an increasing role in the national economy. As such, the aviation community must engage positively in the process of developing solutions to potential conflicts of interest between wind energy and aviation operations. In a similar vein, wind turbine developers

[1] DfT Aviation Policy Framework March 2013

must understand the potential impact of developments on aviation, both at a local and a national level, and to fully engage with the aviation industry to develop suitable mitigation solutions.

Those involved in addressing wind energy and aviation issues must do so in a positive, co-operative and informed manner. Whilst the aims and interests of the respective industries must be protected, a realistic and pragmatic approach is essential for resolving any conflicts between the Government's energy, transport and defence policies.

Aim of this publication

Being a CAP, this document is aimed primarily at providing assistance to aviation stakeholders to help understand and address wind energy related issues, thereby ensuring greater consistency in the consideration of the potential impact of proposed wind turbine developments. However, it is acknowledged that other users such as Local Planning Authorities (LPAs)[2], wind energy developers and members of the general public will also refer to it.

Consequently, it is hoped that some of the issues and questions often posed by these groups have, where appropriate, also been discussed.

Scope

This document provides CAA policy and guidance on a range of issues associated with wind turbines and their effect on aviation that will need to be considered by aviation stakeholders, wind energy developers and LPAs when assessing the viability of wind turbine developments.

It is not the intention or purpose of this CAP to provide instruction on the need or means to object to wind turbine developments; this must remain the decision of individual aerodrome operators, service providers or other organisations. Furthermore, it should also be noted that within the framework of these guidelines, specific circumstances will have to be addressed on a case-by-case basis, as it is not possible or appropriate to prescribe a standard solution. This document should be read in conjunction with specific policy and/or legislative documentation as referenced in the text, as well as the CAA Windfarms web pages.

Significant effort has been spent developing a cohesive approach to wind energy across the civil and military spectrum of aviation. It is an aspiration to create a joint and integrated publication that details both civil and military aviation policy on wind turbines. However, until this is achieved, the Ministry of Defence (MoD), through Defence Infrastructure Organisation (DIO), must continue to be consulted separately on all developments that may affect their sites (both aviation and others).

[2] The term 'LPA' throughout this document is used generically to refer to Planning Authorities within England, Scotland, Wales and Northern Ireland.

Feedback

Stakeholders are encouraged to provide feedback on their experiences with wind turbine development so that this CAP can be updated appropriately. This CAP will be reviewed biennially and, due to the lengthy process that must be followed, minor amendments cannot be made. However, interim amendments and supplementary guidance will be published through additional CAA Policy Statements or on the CAA Wind Energy web pages to maintain the currency and relevance of CAA guidance and policy.

Contact details

General enquiries concerning this publication can be addressed to windfarms@caa.co.uk. Additional contact details, including postal addresses, are provided at Appendix B.

Glossary

A list of specialised words or terms with their definitions follows:	
AAA	Airspace, ATM and Aerodromes (CAA)
ACP	Airspace Change Process
AD	Air Defence
AIP	Aeronautical Information Publication
ANO	Air Navigation Order
ANSP	Air Navigation Service Provider
AOA	Airport Operators Association
ATC	Air Traffic Control
CAA	Civil Aviation Authority
CAS	Controlled Airspace
CAP	Civil Aviation Publication
CFAR	Constant False Alarm Rate
CNS	Communications, Navigation And Surveillance
DECC	Department Of Energy And Climate Change
DfT	Department For Transport
DIO	Defence Infrastructure Organisation (Formerly Defence Estates)
DME	Distance Measuring Equipment
DTM	Digital Terrain Mapping
DVOF	Defence Vertical Obstruction File
DZ	Dropping Zone
EASA	European Aviation Safety Agency
EM	Electromagnetic
FT	Feet
GA	General Aviation

A list of specialised words or terms with their definitions follows:	
HMR	Helicopter Main Route
IFP	Instrument Flight Procedures
ILS	Instrument Landing System
JAR	Joint Aviation Requirements
KM	Kilometre(S)
LF	Low Flying
LOS	Line Of Sight
LPA	Local Planning Authority (also refers to planning authorities of devolved governments)
m	Metre(s)
MAP	Missed Approach Procedure
MATS	Manual of Air Traffic Services
MHz	Mega Hertz
MoD	Ministry of Defence
Mode S	Mode Select
MSD	Minimum Separation Distance
MW	Mega Watts
MWT	Micro Wind Turbine
NAFW	National Assembly for Wales
NAIZ	Non-Automatic Initiation Zones
Navaids	Navigation Aids
NDB	Non Directional Beacon
NERL	NATS En Route plc
NM	Nautical mile(s) (1853 m or 1.15 Statute Miles)
ODPM	Office of the Deputy Prime Minister
OLS	Obstacle Limitation Surface
PPG	Planning Policy Guidance Note

A list of specialised words or terms with their definitions follows:	
P-RNAV	Precision Area Navigation
PSR	Primary Surveillance Radar
RAM	Radar Absorbent Material
RCS	Radar Cross-Section
RF	Radio Frequency
RNAV	Area Navigation
SARG	Safety and Airspace Regulation Group (CAA)
SID	Standard Instrument Departure
SMS	Safety Management Systems
SSR	Secondary Surveillance Radar
STAR	Standard Instrument Arrival Route
TMZ	Transponder Mandatory Zones
VFR	Visual Flight Rules
VOR	VHF Omni Directional Range

Chapter 1

CAA Responsibilities

General

1.1 The CAA is responsible for safety and airspace regulation of civil aviation in the UK under the Civil Aviation Act 1982 and the Transport Act 2000. The CAA's Safety and Airspace Regulation Group (SARG) is responsible for the regulation of licensed aerodromes and Air Traffic Services (ATS) in the UK; the planning and regulation of all UK airspace, including the communications, navigation and surveillance (CNS) infrastructure, and also has the lead responsibility within the CAA for all wind turbine related issues. Within SARG, wind turbine related issues are addressed by CAA Infrastructure.

1.2 Legislative provisions affecting all development, including wind turbines, are set out for England and Wales in Town & Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002 (ODPM Circular 01/2003). Similar provisions are set out for Scotland in the Town & Country Planning Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas (Scotland) Direction 2003 (Scottish Planning Circular 2/2003), and for Northern Ireland in the Planning Policy Statement 18: Renewable Energy. These provisions only apply formally to those aerodromes and technical sites that are officially safeguarded; moreover, statutory consultees are limited to the MoD, NATS En Route Ltd (NERL) and affected service providers.

1.3 At all times, responsibility for the provision of safe services lies with the ATS provider or Air Navigation Service Provider (ANSP). It should be noted that the CAA does not have regulatory powers to approve or reject planning applications.

1.4 The CAA policy on wind energy is that:

1. Wind turbine developments and aviation need to co-exist in order for the UK to achieve its binding European target to achieve a 15% renewable energy commitment by 2020, and enhance energy security, whilst meeting national and international transport policies. However, safety in the air is paramount and will not be compromised. As the independent aviation regulator, the CAA is well placed to provide clarification to both the aviation industry and the wind energy industry;

2. Due to the complex nature of aviation operations, and the impact of local environmental constraints, all instances of potential negative impact of proposed wind turbine developments on aviation operations must be considered on a case- by-case basis;

3. It is CAA policy to provide the best and most timely advice to aviation and wider wind development stakeholders through consultation, the publication of CAP 764 and its associated web pages on the CAA web site;

4. Such clarification, advice and guidance is provided through the publication of this and associated official CAA and government documents, along with the CAA Windfarms web pages.

Aerodrome and Communications Navigation and Surveillance (CNS) site safeguarding[3]

1.5 Many civil aerodromes in the UK are certificated in accordance with EU Regulation 139/2014 (Aerodromes) or licensed in accordance with the Air Navigation Order (ANO) 2009 as amended. Under either of these provisions, the CAA is responsible for being satisfied that a certificated or licensed aerodrome complies with the relevant requirements and is safe for use by civil aircraft, having regard in particular to the physical characteristics of the aerodrome and its surroundings. Aerodrome operators are required to have procedures for safeguarding, to monitor the changes in the obstacle environment, marking and lighting, and in human activities or land use on the aerodrome and in the areas around the aerodrome. In addition, a requirement is placed on the licensee to take all reasonable steps to ensure that the aerodrome and its surrounding airspace are safe at all times for use by aircraft.

1.6 'Statutory' or 'official' safeguarding is a process of obligatory consultation between an LPA and consultees and is designed to safeguard technical sites and certain aerodromes in the UK. However, the same process of consultation can take place for aerodromes and technical sites that are not given this statutory protection; this process is known as unofficial safeguarding.

1.7 Certain civil licensed aerodromes (selected by Government on the basis of their importance to the national air transport system) are officially safeguarded. All EASA certificated aerodromes are deemed to be officially safeguarded. In particular, such safeguarding ensures that the operations and development of the aerodromes are not inhibited by buildings, structures, erections or works which infringe protected surfaces, obscure runway approach lights or have the potential to impair the performance of aerodrome CNS. A similar official safeguarding system applies to certain military sites, including aerodromes,

[3] Further information can be found in:

- England and Wales: Joint ODPM, DfT, Planning Circular 1/2003 guidance on Safeguarding, Aerodromes, Technical Sites and Military Explosives Storage Areas
- Scotland: Planning Circular 2 2003
- Graphics of safeguarded technical sites can be found at:
- http://www.nats.aero/services/information/wind-farms/self-assessment-maps/

selected on the basis of their strategic importance.

1.8 In general, aerodrome safeguarding is limited to the vicinity of the aerodrome (the definition of 'vicinity' will vary depending upon the activity that takes place at that aerodrome). The CAA Aerodromes Team conducts oversight audits at certified and licensed aerodromes to confirm compliance to the applicable rules.

1.9 CAP 793 (Safe Operating Procedures at Unlicensed Aerodromes) provides guidance for unlicensed aerodromes.

1.10 Where an Instrument Landing System (ILS) is used at an aerodrome, safeguarding criteria are used to protect the ILS radio signals from corruption. Technical safeguarding aspects are detailed in CAP 670 (Air Traffic Services Safety Requirements) GEN 02.

1.11 Aerodrome operators are responsible for liaising with LPAs to prevent operational airspace being infringed by new development. One significant consideration is the protection of the Obstacle Limitation Surface (OLS)[4] that should be applied for aerodrome safeguarding. The CAA may be required to explain technical matters to local or central government if a contested development proposal is referred to Ministers for decision.

1.12 The safeguarding of unlicensed aerodromes falls within the advice promulgated in the aforementioned national circulars, which, at Paragraph 13 of Annex 2 state: "Operators of licensed aerodromes which are not officially safeguarded and operators of unlicensed aerodromes and sites for other aviation activities (for example gliding or parachuting) should take steps to protect their locations from the effects of possible adverse development by establishing an agreed consultation procedure between themselves and the local planning authority or authorities. Local planning authorities are asked to respond sympathetically to requests for non-official safeguarding."

1.13 The safeguarding of unlicensed aerodromes is therefore a matter of discussion between the operator and the LPA and the need for constructive liaison from an early stage is evident. CAP 793 provides guidance. Both official and unofficial safeguarding are discussed further in Chapter 3 of this document.

1.14 In all cases, regardless of the status of the aerodrome, any development that causes pilots to experience an increase in difficulty when using an aerodrome may lead to a loss of utility. The CAA considers that if the aerodrome operator

[4] OLS is the hypothetical boundary which indicates the extent of a volume of airspace which should be kept free of obstacles, so far as is reasonably practicable, to facilitate the safe passage of aircraft. It is used collectively to refer to other terms which are fully defined in Chapter 4 of Annex 14 to the Chicago Convention and incorporated into UK civil aviation regulation within CAP 168. OLS comprises of: approach surface, balked landing surface, conical surface, inner approach surface, inner horizontal surface, inner transitional surface, take-off climb surface and transitional surface.

advises that the aerodrome's established amenity would be affected by a development, their advice can generally be considered as expert testimony in the context of the operation of the aerodrome. However, such comment requires robust evidence, and may be subjected to scrutiny by the CAA (or any other party with equivalent expertise), should disagreement between the aviation operator and the wind energy developer arise. Notwithstanding that the CAA has no regulatory oversight of unlicensed aerodromes it is recommended that developers and planning authorities give similar consideration to comments and evidence from the operators of unlicensed aerodromes.

1.15 It is recommended that aerodrome operators that are not officially safeguarded have agreed unofficial safeguarding maps with LPAs.

1.16 The safety of aircraft in UK airspace is often dependent on ground-based navigation and radio aids. DfT Circular 1/2003 and Scottish Circular 2/2003 provides for the safeguarding of civil technical sites currently owned by NERL and military technical sites owned by the Secretary of State for Defence.

Airspace management

1.17 SARG, as the airspace regulatory authority, is responsible for developing, approving, monitoring and enforcing policies for the safe and efficient allocation and use of UK airspace and its supporting infrastructure, taking into account the needs of all stakeholders, national security and environmental issues.

1.18 SARG is directed by the Secretary of State for Transport to act with impartiality to ensure that the interests of all airspace users (including General Aviation (GA) stakeholders) and the community at large are taken into account in respect of how UK airspace is managed. To this end, formal consultation with airspace users, service providers and other relevant bodies shall be conducted with the aim of obtaining consensus, wherever possible, before making changes in the planning or design of UK airspace arrangements. The environmental impact of proposals for change shall be taken into consideration by ensuring that consultation is conducted with the appropriate authorities, to lessen or mitigate such impact to the maximum extent possible.

1.19 The Airspace Change Process (ACP) is mandatory for the majority of airspace change requests. It is a robust process that ensures that all appropriate stakeholders are consulted; CAP 725 refers.

Approvals for equipment and service provision

1.20 In order to provide an ATS in the UK, a service provider must be granted an approval by the CAA. EC 1035/2011, EC 550/2004 and relevant sections of the ANO (2009) as amended apply.

1.21 Where service providers use a remote feed of surveillance data from a

contracted source, they remain responsible for gaining the requisite approvals for the use of data as part of a surveillance service. ANSPs must have effective processes and procedures to:

1. Safeguard their service through being able to recognise when wind turbine developments may affect their service, and by participating in planning activities;

2. Be able to assess the likely effect of a wind turbine development on their service. It is not automatically the case that a wind turbine development will result in a degradation to the service. The service provider must first assess whether the planned development will technically impact upon the CNS systems used. Where it is assessed that there will be a technical impact, the service provider must then assess whether this has any operational significance (see also Chapter 2);

3. Be able to establish what reasonable measures may be put in place to mitigate the effect of a wind turbine development. At all times, a collaborative approach between the service provider and the wind turbine developer is required to ensure an appropriate (i.e. reasonable, achievable and timely) mitigation is identified.

1.22 Where a service provider has to make a change to equipment or operational procedures in order to safely accommodate a wind turbine development then the following must be addressed:

1. The service provider must perform a safety assessment on the change. The final safety assessment cannot be made until all changes have been implemented and wind turbine developments are operational;

2. As part of the safety assessment, the service provider should at least consider the issues raised in Chapter 2 of this CAP concerning the impact of wind turbines on aviation;

3. Where considering mitigations to address the impact of the wind turbine development, service providers are advised to review the issues and limitations summarised in Chapter 2. Full details are available in the CAA CAP 670;

4. All significant changes to an ATS must be notified by an ANSP to their SARG Regional Inspector who may wish to see evidence that the change has been managed safely and in accordance with the ANSPs change management processes. Where appropriate, an updated or amended Safety Case may be required;

5. ANSPs that fail to properly address the effects of a wind turbine development on a service may have the existing Certificate withdrawn by the CAA, or

variations applied to the Designation which may result in the closure of that service.

Advice to Government

1.23 In discharging its role as an independent regulator, the CAA is required to provide advice to Government as required. To this end, the CAA is proactive with appropriate Government departments in respect of wind energy related issues. The CAA is a member of the DECC (Department of Energy and Climate Change) Aviation Management Board and its sub-groups to provide expert input on aviation aspects of the Government's renewable energy programme. Details of these groups are contained in Appendix A.

Chapter 2

Impact of wind turbines on aviation

Introduction

2.1 The development of sites for wind turbines has the potential to cause a variety of negative effects on aviation. These include (but are not limited to): physical obstructions; the generation of unwanted returns on Primary Surveillance Radar (PSR); adverse effects on the overall performance of CNS equipment; and turbulence. Whilst it is generally the larger, commercial turbines that have the greatest impact on aviation, the installation of other equipment may also affect operations. Smaller turbines, and the preliminary activities for larger turbines (such as the erection of anemometer masts on potential development sites), could have a negative impact on aviation and so require assessment. Moreover, the cumulative effects of wind turbines on aviation need to be assessed if developments proliferate in specific areas.

2.2 This chapter aims to provide a summary of the issues that aviation stakeholders should consider when assessing the impact of a proposed wind turbine development. It is not intended to be exhaustive because local circumstances may raise issues that are unique to a specific case. For this reason, the local aerodrome operator, ANSP and ATS providers may be best qualified to interpret what this impact might be; however, they must demonstrate a thorough assessment of how it will affect the safety, efficiency and flexibility of their specific operations. Robust evidence may be required: see also para 1.14.

Wind turbine effects on PSR[5]

2.3 The following section describes the various effects that wind turbines have caused on Air Traffic Control (ATC) PSRs during the trials conducted as part of many research projects around the UK and the rest of the world.

2.4 ANSPs must therefore consider the possibility that their radars be affected by each of these phenomena as a result of wind turbines within the coverage range of their surveillance systems.

2.5 In basic terms, a PSR transmits a pulse of energy that is reflected back to the radar receiver by an object that is within its Line of Sight (LOS)[6]. The amount of reflected energy picked up by the receiver will depend upon a number of factors

[5] The following paragraphs are intended as a summary only. Full explanations and detailed technical discussion are available in the CAA CAP 670: ATS Safety Requirements at SUR 13.

[6] Note radar line of sight is different to visual line of sight.

such as the size, shape and orientation of the object[7], as well as receiver sensitivity and the weather. In general terms, the larger a wind turbine is, the more energy will be reflected and there is an increased chance of it creating false returns to radar (i.e. returns that are not aircraft). These unwanted returns are known as 'clutter'[8]. Issues may be compounded by increasing numbers of wind turbines which could potentially cause greater areas and densities of clutter.

2.6 Providing that it remains within radar LOS, generally the closer a wind turbine is to a radar station, the greater the likelihood its reflected energy will be picked up by the radar receiver. It also follows that the taller a turbine is, the greater the distance from the radar that it will remain within radar LOS (unless the turbine is hidden by terrain). A characteristic that makes wind turbines more unpredictable is the fact that because the turbines rotate to follow the wind, the cross-sectional area presented to the radar at any given time, and therefore the RCS of the turbine, will vary depending upon wind direction. This presents challenges to generating a 'standard' turbine RCS for radar modelling purposes. Given that aviation safety issues are involved, a conservative approach should generally be adopted.

2.7 Typically, radar returns from a wind turbine comprise reflections from both stationary and moving elements: these provide different challenges for the radar. While the reflected radar signal from stationary elements, such as the tower, can be removed using stationary clutter filters in the radar processor, rotating wind turbine blades can impart a Doppler shift to any radar energy reflecting off the blades. Doppler shifts are used by a number of radars to differentiate between moving objects, namely aircraft, and stationary terrain with the latter being processed out and not displayed to the operator. The radar may therefore detect Doppler returns from moving wind turbine blades and display them as returns on the radar screen. Furthermore, at sites with more than one turbine, the radar may illuminate a blade or blades from one turbine on one antenna sweep, then illuminate the blades of a different turbine on the next sweep. This can create the appearance on the radar screen of returns moving about within the area of the wind farm, sometimes described as a "twinkling" appearance or "blade flash effect". These moving returns can appear very similar to those that would be produced by a light aircraft. The appearance of multiple false targets in close proximity can trick the radar into initiating false aircraft tracks. False PSR returns can also 'seduce' real aircraft tracks away from their true returns as the radar attempts to update an aircraft track using the false return. This can lead to degradation of radar tracking capability.

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[7] Which together contribute to the Radar Cross Section (RCS) of the obstacle.

[8] Note that the term 'clutter' refers simply to unwanted false returns and can be generated by a number of means, not simply from wind turbines.

2.8 The large RCS of wind turbines and the blade flash effect can also lead to a decrease in radar sensitivity. This can result in the loss of small targets and a reduction in the maximum range at which the smallest targets can be detected. Wind turbines can also create a shadow above and beyond the wind farm so that aircraft flying within this shadow may go undetected.

Wind Turbine Effects on secondary surveillance radar (SSR)[9]

2.9 In general terms, SSRs differ from PSRs as rather than measuring the range and bearing of targets through detecting reflected radar signals, an SSR transmits an interrogation requesting a dedicated response. Upon receiving an interrogation, the aircraft then transmits a coded reply which the SSR can use to ascertain the aircraft's position as well as decode other information contained within the response.

2.10 Wind turbine effects on SSR are traditionally less than those on PSRs but can be caused due to the physical blanking and diffracting effects of the turbine towers, depending on the size of the turbines and the wind farm. These effects are typically only a consideration when the turbines are located very close to the SSR i.e. less than 10 km.

2.11 SSR energy may be reflected off the structures during both the interrogation and reply phases. In effect, the signals are bounced off the wind turbines and can therefore arrive at the intended target from a false direction. This can result in aircraft, which are in a different direction to the way the radar is looking, replying through the reflector and tricking the radar into outputting a false target in the direction where the radar is pointing, or at the obstruction.

Surveillance service impact assessment

2.12 Prediction of the effect of wind turbines on any particular radar site is a complex task depending on many factors including terrain, the weather, the maximum height of both radar and wind turbines, radar LOS, the operational range of affected radars, diffraction and antenna beam tilt.

2.13 There are a number of models that are employed to demonstrate potential impacts of wind turbine developments on radar. Such models are constantly developing and will offer some guidance as to the likelihood of wind turbines presenting a radar return; although the nature of wind turbine operations vary due to the unpredictability of different turbine types, variable turbine rotation speed and the times of operation of individual turbines. Therefore, the degree of certainty as to whether a turbine, or group of turbines, will be displayed or not in marginal ‘radar/radio LOS’ cases cannot be guaranteed. In such cases, and

[9] The following paragraphs are intended as a summary only. Full explanations and detailed technical discussion are available in the CAA CAP 670: ATS Safety Requirements at SUR 13.

where aviation safety is a potential issue, safety consideration should always be applied in a conservative manner.

2.14 The CAA does not endorse any one specific radar modelling tool. Nor, given the multitude of factors affecting RCS, can a 'standard' RCS be identified for micro, medium and large wind turbines. It is strongly suggested that developers engage with the appropriate ANSP prior to commissioning a propagation assessment in order to ensure that the proposed model is suitable and is acceptable to the ANSP. Failure to do this could result in later disagreement and conflict once results are released. ANSPs are encouraged to consider publishing clear guidance as to which radar models they would consider acceptable to their requirements.

2.15 Eurocontrol has provided basic international guidelines on how to assess the effects of wind turbines on radar. It should be noted that these guidelines do not overwrite national planning jurisdictions or requirements, but are included here as a source of further potential information.

2.16 If the radar station likely to be affected by a proposed wind turbine development belongs to NATS, useful self assessment guidance is available at: http://www.nats.aero/services/information/wind-farms/self-assessment-maps/.

2.17 If the wind turbine development is likely to affect an MOD radar station; it is recommended that the MOD should be contacted at the earliest opportunity. Further guidance can be found on the MOD Windfarms Safeguarding web site

Mitigation

2.18 The following paragraphs give a summary of some of the mitigation methods that are available to help counter the effects of wind turbines, primarily on PSR and SSR related issues. More detailed explanations and analysis of mitigation techniques are contained within the CAA CAP 670: ATS Safety Requirements at SUR 13. Not all the mitigation methods will be suitable in all circumstances and more than one method may be required to mitigate risks to an acceptable level. The definition of 'acceptable' will have to be made on a case by case basis.

2.19 It is the responsibility of the developer to consult with the aviation stakeholder to discuss whether mitigation is possible and, if so, how it would best be implemented. It must also be noted that most mitigation methods would be subject to a standard safety assessment process by the ANSP who, in turn, would need to demonstrate that the system is safe in order to gain CAA approval (where applicable). Accordingly, where a wind turbine development is likely to impact upon the provision of an ATS, then the developer and ANSP should co-operate to mitigate such impacts wherever possible.

2.20 In determining the appropriateness of radar mitigations, stakeholders need to be aware of the potential impact of the Government's Spectrum Release

Programme. This work stream, overseen by the Government Public Expenditure Committee (Assets) seeks to release 500MHz of spectrum from "public infrastructure" use by 2020 to boost growth in the UK economy. The CAA has been tasked to undertake a major piece of work in support of this programme. This aims to deliver a release from 2.7-2.9MHz (which is currently used by S-Band PSR) by reviewing how non-cooperative surveillance can be best delivered to meet the operational and safety requirements of ANSPs and consistent with the Future Airspace Strategy (FAS). In parallel, there is an aspiration to use this opportunity to develop a strategic approach to windfarm mitigation in how non-cooperative surveillance is deployed. This significant programme is being managed as a phased approach with GO/NO GO decision points at appropriate milestones. The CAA will be providing updates on progress via the web page listed at footnote 13, below, at suitable intervals to keep stakeholders informed.

Summary of mitigation techniques

2.21 Mitigation techniques can be categorised in to several key types. This section provides a summary of each category. More detailed explanation is available in the CAP 670: ATS Safety Requirements.

Work-rounds

2.22 Work-rounds are interim measures which would enable an ANSP to continue providing an ATS using surveillance radar, potentially under reduced operational efficiency or an increased level of risk, whilst a long-term full mitigation solution is being progressed. Work-rounds can include moving the locations of the wind turbines (where feasible), introducing sector blanking, re-routing traffic, or using SSR only.

In-fill radars

2.23 Several manufacturers are known to have developed in-fill solutions specifically designed for the purpose of wind farm mitigation on ATC radars. This either involves combining the target data from a radar that does not have line-of-sight to the wind farm or from a radar with a smaller coverage area that is situated somewhere within the wind farm or where the wind farm is within its within LOS such that the airspace above the wind farm area can be monitored using the in-fill radar, therefore a complete air situation picture can be produced by combining the two results.

Three- Dimensional radars

2.24 Traditional ATC primary radars measure only the range and bearing of the target and do not measure altitude data. They are therefore classed as two dimensional radars. Some PSRs can provide three-dimensional information and can therefore be used as in fill radars above wind farm affected areas.

High Pulse Repetition Frequency (PRF) radars

2.25 Some manufacturers have also developed radars that utilise a high transmitter PRF. This technique makes it possible to discriminate between aircraft and wind turbines by analysing their Doppler signatures and remove the turbine clutter from the display. Such radars may be used as in-fills or if sufficient range is achievable, the radar may be used as an alternative to a conventional PSR.

Spectrum filters

2.26 Some manufacturers have attempted to develop a solution that is based on modifying their existing radars by incorporating software to compare target return Doppler signatures with the aim of giving the system the ability to discriminate between turbines and aircraft.

Predictive and multi-sensor trackers

2.27 There have been proposals to employ specialist tracking systems to overcome the impact of wind turbine farms on radar. Such solutions offer the addition of plot extraction and predictive tracking to any compatible radar. Although this may not provide a complete solution to address all potential effects they may offer some potential for the radar processing system to make a semi-intelligent assessment of returns from the vicinity of a wind turbine farm in order to distinguish clutter, including that induced by turbines, from aircraft.

Transponder Mandatory Zones (TMZ) and surveillance by co-operative ground sensor

2.28 Under current UK regulations or proposals not all UK airspace will require an SSR transponder to be fitted and used by aircraft. However it is recognised that in certain circumstances and in certain areas, mandatory transponder carriage can provide significant safety benefits. The CAA has regulatory powers to create TMZs for a number of reasons, one of which may be to help mitigate wind turbine effects on a PSR. External bodies can also request TMZs; however, the Airspace Change Process (ACP) (CAP 725) must be followed. The ACP ensures that the requirement for a TMZ is fully justified and that the effect upon all airspace users is fully consulted and assessed. Proposals for a TMZ should be submitted to CAA Airspace Regulation[10]. A CAA case officer will assess the proposal and make recommendations to CAA Director SARG (formerly Director Airspace Policy) as appropriate. Consideration of the feasibility of a TMZ to mitigate a specific and identified risk should include: effect on other airspace users; the creation of ‘choke points’ within Class G airspace; whether the affected ATC system is capable of PSR blanking; and the likelihood of the CAA approving SSR-only operations.

[10] Contact via AROps@caa.co.uk

2.29 Offshore SSR Only and TMZ. Despite offshore uncontrolled airspace being largely free of non-transponder equipped aircraft, this cannot be taken to mean that SSR only operations, or TMZs, would enjoy an easier approval process. In many instances, the ability to identify non-transponding aircraft (for example, following equipment failure) will be required to maintain safety cases.

2.30 Effect of TMZ on ATS Provision. TMZs are only viable when it is acceptable that the use of a non-co-operative surveillance technique (such as PSR) is not necessary for security reasons or for the detection of targets that are possibly undetected by SSR or other co-operative surveillance technique being used. It must be noted that, for Air Defence reasons, TMZs may not be suitable in all areas.

2.31 ANSPs may choose to provide surveillance by a suitable co-operative sensor over the wind farm area, in addition to the main PSR, as mitigation to the wind farm clutter on a surveillance display.

Risk assessment and mitigation of possible hazards introduced by wind turbines

2.32 Any new hazards should be identified and assessed to determine if mitigations are adequate to reduce risks to an acceptable level; this should be in accordance with the service provider's Safety Management System (SMS) Risk Assessment and Mitigation process. Ultimately, failure to address such issues may result in withdrawal or variation of the article 169/ 205 Approval/Designation thereby preventing the provision of the air navigation service.

2.33 In assessing proposed developments and mitigations submitted by wind turbine developers, it is not unreasonable for an aviation stakeholder/ANSP to request sufficient technical information from the developer that would support the production of an adequate safety case. The responsibility for completing the safety case lies with the ANSP. However its completion should be a co-operative effort between the developer and the ANSP with any necessary commercial considerations subject to agreement between the two.

Aeronautical navigation aids and communication systems

2.34 A wide range of systems, including aids such as ILS, VOR/DME, and Direction Finders, together with air-ground communications facilities, could potentially be affected by wind turbine developments. Wind turbines can affect the propagation of the radiated signal from these navigation and communication facilities because of their physical characteristics, such as their situation and orientation in relation to the facility. As a result, the integrity and performance of these systems can, potentially, be degraded.

2.35 The CAA has been made aware of research that indicates the possibility of wind turbines adversely affecting the quality of radio communication between Air Traffic Controllers and aircraft under their control. Accordingly, as a work-stream under the DECC Aviation Management Board, the CAA are working in conjunction with NATS and others to test a variety of civil VHF aircraft radios and a smaller number of military UHF airborne radios against a simulated wind farm signature waveform. This research will be published in due course and in the interim, updates will be provided to the Aviation Management Board[11]. Until further information is available, issues concerning wind turbines and VHF communications should be dealt with on a case-by-case basis and reference made to the guidance contained in Section GEN-01 of CAP 670. Information regarding the technical safeguarding of aeronautical radio stations at aerodromes, including examples of the minimum dimensions for those areas that must be safeguarded, is contained in GEN-02 of CAP 670. However, aerodrome operators and ANSPs are advised to consider each proposal carefully and if necessary, seek specific technical advice.

Air Traffic Services

2.36 Where an ANSP determines that it is likely that a planned wind turbine development would result in any of the above effects on their CNS infrastructure, this may not, in itself, be sufficient reason to justify grounds for rejection of the planning application. The ANSP must determine whether the effect on the CNS infrastructure has a negative impact on the provision of the ATS. The developer should pay for an assessment of appropriate mitigating actions that could be taken by the ANSP and/or wind energy developer to deal with the negative impact. The position of an ANSP at inquiry would be significantly degraded if they had not considered all potentially appropriate mitigations. It is essential that wind energy developers form a relationship with the relevant ANSP in order to deal with the impact that their development may have, prior to making an application.

2.37 Where possible, it can be beneficial for the ANSP to record or plot real traffic patterns over a period of time using the radar system, and to use this to identify the prevalent traffic patterns. This can then be compared to the location of the proposed wind turbine development. Where appropriate and feasible, the recorded traffic data above a particular project may be released for further analysis.

2.38 When examining the effects of wind turbines on ATS, particular attention should be paid to the following:

[11] Minutes of meetings and other information can be found on the Aviation Management Board Web Page https://www.gov.uk/government/groups/aviation-management-board-aviation-advisory-panel-and-fund-management-board

1. Departure Routes including Standard Instrument Departures;
2. Standard Instrument Arrival Routes;
3. Airspace Classification.
4. Area Navigation (RNAV) and Precision Air Navigation routes;
5. Sector Entry and Exit points;
6. Holding points (including the holding areas);
7. Missed Approach Routes;
8. Radar Vectoring Routes;
9. Final Approach Tracks;
10. Visual Reporting Points;
11. Published Instrument Flight Path for the aerodrome;
12. Potential impact on navigation aids and voice communications;
13. Future airspace and operational requirements where aerodrome growth is anticipated (Para 2.49 provides comment on future requirements).

2.39 Factors such as the type of radar service being applied and the airspace classification must also be considered when trying to assess the adverse impact of wind turbine effects.

Offshore helicopter operations

2.40 Wind energy developments (including anemometer masts) within a 9 NM radius of an offshore helicopter installation could introduce obstructions that would have an impact on the ability to safely conduct essential instrument flight procedures to such facilities in low visibility conditions. Consequently, any such restrictions have the potential to affect not only normal helicopter operations but could also threaten the integrity of offshore installation safety cases where emergency procedures are predicated on the use of helicopters to evacuate the installation.

2.41 Chapter 3 provides background information on the issues related to wind energy developments and offshore helicopter activities including Helicopter Main Routes (HMRs).

Maritime and Coastguard Agency (MCA)

2.42 The MCA's mission is to deliver safety at sea, counter pollution response and the coordination of maritime Search and Rescue (SAR) throughout the UK SAR Region and UK Pollution Control Zone. In the context of aviation, the MCA will (from early-2016) provide the SAR helicopter service for the UK.

2.43 The increasing numbers and geographical extent of offshore wind farms not only has the potential to increase the probability of a maritime SAR incident but also could constrain the MCA's ability to respond to such an incident. It is therefore strongly recommended that developers consult with the MCA at the earliest opportunity such that mitigating measures can be designed in from the outset. The following guidance has been provided by the MCA but should not be taken as being exhaustive and does not remove the recommendation to consult; further detail can be found in Maritime Guidance Note 371 and contact details for the MCA are listed at Appendix B.

2.44 The nature of SAR activity necessitates the requirement to conduct SAR within the confines of offshore wind turbine developments. Given the distance offshore of some UK windfarms, helicopters may be the only viable means of SAR. While in clear weather, searches can be conducted from above the maximum blade tip height, operations in poor weather and rescues themselves may necessitate SAR operations within a windfarm below blade tip height. As technology progresses and turbine heights increase, this issue is exacerbated. Furthermore, when faced with the prospect of long transits to a SAR area, the presence of adjacent windfarms along the transit route can provide obstacles to SAR helicopters if conditions do not permit transits to be flown above maximum blade height.

2.45 The MCA has provided the following guidance to mitigate SAR risks:

1. Turbines are positioned in straight lines with a common orientation across the whole development, creating safe lanes for SAR access.
2. Safe lanes are constructed across the width of the development rather than the length.
3. Curved or non-linear designs should be avoided.
4. High density perimeter turbines can compromise the safe lanes and should be avoided.
5. The wind farm should be fitted with lighting that is controllable from the development control room and which is NVG compatible.
6. The control room for the development should be equipped with VHF (air and maritime) communications with remote antennas in the wind farm to facilitate SAR communications.
7. Turbines should be marked with geographically logical numbering to facilitate navigation within the wind farm.
8. Substations and meteorological masts should be aligned with turbines so as not to impede SAR lanes.

9. Where possible, SAR lanes should be aligned with those of adjacent wind turbine developments or buffer zones created.

Cumulative effects

2.46 There is no doubt that, while developments with small numbers of wind turbines can have an adverse effect on aviation operations, it is the proliferation of developments, and the resulting cumulative effect, that is of far more significant concern. It may be possible to successfully mitigate the effects of a single turbine or small development; however, the combined effect of numerous individual turbines or multiple wind turbine developments can be hard, if not impossible, to mitigate. Therefore it is feasible that ANSPs may lodge objections to subsequent developments in areas where they had previously been able to accommodate proposed wind turbine developments.

2.47 The cumulative effect of geographically separated wind turbine developments may have more impact on aviation than if such developments were located in close proximity to each other. For example, individual areas of clutter separated by 5 NM could have more impact on the provision of ATS than one slightly larger area of clutter. This does not mean to suggest that large areas of clutter are always more preferable; however, this should be taken into consideration and discussed with the ANSP.

2.48 For aerodrome operators or en route service providers, there is a difficulty in protecting aviation activity from these cumulative effects, in part because planning applications are generally dealt with on a 'first come, first served' basis. All approved applications[12] must be taken into account when considering future applications. This could lead to a situation whereby viable applications are objected to on the grounds of cumulative effect even though other, potentially less viable, projects have not been completed due to the inability, for a variety of reasons, to satisfactorily resolve suspensive conditions.

2.49 The basis for an objection based on cumulative effect would be that the safety and efficiency of the aerodrome or en-route service may not be maintained or that the growth of an aerodrome or en-route service may be constrained. However, the decision concerning how firm these future plans have to be in order to be considered would be within the remit of the LPA. Nevertheless, airports are encouraged to produce 'Master Plans' indicating their future development plans. It is anticipated that these may be taken into consideration by an LPA.

2.50 It is recognised that many potential developments fail to reach maturity within the formal planning stage. Nevertheless, it is in the interests of aviation stakeholders

[12] Including developments subject to 'suspensive conditions': where planning approval is granted subject to final agreement between an aviation stakeholder and a developer concerning an appropriate mitigation solution.

to take all developments about which they are aware into account until they have been formally notified that a proposal has been abandoned. Therefore, it is in a wind turbine developer's interest to inform all involved parties when such developments are abandoned or postponed.

Turbulence

2.51 Turbulence is caused by the wake of the turbine which extends down-wind behind the blades and the tower, from a near to a far field. The dissipation of the wake and the reduction of its intensity depend on the convection, the turbulence diffusion, the topography (obstacles, terrain etc.) and the atmospheric conditions.

2.52 There is evidence of considerable research activity on modelling and studying the wake characteristics within wind developments, using computational fluid dynamics techniques, wind tunnel tests and on site LIDAR measurements. A literature survey was recently conducted by the University of Liverpool and CAA[13] to establish the scale and the advances of current research on this front.

2.53 It is recognised that aircraft wake vortices can be hazardous to other aircraft, and that wind turbines produce wakes of similar, but not identical, characteristics to aircraft. Although there are independent bodies of knowledge for both of the above, currently, there is no known method of linking the two. Published research shows measurements at 16 rotor diameters downstream of the wind turbine indicating that turbulence effects are still noticeable[14]. Measurement work has been focused on the near wake due to technical challenges of the experimental set up, while modelling studies are capable of examining the wake turbulence further downstream[15][16]. Although models can be used to study the effects of the far wake, verification and validation processes of these models are still ongoing[17].

2.54 There are currently no Mandatory Occurrence Reports (MOR)[18] or aircraft accident reports related to wind turbines in the UK. However, the CAA has received anecdotal reports of aircraft encounters with wind turbine wakes

[13] http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/

[14] Wind Turbine Wake Analysis, L.J. Vermeer, J.N. Sorenson, A Crespo, Progress in Aerospace Sciences, 39 (2003) 467-510.

[15] Calculating the flow field in the wake of wind turbines, J.F. Ainslie, Journal of Wind Engineering and Industrial Aerodynamics, 27 (1988) 213-224.

[16] Turbulence characteristics in wind-turbine wakes, A Crespo and J Hernandez, Journal of Wind Engineering and Industrial Aerodynamics 61 (1996) 71-85.

[17] Investigation and Validation or Wind turbine Wake Models, A Duckworth and R.J. Barthelmie, Wind Engineering, 32 (2008) 459-475. Also http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/

[18] CAP 382 - The Mandatory Occurrence Reporting Scheme - comment verified against CAA database up to 30 June 2015.

representing a wide variety of views as to the significance of the turbulence. Although research on wind turbine wakes has been carried out, the effects of these wakes on aircraft are not yet known. Furthermore, the CAA is not aware of any formal flight trials to investigate wake effects behind operating wind turbines. In the UK wind turbines are being proposed and built close to aerodromes (both licensed and unlicensed), including some developments on aerodrome sites, indicating an urgent need to assess the potential impact of turbulence on aircraft and in particular, to light aircraft and helicopters.

2.55 The CAA has so far investigated the effects of small wind turbine wakes on GA aircraft[19]. The results of this study show that wind turbines of rotor diameter (RD) of less than 30m should be treated like an obstacle and GA aircraft should maintain a 500ft clearance. Regarding wind turbines of larger RD than 30m; these are subject to further investigations. Until the results of these investigations are available, discussions between aerodrome managers and wind farm developers are encouraged, taking note of existing CAA safeguarding guidance. As the results of this research become available the CAA Wind Energy web pages will be updated.

2.56 Pilots of any air vehicle who firmly believe that they have encountered significant turbulence, which they believe to have been caused by a wind turbine, should consider the need to report this through the existing MOR scheme.

2.57 Until the result of further research is known, analysis of turbulence can only be undertaken on a case-by-case basis, taking into account the proximity of the development and the type of aviation activity conducted. Whilst being a consideration for all aircraft (particularly in critical stages of flight), turbulence is of particular concern to those involved in very light sport aviation such as gliding, parachuting, hang-gliding, paragliding or microlight operations as in certain circumstances turbulence could potentially cause loss of control that is impossible to recover from.

Wind turbine wake physics

2.58 Wind turbine wake is dependent on many parameters. The thrust generated by rotor, the tip velocity ratio (blade tip velocity to wind speed), wind direction and speed, turbulence level in free stream, weather condition and the geometry of wind turbine all have impacts on the characteristics of the wake. Due to all these parameters, it is difficult to scale wake results from a small to a large wind

[19] http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/

turbine. For this reason the work carried out by Liverpool University[20] is, at present, restricted to small wind turbines of less than 30m of RD.

2.59 The wake of a wind turbine can be divided into a near and a far region. The near wake is the area just downstream of the rotor up to one RD, where the effect of the rotor properties, including the blade aerodynamics and geometry determine the flow field. Near wake research is mainly focused on the wind turbine's performance and the physics of power extraction. The far wake is the region beyond the near wake, where the details of the wake are less dependent on the rotor design. The main interest in this area is the wake interference with other wind turbines (e.g. in a wind farm) or passing-by aircraft (wind turbine wake encounter). Here, flow convection and turbulent diffusion are the two main mechanisms that determine the flow field.

2.60 LIDAR field measurements on a WTN250 wind turbine at East Midlands Airport, UK, indicated that statistically, the wake velocities recovered to 90% of the free stream velocity at the downstream distance of 5 RD. It is expected that the work conducted by Liverpool University will continue with LIDAR surveys of larger wind turbines to provide reliable wake data to allow the study of the encounters using flight simulations. These results will be made public as soon as they become available.

2.61 Based on the models described in the Liverpool University Research Paper[21], schematics of the wake region for small wind turbines are given in the following figures. The figures show the zone where wake encounter has potential to cause severe impact on the encountering GA aircraft.

Figure 1: Schematic of the wind turbine wake. The effect of wake is weaker beyond 5-RD downwind for the wind turbines of diameter < 30m.

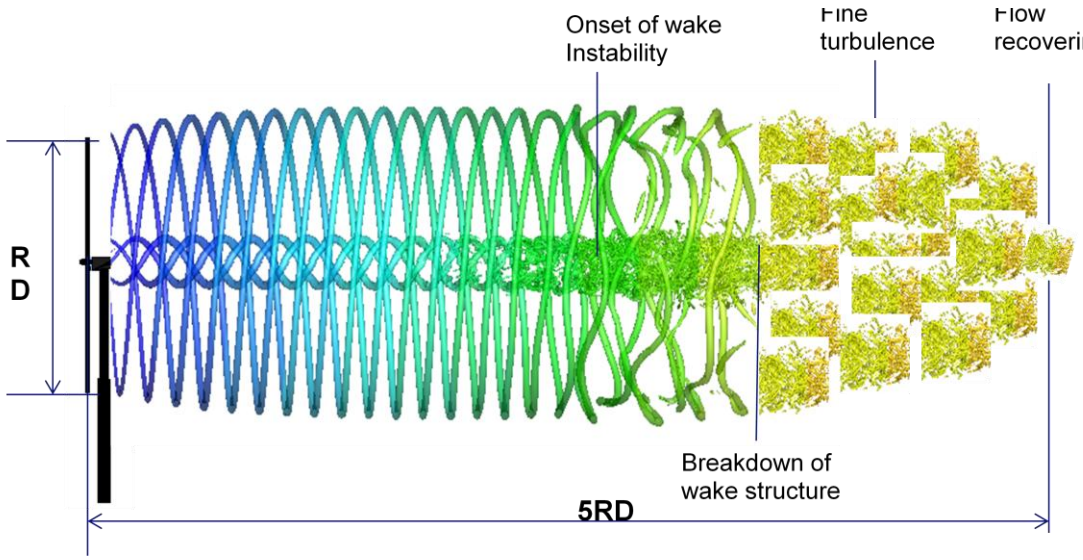
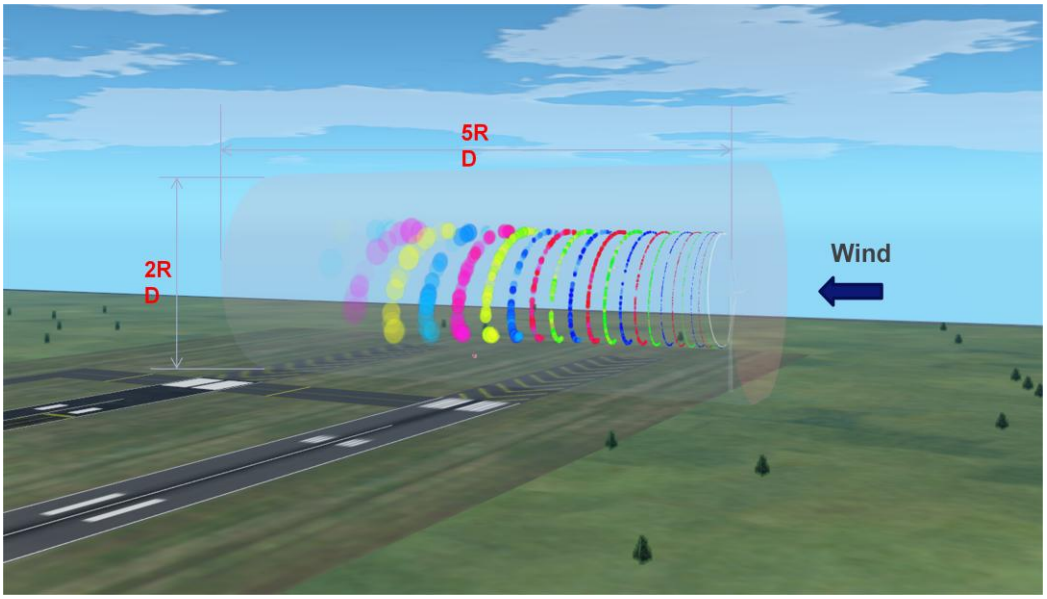


Figure 1:

[20] http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/

[21] http://www.liv.ac.uk/flight-science/cfd/wake-encounter-aircraft/

Figure 2: The cylindrical region downwind the rotor should be avoided. Its size is 5RD (downwind) by 2RD (vertical). Coloured helices indicate wake vortices and decay.



Economic issues

2.62 As a result of the role and responsibilities of the CAA and aviation stakeholders, action will be taken to maintain the high standards of safety, efficiency and flexibility. However, it is possible that aviation activity might have to be constrained as a consequence of proposed wind energy developments. Even in circumstances where a proposed development may not affect a current activity, future expansion (for example, as listed in an Aerodrome Master Plan) may be restricted were it to go ahead. This could eventually have an economic impact on the aerodrome, ANSP or activity, and this aspect should be taken into consideration when assessing the impact of any proposed wind turbine development. Therefore, it is considered entirely appropriate for an aerodrome to include an assessment of the economic impact that may arise from a proposed wind turbine development. However, it is important to note that comments made in this respect need to be unambiguous in order to allow an LPA to ensure that this important aspect is taken into account appropriately.

En-route obstructions

2.63 It is possible that an existing or proposed wind turbine development that does not infringe an aerodrome OLS may nevertheless have a potential impact upon local aviation activity. For example, a development beyond an OLS, but only marginally clear (laterally or vertically), of Controlled Airspace (CAS), might be assessed as having a potential adverse impact upon operations within Class G (uncontrolled) airspace due to the potential for the creation of ‘choke points’ where aircraft are forced into a reduced volume of available airspace

2.64 Whilst the CAA will highlight such issues away from the immediate vicinity of aerodromes, aerodrome operators/licensees should be cognisant of these issues when engaging with other parties on wind turbine associated matters. Further related comment is contained at Chapter 3 (Obstructions, Lighting and Marking).

Figure 3: Difficulties in visually acquiring anemometer masts.

2.65 Wind turbine developers should be aware that anemometer masts are often difficult for pilots to acquire visually (see Figure 3 above), and so aviation stakeholders may assess that individual masts should be considered a significant hazard to air navigation and may request (either during the planning process, or post-installation) that masts be lit and/or marked. Typically, there is no legal mandate for structures smaller than 150 m (492 ft) to be lit. Whilst the CAA would not in isolation make any case for lighting and/or marking of structures that is not required under existing regulation, the CAA would typically support related aviation stakeholder proposals to aid the visual conspicuity of anemometer masts on a case by case basis. Individual cases should not set a precedent for future requests. The MCA is likely to require that all offshore masts are lit to mitigate the risks to SAR helicopters. In addition, onshore masts have to potential to pose a risk to general aviation. To that end, the General Aviation Awareness Council (on behalf of other GA representative bodies) and a number of helicopter operators, with the in principle agreement of RenewableUK (the

UK's leading not for profit renewable energy trade association), have asked that the following request be relayed by the CAA on their behalf[22]:

"Anemometer masts and/ or their guy wires should be equipped with aids to increase their daytime visual conspicuity where a risk based proposal demonstrating specific need for such measures has been submitted by the aviation stakeholder. Noting that the deployment of any such measure can only be mandated by the relevant Planning Authority, it is acknowledged that such visual conspicuity aids should not impact upon the integrity of the structure itself, the data generated or risk to personnel these aspects are for the developer to consider/assess.

The most effective means of achieving this may be the use of orange marker buoys on the guy wires, such as those that may be fitted to overhead power cables (the use of which has some basis in international regulatory direction). However it is noted that in some locations the structural loads imposed by such markers may be unacceptable. In such cases, the goal of increasing the visual conspicuity of masts and supporting guys might be achieved by different means, which generally place little or no additional structural load on the mast/guy combination. Such means include:

1. *Painting all or part of the mast; options could include alternate contrasting stripes, such as orange and white, or a single contrasting colour (noting that it may need to contrast with terrain, or sky, or both) and/or,*
2. *Reflective bird flight deflectors of minimum 120mm diameter fitted to the guy wires at intervals, and/or*
3. *High visibility sheaths enveloping the supporting guy and/or*
4. *Ground mats, or construction such as a box, of a contrasting colour scheme to the ground at the foot of the mast.*

Whichever method is chosen it will need to satisfy all other relevant planning considerations. For example, bird deflectors may be required for bird protection reasons, and visual intrusion concerns may need to be taken into account. It is envisaged that the norm would be that one method would suffice."

It is recommended that agreement should be sought, through dialogue between the aviation stakeholder, the developer and the LPA regarding the most appropriate method of mitigation. However, should the LPA require further input regarding the general requirement for increasing the visual conspicuity of lattice masts or the specific need in any particular case, enquiries should be forwarded

[22] This text is routinely replicated in CAA Correspondence when asked to comment on related planning applications.

to the GAAC at GAAC, Bicester Airfield, Skimmingdish Lane, Bicester, Oxon, OX26 5HA (e-mail planning@gaac.org.uk).

2.66 Where such obstacles affect operations on an aerodrome, it is the responsibility of the aerodrome operator to ensure appropriate publication in the UK Aeronautical Information Publication (AIP), and to ensure that they establish an effective working relationship with their LPA to ensure that they are consulted when appropriate.

Emergency Services Aviation Support Units (ASUs)

2.67 Since the inception of emergency aviation, there has been a dramatic rise in the number of police and air ambulance operators as well as a small number of fire brigade operations. Due to their unique operating nature, it is difficult to predict the impact of wind turbine developments on these ASUs. It is important, therefore, for emergency service ASUs to engage with all relevant LPAs within their operating area to ensure that they are consulted when planning applications are made. The CAA encourages developers and LPAs to consult with local ASUs, and would be supportive of claims to mark or light turbines that do not fall under article 219 of the ANO where a case by case assessment demonstrates there is a justifiable benefit.

2.68 Police ASUs are licensed by the CAA to operate below 500 feet Above Ground Level (AGL) in order to carry out their duties. Police helicopters will routinely follow main roads and motorways but may also transit along open land, sometimes in difficult weather conditions, during their operations and may need to land anywhere; although they will also have specifically designated landing sites. It should be noted that while some Police ASUs fly with Night Vision Goggles (NVGs), their use is not currently universal. Police Aviation in England and Wales is centrally coordinated by the National Police Air Service (NPAS) which is administered by the West Yorkshire Constabulary. Maps showing NPAS helicopter bases can be found on the NPAS Website. NPAS have recently established a single email address for windfarm consultations and advice: npas.obstructions@npas.pnn.police.uk which should be used for correspondence. The Scottish Police ASU, based in Glasgow, is not currently part of NPAS and should be contacted directly where appropriate.

Military impact

2.69 Wind turbine developments can have a detrimental effect on military operations. Military aviation operations predominantly take place in Class G airspace and can differ markedly from civil operations, particularly with respect to operational low flying, and the sensitivity of military CNS facilities. The DIO are to be consulted in all cases where a proposed wind turbine development may affect military operations. More information is available from the DIO Website.

Chapter 3

Safeguarding considerations

General considerations

3.1. There are a significant number of certificated or licensed aerodromes in the UK. In the region of one third of these, along with en-route CNS, have been designated by the Government as aerodromes to be safeguarded by statutory process, this is known as 'official safeguarding'. As part of this process, CAA certified maps of these officially safeguarded aerodromes and en route technical sites are produced and a Statutory Direction obliges associated LPAs to consult the aerodromes operators about proposed developments that fall within the boundaries specified on the maps.

3.2. Those aerodromes and CNS sites that are not safeguarded by statutory process can be unofficially safeguarded by agreeing protection measures with their LPA.

3.3. Further information about aerodrome safeguarding can be found on the Publications Section of the CAA website.

Safeguarding maps

3.4. Maps of officially safeguarded aerodromes and en route CNS technical sites are produced and submitted to LPAs. These maps denote the areas where consultation should take place with the aerodrome operator.

3.5. Other aerodromes may produce a safeguarding map and request that their LPA recognise their wish to be included in consultation for planning purposes. It is the published advice of the Government[23] that all aerodromes should take steps to protect their locations from the effects of possible adverse development by agreeing a safeguarding procedure with the LPA.

Wind turbine safeguarding maps

3.6. In order to assist the consultation process with wind turbine developers and in providing a diagrammatic illustration of the related aviation issues in discussion with LPAs, a number of aerodromes have developed specific wind turbine safeguarding maps, which graphically depict the aviation operator's assessment of the desirability and feasibility of wind turbine developments. Areas are shown where development would be either undesirable, undesirable but possible, or acceptable (albeit potentially with constraints to address cumulative effects and

[23] The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) Direction 2002

proliferation issues). Other aerodromes have simply prepared radar consultation zone maps, given the dynamic nature of cumulative effects.

Safeguarding of technical sites

3.7. There is a statutory process to safeguard certain sites which are integral to the provision of en-route ATS. Radar and radio stations, navigation beacons and some microwave communications links are subject to such arrangements[24]. LPAs have an obligation to consult the operators of such sites as defined in official safeguarding maps. Developers may also request discussion with site operators in order to provide necessary mitigation. The International Civil Aviation Organization (ICAO) Eur Doc 015 and CAP 670 are sources of guidance to provide a basis for such discussion.

Obstructions, lighting and marking

3.8. The treatment of land-based obstacles to air navigation is covered by existing legislation. Obstacles located close to licensed aerodromes are covered under Section 47 of the Civil Aviation Act 1982. Government aerodromes are similarly covered under the Town & Country Planning Act (General Permitted Development) Order 2000. article 219 of the ANO 2009 details the requirement for the lighting of land-based tall structures located outside of the safeguarded areas of licensed and government aerodromes.

3.9. Onshore Obstacle Lighting Requirement ICAO regulations (Annex 14 Chapter 6) and article 219 of the ANO 2009 require that structures away from the immediate vicinity of an aerodrome, which have a height of 150 m (492 ft) or more AGL are:

1. Fitted with medium intensity steady red lights[25] positioned as close as possible to the top of the obstacle[26], and also equally spaced at intermediate levels, so far as practicable, between the top lights and ground level with an interval not exceeding 52 m;

2. Illuminated at night, visible in all directions and any lighting failure is rectified as soon as is reasonably practicable;

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[24] ICAO EUR DOC 015 recommends safeguarding zones for VORs.

[25] 'Medium intensity steady red light' means a light that complies with the characteristics described for a medium intensity type C light as specified in Volume 1 (Aerodrome Design and Operations) of Annex 14 (Third edition November 1999) to the Chicago Convention.

[26] In relationship to wind turbines, the requirement to fit aviation obstruction lighting 'as close as possible to the top of the obstacle' is typically translated to mean the fitting of lights on the top of the supporting structure (the nacelle) rather than the blade tips. However, any case by case study related to onshore turbines with a maximum height at or above 150m AGL may conclude that additional or amended lighting specifications are required.

3. Painted appropriately: the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study.

3.10. In addition, the CAA will provide advice and recommendations regarding any extra lighting requirements for aviation obstruction purposes where, owing to the nature or location of the structure, it presents a significant hazard to air navigation. However, in general terms, structures less than 150 m (492 ft) high, which are outside the immediate vicinity of an aerodrome, are not routinely lit; unless the 'by virtue of its nature or location' argument is maintained. UK AIP ENR 1.1 para 5.4 'Air Navigation Obstacles' refers.

3.11. When input is sought, the CAA routinely comments to the effect that, in respect to a proposed wind turbine development, there might be a need to install aviation obstruction lighting to some or all of the associated turbines, when specific concerns have been expressed by other elements of the aviation industry; i.e. the operators. For example, if the MoD or a local aerodrome suggest and can support such a need, the CAA (sponsor of policy for aviation obstruction lighting) would wish, in generic terms, to support such a claim. However, this would only be done where it can reasonably be argued that the structure(s), by virtue of its/their location and nature, could be considered a significant navigational hazard. That said, if the claim was clearly outside credible limits (i.e. the proposed turbine(s) was/were many miles away from any aerodrome or it/they were of a height that was unlikely to affect even military low flying), the CAA would play an 'honest-broker' role. It is unusual for the CAA, in isolation, to make a case for aviation warning lighting unless article 219 demands such lighting.

3.12. All parties should be aware that, in any case where a wind turbine development lies (or would lie) outside any aerodrome safeguarding limits and the turbine height was less than 150 m (492 ft) (and therefore the provisions of article 219 of the ANO 2009 would not apply), the aviation industry, including the CAA, is not in a position to demand that the turbines are lit. In such cases the decision related to the fitting of aviation warning lighting rests with the relevant LPA, which will necessarily need to balance the aviation lighting requirement against other considerations (e.g. environmental). If deemed as an aviation obstruction, and thus requiring a specific marking scheme, the CAA advice on the colour of wind turbines would align with ICAO criteria.

3.13. Whilst anemometer masts are likely to remain below the threshold that requires they be lit, there may be instances where their lighting is deemed prudent.

Offshore obstacle requirements

3.14. Whilst the mandated requirement for the lighting of wind turbines generators in UK territorial waters[27] is set out at article 220 of the UK ANO (2009) as amended, additional guidance is provided below.[28]

3.15. The article requires medium intensity (2000 candela) steady red lighting mounted on the top of each nacelle and requires for some downward spillage of light. The article also allows for the CAA to permit that only turbines on the periphery of any wind farm need to be equipped with aviation warning lighting. Such lighting, where achievable, shall be spaced at longitudinal intervals not exceeding 900 metres[29]. There is no current routine requirement for offshore obstacles to be fitted with intermediate vertically spaced aviation lighting, however, given the potential increase in maximum height of the next generation of offshore wind turbines with nacelle heights potentially approaching 150m above sea level, additional lighting may be required. The CAA will consider such applications on a case by case basis.

3.16. To resolve concerns from the maritime community, work has been undertaken to develop an aviation warning lighting standard which is clearly distinguishable from maritime lighting. Where it is evident that the default aviation warning lighting standard (article 220) may generate issues for the maritime community, a developer can make a case, that is likely to receive CAA approval, for the use of a flashing red Morse Code Letter 'W' instead. There is, however, no intent to change the lighting intensity specifications set out in article 220; indeed those specifications remain the default aviation warning lighting requirement.

3.17. Where flashing lights are used, they are to be synchronised to flash simultaneously[30]. Where the Flashing Morse W standard is approved by the CAA and utilised, the recommendation is for a 5 second long sequence, visually synchronised across aviation and maritime lighting sequences.

3.18. Attention is drawn to the provisions that already exist within article 220 that require the reduction in lighting intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5km. All offshore wind turbine developers are expected

[27] Taken to apply to any wind turbine generator or meteorological mast that is situated in waters within or adjacent to the United Kingdom up to the seaward limits of the territorial sea. However, the CAA will provide similar planning advice related to the lighting of wind turbines and meteorological mast beyond the limits of UK Territorial Waters.

[28] This guidance replaces CAA Policy Statements 22 November 2012 'Lighting of Wind Turbine Generators in United Kingdom Territorial Waters' and 27 April 2012 'Failure of Aviation Warning Lights on Offshore Wind Turbines'.

[29] ICAO Annex 14 Volume 1 paragraph 6.3.14.

[30] ICAO Annex 14 Volume 1 paragraph 6.4.3.

to comply fully with the requirement aspect and to make full use of the additional allowance that exists within article 220.

3.19. In addition to the article 220 mandated lighting, there may also be lighting requirements associated with winching and SAR operations. The lighting needed to facilitate safe helicopter hoist operations to wind turbine platforms is set out in CAP 437. Information on SAR Requirements can be found in Maritime Guidance Note 371 and a summary of relevant aspects can be found in Chapter 2 of this document. It is recommended that SAR lighting requirements are agreed with the MCA at the earliest possible opportunity.

3.20. As offshore wind farms are developed, meteorological masts may be deployed to ascertain the wind resource characteristics. These masts can be in excess of 100 m tall and are extremely slender rendering them potentially inconspicuous to aviators flying over the sea, particularly when there are no other structures nearby. This is potentially hazardous, particularly during helicopter operations when it may be necessary to descend in order to avoid icing conditions. Consequently the CAA recommends that all offshore obstacles (regardless of their location within or outside of territorial waters) that are over 60 m (197 feet) above sea level should be fitted with one medium intensity steady red light positioned as close as possible to the top of the obstacle.

3.21. The CAA does not typically request specific markings for offshore obstacles. However, any aviation stakeholder that considered a particular structure to be a significant navigational hazard could make a case for it to be lit and/or marked to increase its visual conspicuity. The request (as opposed to mandate) for such lighting and/or marking would need to be negotiated with the owner of the structure or, if at the planning stage, the relevant planning authority. If asked for comment, it would be unlikely that the CAA would have any fundamental issue associated with an appropriate aviation stakeholder's case for lighting/marking of any structure that could reasonably be considered to be a significant hazard.

3.22. For military aviation purposes the MoD may suggest an additional offshore lighting requirement. Whilst it is possible that the lighting standard described above will meet the MoD needs, it is recommended that in all cases developers additionally seek related input from the DIO.

Failure of offshore lighting

3.23. Article 220 (7) of the ANO 2009 states “In the event of the failure of any light which is required by this article to be displayed by night the person in charge of a wind turbine generator must repair or replace the light as soon as reasonably practicable.” It is accepted that in the case of Offshore Obstacles there may be occasions when meteorological or sea conditions prohibit the safe transport of staff for repair tasks. In such cases International Standards and Recommended Practices require the issue of a Notice to Airmen (NOTAM).

3.24. The CAA considers the operator of an Offshore Wind Farm as an appropriate person for the request of a NOTAM relating to the lighting of their wind farm. Should the anticipated outage be greater than 36 hours then the operator shall request a NOTAM to be issued by informing the NOTAM section (operating 24 hours) of the UK Aeronautical Information Service (AIS) by telephoning +44 (0) 20 8750 3773/3774 as soon as possible. AIS will copy the details of the NOTAM to the operator and to the CAA.

3.25. The following information should be provided:

1. Name of wind farm (as already recorded in the AIP[31]).
2. Identifiers of affected lights (as listed in the AIP) or region of wind farm if fault is extensive (e.g. North east quadrant/south west quadrant/ entire or 3 NM centred on position 515151N 0010101W).
3. Expected date of reinstatement.
4. Contact telephone number.

3.26. Note that if the turbine or wind farm does not have a listing in the AIP then it will not be possible to issue a NOTAM. Typically all offshore turbines of a maximum blade tip height of 300 feet or more will be recorded within the AIP.

3.27. In order to expedite the dissemination of information during active aviation operations the wind farm operator may also consider establishing a direct communication method with aviation operators in the area. These may include:

1. Air Traffic Service Units e.g. Aberdeen Radar or Anglia Radar.
2. Local airports.
3. Local helicopter operators.

3.28. The information will be the same as in the NOTAM request, and should also include a note that a NOTAM has been requested, or if available, the NOTAM reference.

3.29. If an outage is expected to last longer than 14 days then the CAA shall also be notified directly at windfarms@caa.co.uk (normal working hours) to discuss any issues that may arise and longer term strategies.

Consultation zones around offshore helidecks

3.30. For many years, the CAA has emphasised the importance of operators and developers taking into consideration all existing and planned obstacles around offshore helicopter destinations that might impact on the safe operation of

[31] UK Aeronautical Information Publication (www.ais.org.uk) En Route Supplement 5.4.

associated helicopter low visibility approaches in poor weather conditions. In order to help achieve a safe operating environment, a consultation zone of 9 NM radius exists around offshore helicopter destinations. This consultation zone is not a prohibition on development within a 9 NM radius of offshore operations, but a trigger for consultation with offshore helicopter operators, the operators of existing installations and exploration and development locations to determine a solution that maintains safe offshore helicopter operations alongside the proposed development. This consultation is essential in respect of established developments. However, wind energy lease holders, oil and gas developers, and petroleum licence holders are advised to discuss their development plans with each other to minimise the risks of unanticipated conflict at a later date. Topics for discussion within any such consultation should include, but are not limited to:

1. Prevailing weather conditions, including predominant wind direction;
2. Manning status of the installation;
3. Frequency of flights to the installation and predominant routes;
4. Performance limitations of offshore helicopter types utilising the helideck;
5. Established helicopter instrument and low visibility approach procedures;
6. Mandated constraints on approaches to helidecks on installations;
7. Long term access to well and subsea infrastructure;
8. Concurrent wind farm operations and oil and gas operations to well and subsea infrastructure;
9. SAR operations to the installation in the event of an emergency;
10. Location and height of potential obstacles including proposed wind turbines.

3.31. The following paragraphs provide, in layman's terms, an explanation of the reasoning behind the need for the 9 NM consultation zone. While procedures will differ depending upon the installation, operator and aircraft type involved, the following notes are based upon Commission Regulation (EU) No 965/2012 (the European Air Operations Regulation), improved flight procedure documentation and the practical application of such requirements:

1. Basic Requirement. The 9 NM consultation zone aims to provide a volume of obstacle-free airspace within which a low visibility approach profile and, in the event of a pilot not being able to complete his approach, a missed approach can be flown safely. Such profiles must allow for an acceptable pilot workload, a controlled rate of descent, one engine inoperative performance and obstacle clearance.

2. Approach. Routinely, helicopters making manually flown radar/GPS approaches and, in the future, autopilot-coupled approaches, to offshore installations will commence the approach from not below 1500 ft Above Mean Sea Level (AMSL) or 1000 ft above obstacles, whichever the higher. As helicopters approaching offshore installations must make the final approach substantially into wind, the approach could be from any direction. The obstacle-free zone must, therefore, extend throughout 360° around the installation to prevent restrictions being placed on the direction of low visibility approaches and departures. Additionally, during the approach, all radar contacts have to be avoided by at least 1 NM which could interfere with the necessary stable approach path if manoeuvring is required. The approach sequence and descent below 1500 ft routinely commences from about 8 NM downwind of the destination installation and the final approach starts at around 5–6 NM and 1000–1500 ft. The helicopter descends to a minimum descent height (at least 200 ft by day and 300 ft at night), which is commonly achieved within 2 NM of the helideck having descended on a ‘glide path’ of between 3–4°. Thereafter, it flies level at that height towards the Missed Approach Point (MAPt). As the helicopter approaches the MAPt, a minimum of 0.75 NM from the offshore destination, the pilot must decide whether or not he has the required the necessary visual references to proceed to land or, if not, conduct a go-around following a missed approach procedure.

3. Go-Around and Missed Approach Procedure (MAP). Upon initiating a go-around, the pilot will follow a MAP whereby the helicopter is either turned away from the destination structure by up to 45° and climbs, or climbs straight ahead depending on the procedure being used. The anticipated rate of climb during the missed approach phase is based upon one engine inoperative performance criteria and could be quite shallow (1–2°). For obvious safety reasons, a go-around involving a climb from the minimum descent height needs to be conducted in an area free of obstructions as this procedure assures safe avoidance of the destination structure.

4. Departure Procedure. On departure from an offshore installation the aircraft will be climbed vertically over the deck to a height determined by its performance criteria and is committed to the take off once a nose down attitude is adopted. If during this phase an engine failure is experienced then the anticipated rate of climb will be the same as described above for the MAP; however, the climb could start from as low as 35 ft above sea level dependent on deck height. The distance to climb to a safe altitude by which either a turn can be carried out, or straight ahead, to reach separation from obstacles will be dependent on aircraft one engine inoperative performance criteria. The aircraft can be up to 10º either side of the departure heading and the radius of any turn carried out can be up to 1000 m.

3.32. In summary, obstacles within 9 NM of an offshore destination would potentially impact upon the feasibility to conduct some helicopter operations (namely, low visibility or missed approach procedures) at the associated site. Owing to the obstruction avoidance criteria, inappropriately located wind turbines could delay the descent of a helicopter on approach such that the required rate of descent (at low level) would be excessive and impair the ability of a pilot to safely descend to 200/300 ft by the appropriate point of the approach (2 NM). If the zone is compromised by an obstruction, it should be appreciated that routine low visibility flight operations to an installation may be impaired with subsequent consequences for the platform operator or drilling unit charterer. One such consequence could be that the integrity of offshore platform or drilling unit safety cases, where emergency procedures are predicated on the use of helicopters to evacuate the installation, is threatened. Additionally, helicopter operations to wind farms may impact on oil and gas operations. It is therefore essential that the installation operators, helicopter operators and other interested parties are engaged in the consultation process.

Helicopter Main Routes (HMR)

3.33. HMRs, as defined in the UK AIP, have been in use over the North Sea and in Morecambe Bay for many years. Whilst such routes have no lateral dimensions (only route centre-lines are charted) they provide a network of offshore routes utilised by civilian helicopters. Wind turbine developments could impact significantly on operations associated with HMRs: the effect will depend on the degree of proliferation, and so a small number of individual turbines should cause minimal effect. However, a large number of turbines beneath an HMR could result in significant difficulties by forcing the aircraft to fly higher in order to maintain a safe vertical separation from wind turbines. The ability of a helicopter to fly higher would be dependent upon the 0° isotherm (icing level); this might preclude the aircraft from operating on days of low cloud base if the 0º isotherm was at 2000 ft or below as the aircraft must be able to descend to a clear area below cloud and with a positive temperature to safely de-ice if necessary.

3.34. There should be no obstacles within 2 NM either side of HMRs but where planned should be consulted upon with the helicopter operators and ANSP. The 2 NM distance is based upon: operational experience; the accuracy of navigation systems; and, importantly, practicality. Such a distance (2 NM) would provide time and space for helicopter pilots to descend safely to an operating height below the icing level. For the purpose of transiting wind turbine developments under Visual Flight Rules, corridors may be established that are no less than 1 NM wide. Additionally, helicopters (like all aircraft), are required by Commission Implementing Regulation (EU) No 932/2012 (the Standardised Rules of the Air Regulation) to avoid persons, vessels, vehicles and structures by a minimum distance of 500 ft; this applies equally to the avoidance of wind turbines and any other structure.

3.35. Notwithstanding the above, low level coverage is of particular importance in the provision of full ATS to offshore helicopter operators, and ANSPs will need to give careful consideration to any proposed development that impact on the supporting PSR feed. Moreover, dependent on the level and type of service provided prior to the installation of wind turbines, it may prove necessary to maintain a buffer greater than 2 NM from HMRs in order to maintain the previous service provision by an ATS provider or ANSP. Further guidance is available from SARG.

Facilitation of helicopter support to offshore installations

3.36. In order to facilitate construction or maintenance flights within the boundaries of wind turbine developments, consideration should be given to the use of flight corridors being built into the development layout plans. Such corridors should be oriented and their width designed in consultation with the helicopter operators, given that it will be governed by the VFR performance of the aircraft in use. The layout of the turbines may also need to consider the requirements of the MCA with regards to SAR within the field.

Military requirement for Infra-Red (IR) lighting

3.37. Low flying is a vital element of military operations in areas of conflict, and a large proportion of the flying will be undertaken at night. Low flying training across the UK can take place as low as 100 ft for fast jet aircraft in Tactical Training Areas, and 250 ft in Low Flying Areas. Helicopters fly tactically down to 50 ft and routinely down to100 ft during training sorties in all areas.

3.38. The MoD have recently published Obstruction Lighting Guidance which is also available via the Aviation and Radar page on the RenewablesUK Website. The majority of night time flying by MoD aircraft is undertaken by crews equipped with NVGs; therefore IR vertical obstruction lights will be suitable in most occasions.

3.39. An application for onshore wind turbines will receive notification from DIO indicating whether IR lights will be suitable. In some cases a combination IR / red lighting will be required, for example geographical choke points or to denote the extremities of a larger wind farm.

3.40. Careful attention needs to be taken to ensure that the IR light chosen by the wind developer meets the MoD's requirements, as some IR (Light Emitting Diode) lights are not compatible with military NVGs.

3.41. Requests for clarification should be addressed to the DIO. Contact details are included in Appendix B.

Parachute drop zones

3.42. Parachutists drop from heights up to 15,000 ft AGL within a published Drop Zone (DZ), normally out to a minimum of 1.5 NM/2.8 km radius from the centre of the Parachute Landing Area (PLA).

3.43. Hazards to PLAs are categorized as:

1. Special Hazard. A hazard which could constitute a special risk to parachutists and if parachutists were to come into contact with may result in serious or fatal injury" e.g. stretches of open water, deep rivers, electricity power lines, wind turbines of a height greater than 15m to blade tip at its highest point, densely built up areas, cliffs and quarries.

2. Major Hazard. Obstacles, either natural or artificial, which because of their size may be difficult to avoid and which, if struck by a parachutist, may result in injury; i.e. large hangars, buildings, woods etc.;

3. Minor Hazard. Any object, either natural or artificial, which should be easily avoided but which if struck by a parachutist may result in injury; i.e. hedges, fences, ditches etc.).

3.44. CAP 660 (Parachuting) refers.

3.45. Wind turbines pose a special risk to parachutists and if parachutists were to come into contact with may result in serious or fatal injury; those over 15 m high are considered by the British Parachute Association (BPA) to be a Special Hazard. Wind turbines of 15 m or below are considered Major Hazards.

3.46. PLAs to be used by all designations of parachutists should provide a large open space of reasonably level ground, which can contain a circle of 250 m radius free from Major Hazards and largely free from Minor Hazards. These PLAs should be bordered on at least three sides by suitable overshoot areas, where parachutists may land if they are unable to land on the PLA: these overshoot areas should be free from Special Hazards and largely free of Major Hazards.

3.47. Wind turbines over 15 m high (50 feet) are considered a rotating special hazard and as such if located within the designated DZ would likely result in restrictions being placed upon any parachute activity within that DZ.

3.48. It is worthy of note that any obstacle over 300 ft (91.4 m) in height is no longer considered by the BPA to be just a ground obstacle to parachutists, but also an air obstacle, given that it protrudes into airspace within which parachutists (particularly in an emergency situation) may not yet have taken control of their canopies, and so could result in an aerial collision.

Very light aircraft

3.49. Due to the potential for sudden loss of lift within areas of turbulence, very light aircraft are operated away from areas of known turbulence or only in areas where turbulence is consistent and predictable (such as hill sites used by hang-gliding/paragliding clubs). Introducing a wind turbine to a location that is frequented by very light aircraft may result in that location becoming unviable or less attractive to visiting pilots if the turbine generates turbulence that may exceed the aircraft's operating limits.

Chapter 4

Wind turbine development planning process

Pre-planning and consultation

4.1. The weight of relevant knowledge accrued by wind turbine developers and ANSPs over the past decade has been substantial: issues are better understood, and proper procedures for effective consultation are in place. Developers are required to undertake their own pre- planning assessment of potential civil aviation related issues. It should also be noted that NATS, the MoD and certain airports also offer pre-planning services. Table 1 provides an overview of considerations, and the following paragraphs detail what developers will need to consider, conducting associated consultations as appropriate.

Table 1: Overview of consultation considerations

	CNS Facilities	Obstacle Considerations
Aerodrome *(Consultation required with aerodrome licensee/manager)*	▪ Safeguard PSR and SSR ▪ Safeguard Approach Aids ▪ Safeguard Navigation Beacons ▪ Safeguard VHF	▪ OLS ▪ Impact on procedures ▪ Need for lighting to aid night time conspicuity ▪ Anemometer masts
En Route *(Consultation required with MoD and NERL)*	▪ Safeguard PSR and SSR ▪ Safeguard Navigation Beacons ▪ Safeguard VHF	▪ >300 ft/91 m Chart and entry to AIP ▪ >150 m (492 ft) Lighting in accordance with article 219 of ANO (2009) ▪ Marking of turbine (upper 2/3 white in accordance with ICAO guidance) ▪ Potential for additional lighting requirements where turbines may be considered as a significant hazard to air users ▪ Anemometer masts ▪ Emergency Service ASUs and HEMS (including MCA in remote areas)
Offshore *(Consultation*	▪ Safeguard PSR and SSR	▪ Offshore Lighting in accordance with article 220 of ANO (2009) and CAP

	CNS Facilities	Obstacle Considerations
required with MoD NERL and MCA)	▪ Safeguard Navigation Beacons ▪ Safeguard VHF	764 ▪ HMR ▪ Operations around oil and gas platforms ▪ Anemometer masts ▪ Search and Rescue requirements

4.2. Aerodromes. Whilst not definitive, it should be anticipated that any wind turbine development within the following criteria[32] might have an impact upon civil aerodrome[33] - related operations:

1. Unless otherwise specified by the aerodrome or indicated on the aerodrome's published wind turbine consultation map, within 30 km of an aerodrome with a surveillance radar facility. The distance can be far greater than 30 km depending upon a number of factors including the type and coverage of the radar and the particular operation at the aerodrome;
2. Within airspace coincidental with any published Instrument Flight Procedure (IFP) to take into account the aerodrome's requirement to protect its IFPs;
3. Within 17 km of a non-radar equipped licensed[34] aerodrome with a runway of 1100 m or more;
4. Within 5 km of a non-radar equipped licensed aerodrome with a runway of less than 1100 m;
5. Within 4 km of a non-radar equipped unlicensed aerodrome with a runway of more than 800 m;
6. Within 3 km of a non-radar equipped unlicensed aerodrome with a runway of less than 800 m.

[32] Aerodrome criteria are generically based upon the safeguarding requirements and guidance contained in Regulation EC 139 of 2014, CAP 168 and CAP 793 (both current and historical). The ranges quoted are for guidance only. If proposed developments lie marginally outside the ranges highlighted, but nevertheless in close proximity to other developments, developers are advised to consider the potential proliferation issues. The object of any pre-planning process is to identify all possible aviation concerns to the developer at an early stage and as such, the assessment should err on the side of caution.

[33] In this context the term 'aerodrome' includes any site used regularly by aircraft (including helicopters and gliders) for take-off and landing. The CAA-sponsored, NATS-produced VFR charts depict all such sites known to the CAA, although effects on uncharted aerodromes must still be considered.

[34] Licensed in accordance with Part 27 of ANO (2009) as amended.

4.3. The figures above are for initial guidance purposes only and do not represent definitive ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. These ranges are intended as a prompt for further discussion between developers and aviation stakeholders in the absence of any other published criteria.

4.4. Many modern gliders have a glide ratio of at least 50:1 and the most modern gliders can exceed that, with further progress expected in future. Developments of wind turbines within 10 km of a gliding site or where the maximum height of the structure is within a 50:1 angle of a gliding site will present additional considerations beyond those associated with powered aircraft. Therefore, notwithstanding the CAA recommended distances quoted above, the British Gliding Association (BGA) requests that relevant gliding sites and the BGA are consulted where proposed developments are within 10 km of any charted glider launch site.

4.5. Aerodrome operators should address physical safeguarding issues in accordance with the guidance contained within relevant EASA documentation, CAP 168 and CAP 738 as applicable. Operators of unlicensed aerodromes should refer to CAPs 793 and 738 as applicable and are strongly advised to engage with their LPA to ensure that their activities and requirements are well understood. At the very least, unlicensed aerodromes should subscribe to their LPA's Weekly Planning List, which will provide them with information on all planning applications – including wind turbines and anemometer masts – and therefore provide a mechanism for effective self-briefing for their associated pilots.

4.6. Non-aerodrome related activity. Developers should also consider the potential for wind turbines to impact upon known general aviation activity that are annotated on CAA-sponsored, NATS-produced VFR charts, but which are not related to a recognised or single aerodrome (for example, charted fee-fall parachute DZ and hang/ para-gliding winch launch sites). Typically, developers will need to engage direct with relevant aviation operators where a development would be within 3 km of any such site.

4.7. NATS. There may be issues related to en route CNS facilities. Accordingly, details of any proposal need to be considered by NATS. Developers need to undertake related consultation as appropriate as NATS will be consulted by the LPAs. NATS Windfarm web pages provide support.

4.8. Lighting and marking. There might be a need to install aviation warning lighting to some or all of the turbines if increased conspicuity is deemed necessary.

4.9. Charting. In terms of obstacle charting requirements in the UK, a threshold exists at 300 ft (91.4m)[35]

1. Structures with a maximum height of 300 ft (91.4m) above ground level or higher:

   a) There is an ICAO Annex 15 requirement for all obstacles (temporary or otherwise) over 300 ft (91.4m) AGL to be promulgated in the UK AIP and charted on civil aviation charts. Accordingly, any such structure is required to be notified to the Defence Geographic Centre (DGC) who provides the source of obstacle data, published in the UK AIP at ENR 5.4 no later than 10 weeks prior to construction. Information provided should include the type of structure and name of location, an accurate location of the structure(s) in WGS 84 latitude and longitude (degrees, minutes and 1/100 second), an accurate maximum height AMSL/AGL, the lighting status of the turbines and date for the completion of construction. In addition, the developer should also provide the maximum height of any construction equipment required to build the turbines. Removal of turbines is also required to be notified and expected date of removal. The DGC prefer notifications to be submitted electronically: mail to dvof@mod.uk.

   b) In order to ensure that aviation stakeholders are aware of the turbines while aviation charts are in the process of being updated, developments should also be notified through the means of a NOTAM. To arrange an associated NOTAM, a developer should contact CAA Airspace Regulation[36] (AROps@caa.co.uk / 0207 453 6599) no later than 14 days prior to the commencement of construction with the same information as required by the DGC. Of note, if the obstacle falls within an Aerodrome Traffic Zone or Military Aerodrome Traffic Zone, it is the responsibility of that aerodrome to issue the NOTAM.

2. Structures with a maximum height below 300 ft (91.4m) above ground level. In the interest of Aviation Safety, the CAA also requests that any feature/structure 70 ft (21.3m) in height, or greater, above ground level is also reported to the DGC. It should be noted that NOTAMs would not routinely be required for structures under 300 ft (91.4m) unless specifically requested by an aviation stakeholder.

4.10. Emergency ASUs. For completeness it would also be sensible to establish the related viewpoint of local emergency ASUs. This is because of the unique nature of their operations in respect of operating altitudes and potentially unusual

[35] The effective height of a Wind Turbine is the maximum height to blade tip.

[36] Previously named Airspace Utilisation with the email address AUSOps@caa.co.uk. The AROps email address should now be used for all correspondence and NOTAM requests.

landing sites. In addition, The MCA is responsible for the provision of SAR services onshore and offshore. It is recommended that the MCA is consulted on all offshore developments and one of the factors that it will consider is the implications of a development on SAR operations (with surface craft and helicopters). Further information is available in Chapter 2.

4.11. Cumulative effect. The growth in the number of wind turbine developments (either under consideration, in planning, under construction, or operational), is significant. It is possible that the cumulative effect of a number of wind turbine developments in any particular area might potentially result in difficulties for aviation that a single development would not have generated. See also Chapter 2.

4.12. Cross-boundary. In order to delineate responsibility for the provision of flight information services to aircraft, airspace is divided up into internationally recognised Flight Information Regions (FIRs). Airspace in the UK is divided into the London and Scottish FIRs which together form the UK FIR. Coordinates for these boundaries are listed in the UK Aeronautical Information Publication Section ENR 2.1. Offshore developments have the potential to straddle these boundaries, one example being the consented East Anglia ONE development, part of which is in the Dutch FIR. Airspace outside the UK FIR is the responsibility of other European aviation authorities, whose regulations may differ from those that apply in the UK. Accordingly, wind turbine developers should contact the CAA for specific guidance in all instances where developments are likely to approach the limits of the UK FIR.

Formal planning

4.13. Regardless of whether voluntary pre-planning has been undertaken, all proposals for wind turbine developments must eventually move into a formal approval process either through the Electricity Act 1989, the Planning Act 2008, or through the Town and Country Planning Acts[37] . The process is outlined in the subsequent paragraphs, although these guidelines do not purport to be a comprehensive guide to planning procedures.

England and Wales

4.14. In England, LPAs currently handle consent applications for land-based generating stations with a capacity up to 50 MW in accordance with the polices set out in the National Planning Policy Framework (NPPF) and following the procedure set out in the Town and Country Planning Act 1990. The Planning Act 2008 sets out thresholds above which certain types of infrastructure development

[37] Taken to include the Town and Country Planning Act 1990 and Town and Country Planning Act (Scotland) 1997.

are considered to be nationally significant. Currently, land-based electricity generating stations with a capacity over 50MW and offshore generating stations with a capacity above 100MW are classified as Nationally Significant Infrastructure Projects (NSIPs), however, it is the Government's published intention to amend legislation so that all applications for onshore wind energy developments are handled by local planning authorities[38]. Any developer wishing to construct an NSIP must first apply for a type of consent known as 'development consent'. For such projects, the Planning Inspectorate examines the application and will make a recommendation to the relevant Secretary of State, who will determine the application. In Wales, onshore applications over 50 MW and offshore applications over 100MW are currently decided by the relevant UK Secretary of State following the recommendation of the Planning Inspectorate. Applications for developments under 50 MW are dealt with by the relevant LPA under the Town and Country Planning Legislation (Wales). The Welsh Government has published planning advice on renewable energy in the form of Technical Advice Note (TAN) 8 and in the Planning (Wales) Act 2015. In addition, the UK Government has expressed the intent to devolve powers to Welsh Ministers for the consenting of energy schemes both onshore and offshore of up to 350 megawatts capacity[39].

Scotland

4.15. In Scotland, there is currently a similar division of responsibility. Applications for onshore stations of a capacity up to 50 MW are made to the relevant LPA under the Town and Country Planning Act (Scotland). Onshore developments with a capacity greater than 50 MW require consent from the Scottish Government. These applications are handled on behalf of the Scottish Ministers by the Energy Consents Unit (ECU) under Section 36 of the Electricity Act (1989). In Scotland, applications for marine energy (including offshore wind) are made to Marine Scotland.

Northern Ireland

4.16. Previously in Northern Ireland, the Planning Service (an Agency within the Department of the Environment), handled all proposals for land-based generating stations irrespective of capacity. From 1 April 2015, the responsibility for planning has been shared between 11 new councils and the Department of the Environment. Applications will be classified as either 'local', 'major' or being of 'regional significance'. Criteria for assessing the classification of developments are contained within The Planning (Development Management) Regulations (Northern Ireland) 2015. An application deemed to be of regional significance

[38] Dept of Communities and Local Government online guidance on Renewable and Low Carbon Energy dated 18 June 15.

[39] The Queens Speech 27 May 2015 - contained within the proposed Wales Bill.

must be made to, and will be determined by, the Department of the Environment. Councils will be responsible for determining major and local development applications. In Northern Ireland, offshore wind farm proposals are the responsibility of the Department of Enterprise, Trade and Investment.

Micro wind turbines

4.17. The legislation to allow permitted development rights for householders to install MWTs on their premises came into force on 1 December 2011. Details of the order can be found in Class H and I of Part 14 in Schedule 2 of The Town and Country Planning (General Permitted Development) (England) Order 2015. The same legislation came into force in Wales on 22 May 2012. The legislation applies to both building mounted and free standing turbines that do not exceed 15 metres and 11.1 metres above the ground respectively. The Planning Portal hosts the Domestic Wind Turbine Safeguarding Land Tool, which establishes whether or not a proposed wind turbine will be located on safeguarded land. If the proposed turbine is not on safeguarded land it has successfully met one of the requirements of being eligible for permitted development. All turbines that do not meet the above requirements are currently processed in a manner relevant to all other scales of wind turbine development.

CAA involvement

4.18. Currently, the CAA can provide the following input to formal planning submissions for wind turbine developments:

1. Identification of aviation stakeholders that would potentially be affected;
2. Reviewing the aviation section of the Environmental Statement for accuracy and completeness;
3. Consideration of regulatory requirements;
4. Consideration of whether all other aviation issues known to the CAA have been taken into account (including other potential developments).

4.19. It should be noted that the CAA is currently only a statutory consultee for onshore developments in excess of 50MW and for offshore developments in excess of 100MW. Responses to other planning submissions will be made, resource permitting.

Promulgation of wind turbine developments

4.20. The need to promulgate the existence of tall structures that might constitute a significant aviation obstruction is self-evident. LPAs routinely advise the DGC of also report such information to DGC. Through the updated promulgation of a database document, the SARG Aeronautical Charts and Data section is advised of all such developments and update aviation charts accordingly. All structures

(including wind turbines and anemometer masts) in excess of 300 ft in height are depicted on charts and details of each wind turbine are promulgated in the UK AIP, ENR 5.4 (CAP 32) 9.2. By exception, structures less than 300 ft high may be promulgated for civil aviation en-route purposes if their presence is deemed to be of navigational significance.

Call-ins and inquiries

Call ins

4.21. Whilst the aviation industry has no powers of veto, there is a legal obligation placed upon LPAs to give warning if they are minded to grant planning permission against advice given by a statutory safeguarding consultee (ODPM/DfT/ NAFW Circular 1/2003 and Scottish Executive Circular 2/2003 refer). This process offers an opportunity for the CAA to establish whether a solution is apparent or, if it fails to resolve the issue, to refer the matter for a decision by central Government. This procedure is always a last resort, as it is anticipated that communication and cooperation can obviate the need for it.

Inquiries

4.22. In the event that a planning application is referred to a planning inquiry, the CAA may be requested by the LPA to provide expert witness evidence. This may be by providing written statements or by attendance at the Inquiry.

Consistency, accuracy and use of consultants

4.23. When aviation stakeholders are consulted over wind turbine developments, either at the pre-planning stage or once the formal planning application process has begun, it is critical that the responses made are consistent, factually accurate and cover all relevant aspects. It should be noted that these responses may be subject to challenge and CAA is often asked to provide an impartial regulatory perspective on what has been submitted.

4.24. In submitting a wind turbine development proposal, developers will regularly employ subject matter experts in the form of consultants to prepare reports to identify potential issues and address any issues raised by aviation stakeholders. This may be in the pre-application stage or to seek to address aviation concerns following aviation objections. In addition, as part of the formal process, developers are often required to submit an Environmental Impact Assessment which will include an assessment of aviation issues and mitigations, often based on supporting reports commissioned by the developers. If asked for comment, CAA will request that LPAs pursue any assertions or statements made in respect of aviation with the appropriate aviation stakeholder, developer or consultant.

CAA provision of advice

4.25. The CAA is often approached for comment and advice concerning the validity of objections raised or the suitability of mitigations proposed. However, it is incumbent upon the developer to liaise with the appropriate aviation stakeholder to discuss – and hopefully resolve or mitigate – aviation related concerns without requiring further CAA input. However, if these discussions break down or an impasse is reached, the CAA can be asked to provide objective comment. It must be remembered that the CAA has no powers to either prevent wind turbine developments going ahead or to require that an aviation stakeholder remove their objection. Nevertheless, by involving the CAA at an appropriate stage, it is hoped that some form of agreement can be reached that prevents the need for costly Planning Inquiries that feature aviation as a key issue.

4.26. Of further note is that as the UK's independent civil aviation regulator of, the CAA will not typically provide comment on MoD objections or arguments unless such comments have been requested by the MoD. However, in circumstances where there is a mixture of civil and military objections and where it is appropriate to do so, the CAA could facilitate discussions between all the parties (including the MoD).

APPENDIX A

DECC Governance and meeting structure

A1 In addition to work to improve the processes of consultation and assessment, there is a substantial amount of other activity going on to identify, develop and implement solutions to the potential impacts that wind turbines can have on radar systems. It was recognised that it would be beneficial to draw this work together within a single plan in order to have a coordinated approach to finding solutions to the wind turbine – radar issue. Therefore, together with stakeholders in the aviation and wind development sectors, DECC and several partners jointly developed an Aviation Plan to move work forward so that wind turbine developments could be developed while, at the same time, the maintenance of national security and the continued safe operation of our aviation environment were ensured. The structure and principles of the Aviation Plan were endorsed by the Wind Energy, Defence and Civil Aviation Interests Working Group in March 2008.

A2 The overall aim of the Aviation Plan is to provide an evolving suite of generic mitigation solutions to which wind turbine developers and their aviation stakeholders can turn when discussing the best potential solutions for any particular wind proposal. The development of this suite of generic solutions is an on-going process and builds on a number of solutions that are already available to wind turbine developers.

A3 The governance of the Aviation Plan is the responsibility of an Aviation Management Board (AMB), which in turn is supported by a technical-level Aviation Advisory Panel (AAP). RenewableUK have taken on the responsibility of establishing an industry funding mechanism that will part- support, financially, the work-streams within the Plan, which is managed by the Fund Management Board. All meetings sit quarterly.

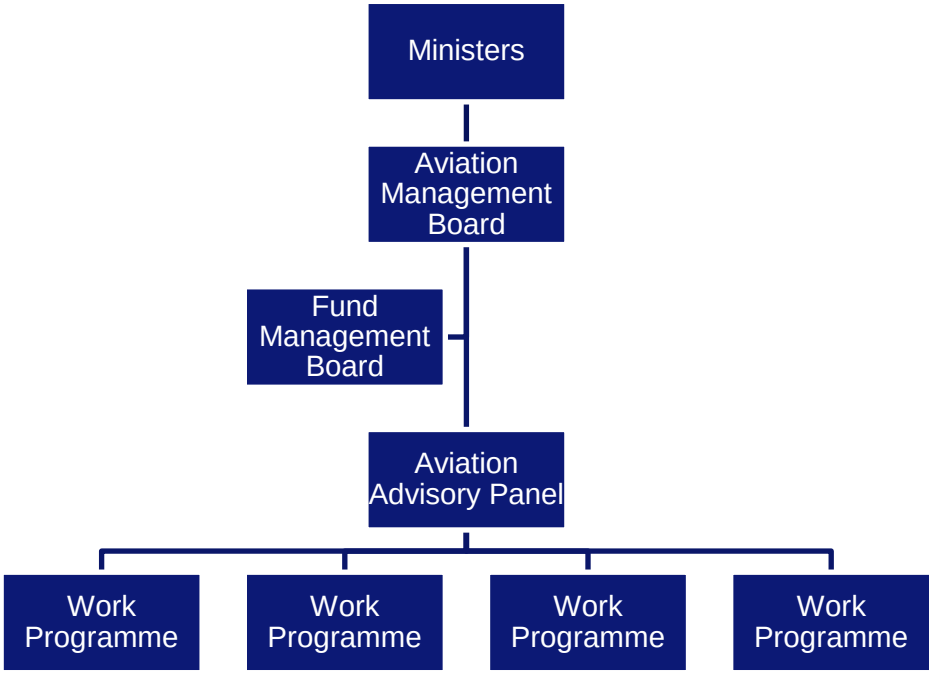

Figure A-1: AMB Governance

A4 The value of the Aviation Plan as a tool for enabling the development of mitigation solutions has been recognised by key stakeholders that have an interest in radar systems and wind turbine developments. To ensure the success of the plan, a number of these have agreed to sign off a second Memorandum of Understanding[40] to commit to the full implementation of the Aviation Plan and its approach to ensuring the timely and effective delivery of solutions to reduce the effect of wind turbines on aviation interests.

[40] https://www.gov.uk/government/publications/wind-turbines-and-aviation-radar-mitigation-issues-memorandum-of-understanding-2011-update

APPENDIX B

Contact Information

CAA Contacts

CAA Windfarms

Windfarms

Infrastructure

Safety and Airspace Regulation Group

CAA House

45-59 Kingsway

London

WC2B 6TE

Tel: 020 7453 6534

http://www.caa.co.uk/Safety-Initiatives-and-Resources/Safety-projects/Windfarms/Windfarms/

windfarms@caa.co.uk

CAA Aerodromes

For information on aerodrome licensing criteria, obstacle limitation surfaces and call-in procedures, contact:

Civil Aviation Authority

Aerodromes Standards Department

Safety and Airspace Regulation Group

Aviation House

Gatwick Airport South

West Sussex

RH6 0YR

CAAAerodromeStandardsDepartment@caa.co.uk

CAA Air Traffic Standards

Where a service provider has to update the safety documentation for a service as a result of a wind turbine development, then they should follow standard practice and contact their regional inspector for approval as necessary. Contact details are below:

CAA En-Route Regulation

Safety and Airspace Regulation Group Aviation House – 2W

Gatwick Airport South

West Sussex

RH6 0YR

Tel: (+44) (0)1293 573060, Fax: (+44) (0)1293 573974

ats.enquiries@caa.co.uk (mark to 'En-Route Regulation')

CAA Southern Regional Office (Gatwick)

Regional Manager ATS Safety Regulation (Southern Region)

Air Traffic Standards Division

Safety and Airspace Regulation Group

Civil Aviation Authority

Aviation House

Gatwick Airport South

West Sussex

RH6 0YR

Tel (+44) (0) 1293 573330, Fax: (+44) (0) 1293 573974

ats.southern.regional.office@caa.co.uk

CAA Northern Regional Office (Stirling)

Regional Manager ATS Safety Regulation (Northern Region)

Air Traffic Standards Division

Safety and Airspace Regulation Group

Civil Aviation Authority

First Floor, Kings Park House

Laurelhill Business Park

Stirling

Scotland

FK8 9JQ

Tel: (+44) (0) 1786 457400

ats.northern.regional.office@caa.co.uk

ATCO Training and Area Control Centres

Enquiries about ATS at Area Control Centres and air traffic controller training establishments should be addressed to:

En Route and College Regulation

Air Traffic Standards

Civil Aviation Authority

Safety and Airspace Regulation Group

Civil Aviation Authority

Aviation House

Gatwick Airport South

West Sussex

RH6 0YR

Tel: (+44) (0) 1293 573259

Fax: (+44) (0) 1293 573974

Other Contacts

The Airport Operators' Association

3 Birdcage Walk

London SW1H 9JJ

www.aoa.org.uk

Tel: (+44) (0) 20 7799 3171

General Aviation Awareness Council

RAeS House

4 Hamilton Place

London

W1J 7BQ

www.gaac.org.uk

Tel: 020 7670 4501

Fax: 020 7670 4309

British Gliding Association Limited

8 Merus Court

Meridian Business Park

Leicester

LE19 1RJ

Tel: +44 (0) 116 289 2956

Fax: +44 (0) 116 289 5025

office@gliding.co.uk

British Parachuting Association

Wharf Way

Glen Parva

Leicester

LE2 9TF

www.bpa.org.uk

Tel: +44 (0)116 278 5271

Fax: +44 (0)116 247 7662

skydive@bpa.org.uk

Defence Geographic Centre

UK DVOF & Powerlines

Air Information Section

Defence Geographic Centre

Elmwood Avenue

Feltham

Middlesex

TW13 7AH

Tel: (+44) (0) 208 818 2702

DVOF@mod.uk

Department for Environment, Food and Rural Affairs

Nobel House

17 Smith Square

London

SW1P 3JR

https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

Department of Energy and Climate Change

Kieran Power

3 Whitehall Place

London

SW1A 2AW

Tel: 0300 068 6189

www.decc.gov.uk

kieran.power@decc.gsi.gov.uk

Department for Transport

Great Minster House

76 Marsham Street

London

SW1P 4DR

https://www.gov.uk/government/organisations/department-for-transport

Maritime and Coastguard Agency

For general enquiries:

SAR Operations Officer

HM Coastguard

Maritime and Coastguard Agency

Southampton

UK

Tel: (023) 8032 9332

Fax: (023) 8032 9488

https://www.gov.uk/government/organisations/maritime-and-coastguard-agency

Roly.McKie@mcga.gov.uk

For Maritime lighting requirements:

MCA Navigation Safety Branch,

HM Coastguard

Maritime and Coastguard Agency

Southampton

UK

Tel: (023) 8032 9523

Fax: (023) 8032 9488

National Police Air Service (England and Wales)

NPAS HQ

Head of Estates and Infrastructure

West Yorkshire Police

Laburnum Road

Wakefield

West Yorkshire

WF1 3QP

Tel: 01924 292520

npas.obstructions@npas.pnn.police.uk

http://www.npas.police.uk/

Ministry of Defence – Defence Infrastructure Organisation (formerly Defence Estates)

Kingston Road

Sutton Coldfield

West Midlands

B75 7RL

0121 311 3847

dio-safeguarding-wind@mod.uk

www.mod.uk/DIO

NATS Safeguarding

NATS Corporate and Technical Centre

4000-4200 Parkway

Whiteley

Hants

PO15 7FL

NATSSafeguarding@nats.co.uk

National Assembly for Wales

Planning Division

Cathays Park

Cardiff

CF10 3NQ

0300 0603300 or 0845 010 3300

Planning.division@wales.gsi.gov.uk

http://gov.wales/topics/planning/?lang=en

DOE Northern Ireland Planning

DOE Planning

Causeway Exchange

1-7 Bedford Street

19-25 Great Victoria Street

Belfast

BT2 7EG

www.planningni.gov.uk

Department for Communities and Local Government

Eland House

Bressenden Place

London

SW1E 5DU

https://www.gov.uk/government/organisations/department-for-communities-and-local-governmentw

Office of Gas and Electricity Markets (OFGEM)

9 Millbank

London

SW1P 3GE

70 West Regent Street

Regents Court

Glasgow

G2 2QZ

https://www.ofgem.gov.uk/

RenewableUK

Greencoat House

Francis Street

London

SW1P 1DH

http://www.renewableuk.com/

Scottish Executive

Energy Consents Unit

4th Floor

5 Atlantic Quay

150 Broomielaw

Glasgow

G2 8LU

econsentsadmin@scotland.gsi.gov.uk

http://www.energyconsents.scot/

Aircraft noise effects on health

Prepared for the Airports Commission

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May 2015

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1. Introduction

Recent years have seen an increase in the strength of the evidence linking environmental noise exposure (road, rail, airport and industrial noise) to health. The World Health Organization (WHO, 2011) recently estimated that between 1 and 1.6 million healthy life years (Disability-Adjusted Life Years) are lost annually because of environmental noise exposure[1], such as road traffic noise and aircraft noise, in high income western European Countries. The WHO estimated that each year 903,000 DALYS are lost due to sleep disturbance; 654,000 DALYS due to noise annoyance; 61,000 DALYS due to heart disease; and 45,000 DALYS due to cognitive impairment in children.

Aircraft noise negatively influences health if the exposure is long-term and exceeds certain levels (Basner et al., 2014). This review briefly summarizes the strength of the evidence for aircraft noise effects on cardiovascular health, sleep disturbance, annoyance, psychological well-being, and effects on children's cognition and learning, as well as briefly discussing guidelines for environment noise exposure. This evidence is related to the three shortlisted schemes for the new runway.

This is a selective review focusing on reviews assessing the strength of the evidence, as well as high quality, robust, large-scale epidemiological field studies of aircraft noise exposure, highlighting studies that have been conducted within the United Kingdom, where possible. It represents key studies within the field but should not be considered an exhaustive review. Studies of road traffic noise, as opposed to aircraft noise, have only been included where evidence for aircraft noise exposure is unavailable.

2. Aircraft noise effects on health: a review of recent evidence

2.1. Cardiovascular health

Over the past 10 years, evidence that aircraft noise exposure leads to increased risk for poorer cardiovascular health has increased considerably. A recent review, suggested that risk for cardiovascular outcomes such as high blood pressure (hypertension), heart attack, and stroke, increases by 7 to 17% for a 10dB increase in aircraft or road traffic noise exposure (Basner et al., 2014). A review of the evidence for children concluded that there were associations between aircraft noise and high blood pressure (Paunović et al., 2011), which may have implications for adult health (Stansfeld & Clark, 2015).

The HYENA study (HYpertension and Exposure to Noise near Airports) examined noise effects on the blood pressure (hypertension) of 4,861 people, aged 45-70 years, who had lived for over 5 years near 7 major European airports including London Heathrow; Amsterdam Schiphol; Stockholm Arlanda & Bromma; Berlin Tegel, Milan Malpensa; and Athens Eleftherios Venizelos (Jarup et al., 2008). High blood pressure was

[1] The range 1 to 1.6 million is given as it is not known if the effects for the different health outcomes are additive or if they might interact/co-occur.

assessed via measurements and medication use. The HYENA study found that a 10dB increase in aircraft noise at night (L_{night}) was associated with a 14% increase in odds for high blood pressure but day-time aircraft noise ($L_{Aeq\ 16\ hour}$) did not increase the odds for high blood pressure (Jarup et al., 2008). The HYENA study did not find an association between day-time aircraft noise and high blood pressure which might be because many residents work away from home during the day-time, leading to potential mis-classification of their day-time aircraft noise exposure. The HYENA study also found that a 10dB increase in night-time aircraft noise was associated with a 34% increase in the use of medication for high blood pressure in the UK (Floud et al., 2011). The HYENA study is a high quality large-scale study of aircraft noise exposure effects on blood pressure, which includes a population sample around London Heathrow airport. One short-coming of the study is that it assesses noise and health at the same point in time, meaning that we cannot be sure whether noise exposure occurred before the poorer health outcomes, or whether the poorer health outcomes may have preceded the noise exposure.

A recent study around London Heathrow airport examined risks for hospital admission and mortality for stroke, coronary heart disease and cardiovascular disease for around 3.6 million people living near London Heathrow airport (Hansell et al., 2013). Both day-time ($L_{Aeq\ 16\ hour}$) and night-time (L_{night}) aircraft noise exposure were related to increased risk for a cardiovascular hospital admission. Compared to those exposed to aircraft noise levels below 51dB in the day-time, those exposed to aircraft noise levels over 63dB in the day-time had a 24% higher chance of a hospital admission for stroke; a 21% higher chance of a hospital admission for coronary heart disease; and a 14% higher chance of a hospital admission for cardiovascular disease. These estimates took into account age, sex, ethnicity, deprivation and lung cancer mortality as a proxy for smoking. These results were also not accounted for by air pollution, which was adjusted for in the analyses. Similar effects were also found between aircraft noise exposure and mortality for stroke, coronary heart disease, and cardiovascular disease. The study concluded that high levels of aircraft noise were associated with increased risks of stroke, coronary heart disease, and cardiovascular disease for both hospital admissions and mortality in areas near Heathrow airport.

Further longitudinal evidence for an association between aircraft noise exposure and mortality from heart attacks comes from a large-scale Swiss study of 4.6 million residents over 30 years of age (Huss et al., 2010). This study found that mortality from heart attacks increased with increasing level and duration of aircraft noise exposure (over 15 years), but there were no associations between aircraft noise exposure and other cardiovascular outcomes including stroke or circulatory disease. The lack of association between aircraft noise and stroke differs from the findings of the similar study conducted around Heathrow airport, which did find an association of aircraft noise on stroke mortality (Hansell et al., 2013).

It is not uncommon for studies in this field to demonstrate some inconsistencies in the specific cardiovascular outcomes for which significant effects of aircraft noise associations are found. There are several explanations for this. Firstly, demonstrating environmental noise effects on cardiovascular disease requires very large samples.

Even in large samples effects may not be statistically significant, as the confidence intervals for the estimate of the effect can be wide, if the cardiovascular outcome does not have a high prevalence, e.g. incidence of stroke. Thus, studies vary in their sample size and in their ability to examine a range of cardiovascular outcomes. Secondly, with epidemiological studies, there is always the potential for residual confounding: the analyses may still not be taking into account all factors, which might be influencing the association between aircraft noise and cardiovascular disease. Thirdly, there is always the possibility of exposure mis-classification: the estimated aircraft noise exposure may be incorrect for some of the sample, which could influence the findings. For example, there is a limitation to using day-time aircraft noise exposure at home for adult samples, when they may work away from their home environment. Fourthly, there is variation in the level and range of aircraft noise exposures examined, which could explain differences between the studies. Despite these differences between the aircraft noise studies, the most recent meta-analysis of the field (Babisch, 2014) concluded that aircraft noise exposure was associated with increased risk for cardiovascular outcomes such as high blood pressure, heart attack and stroke.

It is biologically plausible that long-term exposure to environmental noise might influence cardiovascular health (Babisch, 2014). Figure 2.1. shows a model of proposed pathways between environmental noise exposure and cardiovascular diseases (Babisch, 2014). In brief, increased stress associated with noise exposure might cause physiological stress reactions in an individual, which in turn can lead to increases in established cardiovascular disease risk factors such as blood pressure, blood glucose concentrations, and blood lipids (blood fats). These risk factors lead to increased risk of high blood pressure (hypertension) and arteriosclerosis (e.g. narrowing of arteries due to fat deposits) and are related to serious events such as heart attacks and strokes (Babisch, 2014; Basner et al., 2014). The stress that triggers this pathway can operate directly via sleep disturbance or indirectly via interference with activities and annoyance.

To date, few studies have examined whether aircraft noise exposure influences metabolic risk factors for cardiovascular health, such as Type II diabetes, body mass index, and waist circumference. Such factors would lie on the proposed pathway between aircraft noise exposure and cardiovascular diseases. A recent study of long-term exposure to aircraft noise in Sweden found that exposure was associated with a larger waist circumference but less clearly with Type II diabetes and body mass index (Eriksson et al., 2014). This is an area of research where further evidence should be forthcoming in the next few years.

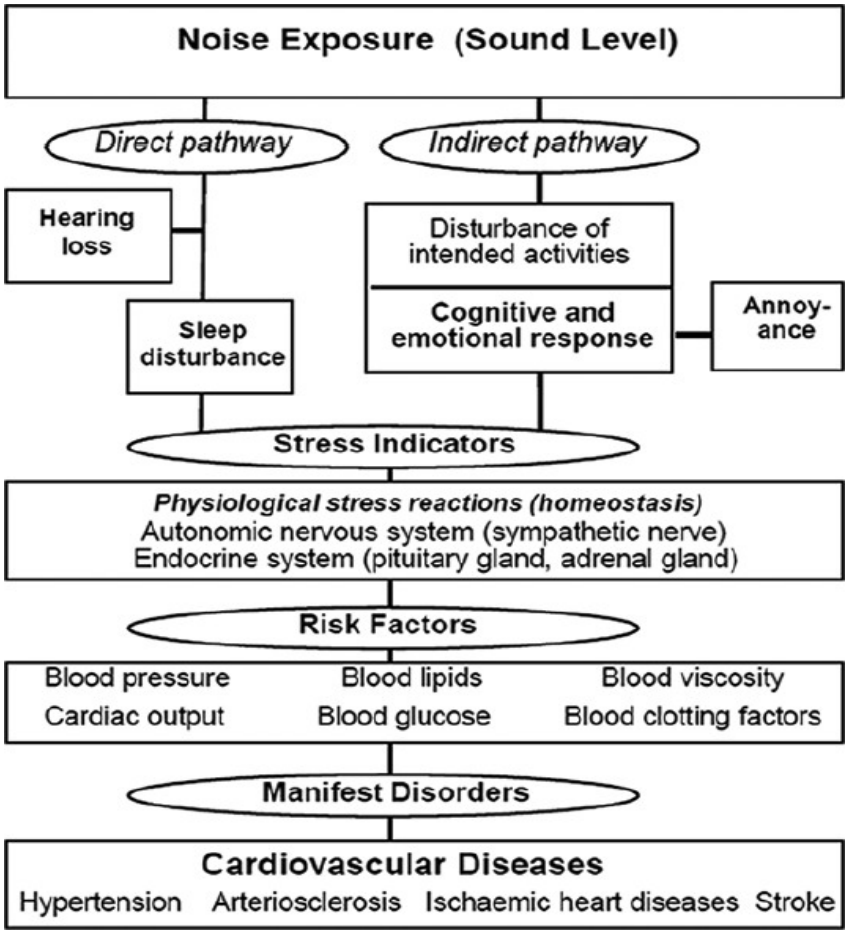

Figure 2.1. Pathways from environmental noise exposure to cardiovascular disease (Babisch, 2014).

2.2. Sleep disturbance

The WHO estimated sleep disturbance to be the most adverse non-auditory effect of environmental noise exposure (Basner et al., 2014; WHO, 2011). Undisturbed sleep of a sufficient number of hours is needed for alertness and performance during the day, for quality of life, and for health (Basner et al., 2014). Humans exposed to sound whilst asleep still have physiological reactions to the noise which do not adapt over time including changes in breathing, body movements, heart rate, as well as awakenings (Basner et al., 2014). The elderly, shift-workers, children and those with poor health are thought to be at risk for sleep disturbance by noise (Muzet, 2007).

The effect of night-time aircraft noise exposure has been explored for a range of sleep outcomes ranging from subjective self-reported sleep disturbance and perceived sleep quality, to more objective measures of interference with ability to fall asleep, shortened sleep duration, awakenings, and increased bodily movements as assessed

by polysomnography[2] (Michaud et al., 2007). Most evidence comes from studies of self-reported sleep disturbance. However, self-reported sleep disturbance outcomes are vulnerable to bias, as such measures are likely to be influenced by noise annoyance and other demographic factors (Clark & Stansfeld, 2011).

Reviews have concluded that there is evidence for an effect of night-time aircraft noise exposure on sleep disturbance from community based studies (Hume et al., 2012; Miedema & Vos, 2007). However, some reviews have concluded that the evidence is contradictory and inconclusive (Jones, 2009; Michaud et al., 2007), which might be explained by methodological differences between studies of noise effects on sleep disturbance. A meta-analysis of 24 studies, including nearly 23,000 individuals exposed to night-time noise levels ranging from 45-65dBA, found that aircraft noise was associated with greater self-reported sleep disturbance than road traffic noise (Miedema & Vos, 2007). However, another study, whilst confirming that aircraft noise was associated with greater self-reported sleep disturbance than road traffic noise, found that when polysomnography measures of sleep disturbance were analysed that road traffic noise was associated with greater disturbance than aircraft noise (Basner et al., 2011).

Polysomnography enables the assessment of noise effects on different stages of the sleep cycle. The average sleep cycle last between 90 to 110 minutes, and an individual experiences between four to six sleep cycles per night (Michaud et al., 2007). Figure 2.2. describes the duration and characteristics of each stage of the sleep cycle (Clark & Stansfeld, 2011) from wake, through non-rapid eye movement (NREM) stages 1 to 4, and rapid eye movement (REM) sleep. It is usual for people to move between NREM sleep stages several times before undergoing REM sleep. Slow-wave sleep (NREM stage 3 and 4) occurs more frequently in the first half of the night, and REM sleep propensity is greater in the second half of the night. Sleep disturbance is indicated by less stage 3, stage 4 and REM sleep, and by more wake and stage 1 sleep, as well as more frequent changes in sleep stage (Basner & Siebert, 2010).

There is evidence that aircraft noise influences the time spent in different sleep stages, with aircraft noise reducing slow-wave sleep (NREM Stage 4) and REM sleep and increasing NREM Stages 1, 2 & 3 (Basner et al., 2008; Swift, 2010). This evidence, taken with the increase in REM sleep in the later stages of the night might have implications for early morning (04.00-06.30 hours) flight operations at airports.

A laboratory study compared the potential effects of changes in the night-time curfew at Frankfurt airport on sleep disruption (Basner & Siebert, 2010), using polysomnography on 128 subjects over 13 nights. Three different operational scenarios were compared: scenario 1 was based on 2005 air traffic at Frankfurt airport which included night flights; scenario 2 was as scenario 1 but cancelled flights between 23.00-05.00 hours; scenario 3 was as scenario 1 but with flights between 23.00-05.00

[2] Polysomnography records biophysiological changes that occur during sleep, including brain waves using electroencephalography (EEG), eye movements using electroculography (EOG), muscle activity using electromyography (EMG), and heart rhythm using electrocardiography (ECG).

hours rescheduled to the day-time and evening periods. The study found that compared to the night without a curfew on night flights (scenario 1), small improvements were observed in sleep structure for the nights with curfew, even when the flights were rescheduled to periods before and after the curfew period. However, the change in the amount of time spent in the different sleep stages for the different scenarios was small, which might be explained by the small number of night-flights (on average 4 take-offs per hour) in the Frankfurt airport scenarios examined: larger effects may be observed for airports with a greater number of night-flights. The authors concluded that the benefits for sleep seen in the scenario involving rescheduling of flights rather than cancellation may be offset by the expected increase in air traffic during the late evening and early morning hours for those who go to bed before 22.30 or after 01.00 hours.

Wake	
Non-rapid eye movement (NREM)	
Stage 1	Light stage of sleep Lasts 5-10 minutes Bridge between wakefulness and sleep
Stage 2	Light stage of sleep Lasts around 20 minutes Brain waves of increased frequency Increased heart rate variability
Stage 3	Transition to deeper stages of sleep Increased amount of delta waves of lower frequency
Stage 4	Deepest stage of sleep Characterised by a greater number of delta waves
Rapid Eye Movement (REM) sleep	Typically starts 70-90 minutes after falling asleep Characterised by rapid eye movements Increases in brain activity Greater variability in respiration rate, blood pressure and heart rate

Figure 2.2. Stages of sleep, adapted from (Clark & Stansfeld, 2011).

The WHO Europe Night Noise Guidelines (WHO, 2009) were based on expert-consensus that there was sufficient evidence that nocturnal environmental noise exposure was related to self-reported sleep disturbance and medication use, and that there was some evidence for effects of nocturnal noise exposure on high blood pressure (hypertension) and heart attacks. The WHO Europe Night Noise Guidelines state that the target for nocturnal noise exposure should be 40 dB $L_{night,\ outside}$, which should protect the public as well as vulnerable groups such as the elderly, children, and the chronically ill from the effects of nocturnal noise exposure on health. The Night Noise Guidelines also recommend the level of 55 dB $L_{night,\ outside}$, as an interim target for countries wishing to adopt a step-wise approach to the guidelines. It is worth noting that the 40dB $L_{night\ outside}$ guideline represents a very low level of noise exposure, e.g. a refrigerator humming.

There have been fewer studies on aircraft noise exposure and sleep in children (Stansfeld & Clark, 2015), even though children are a group thought to be vulnerable to the effects of sleep disturbance (Pirrera et al., 2010). Drawing on studies of road traffic noise exposure in children, studies have suggested associations with sleeping problems (Tiesler et al., 2013), sleep quality (Ohrstrom et al., 2006) and sleepiness during the day (Ohrstrom et al., 2006) but not with difficulties falling asleep (Ohrstrom et al., 2006). However, these studies are limited by small samples and self-reports of sleep. Children sleep outside the typical hours used to denote night-time noise exposure around airports (e.g. L_{night} is typically 23.00 hours to 07.00 hours), so exposures during the hours of the evening and morning, which would fall within day-time exposure metrics may also be relevant when considering sleep disturbance effects for children.

2.3. Annoyance

Annoyance is the most prevalent community response in a population exposed to environmental noise. The term annoyance is used to describe negative reactions to noise such as disturbance, irritation, dissatisfaction and nuisance (Guski, 1999). Annoyance can also be accompanied by stress-related symptoms, leading to changes in heart rate and blood pressure, as described above. Acoustic factors, such as the noise source and sound level, account for only a small to moderate amount of annoyance responses: other factors such as the fear associated with the noise source, interference with activities, ability to cope, noise sensitivity, expectations, anger, attitudes to the source – both positive or negative, and beliefs about whether noise could be reduced by those responsible influence annoyance responses (WHO, 2000).

Annoyance scales are commonly used within European policy to measure the quality of life impact of environmental noise exposure on communities around airports. An International Standard is in place governing the measurement of annoyance in community surveys (Fields et al., 2001; ISO/TS, 2003), with questions typically taking the format “Thinking about the last year when you are at home, how much does the noise from aircraft bother, disturb or annoy you?” with responses ideally given on a 10 point scale with 0 being ‘not at all annoyed’ and 10 being “extremely annoyed”. This question is often reported as the % of the population “highly annoyed” or “annoyed”, where “highly annoyed” is 72% or more on the scale and “annoyed” is 50% or more on the scale.

Exposure to aircraft noise at 60dB L_{den} is estimated to be associated with 38% of the population reporting being “annoyed” and 17% being “highly annoyed” (EC, 2002). Exposure to aircraft noise at 65dB L_{den} is estimated to be associated with 48% of the population reporting being “annoyed” and 26% being “highly annoyed” (EC, 2002). However, in recent years, several studies have suggested that aircraft noise annoyance around major airports in Europe has increased (Babisch et al., 2009; Janssen et al., 2011; Schreckenberg et al., 2010), so the percentage of the population reporting being “annoyed” or “highly annoyed” at each noise exposure level may have

increased since these figures were put forward by the European Commission in 2002 (EC, 2002).

Annoyance responses can also increase in relation to a change in airport operations. A study around Zurich airport found that residents who experienced a significant increase in aircraft noise exposure due to an increase in early morning and late evening flight operations had a pronounced over-reaction of annoyance i.e. the annoyance reaction was greater than that which would be predicted by the level of noise exposure (Brink et al., 2008).

Children also report annoyance responses, although it is not known at what age children being to exhibit annoyance responses. The RANCH (Road traffic and Aircraft Noise exposure and children's Cognition and Health) study found that children aged 9-11 years of age living near London Heathrow, Amsterdam Schiphol, and Madrid Barajas airports, reported annoyance for aircraft noise exposure at school and at home (van Kempen et al., 2009). For school exposure the percentage of "highly annoyed" children increased from about 5.1% at 50dB $L_{Aeq\ 16\ hour}$, to 12.1% at 60dB $L_{Aeq\ 16\ hour}$.

2.4. Psychological health

Following on from annoyance, it has been suggested that long-term noise exposure might influence psychological health. However, overall the evidence for aircraft noise exposure being linked to poorer well-being, lower quality of life, and psychological ill-health is not as strong or consistent as for other health outcomes, such as cardiovascular disease. A recent study of 2300 residents near Frankfurt airport found that annoyance but not aircraft noise levels per se ($L_{Aeq16\ hour}$, L_{night}, L_{den}) was associated with self-reported lower quality of life (Schreckenberg et al., 2010).

Several studies of children around London Heathrow airport have shown no effect of aircraft noise at school on children's psychological health or cortisol levels (Haines et al., 2001a; Haines et al., 2001b; Stansfeld et al., 2009): we would expect cortisol levels to be raised in children with depression. However, there may be a small effect of aircraft noise on hyperactivity symptoms. The West London Schools Study of 451 children around Heathrow airport, aged 8-11 years found higher rates of hyperactivity symptoms for children attending schools exposed to aircraft noise exposure >63dB $L_{Aeq\ 16\ hour}$ compared with <57dB $L_{Aeq\ 16\ hour}$ (Haines et al., 2001a). A similar effect was observed in the RANCH study where 10dB $L_{Aeq\ 16\ hour}$ increase in aircraft noise exposure at school was associated with 0.13 increase in hyperactivity symptoms (Stansfeld et al., 2009). However, these increases in hyperactivity symptoms, whilst statistically significant, are extremely small and most likely not of clinical relevance. Aircraft noise exposure does not appear to be causing children to develop hyperactivity problems.

There have been fewer studies of aircraft noise effects on adult psychological health. The HYENA study, found that a 10dB increase in day-time ($L_{Aeq\ 16\ hour}$) was associated

with a 28% increase in anxiety medication use: similarly, a 10dB increase in night-time (L_{night}) aircraft noise was associated with a 27% increase in anxiety medication use. However, day-time and night-time aircraft noise exposure were not associated with sleep medication or anti-depressant medication use (Floud et al., 2011). Anxiety medication is prescribed for individuals experiencing levels of anxiety and worry that interfere with their ability to function effectively: they can also be prescribed for sleeping problems. A sub-study of the HYENA study found that salivary cortisol (a stress hormone which is higher in people with depression) was 34% higher for women exposed to aircraft noise > 60dB $L_{Aeq\ 24\ hour}$, compared to women exposed to less than 50dB $L_{Aeq\ 24\ hour}$ (Selander et al., 2009). However, no association between aircraft noise and salivary cortisol was found for men.

2.5. Implications of the evidence for aircraft noise effects on health for the shortlisted options for a new runway

2.5.1. Populations exposed for each shortlisted option

This section considers the implications of the current evidence for aircraft noise effects on cardiovascular health, sleep disturbance, annoyance, and psychological health for the three shortlisted options for a new runway:

- Gatwick 2-R promoted by Gatwick Airport Limited (GAL).
- Heathrow-NWR promoted by Heathrow Airport Limited (HAL).
- Heathrow-ENR promoted by Heathrow Hub (HH).

Information relating to each of these options is taken from the "Noise: Baseline", the "Noise: Local Assessment" and the "Noise: Local Assessment Addendum" reports prepared by Jacobs for the Airport Commission (all available on https://www.gov.uk/government/organisations/airports-commission).

The Commission has evaluated these shortlisted options in terms of populations exposed to several noise metrics including $L_{Aeq\ 16\ hour}$, $L_{Aeq\ 8\ hour}$, L_{den}, N70 & N60. Most of the evidence for aircraft noise effects on health has made use of average noise metrics such as $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$. This section relates key messages from the evidence to the estimated populations exposed to $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ for each of the shortlisted options using the predefined exposure categories used by the Commission of >54, >57, >60, >63, >66, >69, and >72dB for $L_{Aeq\ 16\ hour}$ and >48, >51, >54, >57, >60, >63, >66, >69, and >72dB for $L_{Aeq\ 8\ hour}$.

The magnitude of the populations exposed to aircraft noise varies between the shortlisted options for each scheme and is nearly always greater in terms of the net population exposed in the Do-Something scenario compared with the Do-Minimum scenario.

2.5.1.1. Gatwick 2-R

For Gatwick-2-R, the estimated population exposed to day-time noise levels greater than 54dB $L_{Aeq\ 16\ hour}$ is 17,600 in 2030, 19,400 in 2040, and 24,600 in 2050. The estimated population exposed to night-time noise levels greater than 48dB $L_{Aeq\ 8\ hour}$ is 22,300 in 2030, 17,400 in 2040 and 18,600 in 2050.

Table 2.1. Estimated population exposed to levels greater than 54dB $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ in 2030, 2040, & 2050 for Gatwick 2-R.

	Gatwick 2-R		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	17,600	19,400	24,600
57dB $L_{Aeq\ 16\ hour}$	4,900	5,300	7,200
60dB $L_{Aeq\ 16\ hour}$	1,700	1,900	2,800
63dB $L_{Aeq\ 16\ hour}$	400	500	800
66dB $L_{Aeq\ 16\ hour}$	<50	<50	200
69dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
Night-time			
48dB $L_{Aeq\ 8\ hour}$	22,300	17,400	18,600
51dB $L_{Aeq\ 8\ hour}$	6,500	5,200	5,400
54 dB $L_{Aeq\ 8\ hour}$	2,900	2,300	2,400
57dB $L_{Aeq\ 8\ hour}$	800	500	700
60dB $L_{Aeq\ 8\ hour}$	200	100	100
63dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
66dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
69dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 8\ hour}$	<50	<50	<50

These estimates for the population exposed in the Do-Something scenario for Gatwick 2-R are higher than the estimates for the Do-Minimum scenario in 2030, 2040 and 2050. The differences in the 2030, 2040, and 2050 Do-Something scenario compared with the 2030, 2040, and 2050 Do-Minimum scenario are summarized below for day-time and night-time exposure:

2030 $L_{Aeq\ 16\ hour}$
- >54 dB: An increase of 9,600 (from 8,000 to 17,600)
- >57 dB: An increase of 2,700 (from 2,200 to 4,900)
- >60 dB: An increase of 600 (from 1,100 to 1,700)
- >63 dB: No discernible difference from (from 400 to 400)
- >66 dB: A reduction from 300 to <50
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (from <50 to <50)

2040 $L_{Aeq\ 16\ hour}$
- >54 dB: An increase of 12,000 (from 7,400 to 19,400)
- >57 dB: An increase of 3,100 (from 2,200 to 5,300)
- >60 dB: An increase of 1,000 (from 900 to 1,900)
- >63 dB: No discernible difference (from 500 to 500)
- >66 dB: A reduction from 300 to <50
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (<50 to <50)

2050 $L_{Aeq\ 16\ hour}$
- >54 dB: An increase of 17,000 (from 7,600 to 24,600)
- >57 dB: An increase of 4,400 (from 2,800 to 7,200)
- >60 dB: An increase of 1,600 (from 1,200 to 2,800)
- >63 dB: An increase of 300 (from 500 to 800)
- >66 dB: A reduction of 100 (from 300 to 200)
- >69 dB: A reduction from 200 to <50
- >72 dB: No discernible difference (from <50 to <50)

2030 $L_{Aeq\ 8\ hour}$
- >48 dB: An increase of 10,600 (from 11,700 to 22,300)
- >51 dB: An increase of 900 (from 5,600 to 6,500)
- >54 dB: An increase of 1,200 (from 1,700 to 2,900)
- >57 dB: An increase of 200 (from 600 to 800)
- >60 dB: A reduction of 200 (from 400 to 200)
- >63 dB: A reduction from 300 to <50
- >66 dB: No discernible difference (from <50 to <50)
- >69 dB: No discernible difference (from <50 to <50)
- >72 dB: No discernible difference (from <50 to <50)

2040 $L_{Aeq\ 8\ hour}$
- >48 dB: An increase of 6,300 (from 11,100 to 17,400)
- >51 dB: A reduction of 300 (from 5,500 to 5,200)
- >54 dB: An increase of 600 (from 1,700 to 2,300)
- >57 dB: A reduction of 100 (from 600 to 500)
- >60 dB: A reduction of 300 (from 400 to 100)
- >63 dB: A reduction from 300 to <50
- >66 dB: No discernible difference (from <50 to <50)
- >69 dB: No discernible difference (from <50 to <50)
- >72 dB: No discernible difference (from <50 to <50)

2050 $L_{Aeq\ 8\ hour}$
- >48 dB: An increase of 7,400 (from 11,200 to 18,600)
- >51 dB: A reduction of 200 (from 5,600 to 5,400)
- >54 dB: An increase of 700 (from 1,700 to 2,400)
- >57 dB: An increase of 100 (from 600 to 700)
- >60 dB: A reduction of 300 (from 400 to 100)

• >63 dB: A reduction from 300 to <50
• >66 dB: No discernible difference (from <50 to <50)
• >69 dB: No discernible difference (from <50 to <50)
• >72 dB: No discernible difference (from <50 to <50)

2.5.1.2. Heathrow-NWR

For Heathrow-NWR-T, the estimated population exposed to day-time noise levels greater than 54dB $L_{Aeq\ 16\ hour}$ is 456,200 in 2030, 488,600 in 2040, and 491,900 in 2050. The estimated population exposed to night-time noise levels greater than 48dB $L_{Aeq\ 8\ hour}$ is 266,800 in 2030, 308,500 in 2040 and 295,800 in 2050.

Table 2.2. Estimated population exposed to levels greater than 54dB $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ in 2030, 2040, & 2050 for Heathrow-NWR-T.

	Heathrow-NWR-T		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	456,200	488,600	491,900
57dB $L_{Aeq\ 16\ hour}$	237,100	249,900	249,300
60dB $L_{Aeq\ 16\ hour}$	128,200	137,000	140,600
63dB $L_{Aeq\ 16\ hour}$	38,300	41,300	42,900
66dB $L_{Aeq\ 16\ hour}$	1,200	11,800	10,900
69dB $L_{Aeq\ 16\ hour}$	900	900	800
72dB $L_{Aeq\ 16\ hour}$	<50	<50	<50
Night-time			
48dB $L_{Aeq\ 8\ hour}$	266,800	308,500	295,800
51dB $L_{Aeq\ 8\ hour}$	167,200	188,800	185,600
54 dB $L_{Aeq\ 8\ hour}$	72,200	95,700	88,600
57dB $L_{Aeq\ 8\ hour}$	11,600	18,100	12,100
60dB $L_{Aeq\ 8\ hour}$	900	2,400	900
63dB $L_{Aeq\ 8\ hour}$	200	200	200
66dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
69dB $L_{Aeq\ 8\ hour}$	<50	<50	<50
72dB $L_{Aeq\ 8\ hour}$	<50	<50	<50

The differences in the 2030, 2040, and 2050 Do-Something scenarios compared with the 2030, 2040, and 2050 Do-Minimum scenarios are summarized below for day-time and night-time exposure. Generally, the estimates for the population exposed in the Do-Something scenarios for Heathrow-NWR-T in the day-time are higher than the estimates for the Do-Minimum scenarios in 2030, 2040 and 2050: there is an increase in the population exposed at the lower contour levels for $L_{Aeq\ 16\ hour}$ along with a slight reduction in the population exposed at the higher contour levels. For night-noise the population exposed to >48dB $L_{Aeq\ 8\ hour}$ is reduced for the Do-Something scenarios compared with the Do-Minimum scenarios at 2030, 2040 and 2050. In 2030 and 2040,

there is an increase in the population exposed to >51dB and >54dB $L_{Aeq\ 8\ hour}$ but reductions are estimated for all the other $L_{Aeq\ 8\ hour}$ exposure contours. For the 2050 scenario the number of the population exposed at night-time is reduced across all the contours.

2030 $L_{Aeq\ 16\ hour}$

- >54 dB a decrease of 37,400 (from 493,600 to 456,200)
- >57 dB an increase of 15,900 (from 221,200 to 237,100)
- >60 dB an increase of 19,200 (from 109,000 to 128,200)
- >63 dB an increase of 3,100 (from 35,200 to 38,300)
- >66 dB an increase of 4,100 (from 7,900 to 12,000)
- >69dB a reduction of 1,200 (from 2,100 to 900)
- >72 dB no discernible difference (from <50 to <50)

2040 $L_{Aeq\ 16\ hour}$

- >54 dB an increase of 28,000 (from 460,600 to 488,600)
- >57 dB an increase of 30,500 (from 219,400 to 249,900)
- >60 dB an increase of 33,200 (from 103,800 to 137,000)
- >63 dB an increase of 7,400 (from 33,900 to 41,300)
- >66 dB an increase of 4,700 (from 7,100 to 11,800)
- >69 dB a reduction of 1,200 (from 2,100 to 900)
- >72 dB no discernible difference (from <50 to <50)

2050 $L_{Aeq\ 16\ hour}$

- >54 dB an increase of 56,100 (from 435,800 to 491,900)
- >57 dB an increase of 29,700 (from 219,600 to 249,300)
- >60 dB an increase of 36,800 (from 103,800 to 140,600)
- >63 dB an increase of 8,000 (from 34,900 to 42,900)
- >66 dB an increase of 3,200 (from 77,00 to 10,900)
- >69 dB a reduction of 1,300 (from 2,100 to 800)
- >72 dB no discernible difference (from <50 to <50)

2030 $L_{Aeq\ 8\ hour}$

- >48 dB a reduction of 4,400 (from 271,200 to 266,800)
- >51 dB an increase of 15,900 (from 151,300 to 167,200)
- >54 dB an increase of 11,100 (from 61,100 to 72,200)
- >57 dB a reduction of 10,300 (from 21,900 to 11,600)
- >60 dB a reduction 3,000 (from 3,900 to 900)
- >63 dB a reduction of 1,100 (from 1,300 to 200)
- >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2040 $L_{Aeq\ 8\ hour}$

- >48 dB a reduction of 28,500 (from 337,000 to 308,500)
- >51 dB an increase of 4,200 (from 184,600 to 188,800)
- >54 dB an increase of 14,400 (from 813,00 to 95,700)
- >57 dB a reduction of 13,300 (from 31,400 to 18,100)
- >60 dB a reduction of 4,000 (from 6,400 to 2,400)

• >63 dB a reduction of 2,200 (from 2,400 to 200)
• >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2050 $L_{Aeq\ 8\ hour}$
• >48 dB a reduction of 7,730 (from 373,100 to 295,800)
• >51 dB a reduction of 11,800 (from 197,400 to 185,600)
• >54 dB a reduction of 600 (from 89,200 to 88,600)
• >57 dB a reduction of 21,800 (from 33,900 to 12,100)
• >60 dB a reduction of 6,200 (from 7,100 to 900)
• >63 dB a reduction of 2,400 (from 2,600 to 200)
• >66 – 72 dB no discernible differences (all remain at <50 in both scenarios)

2.5.1.3. Heathrow-ENR

For Heathrow-ENR-O (using the offset flight path results), the estimated population exposed to day-time noise levels greater than 54dB $L_{Aeq\ 16\ hour}$ is 480,300 in 2030, 488,900 in 2040 and 462,900 in 2050. The estimated population exposed to night-time noise levels greater than 48dB $L_{Aeq\ 8\ hour}$ is 263,800 in 2030, 298,900 in 2040 and 306,700 in 2050.

Table 2.3. Estimated population exposed to levels greater than 54dB $L_{Aeq\ 16\ hour}$ and $L_{Aeq\ 8\ hour}$ in 2030, 2040, & 2050 for Heathrow-ENR-O.

	Heathrow-ENR-O		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	480,300	488,900	462,900
57dB $L_{Aeq\ 16\ hour}$	257,900	264,700	261,200
60dB $L_{Aeq\ 16\ hour}$	157,500	164,400	165,500
63dB $L_{Aeq\ 16\ hour}$	63,700	67,500	67,100
66dB $L_{Aeq\ 16\ hour}$	17,100	17,700	17,800
69dB $L_{Aeq\ 16\ hour}$	3,900	4,000	3,900
72dB $L_{Aeq\ 16\ hour}$	600	700	600
Night-time			
48dB $L_{Aeq\ 8\ hour}$	263,800	298,900	306,700
51dB $L_{Aeq\ 8\ hour}$	177,400	193,800	197,200
54 dB $L_{Aeq\ 8\ hour}$	87,800	107,300	110,300
57dB $L_{Aeq\ 8\ hour}$	31,000	36,900	36,400
60dB $L_{Aeq\ 8\ hour}$	4,900	6,800	6,200
63dB $L_{Aeq\ 8\ hour}$	800	1,600	1,600
66dB $L_{Aeq\ 8\ hour}$	200	300	200
69dB $L_{Aeq\ 8\ hour}$	<50	100	<50
72dB $L_{Aeq\ 8\ hour}$	<50	<50	<50

The number of people within the day-time $L_{Aeq\ 16\ hour}$ noise contours are greater in the Heathrow-ENR-O Do-Something scenarios, when compared to the Do-Minimum scenarios, for all of the assessment years considered. For night-noise the population exposed to >48dB $L_{Aeq\ 8\ hour}$ and >63 $L_{Aeq\ 8\ hour}$ is reduced for the Do-Something scenario compared with the Do-Minimum scenario at 2030, 2040 and 2050, however, within the other exposure contours there are increases in the population exposed to night-noise.

2030 $L_{Aeq\ 16\ hour}$

- >54 dB: A reduction of 13,300 (from 493,600 to 480,300)
- >57 dB: An increase of 36,700 (from 221,200 to 257,900)
- >60 dB: An increase of 48,500 (from 109,000 to 157,500)
- >63 dB: An increase of 28,500 (from 35,200 to 63,700)
- >66 dB: An increase of 9,200 (from 7,900 to 17,100)
- >69 dB: An increase of 1,800 (from 2,100 to 3,900)
- >72 dB: An increase from <50 to 600

2040 $L_{Aeq\ 16\ hour}$

- >54 dB: An increase of 28,300 (from 460,600 to 488,900)
- >57 dB: An increase of 45,300 (from 219,400 to 264,700)
- >60 dB: An increase of 60,600 (from 103,800 to 164,400)
- >63 dB: An increase of 33,600 (from 33,900 to 67,500)
- >66 dB: An increase of 10,600 (from 7,100 to 17,700)
- >69 dB: An increase of 1,900 (from 2,100 to 4,000)
- >72 dB: A change from <50 to 700

2050 $L_{Aeq\ 16\ hour}$

- >54 dB: An increase of 27,100 (from 435,800 to 462,900)
- >57 dB: An increase of 41,600 (from 219,600 to 261,200)
- >60 dB: An increase of 61,700 (from 103,800 to 165,500)
- >63 dB: An increase of 32,200 (from 34,900 to 67,100)
- >66 dB: An increase of 10,100 (from 7,700 to 17,800)
- >69 dB: An increase of 1,800 (from 2,100 to 3,900)
- >72 dB: A change from <50 to 600

2030 $L_{Aeq\ 8\ hour}$

- >48 dB: A reduction of 7,400 (from 271,200 to 263,800)
- >51 dB: An increase of 26,100 (from 151,300 to 177,400)
- >54 dB: An increase of 26,700 (from 61,100 to 87,800)
- >57 dB: An increase of 9,100 (from 21,900 to 31,000)
- >60 dB: An increase of 1,000 (from 3,900 to 4,900)
- >63 dB: A reduction of 500 (from 1,300 to 800)
- >66 dB: An increase from <50 to 200
- >69 dB: No discernible change (from <50 to <50)
- >72 dB: No discernible change (from <50 to <50)

2040 $L_{Aeq\ 8\ hour}$

- >48 dB: A reduction of 38,100 (from 337,000 to 298,900)
- >51 dB: An increase of 9,200 (from 184,600 to 193,800)
- >54 dB: An increase of 26,000 (from 81,300 to 107,300)
- >57 dB: An increase of 5,500 (from 31,400 to 36,900)
- >60 dB: An increase of 400 (from 6,400 to 6,800)
- >63 dB: A reduction of 800 (from 2,400 to 1,600)
- >66 dB: An increase from <50 to 300
- >69 dB: An increase from <50 to 100
- >72 dB: No discernible change (from <50 to <50)

2050 $L_{Aeq\ 8\ hour}$

- >48 dB: A reduction of 66,400 (from 373,100 to 306,700)
- >51 dB: A reduction of 200 (from 197,400 to 197,200)
- >54 dB: An increase of 21,100 (from 89,200 to 110,300)
- >57 dB: An increase of 2,500 (from 33,900 to 36,400)
- >60 dB: A reduction of 900 (from 7,100 to 6,200)
- >63 dB: A reduction of 1,000 (from 2,600 to 1,600)
- >66 dB: An increase from <50 to 200
- >69 dB: An increase from <50 to <50
- >72 dB: No discernible change (from <50 to <50)

2.5.2. Mitigation

All the schemes suggest mitigation activities for their schemes. Aspects to note are as follows:

- Gatwick 2-R: houses within the 60 $L_{Aeq\ 16\ hour}$ contour will be offered £3,000 towards double glazing and loft insulation for newly affected homes. Residents with a home within the 57dB $L_{Aeq\ 16\ hour}$ contour will be offered £1000 per annum – to qualify residents must have been living in the house before 1st January 2015.
- Heathrow-NWR: runway operations allow respite for local populations. Residents in the 60dB $L_{Aeq\ 16\ hour}$ contour will be offered full-costs for insulation; residents exposed to 55dB L_{den} will be offered a £3,000 contribution towards insulation.
- Heathrow ENR: the promoter is not advocating night-time operation of the extended runway and is also planning to reduce day-time exposure by use of noise preferential routing. This scheme will also offer full-costs for home insulation for residents in the 60dB $L_{Aeq\ 16\ hour}$ contour, with residents in the 55dB L_{den} contour offered a £3,000 contribution towards insulation.

In terms of mitigation, very little is understood in terms of how monetary payments or respite from exposure might influence the associations between aircraft noise and health. The health-benefits associated with many of these activities should not be assumed and need to be empirically tested. The impact of any mitigation scheme would ideally be evaluated to assess efficacy and cost-effectiveness.

2.5.3. Implications of the noise effects on health evidence for the proposed schemes

A brief consideration of the evidence for noise effects on health in relation to the three schemes is provided below:

- Aircraft noise exposure is associated with small increases in risk for poor cardiovascular health outcomes such as high blood pressure, heart attacks, and stroke, as well as with cardiovascular hospital admission and cardiovascular mortality, with effects observed for day-time ($L_{Aeq\ 16\ hour}$) and night-time ($L_{Aeq\ 8\ hour}$) exposure.

- Whilst the increase in risk observed between aircraft noise exposure and cardiovascular health is considered moderate, such increases in risk become important if a large population is exposed to aircraft noise.

- Night-noise is associated with self-reported sleep disturbance and with changes in sleep structure. Night-noise might also be particularly important for cardiovascular effects. Populations exposed to night-time noise could benefit from insulation of their home. It may also be beneficial to consider the use of curfews for night-noise flights: respite may also be effective but needs empirically evaluating.

- Aircraft noise exposure during the evening and early morning (outside the typical 23.00 to 07.00 8 hour night exposure metric) also has relevance for the health and sleep quality of the local population, and may be particularly relevant for children, the physically ill, and shift-workers. Therefore the impact of aircraft noise on the sleep of the local population may not be restricted only to the night-time period and insulation to the homes of populations exposed to day-time noise levels might also be beneficial.

- Consideration should be given to health monitoring of cardiovascular risk factors in the exposed population: for example, high blood pressure and cholesterol can be treated with medication to avoid more serious cardiovascular disease progression. This can probably be achieved through existing NHS Health Checks offered to individuals aged 40-74 by their GPs, which checks vascular and circulatory health.

- Aircraft noise annoyance responses are to be expected for children and adults and it should be borne in mind that annoyance responses in relation to exposure may be higher than predicted by the traditional annoyance curves. In particular, annoyance can increase in relation to operational changes; where populations become newly exposed to noise; where populations experience a step-change in exposure; and in response to early morning and evening flights. Monitoring of annoyance responses over the long-term using survey methods in the exposed population would be advisable. In particular, annoyance responses at different times of the day should be examined. Surveys assessing baseline annoyance, in terms of annoyance responses prior to the development of the new runway would

be useful for comparative purposes. Such monitoring would help the airport to identify any increases in annoyance related to operational decisions.

- Based on current evidence aircraft noise might be associated with decreased quality of life but is unlikely to be causing psychological ill-health. The increases in hyperactivity symptoms observed for children are small and unlikely to be of clinical significance in the population exposed. The evidence relating to aircraft noise effects on psychological health should be re-reviewed throughout the planning process, as further evidence becomes available.

3. Aircraft noise effects on children's cognition and learning

3.1. Reading and memory

Many studies have found effects of aircraft noise exposure at school or at home on children's reading comprehension or memory skills (Evans & Hygge, 2007). The RANCH study (Road traffic and Aircraft Noise and children's Cognition & Health) of 2844 9-10 year old children from 89 schools around London Heathrow, Amsterdam Schiphol, and Madrid Barajas airports found that aircraft noise was associated with poorer reading comprehension and poorer recognition memory, after taking social position and road traffic noise, into account (Stansfeld et al., 2005).

Figure 3.1 shows the exposure-effect relationship between aircraft noise at school and reading comprehension from the RANCH study (Clark et al., 2006), indicating that as aircraft noise exposure increased, performance on the reading test decreased. Reading began to fall below average at around 55dB $L_{Aeq\ 16\ hour}$ at school but as the association is linear, (thus there is no specific threshold above which noise effects begin) any reduction in aircraft noise exposure at schools should lead to an improvement in reading comprehension, supporting a policy to not only insulate schools exposed to the highest levels of aircraft noise. The development of cognitive skills such as reading and memory is important not only in terms of educational achievement but also for subsequent life chances and adult health (Kuh & Ben-Shlomo, 2004). In the UK, reading age was delayed by up to 2 months for a 5dB increase in aircraft noise exposure (Clark et al., 2006). The UK primary schools in the RANCH study ranged in aircraft noise exposure from 34dB $L_{Aeq\ 16\ hour}$ to 68 dB $L_{Aeq\ 16\ hour}$. If we take a 20dB difference in aircraft noise exposure between schools, the study would estimate an 8-month difference in reading age.

For primary school children, aircraft noise exposure at school and at home are very highly correlated: in the RANCH UK sample, this correlation was r=0.91 (Clark et al., 2006). Such a high correlation can make estimating the impact of aircraft noise exposure in both environments difficult. The RANCH study found that night-time aircraft noise at the child's home was also associated with impaired reading comprehension and recognition memory, but night-noise was not having an additional effect to that of day-time noise exposure on reading comprehension or recognition memory (Clark et al., 2006; Stansfeld et al., 2010). These findings suggest that indices

of aircraft noise exposure in the day-time in the school environment should be sufficient to capture effects. Further analyses of the UK RANCH sample found that these associations for aircraft noise exposure remained after taking co-occurring air pollution levels into account (Clark et al., 2012).

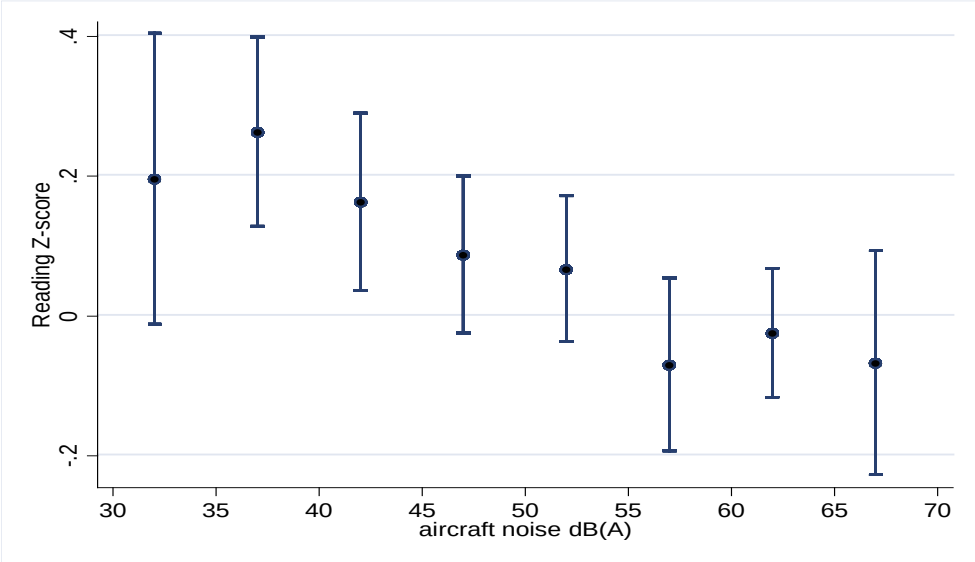

Figure 3.1. Exposure-effect relationship between aircraft noise exposure at school and reading comprehension in the RANCH study (Clark et al., 2006).

There are several ways in which aircraft noise could influence children's cognition: lost teaching time - as a teacher may have to stop teaching whilst noise events occur; teacher and pupil frustration; annoyance and stress responses; reduced morale; impaired attention; children might tune out the aircraft noise and over-generalise this response to other sounds in their environment missing out on information; and sleep disturbance from home exposure which might cause performance effects the next day (Stansfeld & Clark, 2015).

Children spend a considerable amount of time at school in the playground. Play is thought to be important for children's social, cognitive, emotional and physical development, as well as enabling relaxation between more formal teaching activities. Unfortunately, at this time, there is no empirical evidence upon which to draw conclusions about how aircraft noise exposure might impact upon children's use of playground settings.

3.2. School intervention studies

Two studies of interventions to reduce or remove aircraft noise exposure at school are worth noting. The longitudinal Munich Airport study (Hygge et al., 2002) found that prior to the relocation of the airport in Munich, high noise exposure was associated with poorer long-term memory and reading comprehension in children aged 10 years. Two years after the airport closed these cognitive impairments were no longer

present, suggesting that the effects of aircraft noise on cognitive performance may be reversible if the noise stops. In the cohort of children living near the newly opened Munich airport impairments in memory and reading developed over the following two years.

A recent study of 6,000 schools exposed between the years 2000-2009 at the top 46 United States airports, (exposed to Day-Night-Average Sound Level of 55dB or higher) found significant associations between aircraft noise and standardised tests of mathematics and reading, after taking demographic and school factors into account (Sharp et al., 2014). In a sub-sample of 119 schools, they found that the effect of aircraft noise on children's learning disappeared once the school had sound insulation installed. This study supports a policy for insulating schools that may be exposed to high levels of aircraft noise associated with a new runway.

3.3. Implications of the evidence for aircraft noise effects on children's cognition and learning for the proposed schemes

It is clear from the research studies that aircraft noise exposure at school is associated with children' having poorer reading and memory skills. Further, evidence is emerging that confirms the use of insulation to mitigate against these effects, and which ever scheme is undertaken, there should be a commitment to insulate schools exposed to high levels of aircraft noise in the day-time.

Schools located near airports often also experience high levels of road traffic noise but it is important to appreciate that aircraft noise exposure still influences children's learning, even if road traffic noise exposure is high. The results presented for the RANCH study are the association for aircraft noise exposure, after taking road traffic noise into account (Clark et al., 2006).

For each of the shortlisted options an estimate of the change in the number of sensitive buildings, including schools, within each contour between the Do-Minimum and the Do-Something scenarios has been made. Below a summary is given of the difference in the number of schools in the Do-Minimum scenario and the Do-Something scenario for each scheme, focusing on day-time noise exposure which best represents exposure during the school day. It should be noted that these figures do not represent the total number of schools impacted by the schemes: the figures are restricted to schools whose exposure is changed by the scheme.

3.3.1. Gatwick 2-R

Gatwick Airport Limited (GAL) states that it hopes that no new noise sensitive buildings would be given planning consent in the areas with the highest noise contours. It is estimated that in 2030, compared with the Do-Minimum scenario, that there will be 5 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$; in 2040 there will be 7 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$; and in 2050 14 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$. There will also be a small reduction in the number of

schools exposed to >60dB and 63dB $L_{Aeq\ 16\ hour}$ in 2030, 2040, and 2050: in 2030 there will also be a small reduction in the number of schools exposed to 57dB $L_{Aeq\ 16\ hour}$.

The N70 metrics for the schools are at the lower end for all years, with schools mostly exposed to N70>20. These school exposed to aircraft noise associated with Gatwick 2-R would be at the lower-end of the N70 contours, but should be insulated to protect again effects on children's learning. There is a small reduction in the number of schools exposed to N70>200 in 2030, 2040, and 2050: small reductions are also seen for the number of schools exposed to N70>100 in 2030 and 2040, and for N70>50 in 2030.

Table 3.1. Number of schools in the Do-Something Scenarios for Gatwick 2-R compared with the Do-Minimum scenarios.

	Gatwick 2-R		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	5	7	14
57dB $L_{Aeq\ 16\ hour}$	(1)	(1)	2
60dB $L_{Aeq\ 16\ hour}$	(1)	(1)	(1)
63dB $L_{Aeq\ 16\ hour}$	(2)	(2)	(1)
66dB $L_{Aeq\ 16\ hour}$	0	0	0
69dB $L_{Aeq\ 16\ hour}$	0	0	0
72dB $L_{Aeq\ 16\ hour}$	0	0	0
N70			
N70>20	7	6	8
N70>50	(1)	2	2
N70>100	(1)	(1)	0
N70>200	(1)	(1)	(1)
N70>500	0	0	0

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.3.2. Heathrow-NWR

It is estimated that in 2030, compared with the Do-Minimum scenario, that there will be 49 fewer schools exposed to 54dB $L_{Aeq\ 16\ hour}$. In 2040 it is estimated that there will be 12 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$ and in 2050 24 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$.

In 2030 there is a reduction of 2 in the number of schools exposed to N70>20. However, there are increases in the number of schools exposed to N70>20 in 2040 and 2050, and for N70>50, N70>100 and N70>200 in 2030, 2040 and 2050. There is also a small increase (n=2) in the number of schools exposed to N70>500 in 2040 and 2050. Schools experiencing a high number of events over 70dB would benefit from being included in insulation schemes.

Table 3.2. Number of schools in the Do-Something Scenarios for Heathrow-NWR-T compared with the Do-Minimum scenarios.

	Heathrow-NWR-T		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	(49)	12	24
57dB $L_{Aeq\ 16\ hour}$	15	22	15
60dB $L_{Aeq\ 16\ hour}$	17	22	23
63dB $L_{Aeq\ 16\ hour}$	1	1	1
66dB $L_{Aeq\ 16\ hour}$	2	3	4
69dB $L_{Aeq\ 16\ hour}$	1	1	1
72dB $L_{Aeq\ 16\ hour}$	0	0	0
N70			
N70>20	(2)	11	12
N70>50	6	11	9
N70>100	8	16	13
N70>200	4	10	14
N70>500	0	2	2

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.3.3. Heathrow-ENR

Using the offset flight path results, it is estimated that in 2030, compared with the Do-Minimum scenario, that there would be a reduction of 22 schools exposed to >54dB $L_{Aeq\ 16\ hour}$ in 2030. In 2040 it is estimated that there will be 25 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$ and in 2050 13 additional schools exposed to >54dB $L_{Aeq\ 16\ hour}$.

Compared with the Do-Minimum scenario, there would be increase in the number of schools exposed to N70>20, with 16 additional schools exposed in 2030, 29 additional schools in 2040, and 19 additional schools in 2050. For the Heathrow-ENR-O scheme there is also an increase in the number of additional schools exposed to N70>50, N70>100, and N70>200 in 2030, 2040 and 2050. Schools experiencing a high number of events over 70dB would benefit from being included in insulation schemes.

Table 3.3. Number of schools in the Do-Something Scenarios for Heathrow-ENR-O compared with the Do-Minimum scenarios.

	Heathrow-ENR-O		
	2030	**2040**	**2050**
Day-time			
54dB $L_{Aeq\ 16\ hour}$	(22)	25	13
57dB $L_{Aeq\ 16\ hour}$	22	34	32

60dB $L_{Aeq\ 16\ hour}$	36	40	39
63dB $L_{Aeq\ 16\ hour}$	11	12	12
66dB $L_{Aeq\ 16\ hour}$	3	2	3
69dB $L_{Aeq\ 16\ hour}$	2	2	2
72dB $L_{Aeq\ 16\ hour}$	0	0	0
N70			
N70>20	16	29	19
N70>50	19	25	24
N70>100	12	17	19
N70>200	23	27	27
N70>500	0	0	0

Numbers in parentheses indicate a reduction in the number of schools within that noise contour.

3.4. Discussion

The Gatwick 2-R scheme results in a small number of additional schools being exposed to >54dB $L_{Aeq\ 16\ hour}$ in each year. Both of the Heathrow schemes are initially associated with a reduction in the number of schools exposed to 54dB $L_{Aeq\ 16\ hour}$ (49 fewer schools for Heathrow-NWR and 22 fewer schools for Heathrow-ENR), but in subsequent years (2040 & 2050) both schemes would result in additional schools being exposed to 54dB $L_{Aeq\ 16\ hour}$. The number of schools additionally exposed to 54dB $L_{Aeq\ 16\ hour}$ in 2040 is 12 for Heathrow-NWR and 29 for Heathrow-ENR. The number of schools additionally exposed to 54dB $L_{Aeq\ 16\ hour}$ in 2050 is 24 for Heathrow-NWR and 13 for Heathrow-ENR. Over-time both of the Heathrow schemes would result in a considerable increase in the number of schools in the surrounding area being exposed to aircraft noise. Both schemes also result in a small number of additional schools being exposed at the higher ends of the contours.

Whilst Gatwick impacts on fewer additional schools, funding for the insulation of schools additionally exposed to aircraft noise over the process of extending the airport operation (whether it be Gatwick 2R, Heathrow-NWR, or Heathrow-ENR) would need to be found. For example, at present the Heathrow-NWR scheme has £19 million included to insulate schools. Schools exposed would be insulated as they fell into the noise contours. Currently, schools around Heathrow airport are insulated if they are exposed to 63dB $L_{Aeq\ 16\ hour}$. Consideration should be given, particularly for schools experiencing an increase in their average noise exposure and therefore subject to a step-change in exposure, to insulating schools exposed to a high level of aircraft noise. Consideration should also be given to including schools experiencing a high number of events over 70dB in the insulation programme. It is important that any insulation programme for schools is fully-funded and managed over the decades, as the number of schools affected by aircraft noise increases with the operation of some of the schemes, despite initially decreasing the number of schools exposed. Such a large-scale insulation plan of schools should also be evaluated empirically to ensure its effectiveness.

It is important to note that the figures in relation to the number of schools exposed to aircraft noise discussed in this section, do not include schools that may already be exposed to levels above 54dB $L_{Aeq\ 16\ hour}$ or N70>20 prior to the additional runway being commissioned, and/or which may already have been insulated via existing mitigation schemes. It is advisable that all schools within the contours identified as eligible for mitigation, whether newly exposed or already exposed to aircraft noise be offered access to the same insulation programme.

4. Guidelines for Environmental Noise Exposure

4.1. The WHO Community Noise Guidelines

There are recommended guidelines for environmental noise exposure levels. The most influential set of guidelines are those proposed by the World Health Organisation Europe back in 2000 (WHO, 2000), which were determined by expert panels evaluating the strength of the evidence and suggesting guideline values for thresholds for exposure in specific dwellings and for specific health effects. Below is a summary of the guideline levels suggested for dwellings, schools & pre-schools, hospitals, and parkland:

DWELLINGS

Day-time

- Indoors the dwelling during the day/evening – 35 dB $L_{Aeq\ 16\ hour}$
- Outdoor living areas - 55 dB $L_{Aeq\ 16\ hour}$ to protect the majority of people from being 'seriously annoyed' during the day-time.
- Outdoor living areas – 50 dB $L_{Aeq\ 16\ hour}$ to protect the majority of people from being 'moderately annoyed' during the day-time

Night-time

- Outside façades of the living spaces should not exceed 45 dB $L_{Aeq\ 8\ hour}$ and 60 dB L_{Amax} to protect from sleep disturbance.
- Inside bedrooms - 30 dB $L_{Aeq\ 8\ hour}$ and 45 dB L_{Amax} for single sound events to protect from sleep disturbance.

SCHOOLS & PRE-SCHOOL

- School playgrounds outdoors should not exceed 55 dB L_{Aeq} during play to protect from annoyance.
- School classrooms should not exceed 35 dB L_{Aeq} during class to protect from speech intelligibility and, disturbance of information extraction.
- The reverberation time in the classroom should be about 0.6 s.
- Pre-school bedrooms – 30 dB during sleeping time & 45 dB L_{Amax} for single sound events to protect from sleep disturbance.

HOSPITALS

Day-time

- Hospital ward rooms indoor values during the day-time/evening - 30 dB $L_{Aeq\ 16\ hour}$ to protect from sleep disturbance and interference with rest and recovery.

Night-time

- Hospital ward rooms indoor values at night - 30 dB $L_{Aeq\ 8\ hour}$, together with 40 dB L_{Amax} to protect from sleep disturbance and interference with rest and recovery.

PARKLAND AND CONSERVATION AREAS

- Existing large quiet outdoor areas should be preserved and the signal-to-noise ratio kept low.

Below these noise levels, it is thought there are no detrimental effects on health.

The WHO Community Guidelines represent a 'precautionary principle' approach to environmental noise effects on health and the WHO Community Guidelines are often thought by policy makers and acousticians to be very difficult to achieve in practice. It is also worth noting that when these guidelines were established in the late 1990s the evidence-base for noise effects on cardiovascular health and children's cognition was much weaker and that these effects per se, did not inform the guidelines. The WHO plans to publish a revision of these guidelines in 2015, so it is worth stipulating that the revised guidelines should be considered in relation to school, home, hospital and any other settings affected by the new runway.

The number of hospitals identified as being impacted by aircraft noise is low for Gatwick-2R, Heathrow-NWR, and Heathrow-ENR, falling at the lower ends of the noise exposure contours. However, efforts to insulate these hospitals should be included in the planning consent for the successful scheme.

4.2. WHO Night Noise Guidelines

The WHO Europe Night Noise Guidelines (WHO, 2009) state that the target for nocturnal noise exposure should be 40 dB $L_{night, outside}$, which should protect the public as well as vulnerable groups such as the elderly, children, and the chronically ill from the effects of nocturnal noise exposure on health. The Night Noise Guidelines also recommend the level of 55 dB $L_{night, outside}$, as an interim target for countries wishing to adopt a step-wise approach to the guidelines.

4.3. Building Bulletin 93: Acoustic Design of Schools in the UK

For schools, it is also worth noting the requirements of recently updated Building Bulletin 93: Acoustic Design of Schools in the UK (DfE, 2015), which recommends external noise levels for new school buildings or refurbished school buildings should not exceed <60 dB $LA_{, 30\ minutes}$.

5. Conclusion

The health effects of environmental noise are diverse, serious, and because of widespread exposure, very prevalent (Basner et al, 2014). For populations around airports, aircraft noise exposure can be chronic. Evidence is increasing to support preventive measures such as insulation, policy, guidelines, & limit values. Efforts to reduce exposure should primarily reduce annoyance, improve learning environments for children, and lower the prevalence of cardiovascular risk factors and cardiovascular disease (Basner et al, 2014).

6. References

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Projects

The projects listed are those:

- Where the developer has advised the Planning Inspectorate in writing that they intend to submit an application to us in the future
- Where an application has already been made to the Planning Inspectorate and is undergoing the development consent process
- Where a proposal has been decided.

Withdrawn projects are displayed for a period of time before they are removed from the website. Find out more

Use the table below to find projects by stage or type. Alternatively, use the map by clicking on the markers to go to the project page. A list of key events and deadlines for all projects is available on our calendar page.

Project Stage: Show All | Pre Application | Acceptance | Pre Examination | Examination | Recommendation | Decision | Decided | Withdrawn

Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

Show 100 entries

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Search: Previous 1 Next

Project	Developer
A1 Birtley to Coal House Improvement Scheme	Highways England
A1 in Northumberland Alnwick to Ellingham	Highways England
A1 Northumberland Morpeth to Felton	Highways England
A19 Downhill Lane Junction Improvement	Highways England
A27 Arundel Bypass	Highways England
A38 Derby Junctions highway improvement scheme	Highways England
A428 Black Cat to Caxton Gibbet Road Improvement scheme	Highways England
A47 Blofield to North Burlingham	Highways England
A47 North Tuddenham to Easton	Highways England
A47 Wansford to Sutton	Highways England
A47/A11 Thickthorn Junction	Highways England
A5036 Port of Liverpool Access Scheme	Highways England
Bere Alston to Tavistock Railway Reinstatement and Associated Trails	Devon County Council
East Midlands Intermodal Park	Goodman Real Estate (UK) Limited
Expansion of Heathrow Airport (Third Runway)	Heathrow Airport Limited
Great Yarmouth Third River Crossing	Norfolk County Council
Hinckley National Rail Freight Interchange	DB Symmetry (Hinckley) Limited
Lower Thames Crossing	Highways England
M25 junction 10/A3 Wisley interchange improvement	Highways England
M25 junction 28 improvements	Highways England
Portishead Branch Line - MetroWest Phase 1	North Somerset Council
Trans Pennine Upgrade Programme	Highways England
Upper Orwell Crossings	Suffolk County Council
Western Rail Link to Heathrow	Network Rail Infrastructure Limited

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National Infrastructure Planning

Projects

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Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

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Project	Developer
M42 Junction 6 Improvement	Highways England

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National Infrastructure Planning

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Projects

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Project Stage: Show All | Pre Application | Acceptance | Pre Examination | Examination | Recommendation | Decision | Decided | Withdrawn

Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

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Search: Previous 1 Next

Project	Developer
A30 Chiverton to Carland Cross Scheme	Highways England
A303 Stonehenge	Highways England
A585 Windy Harbour to Skippool Improvement Scheme	Highways England
A63 Castle Street Improvement-Hull	Highways England
Manston Airport	RiverOak Strategic Partners Ltd
Rail Central (Strategic Rail Freight Interchange)	Ashfield Land Management Limited and Gazeley GLP Northampton s.á.r.l.
West Midlands Interchange	Four Ashes Limited

Projects

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Project Stage: Show All | Pre Application | Acceptance | Pre Examination | Examination | Recommendation | Decision | Decided | Withdrawn

Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

Show 100 entries

Showing 1 to 3 of 3 entries (filtered from 156 total entries)

Search: Previous 1 Next

Project	Developer
A303 Sparkford to Ilchester Dualling	Highways England
Lake Lothing Third Crossing	Suffolk County Council
Northampton Gateway Rail Freight Interchange	Roxhill Developments Limited

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Projects

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Project Stage: Show All | Pre Application | Acceptance | Pre Examination | Examination | Recommendation | Decision | Decided | Withdrawn

Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

Show 100 entries

Showing 1 to 22 of 22 entries (filtered from 156 total entries)

Search: Previous 1 Next

Project	Developer
A14 Cambridge to Huntingdon Improvement Scheme	Highways England
A160 - A180 Port of Immingham Improvement	Highways Agency
A19 / A184 Testos Junction Improvement	Highways England
A19/A1058 Coast Road Junction Improvement	Highways Agency
A30 Temple to Higher Carblake Improvement	Cornwall Council
A556 Knutsford to Bowdon Scheme	Highways Agency
Able Marine Energy Park	Able Humber Ports Ltd
Daventry International Rail Freight Terminal	Rugby Radio Station Ltd Partnership & Prologis UK
East Midlands Gateway Rail Freight Interchange	Roxhill (Kegworth) Limited
Heysham to M6 Link Road	Lancashire County Council
Ipswich Rail Chord	Network Rail
M1 Junction 10a Grade Separation - Luton	Luton Borough Council
M20 Junction 10A	Highways England
M4 Junctions 3 to 12 Smart Motorway	Highways Agency (now Highways England)
Morpeth Northern Bypass	Northumberland County Council
North Doncaster Rail Chord (near Shaftholme)	Network Rail
Norwich Northern Distributor Road (NDR)	Norfolk County Council
Redditch Branch Enhancement Scheme	Network Rail
Silvertown Tunnel	Transport for London
Stafford Area Improvements - Norton Bridge Railway	Network Rail
Woodside Link Houghton Regis Bedfordshire	Central Bedfordshire Council
York Potash Harbour Facilities Order	York Potash Ltd

Projects

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Project Type: Show All | Business & Commercial | Energy | Transport | Waste | Waste Water | Water

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Project	Developer
Tilbury2	Port of Tilbury London Limited

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Registered number: 10311804

RIVEROAK OPERATIONS LIMITED

UNAUDITED
FINANCIAL STATEMENTS
INFORMATION FOR FILING WITH THE REGISTRAR
FOR THE PERIOD ENDED 31 AUGUST 2017

FRIDAY
L73B07KP
LD6 06/04/2018 #12
COMPANIES HOUSE

RIVEROAK OPERATIONS LIMITED
REGISTERED NUMBER: 10311804

STATEMENT OF FINANCIAL POSITION
AS AT 31 AUGUST 2017

	Note		2017 £
Fixed assets			
Investments			**1,000,000**
			1,000,000
Current assets			
Debtors: amounts falling due within one year	5	**555,169**	
Cash at bank and in hand		**45,251**	
		600,420	
Creditors: amounts falling due within one year		**(912,076)**	
Net current (liabilities)/assets			**(311,656)**
Total assets less current liabilities			**688,344**
Creditors: amounts falling due after more than one year			**(4,458,285)**
Net (liabilities)/assets			**(3,769,941)**
Capital and reserves			
Called up share capital	10		**1**
Profit and loss account	11		**(3,769,942)**
			(3,769,941)

The directors consider that the Company is entitled to exemption from audit under section 477 of the Companies Act 2006 and members have not required the Company to obtain an audit for the period in question in accordance with section 476 of Companies Act 2006.

The directors acknowledge their responsibilities for complying with the requirements of the Companies Act 2006 with respect to accounting records and the preparation of financial statements.

The financial statements have been prepared in accordance with the provisions applicable to companies subject to the small companies regime and in accordance with the provisions of FRS 102 Section 1A - small entities.

The financial statements have been delivered in accordance with the provisions applicable to companies subject to the small companies regime.

The Company has opted not to file the statement of income and retained earnings in accordance with provisions applicable to companies subject to the small companies' regime.

STATEMENT OF FINANCIAL POSITION (CONTINUED)
AS AT 31 AUGUST 2017

The financial statements were approved and authorised for issue by the board and were signed on its behalf on 4 April 2018.

Anthony Freudmann
Director
The notes on pages 3 to 7 form part of these financial statements.

NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 AUGUST 2017

1. Accounting policies

1.1 Basis of preparation of financial statements

The financial statements have been prepared under the historical cost convention unless otherwise specified within these accounting policies and in accordance with Section 1A of Financial Reporting Standard 102, the Financial Reporting Standard applicable in the UK and the Republic of Ireland and the Companies Act 2006.

The following principal accounting policies have been applied:

1.2 Valuation of investments

Investments in subsidiaries are measured at cost less accumulated impairment.

Investments in unlisted Company shares, whose market value can be reliably determined, are remeasured to market value at each balance sheet date. Gains and losses on remeasurement are recognised in the Statement of income and retained earnings for the period. Where market value cannot be reliably determined, such investments are stated at historic cost less impairment.

1.3 Debtors

Short term debtors are measured at transaction price, less any impairment. Loans receivable are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method, less any impairment.

1.4 Cash and cash equivalents

Cash is represented by cash in hand and deposits with financial institutions repayable without penalty on notice of not more than 24 hours. Cash equivalents are highly liquid investments that mature in no more than three months from the date of acquisition and that are readily convertible to known amounts of cash with insignificant risk of change in value.

1.5 Financial instruments

The Company only enters into basic financial instrument transactions that result in the recognition of financial assets and liabilities like trade and other debtors and creditors, loans from banks and other third parties, loans to related parties and investments in non-puttable ordinary shares.

Debt instruments (other than those wholly repayable or receivable within one year), including loans and other accounts receivable and payable, are initially measured at present value of the future cash flows and subsequently at amortised cost using the effective interest method. Debt instruments that are payable or receivable within one year, typically trade debtors and creditors, are measured, initially and subsequently, at the undiscounted amount of the cash or other consideration expected to be paid or received. However, if the arrangements of a short-term instrument constitute a financing transaction, like the payment of a trade debt deferred beyond normal business terms or financed at a rate of interest that is not a market rate or in the case of an out-right short-term loan not at market rate, the financial asset or liability is measured, initially, at the present value of the future cash flow discounted at a market rate of interest for a similar debt instrument and subsequently at amortised cost.

Financial assets that are measured at cost and amortised cost are assessed at the end of each reporting period for objective evidence of impairment. If objective evidence of impairment is found, an impairment loss is recognised in the Statement of income and retained earnings.

1. Accounting policies (continued)

1.5 Financial instruments (continued)

For financial assets measured at amortised cost, the impairment loss is measured as the difference between an asset's carrying amount and the present value of estimated cash flows discounted at the asset's original effective interest rate. If a financial asset has a variable interest rate, the discount rate for measuring any impairment loss is the current effective interest rate determined under the contract.

For financial assets measured at cost less impairment, the impairment loss is measured as the difference between an asset's carrying amount and best estimate of the recoverable amount, which is an approximation of the amount that the Company would receive for the asset if it were to be sold at the reporting date.

Financial assets and liabilities are offset and the net amount reported in the Statement of financial position when there is an enforceable right to set off the recognised amounts and there is an intention to settle on a net basis or to realise the asset and settle the liability simultaneously.

1.6 Creditors

Short term creditors are measured at the transaction price. Other financial liabilities, including bank loans, are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method.

1.7 Borrowing costs

All borrowing costs are recognised in the Statement of income and retained earnings in the period in which they are incurred.

2. Judgments in applying accounting policies and key sources of estimation uncertainty

In the application of the company's accounting policies management is required to make judgements, estimates and assumptions about the carrying value of assets and liabilities that are not readily ascertainable from other sources. The estimates and underlying assumptions are based on historical experience and other factors that are considered to be relevant. Actual outcomes may differ from these estimates.

The estimates and underlying assumptions are reviewed on a continuing basis. Revisions to accounting estimates are recognised in the period in which the estimates are revised.

The key areas of estimation uncertainty that have a significant effect on the amounts recognised in the financial statements are described below:

Prepayments & Accrued Expenditure

The company includes a provision for invoices which are yet to be received from and amounts paid in advance to suppliers. These provisions are estimated based upon the expected values of the invoices which are issued and services received following the period end.

NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 AUGUST 2017

3. Employees

The average monthly number of employees, including directors, during the period was 3.

4. Fixed asset investments

	Other fixed asset investments £
Cost or valuation	
Additions	**1,000,000**
At 31 August 2017	**1,000,000**
Net book value	
At 31 August 2017	**1,000,000**

5. Debtors

	2017 £
Amounts owed by group undertakings	**45,481**
Other debtors	**509,688**
	555,169

6. Cash and cash equivalents

	2017 £
Cash at bank and in hand	**45,251**
	45,251

NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 AUGUST 2017

7. Creditors: Amounts falling due within one year

	2017 £
Trade creditors	**903,576**
Accruals and deferred income	**8,500**
	912,076

8. Creditors: Amounts falling due after more than one year

	2017 £
Other loans	**4,458,285**
	4,458,285

9. Loans

Analysis of the maturity of loans is given below:

	2017 £
Amounts falling due 1-2 years	
Bank loans	**4,458,285**
	4,458,285
	4,458,285

10. Share capital

	2017 £
Allotted, called up and fully paid	
1 Ordinary share of £1	**1**

1 Ordinary share was issued at par on incorporation.

11. Reserves

Profit and loss account

The profit and loss reserve is fully distributable.

12. Controlling party

The company's parent undertaking is Riveroak Strategic Partners Limited, which owns 100% of the issued share capital. The ultimate controlling party is MIO Investments Limited, a 90% shareholder in the parent undertaking.

Companies House

IN01(ef)

Application to register a company

Received for filing in Electronic Format on the: **24/08/2018**

X7CZO7WQ

Company Name in full:	**RIVEROAK FUELS LIMITED**
Company Type:	**Private company limited by shares**
Situation of Registered Office:	**England and Wales**
Proposed Registered Office Address:	**CALDER & CO 16 CHARLES II STREET LONDON UNITED KINGDOM SW1Y 4NW**
Sic Codes:	**52230**

RE-SCAN

FILE COPY

CERTIFICATE OF INCORPORATION OF A PRIVATE LIMITED COMPANY

Company Number **11535715**

The Registrar of Companies for England and Wales, hereby certifies that

RIVEROAK FUELS LIMITED

is this day incorporated under the Companies Act 2006 as a private company, that the company is limited by shares, and the situation of its registered office is in England and Wales

Given at Companies House, Cardiff, on **24th August 2018**

* N11535715F *

Companies House

THE OFFICIAL SEAL OF THE REGISTRAR OF COMPANIES

The above information was communicated by electronic means and authenticated by the Registrar of Companies under section 1115 of the Companies Act 2006

Proposed Officers

Company Director 1

Type:	**Person**
Full Forename(s):	**MR ANTHONY**
Surname:	**FREUDMANN**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED KINGDOM**

Date of Birth: ****/08/1946** *Nationality:* **BRITISH**

Occupation: **AIRPORT DIRECTOR**

The subscribers confirm that the person named has consented to act as a director.

Company Director 2

Type:	**Person**
Full Forename(s):	**MR NIALL**
Surname:	**LAWLOR**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED KINGDOM**

Date of Birth: *Nationality:* **IRISH**

Occupation: **INVESTMENTS**

The subscribers confirm that the person named has consented to act as a director.

Company Director 3

Type:	**Person**
Full Forename(s):	**GEORGE**
Surname:	**YERRALL**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED STATES**

Date of Birth: ****/04/1956** *Nationality:* **AMERICAN**

Occupation: **INVESTMENTS**

The subscribers confirm that the person named has consented to act as a director.

Statement of Capital (Share Capital)

Class of Shares:	**ORDINARY**	*Number allotted*	**1**
Currency:	**GBP**	*Aggregate nominal value:*	**1**

Prescribed particulars

VOTING RIGHTS - SHARES RANK EQUALLY FOR VOTING PURPOSES. ON A SHOW OF HANDS EACH MEMBER SHALL HAVE ONE VOTE AND ON A POLL EACH MEMBER SHALL HAVE ONE VOTE PER SHARE HELD. DIVIDEND RIGHTS - EACH SHARE RANKS EQUALLY FOR ANY DIVIDEND DECLARED. DISTRIBUTION RIGHTS ON A WINDING UP - EACH SHARE RANKS EQUALLY FOR ANY DISTRIBUTION MADE ON A WINDING UP. REDEEMABLE SHARES - THE SHARES ARE NOT REDEEMABLE.

Statement of Capital (Totals)

Currency:	**GBP**	*Total number of shares:*	**1**
		Total aggregate nominal value:	**1**
		Total aggregate unpaid:	**0**

Initial Shareholdings

Name:	**RIVEROAK STRATEGIC PARTNERS LIMITED**		
		Class of Shares:	**ORDINARY**
Address	**16 CHARLES II STREET LONDON SW1Y 4NW**	*Number of shares:*	**1**
		Currency:	**GBP**
		Nominal value of each share:	**1**
		Amount unpaid:	**0**
		Amount paid:	**1**

Persons with Significant Control (PSC)

Statement of initial significant control

On incorporation, there will be someone who will count as a Person with Significant Control (either a registerable person or relevant legal entity (RLE)) in relation to the company

Relevant Legal Entity (RLE) details

Company Name:	**RIVEROAK STRATEGIC PARTNERS LIMITED**
Service Address:	**16 CHARLES II STREET** **LONDON** **SW1Y 4NW**
Legal Form:	**PRIVATE LIMITED COMPANY**
Governing Law:	**ENGLAND AND WALES**
Register Location:	**UNITED KINGDOM**
Country/State:	**UNITED KINGDOM**
Registration Number:	**10269461**

Nature of control	**The relevant legal entity holds, directly or indirectly, 75% or more of the shares in the company.**
Nature of control	**The relevant legal entity holds, directly or indirectly, 75% or more of the voting rights in the company.**
Nature of control	**The relevant legal entity has the right, directly or indirectly, to appoint or remove a majority of the board of directors of the company.**

Statement of Compliance

I confirm the requirements of the Companies Act 2006 as to registration have been complied with.

Name: **RIVEROAK STRATEGIC PARTNERS LIMITED**
Authenticated **YES**

Authorisation

Authoriser Designation: **subscriber** *Authenticated* **YES**

COMPANY HAVING A SHARE CAPITAL

Memorandum of Association of

Riveroak Fuels Limited

Each subscriber to this Memorandum of Association wishes to form a company under the Companies Act 2006 and agrees to become a member of the company and to take at least one share.

Name of each subscriber	Authentication by each subscriber
RIVEROAK STRATEGIC PARTNERS LIMITED	RIVEROAK STRATEGIC PARTNERS LIMITED

Dated 24/8/2018

COMPANY NUMBER:
THE COMPANIES ACT 1985 TO 2006
PRIVATE COMPANY LIMITED BY SHARES

ARTICLES OF ASSOCIATION

Incorporated on

No.

The Companies Act 2006

Private Company Limited by Shares

ARTICLES OF ASSOCIATION

of

Riveroak Fuels Limited

Interpretation

1 Definitions

In these Articles, unless the context otherwise requires:

Act	means the Companies Act 2006
Appointor	has the meaning given in article 3.1
Articles	means the Company's articles of association for the time being in force
business day	means any day (other than a Saturday, Sunday or bank holiday) in the United Kingdom) on which clearing banks in the City of London are generally open for business
Conflict	has the meaning given in article 9
Model Articles	means the model articles for private companies limited by shares contained in Schedule 1 of the Companies (Model Articles) Regulations 2008 (SI 2008/3229) as amended prior to the date of adoption of the Articles.

2 Application of Model Articles

The Model Articles shall apply to the Company except in so far as they are modified or excluded by these Articles.

Directors and secretary

3 Appointment and removal of alternate directors

3.1 Any director (the **appointor**) (other than an alternate director) may appoint any other director, or any other person approved by resolution of the directors, to:

3.1.1 exercise that director's powers, and

3.1.2 carry out that director's responsibilities,

in relation to the taking of decisions by the directors in the absence of the alternate director's appointor.

3.2 Any appointment or removal of an alternate director must be effected by notice in writing to the Company signed by the appointor, or in any other manner approved by the directors.

3.3 The notice must:

3.2.1 identify the proposed alternate director, and

3.2.2 in the case of a notice of appointment, contain a statement signed by the proposed alternate director that the proposed alternate director is willing to act as the alternate of the director giving the notice.

4 Rights and responsibilities of alternate directors

4.1 An alternate director may act as alternate director to more than one director and has the same rights in relation to any decision of the directors as the alternate director's appointor.

4.2 Except as the Articles specify otherwise, an alternate director:

4.2.1 is deemed for all purposes to be a director;

4.2.2 is liable for his own acts and omissions;

4.2.3 is subject to the same restrictions as his appointor; and

4.2.4 is not deemed to be an agent of or for his appointor

and, in particular (without limitation), each alternate director shall be entitled to receive notice of all meetings of directors and of all meetings of committees of directors of which his appointor is a member.

4.3 A person who is an alternate director but not a director:

4.3.1 may be counted as participating for the purposes of determining whether a quorum is present (but only if that person's appointor is not participating);

4.3.2 may participate in a unanimous decision of the directors (but only if his appointor is an eligible director in relation to that decision, but does not participate); and

4.3.3 shall not be counted as more than one director for the purposes of articles 4.3.1 and 4.3.2.

4.4 A director who is also an alternate director is entitled, in the absence of his appointor, to a separate vote on behalf of his appointor, in addition to his own vote on any decision of the directors (provided that his appointor is an eligible director in relation to that decision), but shall not count as more than one director for the purposes of determining whether a quorum is present.

4.5 An alternate director is not entitled to receive any remuneration from the Company for serving as an alternate director except such part of the alternate director's appointor's remuneration as the appointor may direct by notice in writing made to the Company.

5 Termination of alternate directorship

An alternate director's appointment as an alternate director terminates:

5.1 when the alternate director's appointor revokes the appointment by notice to the Company in writing specifying when it is to terminate;

5.2 on the occurrence, in relation to the alternate director, of any event which, if it occurred in relation to the alternate director's appointor, would result in the termination of the appointor director's appointment as a director;

5.3 on the death of the alternate director's appointor; or

5.4 when the alternate director's appointor's appointment as a director terminates.

6 Decision making by directors - no casting vote

If the numbers of votes for and against a proposal are equal the chairman or other director chairing the meeting shall not be entitled to a casting vote. Article 13 of the Model Articles shall not apply to the Company.

7 Waiver of notice of and quorum for directors' meetings

7.1 Notice of a directors' meeting need not be given to directors who waive their entitlement to notice of that meeting, by giving notice to that effect to the Company at any time. Article 9 of the Model Articles shall be modified accordingly.

7.2 The quorum for directors' meetings may be fixed from time to time by a decision of the directors, but unless otherwise fixed it is one. Article 11 of the Model Articles shall be modified accordingly.

8 Transactions or other arrangements with the Company

Subject to sections 177(5) and 177(6) and sections 182(5) and 182(6) of the Act and provided he has declared the nature and extent of his interest in accordance with the requirements of the Act, a director who is in any way, whether directly or indirectly, interested in an existing or proposed transaction or arrangement with the Company:

8.1 may be a party to, or otherwise interested in, any transaction or arrangement with the Company or in which the Company is otherwise (directly or indirectly) interested;

8.2 shall be an eligible director for the purposes of any proposed decision of the directors (or committee of directors) in respect of such contract or proposed contract in which he is interested;

8.3 shall be entitled to vote at a meeting of directors (or of a committee of the directors) or participate in any unanimous decision, in respect of such contract or proposed contract in which he is interested;

8.4 may act by himself or his firm in a professional capacity for the Company (otherwise than as auditor) and he or his firm shall be entitled to remuneration for professional services as if he were not a director;

8.5 may be a director or other officer of, or employed by, or a party to a transaction or arrangement with, or otherwise interested in, any body corporate in which the Company is otherwise (directly or indirectly) interested; and

8.6 shall not, save as he may otherwise agree, be accountable to the Company for any benefit which he (or a person connected with him (as defined in section 252 of the Act)) derives from any such contract, transaction or arrangement or from any such office or employment or from any interest in any such body corporate and no such contract, transaction or arrangement shall be liable to be avoided on the grounds of any such interest or benefit nor shall the receipt of any such remuneration or other benefit constitute a breach of his duty under section 176 of the Act.

8.7 Article 14 (1), (2), (3) and (4) of the Model Articles shall not apply to the Company.

9 Directors' conflicts of interest

9.1 The directors may, in accordance with the requirements set out in this article, authorise any matter proposed to them by any director which would, if not authorised, involve a director breaching his duty under section 175 of the Act to avoid conflict of interest (**Conflict**).

9.2 Any authorisation under this article will be effective only if:

9.2.1 he matter in question shall have been proposed by any director for consideration at a meeting of directors in the same way that any other matter may be proposed to the directors under the provisions of the Articles or in such other manner as the directors may determine;

9.2.2 any requirement as to the quorum at the meeting of the directors at which the matter is considered is met without counting the director in question; and

9.2.3 the matter was agreed to without his voting or would have been agreed to if his vote had not been counted.

9.3 Any authorisation of a Conflict under this article may (whether at the time of giving the authorisation or subsequently):

9.3.1 extend to any actual or potential conflict of interest which may reasonably be expected to arise out of the Conflict so authorised;

9.3.2 be subject to such terms and for such duration, or impose such limits or conditions as the directors may determine;

9.3.3 be terminated or varied by the directors at any time.

This will not affect anything done by the director prior to such termination or variation in accordance with the terms of the authorisation.

9.4 In authorising a Conflict the directors may decide (whether at the time of giving the authorisation or subsequently) that if a director has obtained any information through his involvement in the Conflict otherwise than as a director of the Company and in respect of which he owes a duty of confidentiality to another person the director is under no obligation to:

9.4.1 disclose such information to the directors or to any director or other officer or employee of the Company;

9.4.2 use or apply any such information in performing his duties as a director;

where to do so would amount to a breach of that confidence.

9.5 Where the directors authorise a Conflict they may provide, without limitation (whether at the time of giving the authorisation or subsequently) that the director:

9.5.1 is excluded from discussions (whether at meetings of directors or otherwise) related to the Conflict;

9.5.2 is not given any documents or other information relating to the Conflict;

9.5.3 may or may not vote (or may or may not be counted in the quorum) at any future meeting of directors in relation to any resolution relating to the Conflict.

9.6 Where the directors authorise a Conflict:

9.6.1 the director will be obliged to conduct himself in accordance with any terms imposed by the directors in relation to the Conflict;

9.6.2 the director will not infringe any duty he owes to the Company by virtue of sections 171 to 177 of the Act provided he acts in accordance with such terms, limits and conditions (if any) as the directors impose in respect of its authorisation.

9.7 A director is not required, by reason of being a director (or because of the fiduciary relationship established by reason of being a director), to account to the Company for any remuneration, profit or other benefit which he derives from or in connection with a relationship involving a Conflict which has been authorised by the directors or by the Company in general meeting (subject in each case to any terms, limits or conditions attaching to that authorisation) and no contract shall be liable to be avoided on such grounds.

10 Secretary

The directors may appoint any person willing to act as the secretary for such term, at such remuneration and upon such conditions as they may think fit and from time to time remove such person and, if the directors so decide, appoint a replacement, in each case by a decision of the directors.

Shares

11 Disapplication of pre-emption rights

The pre-emption provisions of section 561 of the Act and the provisions of section 562 of the Act shall not apply to any allotment of the Company's equity securities.

12 Lien

The Company shall have a first and paramount lien on every share whether fully paid-up or not, standing registered in the name of any person indebted or under liability to the Company, whether he shall be the sole registered holder or shall be one of two or more joint holders, for all moneys presently payable by him or his estate to the Company.

Indemnity and insurance

13 Indemnity

13.1 Subject to article 13.2, but without prejudice to any indemnity to which a relevant officer is otherwise entitled:

13.1.1 each relevant officer shall be indemnified out of the Company's assets against all costs, charges, losses, expenses and liabilities incurred by him as a relevant officer:

(a) in the actual or purported execution and/or discharge of his duties, or in relation to them; and

(b) in relation to the Company's (or any associated company's) activities as trustee of an occupational pension scheme (as defined in section 235(6) of the Act),

including (in each case) any liability incurred by him in defending any civil or criminal proceedings, in which judgment is given in his favour or in which he is acquitted or the proceedings are otherwise disposed of without any finding or admission of any material breach of duty on his part or in connection with any application in which the court grants him, in his capacity as a relevant officer, relief from liability for negligence, default, breach of duty or breach of trust in relation to the Company's (or any associated company's) affairs; and

13.1.2 the Company may provide any relevant officer with funds to meet expenditure incurred or to be incurred by him in connection with any proceedings or application referred to in article 13.1.1

13.1.3 and otherwise may take any action to enable any such relevant officer to avoid incurring such expenditure.

13.2 This article does not authorise any indemnity which would be prohibited or rendered void by any provision of the Act or by any other provision of law.

13.3 In this article:

13.3.1 companies are associated if one is a subsidiary of the other or both are subsidiaries of the same body corporate; and

13.3.2 a **relevant officer** means any director or other officer or former director or other officer of the Company or an associated company (including any company which is a trustee of an occupational pension scheme (as defined by section 235(6) of the Act), but excluding in each case any person engaged by the Company (or associated company) as auditor (whether or not he is also a director or other officer), to the extent he acts in his capacity as auditor).

13.4 Article 52 of the Model Articles shall not apply to the Company.

14 Insurance

14.1 The directors may decide to purchase and maintain insurance, at the expense of the Company, for the benefit of any relevant officer in respect of any relevant loss.

14.2 In this article:

14.2.1 a **relevant officer** means any director or other officer or former director or other officer of the Company or an associated company (including any company which is a trustee of an occupational pension scheme (as defined by section 235(6) of the Act), but excluding in each case any person engaged by the Company (or associated company) as auditor (whether or not he is also a director or other officer), to the extent he acts in his capacity as auditor);

14.2.2 a **relevant loss** means any loss or liability which has been or may be incurred by a relevant officer in connection with that relevant officer's duties or powers in relation to the Company, any associated company or any pension fund or employees' share scheme of the Company or associated company; and

14.2.3 companies are associated if one is a subsidiary of the other or both are subsidiaries of the same body corporate.

14.3 Article 53 of the Model Articles shall not apply to the Company.

Companies House

COMPANY NAME: **RIVEROAK FUELS LIMITED**
COMPANY NUMBER: **11535715**

Officers date of birth was removed from the IN01 on 30/10/2018 as it was Factually Inaccurate

FILE COPY

CERTIFICATE OF INCORPORATION
OF A
PRIVATE LIMITED COMPANY

Company Number **11720590**

The Registrar of Companies for England and Wales, hereby certifies that

RIVEROAK MSE LIMITED

is this day incorporated under the Companies Act 2006 as a private company, that the company is limited by shares, and the situation of its registered office is in England and Wales

Given at Companies House, Cardiff, on **10th December 2018**

* N11720590C *

Companies House

THE OFFICIAL SEAL OF THE REGISTRAR OF COMPANIES

The above information was communicated by electronic means and authenticated by the Registrar of Companies under section 1115 of the Companies Act 2006

Companies House

IN01(ef)

Application to register a company

Received for filing in Electronic Format on the: **10/12/2018**

X7KICLXL

Company Name in full:	**RIVEROAK MSE LIMITED**
Company Type:	**Private company limited by shares**
Situation of Registered Office:	**England and Wales**
Proposed Registered Office Address:	**CALDER & CO 16 CHARLES II STREET ST. JAMES'S LONDON UNITED KINGDOM UNITED KINGDOM SW1Y 4NW**
Sic Codes:	**96090**

I wish to entirely adopt the following model articles: **Private (Ltd by Shares)**

Proposed Officers

Company Director 1

Type:	**Person**
Full Forename(s):	**MR ANTHONY**
Surname:	**FREUDMANN**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED KINGDOM**

Date of Birth: ****/08/1946** *Nationality:* **BRITISH**

Occupation: **DIRECTOR**

The subscribers confirm that the person named has consented to act as a director.

Company Director 2

Type:	**Person**
Full Forename(s):	**MR NIALL**
Surname:	**LAWLOR**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED STATES**

Date of Birth: ****/08/1970** *Nationality:* **IRISH**

Occupation: **DIRECTOR**

The subscribers confirm that the person named has consented to act as a director.

Company Director 3

Type:	**Person**
Full Forename(s):	**MR GEORGE**
Surname:	**YERRALL**
Service Address:	**recorded as Company's registered office**
Country/State Usually Resident:	**UNITED STATES**

Date of Birth: ****/04/1956** *Nationality:* **AMERICAN**

Occupation: **DIRECTOR**

The subscribers confirm that the person named has consented to act as a director.

Statement of Capital (Share Capital)

Class of Shares:	**ORDINARY**	*Number allotted*	**1**
Currency:	**GBP**	*Aggregate nominal value:*	**1**

Prescribed particulars

VOTING RIGHTS - SHARES RANK EQUALLY FOR VOTING PURPOSES. ON A SHOW OF HANDS EACH MEMBER SHALL HAVE ONE VOTE AND ON A POLL EACH MEMBER SHALL HAVE ONE VOTE PER SHARE HELD. DIVIDEND RIGHTS - EACH SHARE RANKS EQUALLY FOR ANY DIVIDEND DECLARED. DISTRIBUTION RIGHTS ON A WINDING UP - EACH SHARE RANKS EQUALLY FOR ANY DISTRIBUTION MADE ON A WINDING UP. REDEEMABLE SHARES - THE SHARES ARE NOT REDEEMABLE.

Statement of Capital (Totals)

Currency:	**GBP**	*Total number of shares:*	**1**
		Total aggregate nominal value:	**1**
		Total aggregate unpaid:	**0**

Initial Shareholdings

Name:	**RIVEROAK STRATEGIC PARTNERS LIMITED**		
		Class of Shares:	**ORDINARY**
Address	**16 CHARLES II STREET LONDON SW1Y 4NW**	*Number of shares:*	**1**
		Currency:	**GBP**
		Nominal value of each share:	**1**
		Amount unpaid:	**0**
		Amount paid:	**1**

Persons with Significant Control (PSC)

Statement of initial significant control

On incorporation, there will be someone who will count as a Person with Significant Control (either a registerable person or relevant legal entity (RLE)) in relation to the company

Relevant Legal Entity (RLE) details

Company Name:	**RIVEROAK STRATEGIC PARTNERS LIMITED**
Service Address:	**16 CHARLES II STREET** **LONDON** **SW1Y 4NW**
Legal Form:	**PRIVATE COMPANY LIMITED BY SHARES**
Governing Law:	**UNITED KINGDOM**
Register Location:	**UNITED KINGDOM**
Country/State:	**UNITED KINGDOM**
Registration Number:	**10269461**

Nature of control	**The relevant legal entity holds, directly or indirectly, 75% or more of the shares in the company.**
Nature of control	**The relevant legal entity holds, directly or indirectly, 75% or more of the voting rights in the company.**

Statement of Compliance

I confirm the requirements of the Companies Act 2006 as to registration have been complied with.

Name: **RIVEROAK STRATEGIC PARTNERS LIMITED**
Authenticated **YES**

Authorisation

Authoriser Designation: **subscriber** *Authenticated* **YES**

End of Electronically filed document for Company Number: 11720590

COMPANY HAVING A SHARE CAPITAL

Memorandum of Association of

Riveroak MSE Limited

Each subscriber to this Memorandum of Association wishes to form a company under the Companies Act 2006 and agrees to become a member of the company and to take at least one share.

Name of each subscriber	Authentication by each subscriber
Riveroak Strategic Partners Limited	Riveroak Strategic Partners Limited

Dated 10/12/2018

Company Number:

The Companies Act 2006

PRIVATE COMPANY LIMITED BY SHARES

ARTICLES
OF ASSOCIATION

Riveroak MSE Limited

Incorporated on

SCHEDULE 1 Regulation 2

MODEL ARTICLES FOR PRIVATE COMPANIES LIMITED BY SHARES

Riveroak MSE Limited

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PART 1

INTERPRETATION AND LIMITATION OF LIABILITY

Defined terms

1. In the articles, unless the context requires otherwise—

"articles" means the company's articles of association;

"bankruptcy" includes individual insolvency proceedings in a jurisdiction other than England and Wales or Northern Ireland which have an effect similar to that of bankruptcy;

"chairman" has the meaning given in article 12;

"chairman of the meeting" has the meaning given in article 39;

"Companies Acts" means the Companies Acts (as defined in section 2 of the Companies Act 2006), in so far as they apply to the company;

"director" means a director of the company, and includes any person occupying the position of director, by whatever name called;

"distribution recipient" has the meaning given in article 31;

"document" includes, unless otherwise specified, any document sent or supplied in electronic form;

"electronic form" has the meaning given in section 1168 of the Companies Act 2006;

"fully paid" in relation to a share, means that the nominal value and any premium to be paid to the company in respect of that share have been paid to the company;

"hard copy form" has the meaning given in section 1168 of the Companies Act 2006;

"holder" in relation to shares means the person whose name is entered in the register of
members as the holder of the shares;

"instrument" means a document in hard copy form;

"ordinary resolution" has the meaning given in section 282 of the Companies Act 2006;

"paid" means paid or credited as paid;

"participate", in relation to a directors' meeting, has the meaning given in article 10;

"proxy notice" has the meaning given in article 45;

"shareholder" means a person who is the holder of a share;

"shares" means shares in the company;

"special resolution" has the meaning given in section 283 of the Companies Act 2006;

"subsidiary" has the meaning given in section 1159 of the Companies Act 2006;

"transmittee" means a person entitled to a share by reason of the death or bankruptcy of a shareholder or otherwise by operation of law; and

"writing" means the representation or reproduction of words, symbols or other information in a visible form by any method or combination of methods, whether sent or supplied in electronic form or otherwise.

Unless the context otherwise requires, other words or expressions contained in these articles bear the same meaning as in the Companies Act 2006 as in force on the date when these articles become binding on the company.

Liability of members

2. The liability of the members is limited to the amount, if any, unpaid on the shares held by them.

PART 2

DIRECTORS

DIRECTORS' POWERS AND RESPONSIBILITIES

Directors' general authority

3. Subject to the articles, the directors are responsible for the management of the company's business, for which purpose they may exercise all the powers of the company.

Shareholders' reserve power

4.—(1) The shareholders may, by special resolution, direct the directors to take, or refrain from taking, specified action.

(2) No such special resolution invalidates anything which the directors have done before the passing of the resolution.

Directors may delegate

5.—(1) Subject to the articles, the directors may delegate any of the powers which are conferred on them under the articles—

(a) to such person or committee;

(b) by such means (including by power of attorney);

(c) to such an extent;

(d) in relation to such matters or territories; and

(e) on such terms and conditions;

as they think fit.

(2) If the directors so specify, any such delegation may authorise further delegation of the directors' powers by any person to whom they are delegated.

(3) The directors may revoke any delegation in whole or part, or alter its terms and conditions.

Committees

6.—(1) Committees to which the directors delegate any of their powers must follow procedures which are based as far as they are applicable on those provisions of the articles which govern the taking of decisions by directors.

(2) The directors may make rules of procedure for all or any committees, which prevail over rules derived from the articles if they are not consistent with them.

DECISION-MAKING BY DIRECTORS

Directors to take decisions collectively

7.—(1) The general rule about decision-making by directors is that any decision of the directors must be either a majority decision at a meeting or a decision taken in accordance with article 8.

(2) If—

(a) the company only has one director, and

(b) no provision of the articles requires it to have more than one director,

the general rule does not apply, and the director may take decisions without regard to any of the provisions of the articles relating to directors' decision-making.

Unanimous decisions

8.—(1) A decision of the directors is taken in accordance with this article when all eligible directors indicate to each other by any means that they share a common view on a matter.

(2) Such a decision may take the form of a resolution in writing, copies of which have been signed by each eligible director or to which each eligible director has otherwise indicated agreement in writing.

(3) References in this article to eligible directors are to directors who would have been entitled to vote on the matter had it been proposed as a resolution at a directors' meeting.

(4) A decision may not be taken in accordance with this article if the eligible directors would not have formed a quorum at such a meeting.

Calling a directors' meeting

9.—(1) Any director may call a directors' meeting by giving notice of the meeting to the
directors or by authorising the company secretary (if any) to give such notice.
(2) Notice of any directors' meeting must indicate—
(a) its proposed date and time;
(b) where it is to take place; and
(c) if it is anticipated that directors participating in the meeting will not be in the same place, how it is proposed that they should communicate with each other during the meeting.
(3) Notice of a directors' meeting must be given to each director, but need not be in writing.
(4) Notice of a directors' meeting need not be given to directors who waive their entitlement to notice of that meeting, by giving notice to that effect to the company not more than 7 days after the date on which the meeting is held. Where such notice is given after the meeting has been held, that does not affect the validity of the meeting, or of any business conducted at it.

Participation in directors' meetings

10.—(1) Subject to the articles, directors participate in a directors' meeting, or part of a
directors' meeting, when—
(a) the meeting has been called and takes place in accordance with the articles, and
(b) they can each communicate to the others any information or opinions they have on any particular item of the business of the meeting.
(2) In determining whether directors are participating in a directors' meeting, it is irrelevant where any director is or how they communicate with each other.
(3) If all the directors participating in a meeting are not in the same place, they may decide that the meeting is to be treated as taking place wherever any of them is.

Quorum for directors' meetings

11.—(1) At a directors' meeting, unless a quorum is participating, no proposal is to be voted on, except a proposal to call another meeting.
(2) The quorum for directors' meetings may be fixed from time to time by a decision of the directors, but it must never be less than two, and unless otherwise fixed it is two.
(3) If the total number of directors for the time being is less than the quorum required, the
directors must not take any decision other than a decision—
(a) to appoint further directors, or
(b) to call a general meeting so as to enable the shareholders to appoint further directors.

Chairing of directors' meetings

12.—(1) The directors may appoint a director to chair their meetings.
(2) The person so appointed for the time being is known as the chairman.
(3) The directors may terminate the chairman's appointment at any time.
(4) If the chairman is not participating in a directors' meeting within ten minutes of the time at which it was to start, the participating directors must appoint one of themselves to chair it.

Casting vote

13.—(1) If the numbers of votes for and against a proposal are equal, the chairman or other director chairing the meeting has a casting vote.
(2) But this does not apply if, in accordance with the articles, the chairman or other director is not to be counted as participating in the decision-making process for quorum or voting purposes.

Conflicts of interest

14.—(1) If a proposed decision of the directors is concerned with an actual or proposed
transaction or arrangement with the company in which a director is interested, that director is not to be counted as participating in the decision-making process for quorum or voting purposes.
(2) But if paragraph (3) applies, a director who is interested in an actual or proposed transaction or arrangement with the company is to be counted as participating in the decision-making process for quorum and voting purposes.
(3) This paragraph applies when—

(a) the company by ordinary resolution disapplies the provision of the articles which would otherwise prevent a director from being counted as participating in the decision-making process;

(b) the director's interest cannot reasonably be regarded as likely to give rise to a conflict of interest; or

(c) the director's conflict of interest arises from a permitted cause.

(4) For the purposes of this article, the following are permitted causes—

(a) a guarantee given, or to be given, by or to a director in respect of an obligation incurred by or on behalf of the company or any of its subsidiaries;

(b) subscription, or an agreement to subscribe, for shares or other securities of the company or any of its subsidiaries, or to underwrite, sub-underwrite, or guarantee subscription for any such shares or securities; and

(c) arrangements pursuant to which benefits are made available to employees and directors or former employees and directors of the company or any of its subsidiaries which do not provide special benefits for directors or former directors.

(5) For the purposes of this article, references to proposed decisions and decision-making
processes include any directors' meeting or part of a directors' meeting.
(6) Subject to paragraph (7), if a question arises at a meeting of directors or of a committee of directors as to the right of a director to participate in the meeting (or part of the meeting) for voting or quorum purposes, the question may, before the

conclusion of the meeting, be referred to the chairman whose ruling in relation to any director other than the chairman is to be final and conclusive.
(7) If any question as to the right to participate in the meeting (or part of the meeting) should arise in respect of the chairman, the question is to be decided by a decision of the directors at that meeting, for which purpose the chairman is not to be counted as participating in the meeting (or that part of the meeting) for voting or quorum purposes.

Records of decisions to be kept

15. The directors must ensure that the company keeps a record, in writing, for at least 10 years from the date of the decision recorded, of every unanimous or majority decision taken by the directors.

Directors' discretion to make further rules

16. Subject to the articles, the directors may make any rule which they think fit about how they take decisions, and about how such rules are to be recorded or communicated to directors.

APPOINTMENT OF DIRECTORS

Methods of appointing directors

17.—(1) Any person who is willing to act as a director, and is permitted by law to do so, may be appointed to be a director—
(a) by ordinary resolution, or
(b) by a decision of the directors.
(2) In any case where, as a result of death, the company has no shareholders and no directors, the personal representatives of the last shareholder to have died have the right, by notice in writing, to appoint a person to be a director.
(3) For the purposes of paragraph (2), where 2 or more shareholders die in circumstances
rendering it uncertain who was the last to die, a younger shareholder is deemed to have survived an older shareholder.

Termination of director's appointment

18. A person ceases to be a director as soon as—
(a) that person ceases to be a director by virtue of any provision of the Companies Act 2006 or is prohibited from being a director by law;
(b) a bankruptcy order is made against that person;
(c) a composition is made with that person's creditors generally in satisfaction of that
person's debts;
(d) a registered medical practitioner who is treating that person gives a written opinion to the company stating that that person has become physically or mentally incapable of acting as a director and may remain so for more than three months;

(e) by reason of that person's mental health, a court makes an order which wholly or partly prevents that person from personally exercising any powers or rights which that person would otherwise have;

(f) notification is received by the company from the director that the director is resigning from office, and such resignation has taken effect in accordance with its terms.

Directors' remuneration

19.—(1) Directors may undertake any services for the company that the directors decide.

(2) Directors are entitled to such remuneration as the directors determine—

(a) for their services to the company as directors, and

(b) for any other service which they undertake for the company.

(3) Subject to the articles, a director's remuneration may—

(a) take any form, and

(b) include any arrangements in connection with the payment of a pension, allowance or gratuity, or any death, sickness or disability benefits, to or in respect of that director.

(4) Unless the directors decide otherwise, directors' remuneration accrues from day to day.

(5) Unless the directors decide otherwise, directors are not accountable to the company for any remuneration which they receive as directors or other officers or employees of the company's subsidiaries or of any other body corporate in which the company is interested.

Directors' expenses

20. The company may pay any reasonable expenses which the directors properly incur in

connection with their attendance at—

(a) meetings of directors or committees of directors,

(b) general meetings, or

(c) separate meetings of the holders of any class of shares or of debentures of the company, or otherwise in connection with the exercise of their powers and the discharge of their responsibilities in relation to the company.

PART 3

SHARES AND DISTRIBUTIONS

SHARES

All shares to be fully paid up

21.—(1) No share is to be issued for less than the aggregate of its nominal value and any

premium to be paid to the company in consideration for its issue.
(2) This does not apply to shares taken on the formation of the company by the subscribers to the company's memorandum.

Powers to issue different classes of share

22.—(1) Subject to the articles, but without prejudice to the rights attached to any existing share, the company may issue shares with such rights or restrictions as may be determined by ordinary resolution.
(2) The company may issue shares which are to be redeemed, or are liable to be redeemed at the option of the company or the holder, and the directors may determine the terms, conditions and manner of redemption of any such shares.

Company not bound by less than absolute interests

23. Except as required by law, no person is to be recognised by the company as holding any share upon any trust, and except as otherwise required by law or the articles, the company is not in any way to be bound by or recognise any interest in a share other than the holder's absolute ownership of it and all the rights attaching to it.

Share certificates

24.—(1) The company must issue each shareholder, free of charge, with one or more certificates in respect of the shares which that shareholder holds.
(2) Every certificate must specify—
(a) in respect of how many shares, of what class, it is issued;
(b) the nominal value of those shares;
(c) that the shares are fully paid; and
(d) any distinguishing numbers assigned to them.
(3) No certificate may be issued in respect of shares of more than one class.
(4) If more than one person holds a share, only one certificate may be issued in respect of it.
(5) Certificates must—
(a) have affixed to them the company's common seal, or
(b) be otherwise executed in accordance with the Companies Acts.

Replacement share certificates

25.—(1) If a certificate issued in respect of a shareholder's shares is—
(a) damaged or defaced, or
(b) said to be lost, stolen or destroyed, that shareholder is entitled to be issued with a replacement certificate in respect of the same shares.
(2) A shareholder exercising the right to be issued with such a replacement certificate—

(a) may at the same time exercise the right to be issued with a single certificate or separate certificates;
(b) must return the certificate which is to be replaced to the company if it is damaged or defaced; and

(c) must comply with such conditions as to evidence, indemnity and the payment of a
reasonable fee as the directors decide.

Share transfers

26.—(1) Shares may be transferred by means of an instrument of transfer in any usual form or any other form approved by the directors, which is executed by or on behalf of the transferor.
(2) No fee may be charged for registering any instrument of transfer or other document relating to or affecting the title to any share.
(3) The company may retain any instrument of transfer which is registered.
(4) The transferor remains the holder of a share until the transferee's name is entered in the register of members as holder of it.
(5) The directors may refuse to register the transfer of a share, and if they do so, the instrument of transfer must be returned to the transferee with the notice of refusal unless they suspect that the proposed transfer may be fraudulent.

Transmission of shares

27.—(1) If title to a share passes to a transmittee, the company may only recognise the
transmittee as having any title to that share.
(2) A transmittee who produces such evidence of entitlement to shares as the directors may properly require—
(a) may, subject to the articles, choose either to become the holder of those shares or to have them transferred to another person, and
(b) subject to the articles, and pending any transfer of the shares to another person, has the same rights as the holder had.
(3) But transmittees do not have the right to attend or vote at a general meeting, or agree to a proposed written resolution, in respect of shares to which they are entitled, by reason of the holder's death or bankruptcy or otherwise, unless they become the holders of those shares.

Exercise of transmittees' rights

28.—(1) Transmittees who wish to become the holders of shares to which they have become entitled must notify the company in writing of that wish.
(2) If the transmittee wishes to have a share transferred to another person, the transmittee must execute an instrument of transfer in respect of it.
(3) Any transfer made or executed under this article is to be treated as if it were made or
executed by the person from whom the transmittee has derived rights in respect of the share, and as if the event which gave rise to the transmission had not occurred.
Transmittees bound by prior notices

29. If a notice is given to a shareholder in respect of shares and a transmittee is entitled to those shares, the transmittee is bound by the notice if it was given to the shareholder before the transmittee's name has been entered in the register of members.

DIVIDENDS AND OTHER DISTRIBUTIONS

Procedure for declaring dividends

30.—(1) The company may by ordinary resolution declare dividends, and the directors may decide to pay interim dividends.
(2) A dividend must not be declared unless the directors have made a recommendation as to its amount. Such a dividend must not exceed the amount recommended by the directors.
(3) No dividend may be declared or paid unless it is in accordance with shareholders' respective rights.
(4) Unless the shareholders' resolution to declare or directors' decision to pay a dividend, or the terms on which shares are issued, specify otherwise, it must be paid by reference to each shareholder's holding of shares on the date of the resolution or decision to declare or pay it.
(5) If the company's share capital is divided into different classes, no interim dividend may be paid on shares carrying deferred or non-preferred rights if, at the time of payment, any preferential dividend is in arrear.
(6) The directors may pay at intervals any dividend payable at a fixed rate if it appears to them that the profits available for distribution justify the payment.
(7) If the directors act in good faith, they do not incur any liability to the holders of shares
conferring preferred rights for any loss they may suffer by the lawful payment of an interim dividend on shares with deferred or non-preferred rights.

Payment of dividends and other distributions

31.—(1) Where a dividend or other sum which is a distribution is payable in respect of a share, it must be paid by one or more of the following means—

(a) transfer to a bank or building society account specified by the distribution recipient either in writing or as the directors may otherwise decide;

(b) sending a cheque made payable to the distribution recipient by post to the distribution recipient at the distribution recipient's registered address (if the distribution recipient is a holder of the share), or (in any other case) to an address specified by the distribution recipient either in writing or as the directors may otherwise decide;

(c) sending a cheque made payable to such person by post to such person at such address as the distribution recipient has specified either in writing or as the directors may otherwise decide; or

(d) any other means of payment as the directors agree with the distribution recipient either in writing or by such other means as the directors decide.

(2) In the articles, "the distribution recipient" means, in respect of a share in respect of which a dividend or other sum is payable—

(a) the holder of the share; or

(b) if the share has two or more joint holders, whichever of them is named first in the register of members; or

(c) if the holder is no longer entitled to the share by reason of death or bankruptcy, or

otherwise by operation of law, the transmittee.

No interest on distributions

32. The company may not pay interest on any dividend or other sum payable in respect of a share unless otherwise provided by—

(a) the terms on which the share was issued, or

(b) the provisions of another agreement between the holder of that share and the company.

Unclaimed distributions

33.—(1) All dividends or other sums which are—

(a) payable in respect of shares, and

(b) unclaimed after having been declared or become payable,

may be invested or otherwise made use of by the directors for the benefit of the company until claimed.

(2) The payment of any such dividend or other sum into a separate account does not make the company a trustee in respect of it.

(3) If—

(a) twelve years have passed from the date on which a dividend or other sum became due for payment, and

(b) the distribution recipient has not claimed it,

the distribution recipient is no longer entitled to that dividend or other sum and it ceases to remain owing by the company.

Non-cash distributions

34.—(1) Subject to the terms of issue of the share in question, the company may, by ordinary resolution on the recommendation of the directors, decide to pay all or part of a dividend or other distribution payable in respect of a share by transferring non-cash assets of equivalent value (including, without limitation, shares or other securities in any company).

(2) For the purposes of paying a non-cash distribution, the directors may make whatever

arrangements they think fit, including, where any difficulty arises regarding the distribution—

(a) fixing the value of any assets;

(b) paying cash to any distribution recipient on the basis of that value in order to adjust the rights of recipients; and

(c) vesting any assets in trustees.

Waiver of distributions

35. Distribution recipients may waive their entitlement to a dividend or other distribution

payable in respect of a share by giving the company notice in writing to that effect, but if—

(a) the share has more than one holder, or

(b) more than one person is entitled to the share, whether by reason of the death or

bankruptcy of one or more joint holders, or otherwise,
the notice is not effective unless it is expressed to be given, and signed, by all the holders or persons otherwise entitled to the share.

CAPITALISATION OF PROFITS

Authority to capitalise and appropriation of capitalised sums

36.—(1) Subject to the articles, the directors may, if they are so authorised by an ordinary
resolution—

(a) decide to capitalise any profits of the company (whether or not they are available for distribution) which are not required for paying a preferential dividend, or any sum standing to the credit of the company's share premium account or capital redemption reserve; and

(b) appropriate any sum which they so decide to capitalise (a "capitalised sum") to the persons who would have been entitled to it if it were distributed by way of dividend (the "persons entitled") and in the same proportions.

(2) Capitalised sums must be applied—

(a) on behalf of the persons entitled, and

(b) in the same proportions as a dividend would have been distributed to them.

(3) Any capitalised sum may be applied in paying up new shares of a nominal amount equal to the capitalised sum which are then allotted credited as fully paid to the persons entitled or as they may direct.

(4) A capitalised sum which was appropriated from profits available for distribution may be applied in paying up new debentures of the company which are then allotted credited as fully paid to the persons entitled or as they may direct.

(5) Subject to the articles the directors may—

(a) apply capitalised sums in accordance with paragraphs (3) and (4) partly in one way and partly in another;

(b) make such arrangements as they think fit to deal with shares or debentures becoming distributable in fractions under this article (including the issuing of fractional certificates or the making of cash payments); and

(c) authorise any person to enter into an agreement with the company on behalf of all the persons entitled which is binding on them in respect of the allotment of shares and debentures to them under this article.

PART 4

DECISION-MAKING BY SHAREHOLDERS

ORGANISATION OF GENERAL MEETINGS

Attendance and speaking at general meetings

37.—(1) A person is able to exercise the right to speak at a general meeting when that person is in a position to communicate to all those attending the meeting, during the

meeting, any information or opinions which that person has on the business of the meeting.
(2) A person is able to exercise the right to vote at a general meeting when—
(a) that person is able to vote, during the meeting, on resolutions put to the vote at the meeting, and
(b) that person's vote can be taken into account in determining whether or not such
resolutions are passed at the same time as the votes of all the other persons attending the meeting.
(3) The directors may make whatever arrangements they consider appropriate to enable those attending a general meeting to exercise their rights to speak or vote at it.
(4) In determining attendance at a general meeting, it is immaterial whether any two or more members attending it are in the same place as each other.
(5) Two or more persons who are not in the same place as each other attend a general meeting if their circumstances are such that if they have (or were to have) rights to speak and vote at that meeting, they are (or would be) able to exercise them.

Quorum for general meetings

38. No business other than the appointment of the chairman of the meeting is to be transacted at a general meeting if the persons attending it do not constitute a quorum.

Chairing general meetings

39.—(1) If the directors have appointed a chairman, the chairman shall chair general meetings if present and willing to do so.
(2) If the directors have not appointed a chairman, or if the chairman is unwilling to chair the meeting or is not present within ten minutes of the time at which a meeting was due to start—
(a) the directors present, or
(b) (if no directors are present), the meeting,
must appoint a director or shareholder to chair the meeting, and the appointment of the chairman of the meeting must be the first business of the meeting.
(3) The person chairing a meeting in accordance with this article is referred to as "the chairman of the meeting".

Attendance and speaking by directors and non-shareholders

40.—(1) Directors may attend and speak at general meetings, whether or not they are shareholders.
(2) The chairman of the meeting may permit other persons who are not—
(a) shareholders of the company, or
(b) otherwise entitled to exercise the rights of shareholders in relation to general meetings,
to attend and speak at a general meeting.

Adjournment

41.—(1) If the persons attending a general meeting within half an hour of the time at which the meeting was due to start do not constitute a quorum, or if during a meeting a quorum ceases to be present, the chairman of the meeting must adjourn it.
(2) The chairman of the meeting may adjourn a general meeting at which a quorum is present if—

(a) the meeting consents to an adjournment, or

(b) it appears to the chairman of the meeting that an adjournment is necessary to protect the safety of any person attending the meeting or ensure that the business of the meeting is conducted in an orderly manner.

(3) The chairman of the meeting must adjourn a general meeting if directed to do so by the meeting.
(4) When adjourning a general meeting, the chairman of the meeting must—

(a) either specify the time and place to which it is adjourned or state that it is to continue at a time and place to be fixed by the directors, and

(b) have regard to any directions as to the time and place of any adjournment which have been given by the meeting.

(5) If the continuation of an adjourned meeting is to take place more than 14 days after it was adjourned, the company must give at least 7 clear days' notice of it (that is, excluding the day of the adjourned meeting and the day on which the notice is given)—

(a) to the same persons to whom notice of the company's general meetings is required to be given, and

(b) containing the same information which such notice is required to contain.

(6) No business may be transacted at an adjourned general meeting which could not properly have been transacted at the meeting if the adjournment had not taken place.

VOTING AT GENERAL MEETINGS

Voting: general

42. A resolution put to the vote of a general meeting must be decided on a show of hands unless a poll is duly demanded in accordance with the articles.

Errors and disputes

43.—(1) No objection may be raised to the qualification of any person voting at a general
meeting except at the meeting or adjourned meeting at which the vote objected to is tendered, and every vote not disallowed at the meeting is valid.
(2) Any such objection must be referred to the chairman of the meeting, whose decision is final.

Poll votes

44.—(1) A poll on a resolution may be demanded—

(a) in advance of the general meeting where it is to be put to the vote, or
(b) at a general meeting, either before a show of hands on that resolution or immediately after the result of a show of hands on that resolution is declared.

(2) A poll may be demanded by—
(a) the chairman of the meeting;
(b) the directors;
(c) two or more persons having the right to vote on the resolution; or
(d) a person or persons representing not less than one tenth of the total voting rights of all the shareholders having the right to vote on the resolution.

(3) A demand for a poll may be withdrawn if—
(a) the poll has not yet been taken, and
(b) the chairman of the meeting consents to the withdrawal.

(4) Polls must be taken immediately and in such manner as the chairman of the meeting directs.

Content of proxy notices

45.—(1) Proxies may only validly be appointed by a notice in writing (a "proxy notice")
which—
(a) states the name and address of the shareholder appointing the proxy;
(b) identifies the person appointed to be that shareholder's proxy and the general meeting in relation to which that person is appointed;
(c) is signed by or on behalf of the shareholder appointing the proxy, or is authenticated in such manner as the directors may determine; and
(d) is delivered to the company in accordance with the articles and any instructions contained in the notice of the general meeting to which they relate.

(2) The company may require proxy notices to be delivered in a particular form, and may
specify different forms for different purposes.

(3) Proxy notices may specify how the proxy appointed under them is to vote (or that the proxy is to abstain from voting) on one or more resolutions.

(4) Unless a proxy notice indicates otherwise, it must be treated as—
(a) allowing the person appointed under it as a proxy discretion as to how to vote on any ancillary or procedural resolutions put to the meeting, and
(b) appointing that person as a proxy in relation to any adjournment of the general meeting to which it relates as well as the meeting itself.

Delivery of proxy notices

46.—(1) A person who is entitled to attend, speak or vote (either on a show of hands or on a poll) at a general meeting remains so entitled in respect of that meeting or any adjournment of it, even though a valid proxy notice has been delivered to the company by or on behalf of that person.

(2) An appointment under a proxy notice may be revoked by delivering to the company a notice in writing given by or on behalf of the person by whom or on whose behalf the proxy notice was given.

(3) A notice revoking a proxy appointment only takes effect if it is delivered before the start of the meeting or adjourned meeting to which it relates.

(4) If a proxy notice is not executed by the person appointing the proxy, it must be accompanied by written evidence of the authority of the person who executed it to execute it on the appointor's behalf.

Amendments to resolutions

47.—(1) An ordinary resolution to be proposed at a general meeting may be amended by ordinary resolution if—

(a) notice of the proposed amendment is given to the company in writing by a person entitled to vote at the general meeting at which it is to be proposed not less than 48 hours before the meeting is to take place (or such later time as the chairman of the meeting may determine), and

(b) the proposed amendment does not, in the reasonable opinion of the chairman of the meeting, materially alter the scope of the resolution.

(2) A special resolution to be proposed at a general meeting may be amended by ordinary resolution, if—

(a) the chairman of the meeting proposes the amendment at the general meeting at which the resolution is to be proposed, and

(b) the amendment does not go beyond what is necessary to correct a grammatical or other non-substantive error in the resolution.

(3) If the chairman of the meeting, acting in good faith, wrongly decides that an amendment to a resolution is out of order, the chairman's error does not invalidate the vote on that resolution.

PART 5

ADMINISTRATIVE ARRANGEMENTS

Means of communication to be used

48.—(1) Subject to the articles, anything sent or supplied by or to the company under the articles may be sent or supplied in any way in which the Companies Act 2006 provides for documents or information which are authorised or required by any provision of that Act to be sent or supplied by or to the company.

(2) Subject to the articles, any notice or document to be sent or supplied to a director in

connection with the taking of decisions by directors may also be sent or supplied by the means by which that director has asked to be sent or supplied with such notices or documents for the time being.

(3) A director may agree with the company that notices or documents sent to that director in a particular way are to be deemed to have been received within a specified time of their being sent, and for the specified time to be less than 48 hours.

Company seals

49.—(1) Any common seal may only be used by the authority of the directors.

(2) The directors may decide by what means and in what form any common seal is to be used.

(3) Unless otherwise decided by the directors, if the company has a common seal and it is

affixed to a document, the document must also be signed by at least one authorised person in the presence of a witness who attests the signature.
(4) For the purposes of this article, an authorised person is—
(a) any director of the company;
(b) the company secretary (if any); or
(c) any person authorised by the directors for the purpose of signing documents to which the common seal is applied.

No right to inspect accounts and other records

50. Except as provided by law or authorised by the directors or an ordinary resolution of the company, no person is entitled to inspect any of the company's accounting or other records or documents merely by virtue of being a shareholder.

Provision for employees on cessation of business

51. The directors may decide to make provision for the benefit of persons employed or formerly employed by the company or any of its subsidiaries (other than a director or former director or shadow director) in connection with the cessation or transfer to any person of the whole or part of the undertaking of the company or that subsidiary.

DIRECTORS' INDEMNITY AND INSURANCE

Indemnity

52.—(1) Subject to paragraph (2), a relevant director of the company or an associated company may be indemnified out of the company's assets against—
(a) any liability incurred by that director in connection with any negligence, default, breach of duty or breach of trust in relation to the company or an associated company,
(b) any liability incurred by that director in connection with the activities of the company or an associated company in its capacity as a trustee of an occupational pension scheme (as defined in section 235(6) of the Companies Act 2006),
(c) any other liability incurred by that director as an officer of the company or an associated company.
(2) This article does not authorise any indemnity which would be prohibited or rendered void by any provision of the Companies Acts or by any other provision of law.
(3) In this article—
(a) companies are associated if one is a subsidiary of the other or both are subsidiaries of the same body corporate, and
(b) a "relevant director" means any director or former director of the company or an associated company.

Insurance

53.—(1) The directors may decide to purchase and maintain insurance, at the expense of the company, for the benefit of any relevant director in respect of any relevant loss.
(2) In this article—

(a) a "relevant director" means any director or former director of the company or an associated company,
(b) a "relevant loss" means any loss or liability which has been or may be incurred by a relevant director in connection with that director's duties or powers in relation to the company, any associated company or any pension fund or employees' share scheme of the company or associated company, and
(c) companies are associated if one is a subsidiary of the other or both are subsidiaries of the same body corporate.

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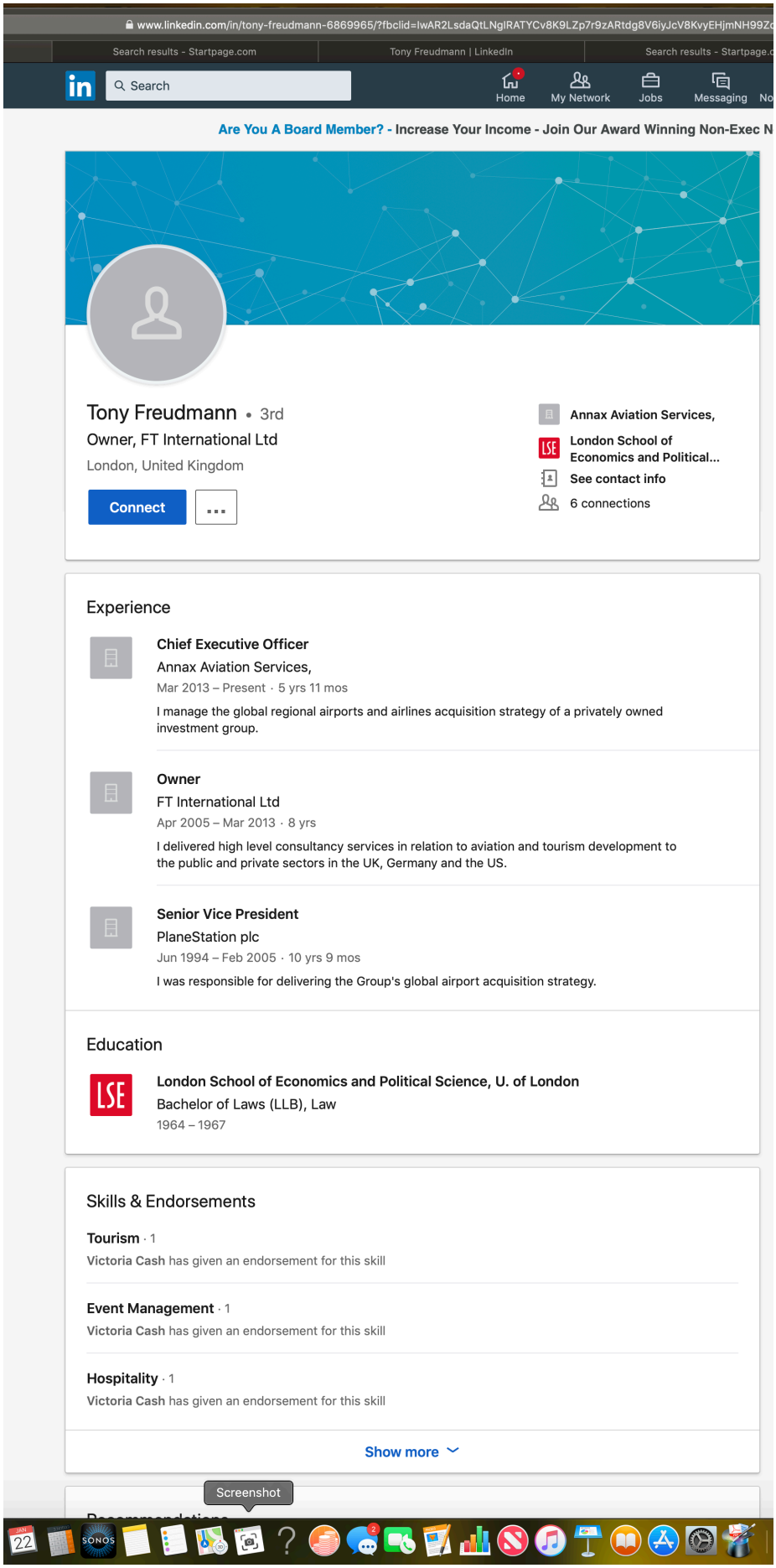
ANNAX AVIATION AIRPORTS LIMITED

08575369 - Dissolved on 10 October 2017

15 Lings Coppice, London, SE21 8SY


www.linkedin.com/in/tony-freudmann-6869965/?fbclid=IwAR2LsdaQtLNgIRATYCv8K9LZp7r9zARtdg8V6iyJcV8KvyEHjmNH99Z
Search results - Startpage.com
Tony Freudmann | LinkedIn
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Are You A Board Member? - Increase Your Income - Join Our Award Winning Non-Exec N
Tony Freudmann • 3rd
Owner, FT International Ltd
London, United Kingdom
Connect
...
Annax Aviation Services,
London School of Economics and Political...
See contact info
6 connections
Experience
Chief Executive Officer
Annax Aviation Services,
Mar 2013 – Present · 5 yrs 11 mos
I manage the global regional airports and airlines acquisition strategy of a privately owned investment group.
Owner
FT International Ltd
Apr 2005 – Mar 2013 · 8 yrs
I delivered high level consultancy services in relation to aviation and tourism development to the public and private sectors in the UK, Germany and the US.
Senior Vice President
PlaneStation plc
Jun 1994 – Feb 2005 · 10 yrs 9 mos
I was responsible for delivering the Group's global airport acquisition strategy.
Education
London School of Economics and Political Science, U. of London
Bachelor of Laws (LLB), Law
1964 – 1967
Skills & Endorsements
Tourism · 1
Victoria Cash has given an endorsement for this skill
Event Management · 1
Victoria Cash has given an endorsement for this skill
Hospitality · 1
Victoria Cash has given an endorsement for this skill
Show more
Screenshot

Registered number: 04352403

FREUDMANN LIMITED

UNAUDITED
FINANCIAL STATEMENTS
INFORMATION FOR FILING WITH THE REGISTRAR
FOR THE YEAR ENDED 31 MARCH 2018

TUESDAY
A7BV9ERK
A14 07/08/2018 #377
COMPANIES HOUSE

FREUDMANN LIMITED
REGISTERED NUMBER: 04352403

STATEMENT OF FINANCIAL POSITION
AS AT 31 MARCH 2018

	Note		2018 £		*2017 £*
Fixed assets					
Tangible assets	4		**1,899**		*1,048*
			1,899		*1,048*
Current assets					
Debtors: amounts falling due within one year	5	**22,592**		*13,514*	
Cash at bank and in hand	6	**17,944**		*6,289*	
		40,536		*19,803*	
Creditors: amounts falling due within one year	7	**(9,857)**		*(7,630)*	
Net current assets			**30,679**		*12,173*
Total assets less current liabilities			**32,578**		*13,221*
Net assets			**32,578**		*13,221*
Capital and reserves					
Called up share capital	8		**100**		*100*
Profit and loss account	9		**32,478**		*13,121*
			32,578		*13,221*

The directors consider that the Company is entitled to exemption from audit under section 477 of the Companies Act 2006 and members have not required the Company to obtain an audit for the year in question in accordance with section 476 of Companies Act 2006.

The directors acknowledge their responsibilities for complying with the requirements of the Companies Act 2006 with respect to accounting records and the preparation of financial statements.

The financial statements have been prepared in accordance with the provisions applicable to companies subject to the small companies regime and in accordance with the provisions of FRS 102 Section 1A - small entities.

The financial statements have been delivered in accordance with the provisions applicable to companies subject to the small companies regime.

The Company has opted not to file the statement of income and retained earnings in accordance with provisions applicable to companies subject to the small companies' regime.

STATEMENT OF FINANCIAL POSITION (CONTINUED)
AS AT 31 MARCH 2018

The financial statements were approved and authorised for issue by the board and were signed on its behalf on 23 April 2018.

[redacted]

E. Freudmann
Director
The notes on pages 3 to 9 form part of these financial statements.

1. Accounting policies

1.1 Basis of preparation of financial statements

The financial statements have been prepared under the historical cost convention unless otherwise specified within these accounting policies and in accordance with Section 1A of Financial Reporting Standard 102, the Financial Reporting Standard applicable in the UK and the Republic of Ireland and the Companies Act 2006.

The following principal accounting policies have been applied:

1.2 Revenue

Revenue is recognised to the extent that it is probable that the economic benefits will flow to the Company and the revenue can be reliably measured. Revenue is measured as the fair value of the consideration received or receivable, excluding discounts, rebates, value added tax and other sales taxes. The following criteria must also be met before revenue is recognised:

Rendering of services

Revenue from a contract to provide services is recognised in the period in which the services are provided in accordance with the stage of completion of the contract when all of the following conditions are satisfied:

- the amount of revenue can be measured reliably;
- it is probable that the Company will receive the consideration due under the contract;
- the stage of completion of the contract at the end of the reporting period can be measured reliably; and
- the costs incurred and the costs to complete the contract can be measured reliably.

1.3 Tangible fixed assets

Tangible fixed assets under the cost model are stated at historical cost less accumulated depreciation and any accumulated impairment losses. Historical cost includes expenditure that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

Depreciation is charged so as to allocate the cost of assets less their residual value over their estimated useful lives, using the straight-line method.

Depreciation is provided on the following basis:

Office Equipment	-	33%

The assets' residual values, useful lives and depreciation methods are reviewed, and adjusted prospectively if appropriate, or if there is an indication of a significant change since the last reporting date.

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and are recognised in the Statement of income and retained earnings.

1. Accounting policies (continued)

1.4 Debtors

Short term debtors are measured at transaction price, less any impairment. Loans receivable are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method, less any impairment.

1.5 Cash and cash equivalents

Cash is represented by cash in hand and deposits with financial institutions repayable without penalty on notice of not more than 24 hours. Cash equivalents are highly liquid investments that mature in no more than three months from the date of acquisition and that are readily convertible to known amounts of cash with insignificant risk of change in value.

1.6 Financial instruments

The Company only enters into basic financial instrument transactions that result in the recognition of financial assets and liabilities like trade and other debtors and creditors, loans from banks and other third parties, loans to related parties and investments in non-puttable ordinary shares.

Debt instruments (other than those wholly repayable or receivable within one year), including loans and other accounts receivable and payable, are initially measured at present value of the future cash flows and subsequently at amortised cost using the effective interest method. Debt instruments that are payable or receivable within one year, typically trade debtors and creditors, are measured, initially and subsequently, at the undiscounted amount of the cash or other consideration expected to be paid or received. However, if the arrangements of a short-term instrument constitute a financing transaction, like the payment of a trade debt deferred beyond normal business terms or financed at a rate of interest that is not a market rate or in the case of an out-right short-term loan not at market rate, the financial asset or liability is measured, initially, at the present value of the future cash flow discounted at a market rate of interest for a similar debt instrument and subsequently at amortised cost.

Financial assets that are measured at cost and amortised cost are assessed at the end of each reporting period for objective evidence of impairment. If objective evidence of impairment is found, an impairment loss is recognised in the Statement of income and retained earnings.

For financial assets measured at amortised cost, the impairment loss is measured as the difference between an asset's carrying amount and the present value of estimated cash flows discounted at the asset's original effective interest rate. If a financial asset has a variable interest rate, the discount rate for measuring any impairment loss is the current effective interest rate determined under the contract.

For financial assets measured at cost less impairment, the impairment loss is measured as the difference between an asset's carrying amount and best estimate of the recoverable amount, which is an approximation of the amount that the Company would receive for the asset if it were to be sold at the reporting date.

Financial assets and liabilities are offset and the net amount reported in the Statement of financial position when there is an enforceable right to set off the recognised amounts and there is an intention to settle on a net basis or to realise the asset and settle the liability simultaneously.

1. Accounting policies (continued)

1.7 Creditors

Short term creditors are measured at the transaction price. Other financial liabilities, including bank loans, are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method.

1.8 Finance costs

Finance costs are charged to the Statement of income and retained earnings over the term of the debt using the effective interest method so that the amount charged is at a constant rate on the carrying amount. Issue costs are initially recognised as a reduction in the proceeds of the associated capital instrument.

1.9 Dividends

Equity dividends are recognised when they become legally payable. Interim equity dividends are recognised when paid. Final equity dividends are recognised when approved by the shareholders at an annual general meeting. Dividends on shares recognised as liabilities are recognised as expenses and classified within interest payable.

1.10 Operating leases: the Company as lessee

Rentals paid under operating leases are charged to the Statement of income and retained earnings on a straight line basis over the lease term.

Benefits received and receivable as an incentive to sign an operating lease are recognised on a straight line basis over the lease term, unless another systematic basis is representative of the time pattern of the lessee's benefit from the use of the leased asset.

The Company has taken advantage of the optional exemption available on transition to FRS 102 which allows lease incentives on leases entered into before the date of transition to the standard 01 April 2016 to continue to be charged over the period to the first market rent review rather than the term of the lease.

1.11 Interest income

Interest income is recognised in the Statement of income and retained earnings using the effective interest method.

1.12 Taxation

Tax is recognised in the Statement of income and retained earnings, except that a charge attributable to an item of income and expense recognised as other comprehensive income or to an item recognised directly in equity is also recognised in other comprehensive income or directly in equity respectively.

The current income tax charge is calculated on the basis of tax rates and laws that have been enacted or substantively enacted by the reporting date in the countries where the Company operates and generates income.

2. Judgments in applying accounting policies and key sources of estimation uncertainty

In the application of the company's accounting policies management is required to make judgements, estimates and assumptions about the carrying value of assets and liabilities that are not readily ascertainable from other sources. The estimates and underlying assumptions are based on historical experience and other factors that are considered to be relevant. Actual outcomes may differ from these estimates.

The estimates and underlying assumptions are reviewed on a continuing basis. Revisions to accounting estimates are recognised in the period in which the estimates are revised.

The key areas of estimation uncertainty that have a significant effect on the amounts recognised in the financial statements are described below:

Accrued Expenditure

The company includes a provision for invoices which are yet to be received from and amounts paid in advance to suppliers. These provisions are estimated based upon the expected values of the invoices which are issued and services received following the period end.

3. Employees

The average monthly number of employees, including directors, during the year was 2 *(2017 - 2)*.

4. Tangible fixed assets

	Office Equipment £
Cost or valuation	
At 1 April 2017	**15,190**
Additions	**1,948**
At 31 March 2018	**17,138**
Depreciation	
At 1 April 2017	**14,142**
Charge for the year on owned assets	**1,096**
At 31 March 2018	**15,238**
Net book value	
At 31 March 2018	**1,900**
At 31 March 2017	*1,048*

5. Debtors

	2018 £	*2017 £*
Trade debtors	**15,071**	*12,010*
Director loan account	**6,017**	-
Other debtors	**1,454**	*1,454*
Prepayments and accrued income	**50**	*50*
	22,592	*13,514*

6. Cash and cash equivalents

	2018 £	2017 £
Cash at bank and in hand	**17,944**	*6,289*
	17,944	*6,289*

7. Creditors: Amounts falling due within one year

	2018 £	2017 £
Trade creditors	**234**	*892*
Corporation tax payable	**4,678**	*2,524*
Other taxation and social security	**3,945**	*2,553*
Directors current account	**-**	*661*
Accruals and deferred income	**1,000**	*1,000*
	9,857	*7,630*

	2018 £	2017 £
Other taxation and social security		
VAT control	**3,945**	*2,553*
	3,945	*2,553*

8. Share capital

	2018 £	2017 £
Allotted, called up and fully paid		
100 Ordinary shares of £1 each	**100**	*100*

9. Reserves

Profit & loss account

The profit and loss account was fully distributable.

10. Related party transactions

At the balance sheet date, the company owed Mrs E Freudmann £6,016 (2017 - (£661)). Interest was charged at 3% on all outstanding balances throughout the year.

Registered number: 05429140

FREUDMANN TIPPLE INTERNATIONAL LIMITED

UNAUDITED
FINANCIAL STATEMENTS
INFORMATION FOR FILING WITH THE REGISTRAR
For the Year Ended 30 March 2018

SATURDAY
A7797BK9
A09 02/06/2018 #330
COMPANIES HOUSE

FREUDMANN TIPPLE INTERNATIONAL LIMITED
Registered number: 05429140

STATEMENT OF FINANCIAL POSITION
As at 30 March 2018

	Note		30 March 2018 £		*31 March 2017 £*
Current assets					
Debtors: amounts falling due within one year	5	**220,168**		*69,213*	
Cash at bank and in hand	6	**548,647**		*176,146*	
		768,815		*245,359*	
Creditors: amounts falling due within one year	7	**(680,778)**		*(246,185)*	
Net current assets/(liabilities)			**88,037**		*(826)*
Total assets less current liabilities			**88,037**		*(826)*
Net assets/(liabilities)			**88,037**		*(826)*
Capital and reserves					
Called up share capital	8		**100**		*100*
Profit and loss account	9		**87,937**		*(926)*
			88,037		*(826)*

The directors consider that the Company is entitled to exemption from audit under section 477 of the Companies Act 2006 and members have not required the Company to obtain an audit for the period in question in accordance with section 476 of Companies Act 2006.

The directors acknowledge their responsibilities for complying with the requirements of the Companies Act 2006 with respect to accounting records and the preparation of financial statements.

The financial statements have been prepared in accordance with the provisions applicable to companies subject to the small companies regime and in accordance with the provisions of FRS 102 Section 1A - small entities.

The financial statements have been delivered in accordance with the provisions applicable to companies subject to the small companies regime.

The Company has opted not to file the statement of income and retained earnings in accordance with provisions applicable to companies subject to the small companies' regime.

The financial statements were approved and authorised for issue by the board and were signed on its behalf on 23 April 2018.

[redacted]

Mr A Freudmann
Director
The notes on pages 2 to 7 form part of these financial statements.

NOTES TO THE FINANCIAL STATEMENTS
For the Period Ended 30 March 2018

1. Accounting policies

1.1 Basis of preparation of financial statements

The financial statements have been prepared under the historical cost convention unless otherwise specified within these accounting policies and in accordance with Section 1A of Financial Reporting Standard 102, the Financial Reporting Standard applicable in the UK and the Republic of Ireland and the Companies Act 2006.

The following principal accounting policies have been applied:

1.2 Revenue

Revenue is recognised to the extent that it is probable that the economic benefits will flow to the Company and the revenue can be reliably measured. Revenue is measured as the fair value of the consideration received or receivable, excluding discounts, rebates, value added tax and other sales taxes. The following criteria must also be met before revenue is recognised:

Rendering of services

Revenue from a contract to provide services is recognised in the period in which the services are provided in accordance with the stage of completion of the contract when all of the following conditions are satisfied:

- the amount of revenue can be measured reliably;
- it is probable that the Company will receive the consideration due under the contract;
- the stage of completion of the contract at the end of the reporting period can be measured reliably; and
- the costs incurred and the costs to complete the contract can be measured reliably.

1.3 Tangible fixed assets

Tangible fixed assets under the cost model are stated at historical cost less accumulated depreciation and any accumulated impairment losses. Historical cost includes expenditure that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

Depreciation is charged so as to allocate the cost of assets less their residual value over their estimated useful lives, using the straight-line method.

Depreciation is provided on the following basis:

Office equipment	-	33%

The assets' residual values, useful lives and depreciation methods are reviewed, and adjusted prospectively if appropriate, or if there is an indication of a significant change since the last reporting date.

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and are recognised in the Statement of income and retained earnings.

1. Accounting policies (continued)

1.4 Debtors

Short term debtors are measured at transaction price, less any impairment. Loans receivable are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method, less any impairment.

1.5 Cash and cash equivalents

Cash is represented by cash in hand and deposits with financial institutions repayable without penalty on notice of not more than 24 hours. Cash equivalents are highly liquid investments that mature in no more than three months from the date of acquisition and that are readily convertible to known amounts of cash with insignificant risk of change in value.

1.6 Financial instruments

The Company only enters into basic financial instrument transactions that result in the recognition of financial assets and liabilities like trade and other debtors and creditors, loans from banks and other third parties, loans to related parties and investments in non-puttable ordinary shares.

Debt instruments (other than those wholly repayable or receivable within one year), including loans and other accounts receivable and payable, are initially measured at present value of the future cash flows and subsequently at amortised cost using the effective interest method. Debt instruments that are payable or receivable within one year, typically trade debtors and creditors, are measured, initially and subsequently, at the undiscounted amount of the cash or other consideration expected to be paid or received. However, if the arrangements of a short-term instrument constitute a financing transaction, like the payment of a trade debt deferred beyond normal business terms or financed at a rate of interest that is not a market rate or in the case of an out-right short-term loan not at market rate, the financial asset or liability is measured, initially, at the present value of the future cash flow discounted at a market rate of interest for a similar debt instrument and subsequently at amortised cost.

Financial assets that are measured at cost and amortised cost are assessed at the end of each reporting period for objective evidence of impairment. If objective evidence of impairment is found, an impairment loss is recognised in the Statement of income and retained earnings.

For financial assets measured at amortised cost, the impairment loss is measured as the difference between an asset's carrying amount and the present value of estimated cash flows discounted at the asset's original effective interest rate. If a financial asset has a variable interest rate, the discount rate for measuring any impairment loss is the current effective interest rate determined under the contract.

For financial assets measured at cost less impairment, the impairment loss is measured as the difference between an asset's carrying amount and best estimate of the recoverable amount, which is an approximation of the amount that the Company would receive for the asset if it were to be sold at the reporting date.

Financial assets and liabilities are offset and the net amount reported in the Statement of financial position when there is an enforceable right to set off the recognised amounts and there is an intention to settle on a net basis or to realise the asset and settle the liability simultaneously.

1. Accounting policies (continued)

1.7 Creditors

Short term creditors are measured at the transaction price. Other financial liabilities, including bank loans, are measured initially at fair value, net of transaction costs, and are measured subsequently at amortised cost using the effective interest method.

1.8 Finance costs

Finance costs are charged to the Statement of income and retained earnings over the term of the debt using the effective interest method so that the amount charged is at a constant rate on the carrying amount. Issue costs are initially recognised as a reduction in the proceeds of the associated capital instrument.

1.9 Dividends

Equity dividends are recognised when they become legally payable. Interim equity dividends are recognised when paid. Final equity dividends are recognised when approved by the shareholders at an annual general meeting. Dividends on shares recognised as liabilities are recognised as expenses and classified within interest payable.

1.10 Interest income

Interest income is recognised in the Statement of income and retained earnings using the effective interest method.

1.11 Taxation

Tax is recognised in the Statement of income and retained earnings, except that a charge attributable to an item of income and expense recognised as other comprehensive income or to an item recognised directly in equity is also recognised in other comprehensive income or directly in equity respectively.

The current income tax charge is calculated on the basis of tax rates and laws that have been enacted or substantively enacted by the reporting date in the countries where the Company operates and generates income.

2. Judgments in applying accounting policies and key sources of estimation uncertainty

In the application of the company's accounting policies management is required to make judgements, estimates and assumptions about the carrying value of assets and liabilities that are not readily ascertainable from other sources. The estimates and underlying assumptions are based on historical experience and other factors that are considered to be relevant. Actual outcomes may differ from these estimates.

The estimates and underlying assumptions are reviewed on a continuing basis. Revisions to accounting estimates are recognised in the period in which the estimates are revised.

The key areas of estimation uncertainty that have a significant effect on the amounts recognised in the financial statements are described below:

Accrued Expenditure

The company includes a provision for invoices which are yet to be received from and amounts paid in advance to suppliers. These provisions are estimated based upon the expected values of the invoices which are issued and services received following the period end.

3. Employees

The average monthly number of employees, including directors, during the period was 2 *(2017 - 2)*.

4. Tangible fixed assets

	Office equipment £
Cost or valuation	
At 1 April 2017	**3,724**
At 30 March 2018	**3,724**
Depreciation	
At 1 April 2017	**3,724**
At 30 March 2018	**3,724**
Net book value	
At 30 March 2018	**-**
At 31 March 2017	-

NOTES TO THE FINANCIAL STATEMENTS
For the Period Ended 30 March 2018

5. Debtors

	30 March 2018 £	*31 March 2017 £*
Trade debtors	**42,457**	*20,857*
Director's loan account	**146,018**	*36,495*
Other debtors	**31,693**	*11,861*
	220,168	*69,213*

6. Cash and cash equivalents

	30 March 2018 £	*31 March 2017 £*
Cash at bank and in hand	**548,647**	*176,146*
	548,647	*176,146*

7. Creditors: Amounts falling due within one year

	30 March 2018 £	*31 March 2017 £*
Trade creditors	**9,069**	*9,296*
Amounts owed to participating interests	**588,905**	*187,324*
Corporation tax	**40,686**	*29,260*
Other taxation and social security	**40,319**	*18,507*
Accruals and deferred income	**1,799**	*1,798*
	680,778	*246,185*

NOTES TO THE FINANCIAL STATEMENTS
For the Period Ended 30 March 2018

8. Share capital

	30 March 2018 £	*31 March 2017 £*
Allotted, called up and fully paid		
45 'A' Ordinary shares of £1 each	**45**	*45*
45 'B' Ordinary shares of £1 each	**45**	*45*
10 'C' Ordinary shares of £1 each	**10**	*10*
	100	*100*

9. Reserves

Profit & loss account

The profit and loss account is fully distributable.

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).

RIVEROAK STRATEGIC PARTNERS LIMITED

Company number **10269461**

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- Accounts
- Capital
- Charges
- Confirmation statements / Annual returns
- Incorporation
- Officers

Date	Description	View / Download
16 Jul 2018	**Confirmation statement** made on 8 July 2018 with updates	View PDF (4 pages)
14 Jun 2018	**Registered office address changed** from 50 Broadway Westminster London SW1H 0BL United Kingdom to Calder & Co 16 Charles Ii Street London SW1Y 4NW on 14 June 2018	View PDF (1 page)
19 Apr 2018	**Register(s) moved** to registered inspection location Calder & Co 16 Charles Ii Street London SW1Y 4NW	View PDF (2 pages)
19 Apr 2018	**Register inspection address** has been changed to Calder & Co 16 Charles Ii Street London SW1Y 4NW	View PDF (2 pages)
11 Apr 2018	**Accounts for a dormant company** made up to 31 July 2017	View PDF (3 pages)
03 Apr 2018	**Confirmation statement** made on 27 March 2018 with no updates	View PDF (3 pages)
28 Mar 2017	**Confirmation statement** made on 27 March 2017 with updates	View PDF (4 pages)
27 Mar 2017	**Confirmation statement** made on 23 March 2017 with updates	View PDF (6 pages)
11 Jan 2017	**Sub-division of shares** on 15 December 2016	View PDF (4 pages)
11 Jan 2017	Resolutions • **Resolution of adoption of Articles of Association**	View PDF (29 pages)
04 Jan 2017	**Change of share class name or designation**	View PDF (2 pages)
09 Dec 2016	**Appointment** of Nicholas Rothwell as a director on 9 December 2016	View PDF (2 pages)
09 Dec 2016	**Appointment** of Rico Seitz as a director on 9 December 2016	View PDF (2 pages)
09 Dec 2016	**Appointment** of Gerhard Huesler as a director on 9 December 2016	View PDF (2 pages)
25 Jul 2016	**Appointment** of Niall Lawlor as a director on 22 July 2016	View PDF (2 pages)
25 Jul 2016	**Appointment** of George Yerrall as a director on 22 July 2016	View PDF (2 pages)
08 Jul 2016	**Incorporation** Statement of capital on 2016-07-08 GBP 1	View PDF (19 pages)