

A new airport for London and the UK

Technical note - shortlisting the options

15 July 2013

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1. Introduction

- 1.1. The UK needs a new hub airport at a single site. The case for this has been presented by the Mayor in his two 'A new airport for London' reports¹, as well as his responses to the Airports Commission Discussion Papers, all of which are available online at www.newairportforlondon.com.
- 1.2. This paper is the pre-cursor to the Mayor's submission of long-term proposals to the Airports Commission. This paper sets out:
 - why airport capacity that facilitates hub operations is essential and why dispersed expansion is not a credible substitute for a single effective hub airport,
 - a high level assessment of a longlist of potential options for new hub airport capacity,
 - application of different weightings to determine a shortlist of options that best meet the Mayor's objectives for London and the UK.
- 1.3. The Mayor will be submitting three proposals to the Airports Commission on July 19 for the additional hub airport capacity that London and the UK need.

2. Executive Summary

- 2.1. A hub airport builds a critical mass of demand of 'local' origin/destination (O/D) and transfer traffic – supporting a wider range of routes and higher frequencies than would otherwise be possible. This enables hub capacity to offer a level of connectivity that supports future growth and prosperity for London and the UK.
- 2.2. This report applies the Mayor's assessment criteria to a number of hub locations – as well as alternative expansion options – before adding a weighting based on Mayoral objectives. It concludes that new capacity at a single site – located either on the Isle of Grain, in the Outer Thames Estuary, or at Stansted is the optimal solution for London and the UK.

3. The value of a hub airport and the options for delivering hub connectivity

- 3.1. Here we briefly outline why a hub is vital to the connectivity of London and the UK and what the best approach to delivering hub capacity is. A more detailed analysis of these issues can be found in the *Mayor's submission to the Airports Commission in response to Discussion Paper 04*.

The value of a hub airport

- 3.2. Hubs enable a virtuous circle of connectivity by aggregating demand for passengers and freight, drawing on origin/destination and transfer traffic and a comprehensive mix of shorthaul and longhaul flights. With a UK hub, this direct connectivity to the UK strongly benefits the UK economy. There are economic consequences for the UK when passengers hub abroad instead.
- 3.3. A UK hub airport needs to serve London because a strong O/D catchment is key.
- 3.4. Hubs continue to play a key role in aviation because they serve the economic interests of airlines and meet the connectivity needs of passengers and freight.
- 3.5. Hubs are driven by anchor airlines – and not alliances. The potential to develop a hub model based on low-cost airline traffic or ‘self-connecting’ is limited.
- 3.6. Competition between hubs globally is becoming more intense – with a smaller number of superhubs emerging in Europe, Asia and elsewhere as the aviation market increasingly divides into the hubs and ‘hub-nots’.

Options for delivering hub connectivity

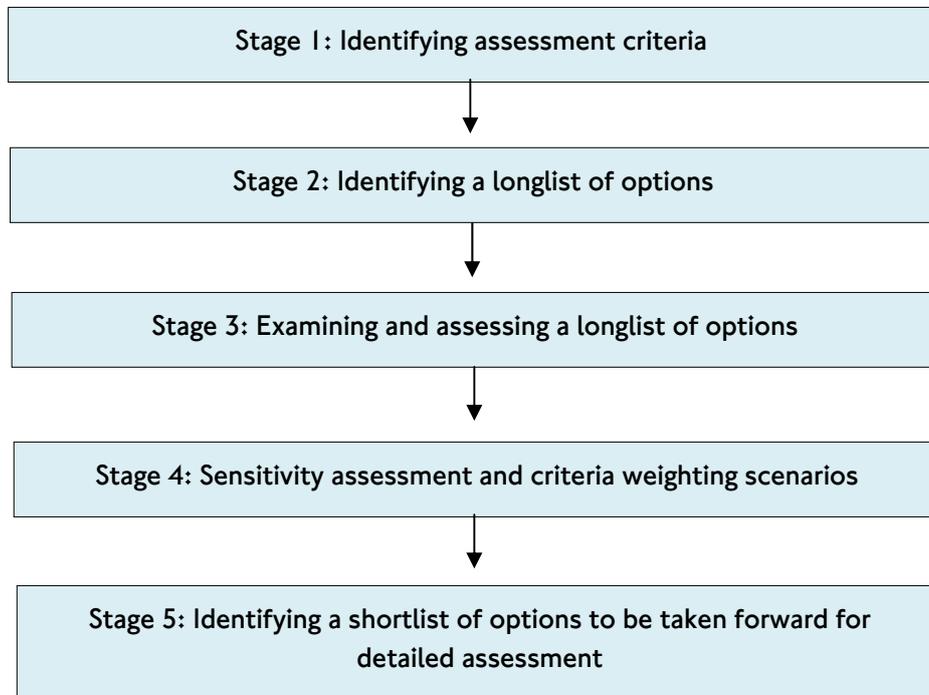
- 3.7. As well as a single-site hub with sufficient capacity, dispersed expansion is an alternative option proposed, with an additional runway at one or more London airports; a variant of this links two London airports with a high speed link (to mimic a single hub location). Growth at airports outside the southeast is also considered.
- 3.8. According to the new route-by-route analysis undertaken, only a single, effective four-runway hub can meet the UK's connectivity needs; it would mean:
- a quadrupling of destinations in emerging markets such as China and South America, 50% more in the US and restoration of domestic hub routes.
 - London serving 20% more destinations than under dispersed expansion (2-2-2), 35% more in North America and 160% more in South America.
- 3.9. Attracting airlines to a new hub airport, underpinned by an anchor carrier, is feasible if Heathrow ceased to be the airport it is today. But under dispersed expansion, Gatwick and Stansted would struggle to attract airlines from Heathrow voluntarily.

- 3.10. An effective hub airport with sufficient spare capacity will maximise passenger choice and promote airline competition, enabling new entrants, routes and frequencies. Dispersed expansion would do little for domestic competition while harming our international competitiveness, with no UK airport truly able to take on foreign hubs.
- 3.11. Dispersed expansion faces challenges in the cost of new surface access infrastructure to two airports, the planning risks and complications in taking forward multi-site expansion and that Heathrow's dire noise impacts would continue unabated.
- 3.12. Dispersed expansion in London – with Gatwick as a 'Second Force' in UK aviation – has been tried and failed. There exist no comparable multi-hub systems in one city region; the New York airports system, though often cited, is not an example, nor is it a model of connectivity or efficient operation.
- 3.13. A split site, even if it could overcome substantial barriers to transfers between sites, would be uncompetitive against rival hubs offering connections at a single location.
- 3.14. Regional growth will continue to be an important element of UK aviation – but cannot offer the level of direct connectivity to serve as a substitute for hub airport capacity.
- 3.15. In a world of intensifying hub competition, if London and the UK cannot provide the hub capacity to keep pace with demand, its global connectivity will suffer and business, trade and inward investment will begin to look elsewhere.
- 3.16. The capacity and global connectivity that the UK requires can only be provided with a new single, effective hub airport serving London.

4. Identifying and assessing potential solutions - the process

Figure 1 describes the process of identifying and assessing potential solutions to identify a shortlist of options for the Mayor to take forward for further assessment.

Figure 1: The process the Mayor has followed to produce a shortlist of options



5. Stage 1: identifying assessment criteria

- 5.1. A series of criteria have been developed for Mayor to assess the options for increasing aviation capacity. These criteria span six themes: economic impacts, airport infrastructure, airspace considerations, surface access provision, environmental impacts and the airport's deliverability. They are the result of an open consultation² with the public and members of the aviation, business and political communities, and they come with the backing of an independent Peer Review Group made up of expert advisers (see Appendix A).

Table 2: The Mayor’s assessment criteria (specific objectives and metrics which apply to each criteria are presented in full in Appendix B)

Economic Criteria	
1A	Global connectivity
1B	Maximises economic benefits
1C	Rebalancing of UK economy
1D	Resource capacity
Airport Criteria	
2A	Runway / terminal capacity
2B	Optimised airport facilities
2C	Night Operations
2D	Minimise risk of local factors
Airspace Criteria	
3A	Airspace
Surface Access Criteria	
4A	Access to economic centres
4B	Access to major population centres
4C	Access to population in Europe
4D	Access for freight
Environmental Criteria	
5A	Climate change
5B	Minimises population within noise contour
5C	Minimises effects of poor air quality
5D	Local communities & built environment
5E	Biodiversity
Deliverability Criteria	
6A	Planning and consents approvals
6B	Construction risks and impacts
6C	Value for money, commercially attractive

5.2. The Mayor supplied the Commission with his criteria following its invitation for suggestions, and was pleased to see the Commission publish its own set of criteria³ in May 2013, which were in very close alignment (as illustrated in table 3, below).

Table 3: A comparison of the Airports Commission's criteria, and the Mayor's.

Airports Commission criteria	Corresponding Mayoral criteria	
Strategic Fit:		
Nature, scale and timing of aviation capacity and connectivity delivered by proposal.	1A	Global connectivity
	6A	Construction Risks and Impacts
	6C	Value for money, commercially attractive
Enhancing UK's status as Europe's most important aviation hub	1A	Global connectivity
	2A	Airport capacity
Supporting the Government's commitments and targets	1B	Maximise economic benefits
	1C	Rebalancing of UK economy
	5A	Climate change
Economy:		
National economic impacts	1B	Maximise economic benefits
Regional/local impacts on other economies and airports affected by the proposal,	1B	Maximise economic benefits
Impacts on UK aviation industry, air passengers	1A	Global connectivity
	4A	Access to economic centres
	4D	Access for freight
	2B	Optimised airport facilities
Impacts on local traffic/congestion, private/public split, future capacity Journey times to major destinations	4A	Access to economic centres
	4D	Access for freight
Air quality impacts of surface access links	5C	Minimises effects of poor air quality
Noise impacts at other locations	5B	Minimises population within noise contour
Climate change: relative opportunities for continuous improvement over time	5A	Climate change
People:		
Passenger experience	2B	Optimised airport facilities
	4A	Access to economic centres
	4C	Access to population in Europe
Likely social impacts – vulnerable groups, quality of life, health, etc.	5D	Local communities & built environment
Wider social impacts	5D	Local communities & built environment
Engaging with local communities	5D	Local communities & built environment
	6A	Construction Risks and Impacts
Cost:		
Total cost – associated assumptions and risk	6A	Construction Risks and Impacts
	6C	Value for money, commercially attractive
Financing of proposal	6C	Value for money, commercially attractive
Safety and resilience	2D	Minimise risk of local factors
Airspace	3A	Airspace
Delivery:		
Delivery risk	6A	Construction Risks and Impacts
	6C	Value for money, commercially attractive

6. Stage 2: Identifying a longlist of options

6.1. Options have been included if they:

- have recently been promoted as hub solutions by credible interested parties (including existing airport operators, architecture practices and other stakeholders),
- pass a high level test of geographic proximity and accessibility – and so good journey times – to key areas of population and economic activity. This is an essential requirement for successful well-connected hub airport capacity.

Options on the longlist

6.2. The longlist comprises 16 options in total: 11 single hub sites, four multi-site alternatives, and a 'do nothing' which considers growth of Heathrow, Gatwick and Stansted up to their current capacities. The options are described in Table 4. Figure 2 illustrates the location of each single hub site.

6.3. The single hub sites assume the same optimised 4-fully-independent runway template, designed to meet our hub capacity needs (180 million passengers per annum) in line with DfT forecasts. This also enables comparison of like with like.

6.4. At Heathrow, in addition to the optimised hub airport layout at Heathrow (option 1), an option that entails a lower level of investment by building on and around existing infrastructure is also tested (option 16). This is in line with proposals that have been put forward by the airport in recent years, and does not seek to secure an optimal layout or the required capacity.

Options not on the longlist

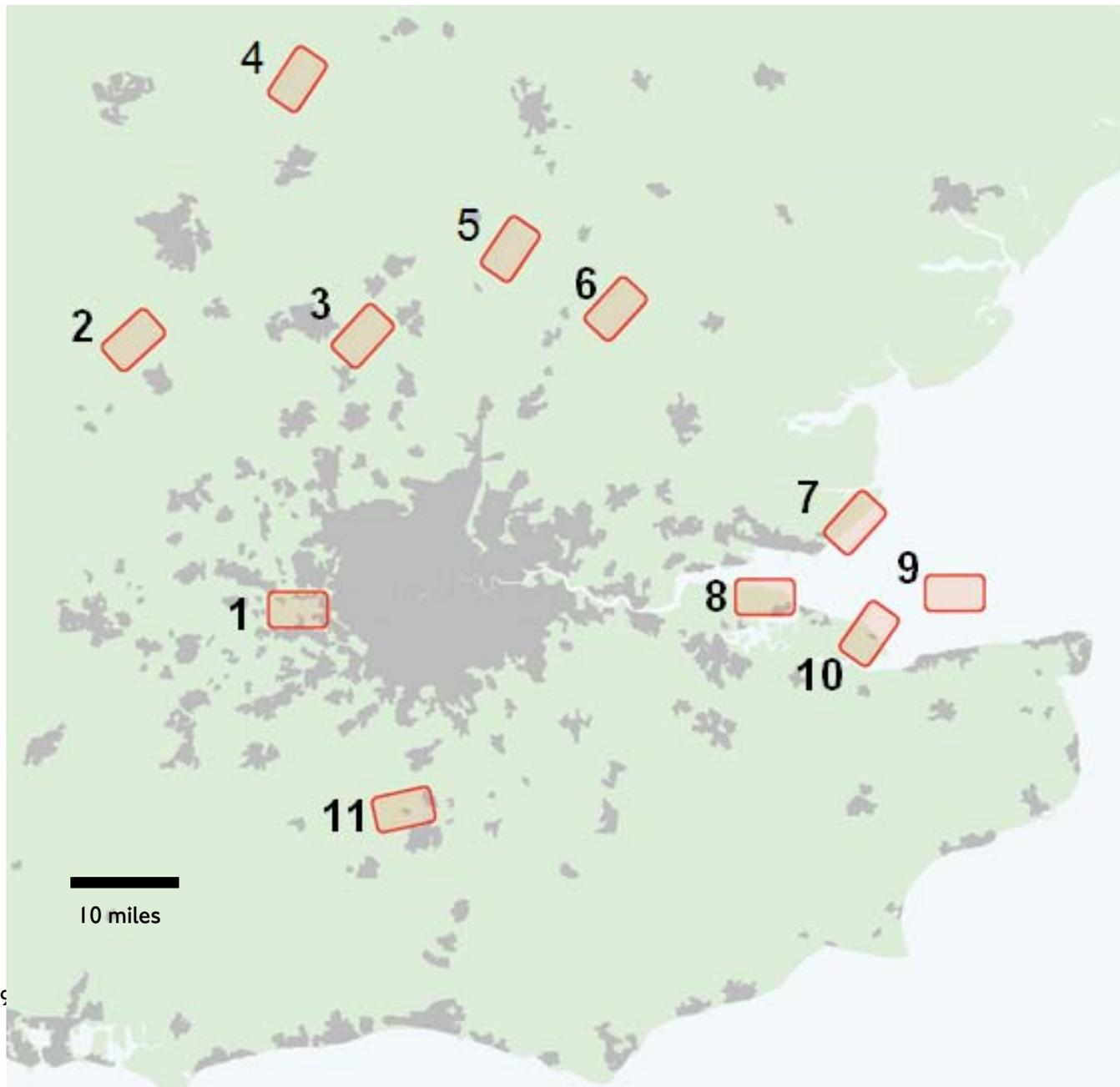
6.5. Regional airport options, such as Manchester were not considered. This is because they cannot offer the strength of local catchment with the high proportion of high value flyers, to provide the O/D traffic underpinning that a successful hub airport requires.

6.6. Other site options which lack credibility as a hub location, many of which are more than 100km from London, are not given further consideration. This includes options proposed at different times such as Alconbury, Birmingham, Goodwin Sands, Lydd, Lyneham, Manston and Southampton. The ability to provide journey times in line with best international practice that meet passenger expectations would be highly challenging. Potential high speed rail journey times into Central London for each of the rejected sites listed above approach or exceed 45 minutes.

Table 4: Longlist of Airport Location Options

Option No.	SITE NAME	Source / Origin	Existing Airport	Distance and direction from central London (km)	Location
1	Heathrow		Y	20km W	G London
2	Cublington	Roskill Commission 1970	N	65km NW	Bucks
3	Luton	Weston Williamson Architects	Y	50km N	Beds
4	Thurleigh		N		
5	Nuthampstead	Roskill Commission 1970	N	60km N	Herts
6	Stansted	MAKE Architects, MAG	Y	50km NE	Essex
7	Maplin	Roskill Commission: minority report 1971	N	70km E	Essex
8	Inner Estuary: Isle of Grain	SERAS 2003, Halcrow / Foster, Bluebase Architects, Olsen	N	50km E	Kent
9	Outer Estuary	RUCATSE 1994, SERAS 2003, Testrad (Oakervee), Gensler	N	85km E	Offshore
10	Inner Estuary: Isle of Sheppey	1965 – 1966 Public inquiry	N	70km E	Kent
11	Gatwick	-	Y	40km S	W Sussex
12	'do nothing'	-	Y	-	multiple
13	'Heathwick' Heathrow-Gatwick ('split site')	-	Y	-	multiple
14	Heathrow 2 + Gatwick 2 + Stansted 2 ('distributed expansion')	Gatwick Airport, Ryanair	Y	-	multiple
15	Heathrow 3 + Gatwick 2 + Stansted 2 ('distributed expansion')	-	Y	-	multiple
16	Heathrow 4 composite expansion	Various sources a. Policy Exchange b. Heathrow Airport 3 rd runway + one at Stanwell Moor	Y	20km W	G London

Figure 2: Location of longlist options



1. Heathrow
 2. Cublington
 3. Luton
 4. Thurleigh
 5. Nuthampstead
 6. Stansted
 7. Maplin
 8. Inner Estuary: Isle of Grain
 9. Outer Estuary
 10. Inner Estuary: Isle of Sheppey
 11. Gatwick
- (the alternative options (12-16) include different forms of development at some of these locations. They are described in section 7.2)

7. Stage 3: Examining and Assessing a long-list of options

- 7.1. To determine the merits of different options, TfL have applied the Mayor's criteria to understand how different options perform. Each option has been subject to a robust and consistent assessment drawing on the data available.
- 7.2. Key assumptions:

Single hub options (1-11)

- For the assessment and comparison of the single hubs on the longlist, a standard design specification (4 full length, fully independent runways and an airport footprint of approximately 10km x 6km accommodating 180 million passengers per annum (mppa), and 1m air traffic movements (ATMs)) has been adopted so that all sites can be assessed on the same basis. This footprint has been superimposed over each potential candidate site.
- For some sites, alternative orientations or layouts have been considered to understand the differences in land-take, noise and environmental impact.
- All shortlisted sites will be the subject of further investigation to fully optimise their location and layout, minimising the impacts of aviation noise, pollution and other airport externalities.

Multi-site options

- **12, do-nothing:** existing sites grow to their current capacity.
- **13, a split site option** with airside rail link, connecting two geographically separate airport sites (Heathrow and Gatwick) with an express airside rail link so that they can offer transfer opportunities across the two locations.
- **14, 2-2-2 distributed expansion.** This would see Heathrow, Gatwick and Stansted each with two runways.
- **15, 3-2-2 distributed expansion.** As 14, but with a third runway provided at Heathrow.
- **16, Heathrow composite expansion.** Expansion of the existing infrastructure at Heathrow to a four runway airport, (*this is distinct from option 1 which is building an entirely new optimised 4 runway layout at Heathrow*).

Applying the Mayor's assessment criteria to each option

- 7.3. Each criteria has been scored on a 1 to 5 scale that is defined for each criteria as set out below. A score of 5 denotes the best performance against the criteria, a score of 1 the worst.
- 7.4. The scores assigned to each option are set out in table 5 on page 18, and the method of assessment and a summary of findings – by criteria – is set out in Appendix C.
- 7.5. Reference should also be made to the option-specific one-pagers which are provided in Appendix D.

Table 5: The scores assigned to each option

The Mayor's assessment criteria	Economic				Airport				As	Surface access				Environmental					Deliverability			Total	
	IA	IB	IC	ID	2A	2B	2C	2D	3A	4A	4B	4C	4D	5A	5B	5C	5D	5E	6A	6B	6C	Total Scores	Rank (unweighted)
Single hub options																							
1: Heathrow	5	4	5	1	5	5	1	5	3	5	5	4	5	5	1	1	1	3	3	1	3	71	11
2: Cumblyington	4	3	4	3	5	5	4	5	3	4	5	3	4	5	4	4	3	5	2	3	2	80	5
3: Luton	5	4	5	4	5	5	2	5	3	5	5	4	5	5	2	2	3	4	3	2	3	81	3
4: Thurleigh	4	4	3	3	5	5	4	5	3	3	2	2	3	5	4	4	4	4	2	3	2	74	9
5: Nuthampstead	4	3	4	4	5	5	3	5	3	4	4	3	5	5	4	4	2	5	2	3	2	79	7
6: Stansted	5	5	5	4	5	5	3	5	3	5	5	4	5	5	4	4	2	4	3	2	3	86	2
7: Maplin	4	3	3	2	5	5	4	5	3	4	3	4	3	5	4	4	4	2	2	3	2	74	9
8: Inner Estuary: Isle of Grain	5	5	5	5	5	5	4	5	3	5	5	4	5	5	4	4	4	2	2	3	2	87	1
9: Outer Estuary	4	4	4	3	5	5	5	5	3	3	2	5	3	5	5	5	5	3	2	2	2	80	5
10: Inner Estuary: Isle of Sheppey	4	4	4	4	5	5	4	5	3	4	3	5	4	5	4	4	4	3	2	3	2	81	3
11: Gatwick	5	4	5	2	5	5	2	5	3	5	4	4	4	5	3	2	2	4	3	2	3	77	8
Alternative options																							
12: Do nothing: LHR (2), LGW (1), STN (1)	1	1	1	4	1	1	1	5	5	5	5	4	5	5	1	1	5	5	5	5	5	71	11
13: Split site: LHR (2), LGW (2), STN (1)	2	3	3	3	2	1	1	5	3	5	5	4	5	5	1	1	1	4	3	4	2	63	14
14: Dispersed expansion: LHR (2), LGW (2), STN (2)	1	2	1	3	1	1	1	5	3	5	5	4	5	5	1	1	1	4	4	4	4	61	16
15: Dispersed expansion+LHR: LHR (3), LGW (2), STN (2)	2	3	3	3	1	1	1	5	3	5	5	4	5	5	1	1	1	4	3	3	4	63	14
16: Heathrow 'sub optimal' composite expansion	5	4	5	1	3	3	1	5	3	5	5	4	5	5	1	1	1	3	3	2	3	68	13

8. Stage 4: Sensitivity and criteria weighting scenarios

- 8.1. Table 5 sets out the scores that have been assigned to each option.
- 8.2. If all criteria were given an even weight and added up, the single hub sites at Inner Estuary (Grain and Sheppey), Stansted, Luton, Outer Estuary and Cublington score highest.
- 8.3. It is important to understand how sensitive any ranking is to individual criteria. A sensitivity assessment has been undertaken to show how each location's performance differs if alternative weightings are applied to certain criteria. This has allowed consistent top performers to be identified and shortlisted.
- 8.4. The following weighting scenarios have been tested. The eight best performing options in each scenario are presented in Figure 3:

Scenario 1: A double score applied to all economic criteria

The primary driver for an increase in aviation capacity is its economic impacts; it is essential that any proposals taken forward support regional and national economic objectives and maximise the economic and social benefits for the UK.

Scenario 2: A double score applied to all environmental criteria

The impacts of aviation on local communities and the natural environment must be minimised if any expansion of aviation is to be sustainable.

Scenario 3: A double score applied to all surface access criteria

These criteria are designed to ensure that an airport has the required access provision: drawing on the widest pool of passengers, staff and freight will be essential to any airport's success. Sufficient new road and rail capacity is integral to any airport option, and a high public transport access mode share will be key to ensuring a sustainable airport.

Scenario 4: A double score applied to all airport design criteria

Any new airport facilities should meet the needs of airlines, passengers and freight by enabling an efficient, effective, safe airport operation that is competitive with the best airports in the world.

Scenario 5: A double score applied to all deliverability criteria

Any new aviation capacity must be capable of being delivered. This must take into account likely planning and construction issues, the commercial and economic case and the ability to secure funding and finance.

The Mayor's objectives: Double scores applied to eight key criteria which reflect key policy priorities of the Mayor

A number of the criteria reflect key policy priorities of the Mayor (IA global

connectivity, 1B maximises economic benefits, 1D resource capacity, 2C night operations, 4A access to economic centres, 5B minimises population within noise contour, 5D local communities and built environment, 6C value for money, commercially attractive).

8.5. Different stakeholders will have different views on what the most important criteria are for identifying a new hub airport location. This assessment is designed to establish the extent to which those differing views might impact upon the conclusions drawn with regard to those sites which perform best

Figure 3: Criteria weighting scenarios, and the impact on an option ranking

Unweighted			Scenario 1: Economic scores count double			Scenario 2: Environmental scores count double		
1	87	Isle of Grain	1	107	Isle of Grain	1	106	Isle of Grain
2	86	Stansted	2	105	Stansted	2	105	Stansted
3=	81	Luton	3	99	Luton	3	103	Outer Estuary
3=	81	Isle of Sheppey	4	97	Isle of Sheppey	4=	101	Isle of Sheppey
5=	80	Outer Estuary	5	95	Outer Estuary	4=	101	Cublington
5=	80	Cublington	6=	94	Cublington	6	99	Nuthampstead
7	78	Nuthampstead	6=	94	Nuthampstead	7	97	Luton
8	77	Gatwick	7	93	Gatwick	8	93	Thurleigh

Scenario 3: Surface access scores count double			Scenario 4: Airport scores count double			Scenario 5: Deliverability scores count double		
1	106	Isle of Grain	1	106	Isle of Grain	1	94	Isle of Grain
2	105	Stansted	2	104	Stansted	2	94	Stansted
3	100	Luton	3=	100	Outer Estuary	3	89	Luton
4	97	Isle of Sheppey	3=	100	Isle of Sheppey	4	88	Isle of Sheppey
5	96	Cublington	5	99	Cublington	5	87	Cublington
6	95	Nuthampstead	6	98	Luton	6=	86	Outer Estuary
7	94	Gatwick	7	97	Nuthampstead	6=	86	Do nothing
8	93	Outer Estuary	8	94	Gatwick	6=	86	Nuthampstead

**The Mayors objectives:
8 Mayoral criteria count double**

1	121	Isle of Grain
2	117	Stansted
3=	111	Outer Estuary
3=	111	Isle of Sheppey
5	109	Luton
6	107	Cublington
7	105	Nuthampstead
8	103	Gatwick

9. Stage 5: Identifying a shortlist of options to be taken forward for detailed assessment

- 9.1. New single hub options perform much better than the alternative options. The economic advantages of a single hub are pronounced, as are the environmental disadvantages of options which involve the retention or expansion of Heathrow.
- 9.2. Two sites consistently come out on top in each scenario - the Inner Estuary: Isle of Grain and Stansted. The Outer Estuary, Luton, and the Inner Estuary: Isle of Sheppey are the best of the rest. Of these:
- There is considerable complexity for a new hub at Luton to overcome in terms of significant physical constraints – primarily its undulating topography, and the proximity to many small and medium sized settlements;
 - The Inner Estuary: Isle of Sheppey is broadly similar to the Inner Estuary: Isle of Grain, but significantly greater distance from economic activity;
 - There are potentially game-changing environmental advantages in terms of impacts on local communities of an Outer Estuary option.
- 9.3. As such the Mayor has chosen to take forward the Outer Estuary as his third shortlisted site, in spite of its greater distance from economic centres, on the basis of its uniquely strong performance against key environmental criteria.
- 9.4. The Mayor's shortlisted options are a therefore, a new single hub at:
- Inner Estuary: Isle of Grain** – this option scores consistently highly, including through sensitivity testing. It presents a good balance between maximising the economic and regeneration impacts that a hub airport could have, whilst able to reduce and manage the negative impacts of aviation.
- Stansted** – this option also scores consistently highly. It is well located to serve key economic centres whilst keeping the impacts on population to a minimum. It has the potential to support high value economic growth in the London – Lea Valley – Cambridge corridor. Strategic road and rail connections could be developed to offer excellent access.
- Outer Estuary** – this option offers unique environmental advantages. The location of the airport is such that aircraft operations could have no noise or adverse air quality impact. Although the site is located some distance from economic centres, and construction costs and risks could be greater – the opportunity to remove all the negative impacts of aviation away from population means that this option should be subject to further investigation.

- 9.5. The Mayor will submit a proposition for a new hub airport at each of these three locations to the Airports Commission by 19 July 2013.

References

¹ Mayor of London. A new airport for London. Part 1 – The case for new capacity. January 2011, and Mayor of London. A new airport for London. Part 2 – The economic benefits of a new hub airport. November 2011

³ TfL launched a consultation on a draft set of criteria on December 21 2012. The consultation ran for eight weeks to February 8 2013, and asked a number of questions. They included both the relative importance of the different criteria and their appropriateness, as well as an overarching question on the need for increased airport capacity serving London and the South East. More than 150 responses were received, from key industry, business, environmental and local authority stakeholders, as well as individuals.

⁴ Airports Commission. Guidance Document 02: Long Term Capacity Options, Sift Criteria, May 2013.

Appendices

Appendix A: The Mayor's Aviation Peer Review Group

This group has been asked to provide independent advice and expertise to the Mayor, in a personal capacity. It comprises the following individuals, who possess a broad mix of planning, economic, environmental and aviation expertise:

- Chris Cain
Principal, Aviation Strategy and Policy Consultancy
- Mike Forster
Director, Forster Associates
- John Green
Managing Director, Face Group
- Professor Sir Peter Hall
Bartlett Professor of Urban Regeneration and Planning, UCL
- Professor Paul Hooper
Chair of Environmental Management and Sustainability, MMU
- Bridget Rosewell
Senior Partner, Volterra Partners
- Bob Schumacher
Managing Director, UK & Ireland, for a leading airline
- Roy Vandermeer OBE QC
Inspector, Heathrow Terminal 5 Inquiry

The Peer Review Group has been closely involved in the development, refinement and review of the application of the assessment criteria.

Appendix B: The Mayor's criteria for assessing options for new airport capacity

Criteria for additional aviation capacity	Target/Metrics to include
<h3>1. Economic criteria</h3> <p>Maximising economic and social benefits</p>	
I A. Global connectivity that meets our future economic needs and enhances our international competitiveness	<ul style="list-style-type: none"> • Key destinations served at required frequency (including emerging economies, UK) • Air freight capacity to key destinations
I B. Connectivity which maximises economic benefits to London, the South East and the rest of the UK.	<ul style="list-style-type: none"> • Net increase in GVA • Net increase in jobs • Ability to meet local, regional, and national growth and regeneration policy goals
I C. Supports Government objectives for rebalancing of the UK economy	<ul style="list-style-type: none"> • Potential to support current and prospective high-growth, value-added, export-oriented and employment-generating sectors
I D. Local area has the necessary resource capacity potential	<ul style="list-style-type: none"> • Capacity to support the number of new jobs, homes and services required and associated business development
<h3>2. Airport infrastructure criteria</h3> <p>Competitive, efficient, effective and safe, while meeting needs of airlines, passengers and freight</p>	
2A. Runway/terminal capacity configured so as to maximise global connectivity and meet long-term demand (2050 and beyond)	<ul style="list-style-type: none"> • Air traffic movements (ATMs) • Passenger throughput (mppa) • Ensuring operational efficiency and resilience
2B. Optimised airport facilities to enable airlines to maximise their economic effectiveness	<p>Competitive, world-class facilities with appropriate capacity and configuration maximising</p> <ul style="list-style-type: none"> • the quality and connectivity offer for passengers • existing and future UK logistics activity
2C. Enables night operations in a location where stringent restrictions are not required to protect local populations	<ul style="list-style-type: none"> • Potential for 24hr operation to support longhaul arrivals and freight movements
2D. Minimises the risk of local factors affecting safe and planned airport operations	<ul style="list-style-type: none"> • Local limitations, restrictions and risks

3. Airspace criteria

Supports the effective and safe operation of the airspace

3A. Meets operational and safety-related airspace requirements	<ul style="list-style-type: none"> • <i>Compatible with relevant national and European airspace regulations, strategies and constraints</i>
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4. Surface access criteria

Enabling passenger, staff and freight access from optimal catchment area, underpinned by a sustainable mode share

4A. Fast, direct rail and road access to economic centres supporting aviation-dependent activity that can also support local and regional transport needs	<ul style="list-style-type: none"> • <i>Rail journey time/accessibility/capacity to key locations</i> • <i>Capacity and connectivity to strategic highway network</i> • <i>Minimising adverse impacts for non-airport-related traffic</i>
4B. Fast, direct rail access to major population centres in the UK	<ul style="list-style-type: none"> • <i>Rail journey time/accessibility/capacity to key cities</i>
4C. Fast, direct rail access to major population centres in continental Europe	<ul style="list-style-type: none"> • <i>Rail journey time/accessibility/capacity to key cities</i>
4D. Road and rail access for freight to key locations	<ul style="list-style-type: none"> • <i>Rail journey time/accessibility/capacity to key locations for freight</i> • <i>Road capacity and connectivity to key locations for freight</i>

5. Environmental criteria

Minimising the impact on local communities and the natural environment

5A. Compatible with the Government's Climate Change commitments	<ul style="list-style-type: none"> • <i>ATMs compatible with CCC UK-wide targets</i>
5B. Minimises the number of people exposed to aircraft noise	<ul style="list-style-type: none"> • <i>Population exposed to noise in excess of the EU 55dB L_{den}</i>
5C. Minimises the number of people affected by poor air quality	<ul style="list-style-type: none"> • <i>Number of exceedances of EU limit values on local air quality (NO₂ and PM_{10/2.5})</i>
5D. Can address impacts on local communities and the built environment	<ul style="list-style-type: none"> • <i>Number/type of properties affected including cultural heritage assets</i> • <i>Opportunity to mitigate negative impacts on local communities' quality of life</i>

5E. Can address impacts on wildlife, biodiversity and landscape	<ul style="list-style-type: none"> • <i>Capable of meeting requirements of European protected sites</i> • <i>Number / type of national and regional designated wildlife and landscape areas potentially affected</i>
6. Deliverability criteria Capable of being delivered and funded, representing value for money	
6A. Can secure planning and consents approvals addressing challenges and in appropriate timescale	<ul style="list-style-type: none"> • <i>Process and timescales for securing consent</i> • <i>Level of planning risk</i>
6B. Can address any construction risks and impacts on existing operations	<ul style="list-style-type: none"> • <i>Level of construction risk/complexity</i>
6C. Value for money, commercially attractive proposition	<ul style="list-style-type: none"> • <i>Attractive proposition to both London and the UK</i> • <i>Commercially attractive proposition for potential investors</i>

Further information regarding the development of these criteria is contained within the Mayor's publication 'New airport capacity options – Assessment criteria; Consultation Results. March 2013'. This document is available online at www.newairportforlondon.com.

Appendix C: Applying the Mayor’s assessment criteria to each option – the method

1: Worst		5: Best
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I A. Global connectivity

Reflects the ability of an airport location to pool enough catchment and transfer passenger demand to sustain the best possible air service connections.

Local base demand of less than 3 million, few aviation intensive activity and/or limited capacity for passengers and ATMs		Large local demand pool (<60km) of 10 million+ including aviation-intensive activity, and capacity for 150+mppa / 1m+ ATMs
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Single hub options able to maximise transfer passenger demand – near to large urban settlements with large local demand – score best. The connectivity made available by capacity at a new single site would be far superior multi-site options.

I B. Maximising economic benefits

Reflects ability of each option to maximise the number of jobs and GVA generated and alignment with growth and regeneration policy objectives, combined with ability to offer a wide route network.

Unable to support important routes and poorly located to support economic growth		Can sustain excellent route network facilitating business and trade supporting growth
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Single hub options located close to existing areas of intensive economic activity and those at the heart of growth and regeneration areas perform more strongly than options more remote.

I C. Sectoral rebalancing of the UK economy

Reflects ability of each option to maximise the number of jobs and GVA generated and alignment with growth and regeneration policy objectives, combined with ability to offer a wide route network.

Unable to support high-value growth industry		Potential to sustain routes and serve areas important for high-value growth industries
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Single hub options located near to these activities (including current airport locations) score best as the new capacity available could help break into emerging markets not currently served. Locations away from where this industry is traditionally located score less well, as do multi-site options.

ID. Resource capacity

Reflects the ability of each location to support the jobs and local economic development associated with a large hub airport.

Area highly constrained, with severe lack of available resources and poor potential to accommodate infrastructure



Area has potential to fully provide all necessary resources for the new hub airport(s) and supporting infrastructure

The greater development potential in areas which are within 60km of Central London compared to other parts of the generally constrained South East is reflected in the high ranking achieved by the Inner Thames Estuary options and Stansted. Luton also performs well. Gatwick and Heathrow score less well, as they are located in areas which have significant physical and infrastructure capacity constraints, frequently experiencing over-heating and congestion.

2A. Runway/terminal capacity

Reflects the ability to support air traffic movements and passenger throughput demand as forecast by the DfT whilst at the same time retaining sufficient capacity for resilience.

Site inadequate to meet need



Site (s) of sufficient scale/configuration

New hub airport sites score well as it is assumed that a new hub airport would be constructed to meet forecast demand and resilience needs far into the future. The alternative options do not score well as they lack the capacity needed to operate efficiently and with resilience built into operations.

2B. Optimised airport facilities

Reflects the potential ability of the airport to act as a world-class hub, meeting the needs of passengers, airlines and freight based on connection times and terminal/stand allocation.

Configured in a way that precludes minimum connection times of less than 90 minutes



Design and layout of provision allows a minimum connection time of 45 minutes to be achievable

All designed-from-scratch hub locations score well as it is assumed minimum connecting times of 45-60 minutes could be achieved. They would also provide the capacity for one or more anchor carrier to base its operations at the hub. The multi-site options such as a split hub score poorly as competitive connection times could not be offered and journey opportunities would be lost.

2C. Night operations

Reflects the ability of the airport to accommodate night operations and the improvements in connectivity this brings, in a location which does not necessitate stringent restrictions to protect local communities.

Night operations not tenable in the long-term due to the number of people affected by noise		Unconstrained night operations
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Sites away from populations such as the Outer Estuary and Isle of Grain score best. Options in close proximity to urban areas have the greatest night operation impacts and score poorly.

2D. Minimise risk

Reflects the risks involved in constructing and operating an airport in compliance to all applicable safety standards and the extent to which such risks can be minimised.

Location carries with it a significant risks to safe and reliable airport operations		Risk to planned airport operations due to local factors is minimised
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All options are assumed to have the potential for risks to be minimised to acceptable levels.

3A. Airspace

Reflects the feasibility of an airspace solution for each option given sufficient time and resources to re-design the airspace and implement the necessary changes.

The challenges faced by airspace are insurmountable		There are no airspace challenges
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All options involving a substantial increase in capacity score equally on this criterion. NATS have stated that it is reasonable to assume that operational procedures and airspace changes could be developed to accommodate expansion of aviation capacity in all the scenarios considered.

4A. Access to key economic centres

Reflects the potential for fast rail and road access from each site to key economic centres supporting aviation-dependent activity. Good connections to the road and rail network will ensure any location can be accessed from a range of important economic clusters.

Very low levels of rail and road connectivity to key economic centres		Very high levels of rail and road connectivity to key economic centres
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Options within 50km of central London – including Heathrow, Stansted and the Inner Estuary – score best; this implies a journey time of less than 30 minutes by high speed rail to central London (West End/City/Docklands).

4B. Access to major population centres

Reflects the population catchment areas of the sites, together with their accessibility by road and rail to the key population centres of the UK. The ability to provide fast rail access as part of a sustainable surface access strategy is a key consideration.

Very low levels of rail and road connectivity to key population centres and population within 60 km of less than 3 million		Very high levels of rail and road connectivity to key population centres and population within 60 km of greater than 10 million
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The best performers are options closest to London, which could feasibly be linked with new high speed rail connections to other areas of the UK.

4C. Access to continental Europe

Reflects the ability to draw demand from Northern Europe using high speed rail.

Poor connectivity to Europe - potential High Speed rail journey time to Lille greater than 125mins		Very good connectivity to Europe - potential High Speed rail journey time to Lille within 75mins
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Options located closest to HSI and the Channel Tunnel score most highly.

4D. Access for freight

Reflects the location's ability to cater for freight movements from the airport to areas of population and to specific hubs of freight activity.

Poor road and rail links to key freight centres		Very good road and rail links to key freight centres
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Options which provide good access to key centres of economic activity and key freight/logistics clusters score best.

5A. Compatible with climate change

Reflects the extent to which growth in aviation can be compatible with Government targets for climate change.

Climate Change targets cannot be met		Aviation growth at this location will be in line with Climate Change targets
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All options are compatible with the climate change targets set by Government.

5B. Population within noise contour

Reflects noise impacts upon population on the basis of noise mapping undertaken and existing published noise data.

Unacceptable impact in terms of noise in a 55dB with 400,000+ as well as much higher dB bands		Less than 10,000 people within the 55dB contour and no-one within much higher dB bands
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Options that perform very strongly include those in coastal or offshore locations away from population such as the Outer Estuary. Options at highly urban locations perform particularly poorly, given the far greater number of people exposed to noise.

5C. Air quality

Reflects proximity to population who would be susceptible to the impacts of poor air quality, and to designated Air Quality Management Areas (AQMA).

70,000+ living within 1.5km of site and AQMAs present within 0.5km		Minimal air quality impact less than 10,000 population within 1.5km of the site, and no AQMAs within 0.5km
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[AQMA represent areas that already suffer from sub standard air quality]

Options that are distant from AQMAs and have the lowest population downwind perform the best. These sites include coastal locations and other less populated areas such as the Outer Estuary, Isle of Grain and Isle of Sheppey.

5D. Local communities & built environment

Reflects potential impact on population displacement and damage to cultural heritage sites.

100,000+ local residents along with cultural heritage with be displaced		Little or no impact on residents and no cultural heritage damage
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Locations which can accommodate the required airport footprint and affect the fewest homes score the best. These locations include those in coastal areas and those distant from densely populated areas.

5E. Biodiversity

Reflects the presence in proximity to the airport both of internationally designated sites (SAC, SPA or Ramsar) and of nationally designated sites (SSSI or rMCZ).

Large scale impact on biodiversity that could not be mitigated		No national or international designations within the footprint of the site and no international designations within 2km of the site
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The best performing locations are those which are least constrained with regard to the presence of designated sites. These include inland locations at Cublington and Nuthampstead. The impacts would be considerable in coastal and estuary locations, requiring significant mitigation.

6A. Planning and consents approvals

Reflects the risk involved in gaining the consents and approvals for new airport capacity.

High risk and consents not feasible in timescales		Minimal risk
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The larger the scale of development the greater the planning and consent risk. All options involving the development of new capacity carry significant – though not insurmountable – planning and consent risks.

6B. Construction risks and impacts

Reflects the risks and impacts involved with construction. The following assumptions were made: the larger the construction task, the bigger the risk; and building around existing operational airport has greater risk. Account has also been taken of the extent to which construction may be constrained by physical factors in the vicinity of the sites.

High construction risks and impacts with considerable unknowns		Low construction risks and impacts
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Significant constraints would apply to every new capacity option. Particular operational constraints would be involved in developing new capacity alongside an existing airport at Heathrow, given its complexity – and to a lesser extent at Gatwick, Stansted and Luton. Luton suffers from significant topological constraints on the site, while the Outer Estuary faces some challenges in building offshore.

6C. Value for money, commercially attractive

Reflects the potential value for money and commercial attractiveness that each site offers.

No visibility of potential funding sources and value for money questionable		Good value for money for both London and UK and reasonably likely to attract private interest
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Greater clarity exists over potential funding sources for current (large) airport sites than new sites and hence score higher. Sites near high population/economic activity score higher than remote sites, on the basis that accessibility to market will enhance commercial attractiveness.

Appendix D: Site specific assessments

1. Locating a new hub airport at Heathrow



Key Facts:

- Site of existing major airport in Greater London – 20km west of Central London. A new effective hub airport would more than double the size of the existing airport footprint.
- Travel time to Central London with a new direct High Speed Rail link: 15 minutes
- Population inside 55dB L_{den} Noise Contour – Extremely high, 1m+
- Severe adverse impacts and challenging to deliver whilst retaining existing airport

Economic – Located in the high productivity West London / Thames Valley economy, and with access to a large demand pool including aviation-intensive economic activity. Location has strong potential to support some sectoral rebalancing by supporting existing clusters of in the Thames Valley and West London, although the area has significant physical and infrastructure capacity constraints. Road congestion is frequently experienced. The capacity to support significant growth in local jobs and in the local economy is limited. The scale of growth a new airport will stimulate is unlikely to align with local and regional environmental policy objectives.

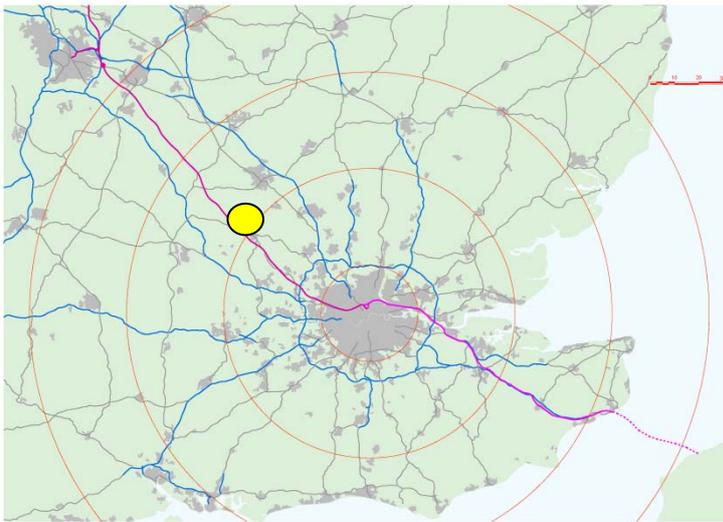
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant additional land, displacing a very substantial number of residents. An extremely large population surrounding the airport will increase the population exposed to noise, warranting significantly constrained night operations (ideally no flights between 2300 and 0700).

Surface Access – The site is well located with respect to a number of strategic road links providing good access to population and economic centres. However there are already substantial capacity constraints during peak periods on a number of these links. The nearby sections of the M25 are amongst the most congested parts of the national strategic road network. Rail provision is relatively good towards central London, and additional capacity will be made available by both Crossrail in 2018 and the Piccadilly line Upgrade – though both will also be catering for significant background demand. Public transport connections to the north, west and south of the airport are currently relatively poor. Airport expansion would require a step change in rail capacity, both to central London, and other key catchment areas. It will be necessary to achieve a more sustainable surface access mode share than current, or the road network would experience significant and severe increases in delay. Even in the event of an improved public transport mode share, the road network will still require substantial upgrading.

Environment – The airport currently has by far the worst noise impacts of any airport in Europe. Expansion would expose even more people to these impacts. In terms of air quality, downwind is a large and densely populated area, including many Air Quality Management Areas – and the site suffers from proximity to several arterial road routes which contribute to high pollution levels and in a number of cases, exceedance of EU limits. The area is also highly constrained regarding Habitats Regulations and designations.

Deliverability – Achieving the relevant planning and consents approvals would be a significant challenge due to the strength of opposition – as seen for the 3rd runway proposals. There is limited local capacity within the current planning regime to ensure the maximum downstream scale of associated development and jobs growth can be secured. This is especially important for accommodating new freight and logistics activity. Retaining existing hub airport operations throughout the construction process in a constrained environment would prove highly challenging. Investment here would likely prove attractive to the private sector.

2. Locating a new hub airport at Cublington



Key Facts:

- New airport location in Buckinghamshire – 65km northwest of Central London
- Proposal recommended by the Roskill Commission in 1970
- Travel time to Central London by High Speed Rail (assuming HS2) : 30-35 minutes
- Population inside 55dB L_{den} Noise Contour – Mid Range

Economic – Located mid-way between London and Birmingham in one of the UK's busiest and fast expanding transport corridors (with HS2), the site has potential to connect into the surrounding economies including the growth areas of Milton Keynes and Oxford, as well as serving London. While there is theoretical potential, development is likely to be space constrained at the immediate site and in some of the surrounding areas and economic nodes. Large scale and 24/7 freight and logistics operations will be difficult to achieve. The scale of growth would be difficult to align with local environmental policy objectives. Labour market capacity constraints may emerge including displacement of some workers from existing economic clusters. Good potential to support some sectoral rebalancing and growth policy especially if rail and air linkages are developed to the UK regions.

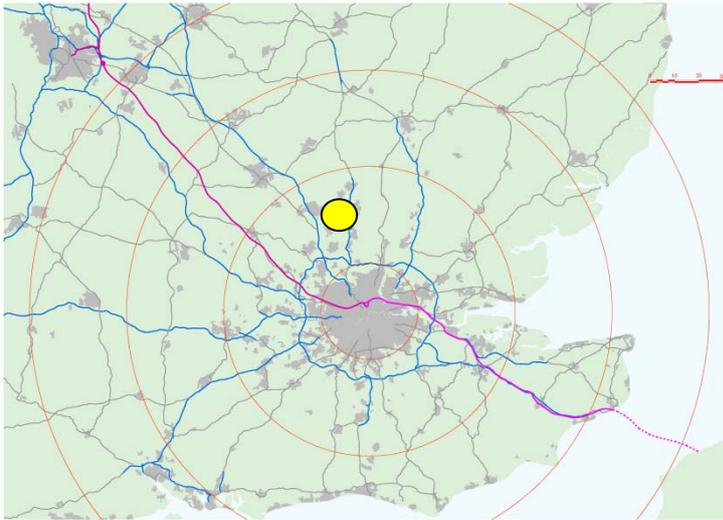
Airport operations – As there is no existing airport at this location a new hub airport would be designed with optimised facilities that will enable a high quality passenger and freight offering. Significant night flight constraints are likely due to a significant and dispersed population in close proximity to the site.

Surface Access – The site is well located relative to current and future airport demand (including freight), but would require significant infrastructure investment to provide the capacity and connectivity on road and rail networks to access major population centres in both the South East and rest of the country. The site is located between the M1 and M40 motorway corridors. Widening of the M1, M40 and M25 corridors is likely to be required. The site is located on the proposed route for the High Speed 2 rail line which will provide good rail connectivity, but not necessarily the required capacity, to London and the South East, as well as areas north.

Environment – The rural location will mean a smaller number of people will be affected by noise than other more urban locations. No large population centres are likely to be affected by poor air quality. The site would require the relocation of a significant population to provide the required site area.

Deliverability – Achieving the relevant planning and consents approvals would be a challenge, and face significant potential local opposition. Construction risks at this location would be relatively similar to all new hub airport sites. Investment here could prove attractive to the private sector.

3. Locating a new hub airport at Luton



Key Facts:

- Existing international airport in Bedfordshire – located 50km north of central London
- A proposal for a new hub airport at the site has been put forward by Weston Williamson Architects
- Travel time to Central London by a new, direct High Speed Rail link: 20–25 minutes
- Current maximum capacity – single runway, 133,700ATMs / 18.5 mppa
- Population inside 55dB L_{den} Noise Contour –High

Economic – Located relatively close to London, adjacent to a small established airport and the M1, the site has potential to connect into the surrounding economies which includes growth areas such as Milton Keynes and the commuter belt north and west of London. There is potential to support some sectoral rebalancing and UK growth policy as well as local regeneration ambitions. The surrounding area may have more potential to absorb development than other sites, if considerable land constraints were addressed.

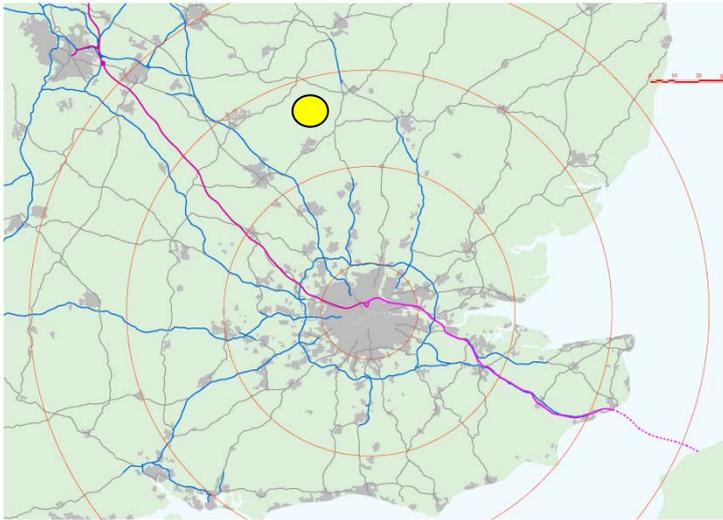
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant additional land. The undulating topography of the area is also a difficult and expensive obstacle to overcome in siting an airport here. Significant night flight constraints are likely due to a significant and dispersed population in close proximity to the site.

Surface Access – The site is well located relative to current and future airport passenger and freight demand. At present there are good connections to the motorway network as the site is located between the M1 and A1 (M) which connect to a number of major population centres to the north and south. However significant widening of the M1, A1 (M) and M25 is likely to be required. While good rail connections exist currently to central London via the Midland Mainline, a step change in rail capacity – potentially involving the construction of a new rail line to Central London would be required to ensure a sustainable surface access mode share. Key catchment areas to the west of London would require new connections – including links such as a potential Oxford-Cambridge rail orbital.

Environment – The flightpaths of the existing airport are routed so as to avoid several large urban areas in relative proximity, but this would not be possible with a 4-runway hub, which would have a large impact in terms of noise exposure. A number of settlements are within both 55dB and 65dB noise contours. Adverse air quality impacts would be keenly felt west of Stevenage and at the smaller settlements of Old Knebworth and Codicote, downwind of the proposed site. There are two sites of Special Scientific Interest (SSSI) within the footprint of the proposed airport. The new airport will also require the displacement of a number of surrounding settlements and population.

Deliverability – Achieving the relevant planning and consents approvals would be a challenge, and face significant potential local opposition. Construction risks are substantial, especially so if the existing airport is kept operational throughout. There are significant local physical constraints in terms of topography and local settlements. This will give rise to considerable construction challenge and risk. Investment here could prove attractive to the private sector.

4. Locating a new hub airport at Thurleigh



Key Facts:

- New airport location in Bedfordshire – 90km north of Central London
- Disused RAF Airfield
- Travel time to Central London on a brand new High Speed Rail link: 30-35 minutes
- Population inside 55dB L_{den} Noise Contour – Low

Economic – Located north of Bedford and east of Northampton, the site is distant from London but near a concentration of the UK logistics industry. It is surrounded by a number of towns that have experienced relatively high population growth in the recent past. The population of the surrounding area is generally low density and rural in character. There will be some policy alignment with growth and regeneration objectives though potential for conflict between the maximum scale of development and local environmental policies.

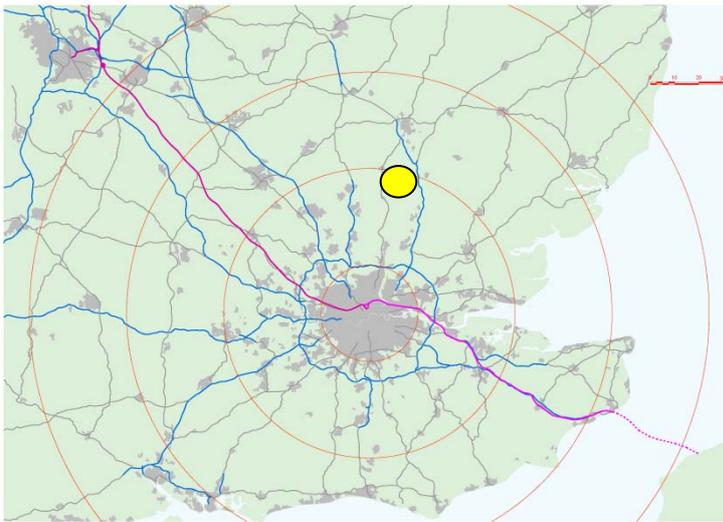
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. The rural location means that at this site night operations could be relatively unconstrained.

Surface Access – This site is accessible to the A1 (M) and A14/M11 corridors but it is some 90 km from Central London. It would require significant investment in rail and road infrastructure. It would need to be connected to the existing strategic road network, and while good rail connections exist currently to central London via the Midland Mainline, which runs close to the site, a step change in rail capacity – potentially involving the construction of a new rail line to Central London would be required to ensure a sustainable surface access mode share. Key catchment areas to the west of London would require new connections – and links such as an Oxford-Cambridge rail orbital.

Environment – Due to the rural location of the proposed site noise and air quality impacts would be relatively low when compared to other options. The site would impact biodiversity with one Special Protected Area (SPA) within the footprint and one within 13km of the proposed site. Population displacement would be relatively limited.

Deliverability – Achieving the relevant planning and consents approvals would be a major challenge, with significant potential local opposition. The significant distance from current and future centres of economic activity may make the site relatively less attractive to investment from the private sector.

5. Locating a new hub airport at Nuthampstead



Key Facts:

- New airport location in Hertfordshire – 60km north of Central London
- Location first proposed by the Roskill commission 1970
- Disused RAF airfield
- Travel time to Central London on a new direct High Speed Rail link: 25 minutes
- Population inside 55dB L_{den} Noise Contour – Low

Economic – Located between London and Cambridge, the site has the potential to support both high value growth to the north and regeneration of the Lea Valley corridor to the south. The site offers considerable economic potential (growth in value added and jobs) and to do so at this location aligns well with a range of Central Government and regional policies. A relatively under-developed area, the extent of future development that is possible would relate to the local environmental policies and other constraints. There is good potential for an airport at this location to support sectoral rebalancing of the economy in particular in high technology and bio-science industries.

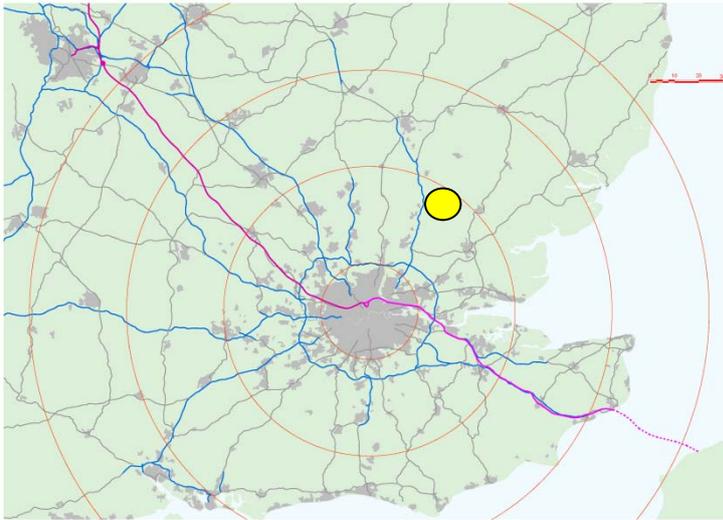
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. It would have to be carefully configured to avoid impacting on operations at Stansted and Luton airports. Some night flight restrictions are likely to be imposed due to the population in proximity to the site.

Surface Access – The site is relatively well located with respect to accessibility to key centres of economic activity including Cambridge and London. It is accessible to the M11 corridor but would require significant investment in infrastructure, including widening of the M11 and M25 to connect to existing road networks to access the major population centres. The site is remote from the proposed High Speed 2 rail corridor, but is near to the East Coast Mainline and West Anglia Mainline. Neither could accommodate the scale of demand and a step change in capacity and journey time to key catchment areas, including Central London would be required.

Environment – Relatively few people will be affected by aircraft noise. There are no internationally designated sites affected, although Great Hormead site of special scientific interest is located within 2km of the site, therefore the development is potentially constrained. There will be some adverse air quality impacts for Elmdon. The number of people that will have to be relocated is relatively low.

Deliverability – Achieving the relevant planning and consents approvals would be a challenge, with significant potential for local opposition. A new airport at this location could be attractive to the private sector.

6. Locating a new hub airport at Stansted



Key Facts:

- Existing airport in Essex – Located 50km northeast of Central London
- Proposals for a new hub airport at Stansted have been put forward by MAKE architects
- Travel time to Central London on a new high speed rail link: 20-25 minutes
- Current maximum capacity – single runway: 253,000ATMs / 36 mppa
- Population inside 55dB L_{den} Noise Contour – Mid Range

Economic – Located between London and Cambridge on the M11 and already a sizeable airport (with supporting infrastructure), the site has the potential to support both high value growth to the north around Cambridge and regeneration of the Lea Valley corridor. Economic potential is considerable (GVA, jobs), and would offer good policy alignment. Local environmental policies may restrict the extent of development that can be accommodated in close proximity to the airport. There is good potential for an airport at this location to support sectoral rebalancing of the economy in particular in high technology and bio-science industries.

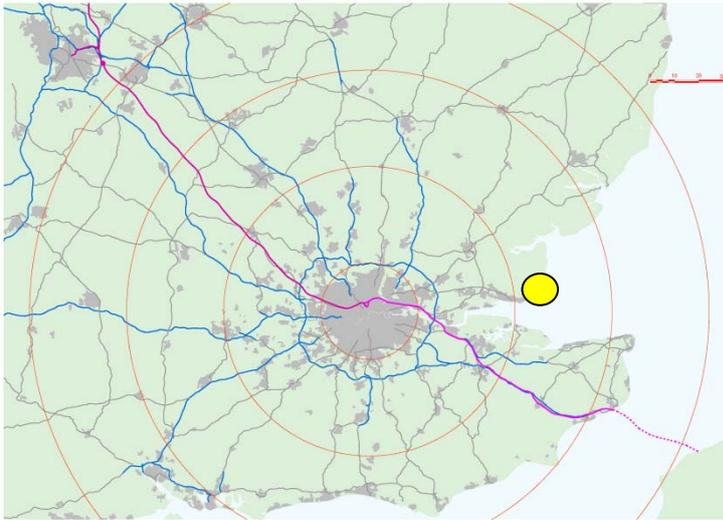
Airport operations – A new hub airport could be located alongside the existing point-to-point airport. Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. It would have to be configured to avoid impacting on operations at Luton. Some night flight restrictions are likely to be imposed due to the population in proximity to the site.

Surface Access – This site has good accessibility by road and rail to key centres of economic activity. The current airport is linked directly to the M11 offering good access for freight but a new hub would require further investment in road infrastructure, including widening of the M11 and M25, and upgrades to key roads north of the site. The site is connected to existing rail services to London and other destinations, although orbital connections are limited. The site is on the West Anglia mainline and close to the East Coast mainline, but a new hub would require a step change in capacity and journey time to Central London and key catchment areas.

Environment – There would be negative noise impacts on the local population. Part of Bishop's Stortford would likely lie within a 55dB L_{den} noise contour, and Thaxted could be severely affected. Inside the footprint and a 2km buffer zone, there are three sites of special scientific interest (SSSI). Adverse air quality could affect Great Dunmow, which is in close proximity to and downwind of the site. A number of surrounding settlements, including listed buildings will be displaced.

Deliverability – Achieving the relevant planning and consents approvals would be a significant challenge due to the strength of opposition - as seen for recent 2nd runway proposals. Retaining operations at the existing airport throughout the construction process would add complexity. Investment here would likely prove attractive to the private sector.

7. Locating a new hub airport at Maplin



Key Facts:

- A new airport location on the Essex Coast – Located 70km east of Central London
- Proposals first put forward by Roskill commission: Minority Report 1971
- Travel time to Central London on High Speed Rail: 30-35 minutes
- Population inside 55dB L_{den} Noise Contour – Low

Economic – Located on the Essex coast, east of Southend, the area currently has little economic activity of a comparative form and scale to that a new hub would generate. Future associated development would be limited to the land side (to the west) and subject to alignment with local environmental policies. Availability of skills may be limited in the short to medium term. Relative remoteness from the rest of the UK may affect the potential for stimulating wider economic benefits.

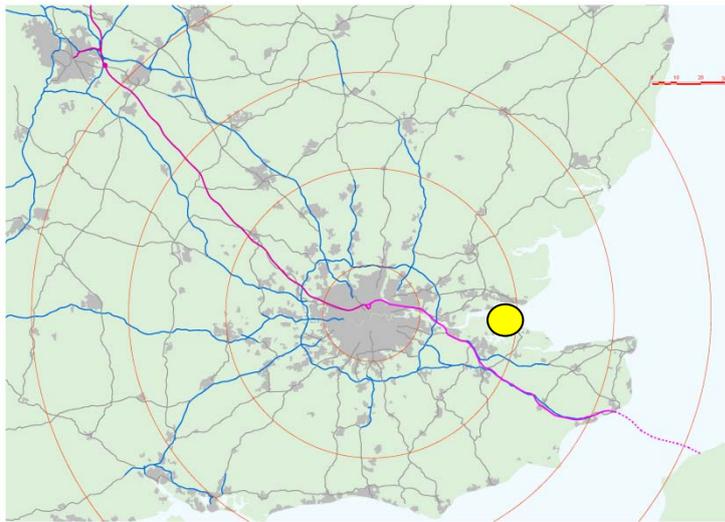
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. It would likely impact operations at Southend airport. Opportunities for relatively relaxed night flight restrictions are probable due to the airport's coastal location.

Surface Access – This site is 70 km from Central London. New rail and road links would be required and a number of existing road and rail links would require upgrading. The site could be accessible to Central London in just over 30 minutes, but a step change in rail capacity and connections to key catchment areas would be required to ensure a sustainable surface access mode share. It could be difficult and expensive to connect the site to areas both north and south at this point in the Thames Estuary.

Environment – The site would expose a relatively low population to excessive noise. There are five internationally designated sites and four nationally designated sites within the 2km buffer zone of the site. Further afield, four Special Protected Areas (SPAs) are located within 13km of the site. There would be a limited air quality impact as there is little population downwind of the site. A limited number of people would require relocation.

Deliverability – Achieving the relevant planning and consents approvals would be a major challenge in particular due to the environmental constraints. Distance from current and future centres of economic activity may make the site relatively less attractive to investment from the private sector.

8. Locating a new hub airport in the Inner Thames Estuary - Isle of Grain



Key Facts:

- New airport location. On the north Kent coast - 50km east of Central London
- A number of proposals for a new airport have been put forward at a similar location – these include Foster + Partners, Bluebase architects and John Olsen
- Travel time to Central London on a new direct high speed rail link: 20-25 minutes
- Population inside 55dB L_{den} Noise Contour – Mid Range

Economic – Located comparatively close to central London, the site is at the centre of the UK's largest regeneration area, the 'Thames Gateway', which has been primed for development from past waves of investment. While current surrounding activities fit well with an airport function (ports, logistics, energy, waste) there is also large scale development capacity to accommodate other employment uses and housing.

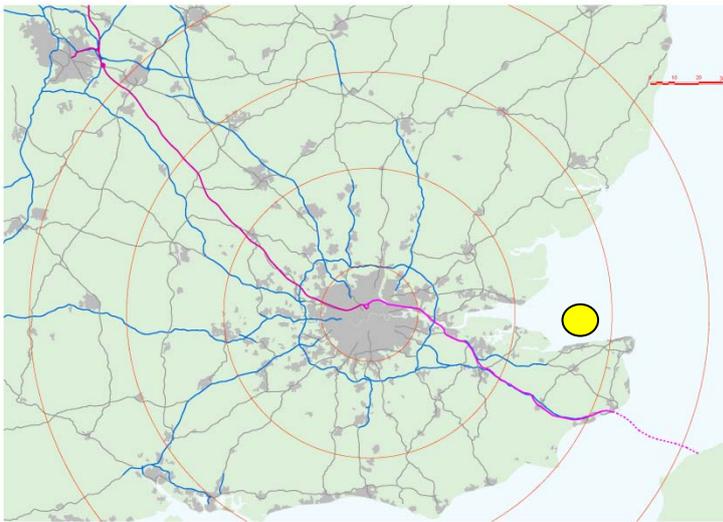
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. The coastal and relatively rural location means that at this site night operations could be relatively unconstrained.

Surface Access – Requires substantial infrastructure investment to improve road and rail journey times to provide access to both Central London, key airport catchment areas, and nodes of economic activity and population beyond London. It is accessible to the A2/M2 and M25 (and the proposed new Lower Thames Crossing) but would require widening of the M25 to connect to existing road networks to access the major population centres. It is located near to High Speed 1, which offers some spare capacity, though a new line would be required to provide a step change in capacity and connectivity both to Central London, and key catchment areas, helping ensure a sustainable surface access mode share.

Environment – The location will cause noise exposure for population living within the noise contour of the new airport. Two coastal Special Protected Areas (SPAs) are located within the site 2km buffer. Five SPAs are located within 13km of the site. There are a total of six Sites of Special Scientific Interest (SSSI) located within the footprint and 2km of the site. Development of the site is considered to be constrained due to these environmental designations. Sheerness is downwind from the airport, and a relatively small population would experience adverse air quality impacts. The village of Grain would require relocation.

Deliverability – Achieving the relevant planning and consents approvals would be a major challenge, in particular on environmental grounds. The strength of local opposition may be significant. Investment here would likely prove attractive to the private sector.

9. Locating a new hub airport in the Outer Thames Estuary



Key Facts:

- New airport location. Offshore, in the Thames Estuary – located 85km east of Central London
- Proposals put forward by RUCATSE 1994 and SERAS 2003
- Travel time to Central London on a new direct High Speed Rail link: 35-40 minutes
- Population inside 55dB L_{den} Noise Contour – none

Economic – Located on land that would have to be reclaimed in the Thames Estuary. Relatively distant from London, significant land side activities would have to be developed on the North Kent coast to accommodate the supporting development to allow the maximum economic benefits to accrue. This would be especially important for nearby freight and logistics activities. Provides good potential for alignment with regeneration of relatively depressed coastal towns and, with an offshore location, provides effective mitigation of a range of airport environmental impacts.

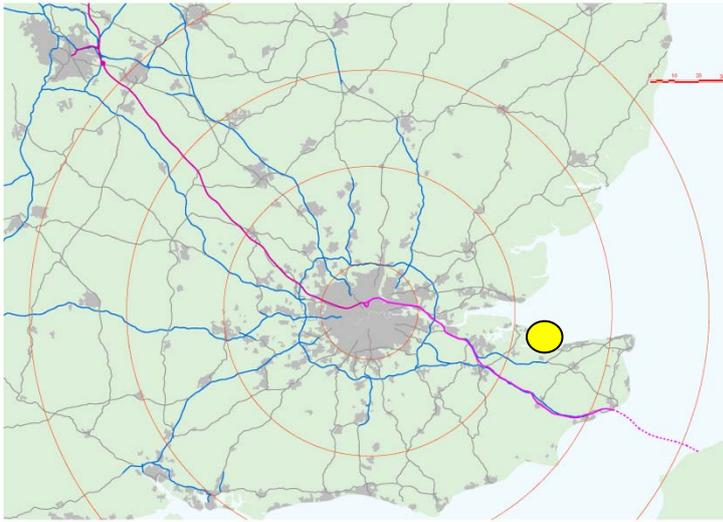
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land reclamation. The offshore location means that night operations would be unconstrained.

Surface Access – Located around 85km from London, the site requires substantial infrastructure investment to provide competitive road and rail journey times to both Central London, key catchment areas, and nodes of economic activity beyond. A step change in rail capacity is required, though High Speed 1 offers some spare capacity. The offshore location makes it remote from existing transport corridors, although with significant investment road access could be provided to the M2/M25 and the proposed new Lower Thames Crossing. Widening of the M25 and M2 would be required.

Environment – Airport could be located and configured so as to expose no one to noise in excess of 55dB L_{den}. Air quality impacts could also be negated. The Outer Thames Estuary Special Protected Area (SPA), a coastal SPA, and Margate and Long Sands SAC (Special Area of Conservation) are located within the footprint of the site and extend into the 2km buffer. Four SPAs are located within 13km of the site. The location is highly constrained from a biodiversity perspective.

Deliverability – The process of achieving the relevant planning and consents approvals would be eased by the airport site not directly affecting areas of population; however the new surface access connections will. Opposition is likely to be significant. There are potentially additional risks associated with offshore construction and a wind farm would need to be relocated. Investment here could still prove attractive to the private sector, but could be reduced on account of the distance from key economic centres.

10. A new hub airport in the Inner Thames Estuary - Isle of Sheppey



Key Facts:

- New airport location on the north Kent coast - located 70km East of Central London
- The idea of a new airport at this location was first put forward in 1965
- Travel time to Central London on a new direct High Speed Rail link: 30-35 minutes
- Population inside 55dB L_{den} Noise Contour – Low

Economic – Located around 70km from London and accessible to the UK's only high speed international rail line, the site is at the eastern end of the UK's main regeneration area. The site is close to surrounding activities such as ports and logistics clusters. An airport could stimulate an increase in high value added activities in a relatively deprived area.

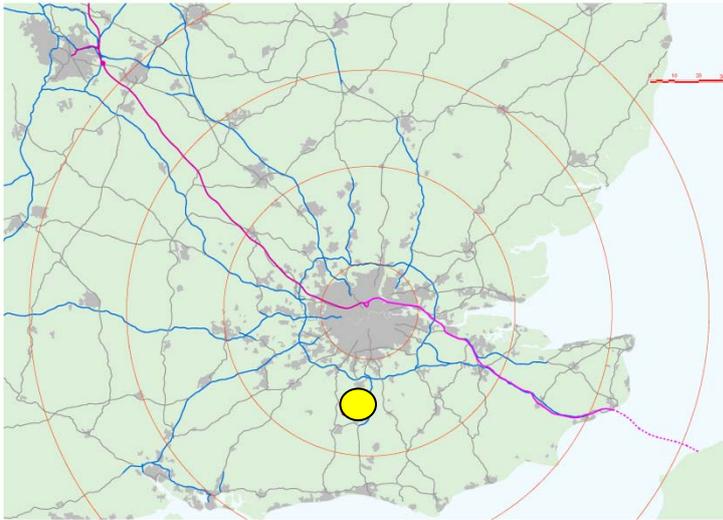
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant land. Night operations at the airport could be relatively unconstrained as a result of the small number of people in close proximity to potential flight paths.

Surface Access – Located at around 70 km from London the site would require significant infrastructure investment to improve road and rail journey times to both Central London and areas of economic activity. It is accessible to the M2 and M25 (and the proposed new Lower Thames Crossing) but would require significant investment in infrastructure, including widening of the M25 to connect to existing road networks to access the major population centres. A step change in rail capacity, both to Central London, and key catchment areas to the west and south west of London would be required to ensure a sustainable surface access mode share.

Environment – Located away from main population areas, the population exposed to noise in excess of 55dB L_{den} is low. The Swale Special Protected Area (SPA) and the Outer Thames Estuary SPA are located within the footprint of the site, with the Medway Estuary and Marshes SPA also being located within 2km. All three of these are coastal SPAs, with a high potential impact. Four additional SPAs are also located within 10km of the site. Within the footprint and the 2km buffer zone of the site, there are a total of three Sites of Special Scientific Impact (SSSI). The development of this site is therefore highly constrained. Air quality and population displacement impacts will be low.

Deliverability – Achieving the relevant planning and consents approvals would be a challenge, with significant potential local opposition. Investment here could prove attractive to the private sector.

11. A new hub airport at Gatwick



Key Facts:

- Existing International Airport in West Sussex – located 40km south of Central London
- Travel time to Central London on a new direct High Speed Rail line: 20 minutes
- Current maximum capacity – single runway: 280,000ATMs / 44 mppa
- Population inside 55dB L_{den} Noise Contour – Mid Range

Economic – Located mid way between London and Brighton and already a large airport, Gatwick has potential to link into the growth of relatively high value added sectors within London and the outer Metropolitan urban areas. However, there is relatively limited local capacity within the current planning regime to provide the airport footprint that will be required for a new hub of the size needed, and secure the maximum downstream scale of associated development and jobs growth. The scale of growth is unlikely to align with local environmental policy objectives especially for surrounding rural areas. There is potential to support some sectoral rebalancing despite being south of London.

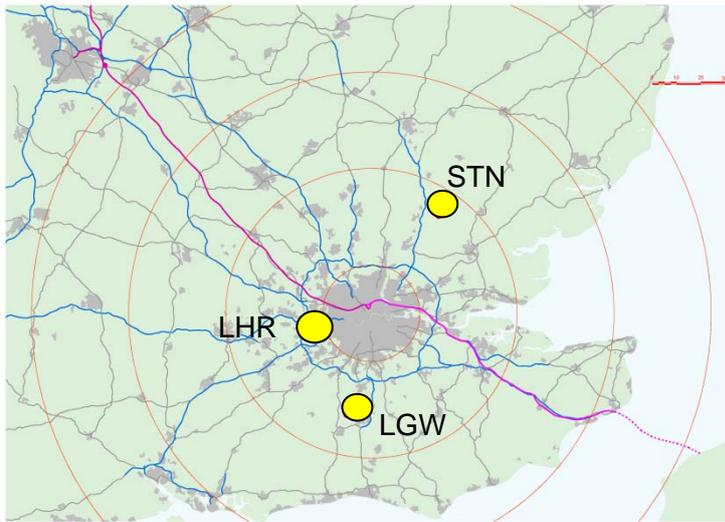
Airport operations – Accommodating an efficient hub airport that meets the needs of industry and consumers would require significant additional land. The number of people exposed to noise will increase, and night operations would remain limited, as they are currently.

Surface Access – This site is relatively well located for key centres of economic activity. The airport is linked directly to the M23 but would require further investment in road infrastructure, including widening of the M23 and M25. The Brighton Mainline rail link which connects the airport to London is already full. A step change in rail capacity would be essential to support any increase in passenger numbers.

Environment – The site is constrained. The towns of Horley and Crawley would be affected by an increase in noise as the airport expands. A substantial proportion of Horley could be directly underneath the flight paths of northern runways. Horley is also likely to be affected by air quality as the airport expands. There is a Special Protected Area (SPA) at Ashdown Forest located 12km from the site. Two sites of Special Scientific Interest are located within the footprint of the proposed airport. The location is in close proximity to a number of settlements and the new airport footprint will result in population being displaced.

Deliverability – Achieving the relevant planning and consents approvals would be a significant challenge. The scale of local opposition is likely to be significant. Construction risk is increased if the existing airport has to remain operational throughout construction. Investment here could prove attractive to the private sector.

12. 'Do-Nothing' - Growth within existing capacity constraints



Key Facts:

- Existing airports Heathrow (LHR), Gatwick (LGW) & Stansted (STN)
- Current maximum capacity - as per DfT 2012 forecasts:
LHR - 475,000ATMs / 93 mppa
LGW - 280,000ATMs / 44 mppa
STN - 253,000ATMs / 36 mppa
- Theoretical combined capacity:
1,008,000ATMs / 173 mppa
- Population inside 55dB L_{den} Noise Contour – Extremely High

Description – The “Do-nothing” approach is based on optimising existing infrastructure at the three airports. Effectively each airport would only be able to grow to the capacity defined by its existing runways. Both Heathrow (2 runways) and Gatwick (1 runway) are operating close to their maximum capacity during peaks while Stansted (1 runway) has some limited scope for growth during peaks. From current levels of usage, passenger growth would only occur through some peak-spreading, operational efficiencies and increased use of larger aircraft.

Economic – While each of the three sites are well located with respect to the demand pool, the extent of growth feasible will fall critically short of the overall demand levels required to sustain the best possible air service connections. The largest adverse impact is with respect to overall global connectivity and the benefit this would bring. Conversely, the limited extent of growth will not place significant challenges in terms of resource capacity.

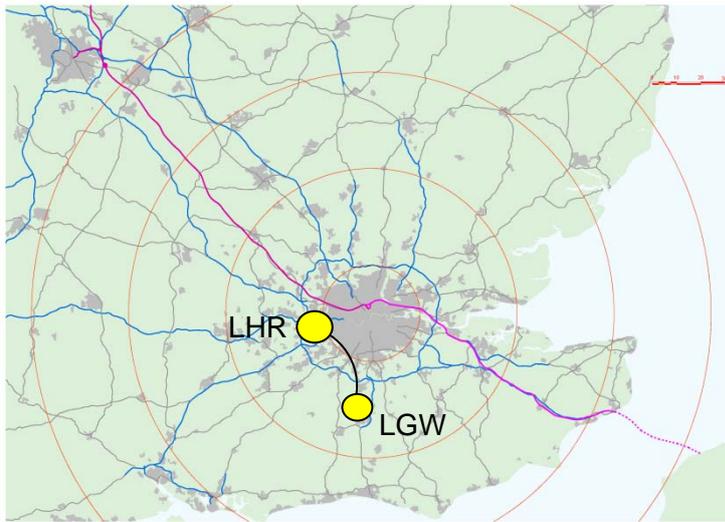
Airport operations – Current capacity constraints at the three airports will make it impossible to meet forecast growth. The existing sub-optimal airport layouts would lead to a low quality passenger and freight offering. Existing restrictions on night flights due to noise impacts will remain in place due to high concentrations of population in close proximity.

Surface Access – Incremental improvements to existing surface access networks would be required. The public transport offer at all three locations has limitations, which constrain the ability to offer a significant shift towards an increased public transport model share although improvements to access to Heathrow are committed. Road networks in the vicinity of each of the airports suffer peak hour congestion, particularly in the vicinity of Heathrow, and in the absence of a significant shift towards public transport, further incremental improvement will be required.

Environment – Involves no reduction in Heathrow’s existing dire noise impacts. There would be intensification of current adverse environmental impacts at each location in terms of noise and air quality from both aviation and surface access, although no new land take with adverse biodiversity impacts or population displacement is required.

Deliverability – No constraints

13. 'Heathwick' – Two runways at Heathrow and Gatwick. One at Stansted



Key Facts:

- Existing airports Heathrow (LHR), Gatwick (LGW) & Stansted (STN)
- Population inside 55dB L_{den} Noise Contour – Extremely High

Description – Proposes a split-site hub distributing operations between Heathrow and Gatwick. Gatwick would add a second runway to bring it to capacity parity with Heathrow. It may be possible to assign a major airline alliance to each although this has never been done successfully as inter-alliance transfer traffic could be lost. To maintain a single hub operation with transfer traffic over two sites, a fast and high frequency interconnecting landside and airside rail links would be required.

Economic - While each of the sites is well located with respect to the demand pool, the extent of growth feasible will fall short of the overall demand levels provided at a single hub airport. Some positive impacts with respect to growing and restructuring the economy may be expected, given the combined locational advantages of the sites, but this will be partially undermined by the service levels which will be possible at each. Resource capacity issues may still apply at Gatwick, but to a lesser extent than for the equivalent single hub options.

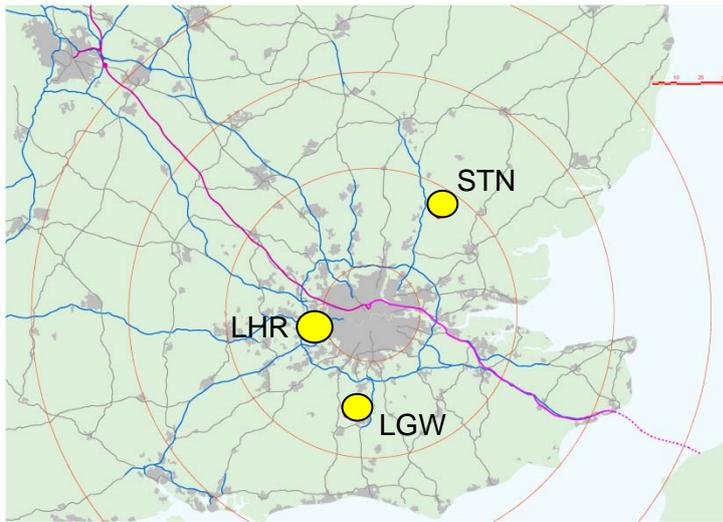
Airport operations – Capacity at Gatwick could double with introduction of a new runway while Heathrow has limited scope to optimise through efficiencies. The option presents significant challenges in terms of optimising airport facilities across the airports, not least in terms of achieving acceptable minimum connect times on the dedicated Heathrow/Gatwick rail link. An additional runway at Gatwick is likely to be subject to additional night flight restrictions, given the proximity of significant population densities. Current night flight constraints at Heathrow would remain.

Surface Access – Incremental improvements to existing surface access networks at Heathrow would be required as well as significant new surface access provision to Gatwick to accommodate the extent of passenger growth. Options for incremental enhancement to rail to Gatwick are highly constrained, with the likely requirement for a step change in rail accessibility to London and beyond, if new surface access demand is to be accommodated sustainably. Significant enhancement to road infrastructure is likely to be required, including widening of M23 and M25.

Environment – Involves no reduction in Heathrow's existing dire noise impacts. With a new second runway, Gatwick will attract significant increase in noise and air quality impacts. The towns of Horley and Crawley would be affected by an increase in the noise and Horley is likely to experience a diminution in air quality as the airport expands. Other environmental concerns at Gatwick include the SSSI within the footprint of the site and the SPA of Ashdown Forest located within 13km of the site.

Deliverability – Achieving the relevant planning and consents approvals for a new runway and terminal expansion at Gatwick would be a significant challenge. There is a legal agreement in place prohibiting runway capacity expansion until 2019. The amount of local opposition would be significant and the quantum of local communities affected would be significant. Construction risks are substantial; the existing airport will need to remain operational throughout. There is also planning and construction risk related to the dedicated rail link. There is no reason to believe that investment here could not prove attractive to the private sector.

14. Distributed hub – Two runways each at Heathrow, Gatwick and Stansted



Key Facts:

- Existing airports Heathrow (LHR), Gatwick (LGW) & Stansted (STN)
- Population inside 55dB L_{den} Noise Contour – Extremely High

Description – Proposes a dispersed airport system distributing hub operations between Heathrow, Stansted and Gatwick. Gatwick and Stansted would each add a second runway to bring it to capacity parity with Heathrow. Hub operations would require fast and high frequency interconnecting landside and airside rail links to enable transfer operations between the airports.

Economic - While each of the three sites is well located with respect to the demand pool, the extent of growth feasible will fall critically short of the overall demand levels required to sustain the best possible air service connections. Positive impacts with respect to growing and restructuring the economy may be expected, given the combined locational advantages of the sites, but this will be partially undermined by the service levels which will be possible at each. The option scores worse than 'Heathwick' across these criteria, on the basis that some degree of hub operational compatibility may be achievable with Heathwick, but is not possible with dispersed sites. Resource capacity issues may still apply at Gatwick, but to a lesser extent than for the equivalent single hub options.

Airport operations – The dispersed hub concept presents significant challenges in terms of optimising capacity and operations. Heathrow operations will become increasingly constrained with respect to night flight and noise restrictions. An additional runway at Gatwick and Stansted is likely to be subject to extensions of current night flight restrictions due to some dense areas of population in proximity to both airports. There are also concerns about the operation of the airspace with three multi-runway airports in the same region.

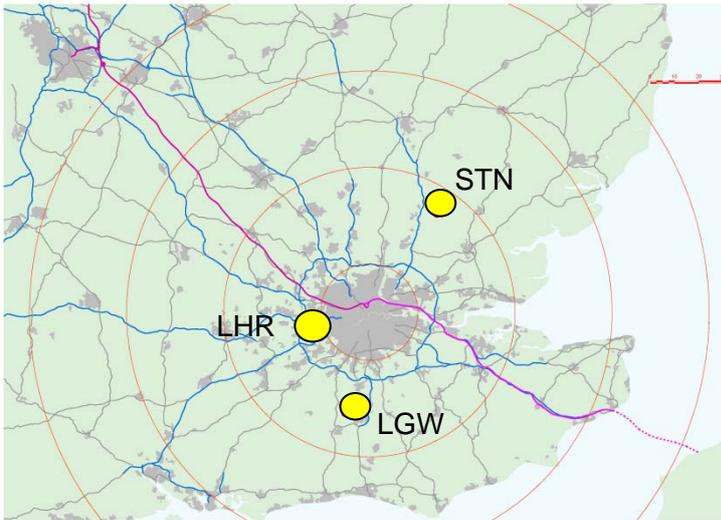
Surface Access – Surface access demand will be more dispersed than at a single site option. While this could ease the extent of road intervention required at any one site (relative to a single site development) it will also present challenges in terms of critical mass of investment in public transport required to provide the quality of provision to each site to bring about a significant shift towards public transport use, with a risk of significant continued car use and need for investment in road. At Heathrow it is most likely that incremental improvement to existing surface access networks would be needed to both road and rail. New surface access provision to Gatwick and Stansted will be required to accommodate the extent of passenger growth. Options for incremental enhancement to rail to Gatwick are highly constrained, with the likely requirement for a step change in rail accessibility to London and beyond, if new surface access demand is to be accommodated sustainably. Enhancements to road infrastructure will be required, including widening of M23, M25 and M11.

Environment – Relatively modest increase in exposure to noise and reduced air quality at Heathrow due to limit on runway capacity, although the overall population affected would remain high. The South West London Waterbodies SPA and Ramsar site is located within 2km buffer, and the Thames Basin Heaths SPA, is located within 13km. As a result, further investigations are required as there is a high potential that the Natura2000 sites would be subjected to likely significant effects. With a new second runway, Gatwick will attract significant increase in noise and air quality impacts. The towns of Horley and Crawley

would be affected by an increase in the noise and Horley will experience a diminution in air quality as the airport expands. Ashdown Forest SPA is located within 13km, and Glovers Wood SSSI is located within 2km. As a result, further investigations would be required if there is the potential for likely significant effects for Natura2000 sites, and is considered to be constrained. At Stansted there would be negative noise impacts on the local population with Bishop's Stortford lying within the noise contour. Inside the footprint and the 2km buffer zone of this site, there are two SSSI, therefore the development is considered to be potentially constrained. In terms of Air quality impact, Great Dunmow is very close and downwind of Stansted. Development of the 2x2x2 Dispersed Hub is considered to be highly constrained and further investigations would be needed to confirm whether the development of this option could meet the requirements of the Habitats Regulations.

Deliverability – Achieving the relevant planning and consents approvals for a new runway and terminal expansion at both Gatwick and Stansted would be a significant challenge. The amount of local opposition would be significant in both cases. Construction risks are substantial; the existing airport will need to remain operational throughout. There is no reason to believe that investment here could not prove attractive to the private sector.

15. Distributed hub – Three runways at Heathrow, two runways at Gatwick and Stansted



Key Facts:

- Existing airports Heathrow (LHR), Gatwick (LGW) & Stansted (STN)
- Population inside 55dB L_{den} Noise Contour – Extremely High

Description – Proposes a dispersed airport system, distributing hub operations between Heathrow, Stansted and Gatwick. Hub operations would require fast and high frequency interconnecting landside and airside rail links to enable transfer operations between the airports. A third runway is built at Heathrow (3R) while Gatwick and Stansted near doubling capacity by adding a new independent runway at each.

Economy - While each of the three sites are well located with respect to the demand pool, the extent of growth feasible will fall short of the overall demand levels required to sustain the best possible air service connections. The largest adverse impact is with respect to overall global connectivity; some positive impacts in growing and restructuring the economy may be expected, given the combined locational advantages of the sites, but this will be partially undermined by the service levels which will be possible at each. The option scores better than the 'dispersed option – Heathrow 2 runway option, in recognition of the advantages in terms of connectivity, economic growth and restructuring of the additional capacity arising from the provision of a new runway in a location well positioned with respect to its market. Resource capacity issues may still apply at Gatwick, but to a lesser extent than for the equivalent single hub options. An additional runway at Heathrow would be expected to give rise to additional resource constraints.

Airport operations – The dispersed hub concept presents significant challenges in terms of optimising capacity and operations. Heathrow operations will be constrained with respect to night flight and noise restrictions. An additional runway at Gatwick and Stansted is likely to be subject to extensions of current night flight restrictions due to some dense areas of population in proximity to both airports. There are also concerns about the operation of the airspace with three multi-runway airports in the same region.

Surface Access – Surface access demand will be more dispersed than at a single site option. While this could ease the extent of road intervention required at any one site (relative to a single site development) it will also present challenges in terms of critical mass of investment in public transport required to provide the quality of provision to each site to bring about a significant shift towards public transport use, with a risk of significant continued car use and need for investment in road. At Heathrow further enhancements (in addition to the 2 runway option) to existing surface access networks would be needed – both road and rail. New surface access provision to Gatwick and Stansted will be required to accommodate the extent of passenger growth. Options for incremental enhancement to rail to Gatwick are highly constrained, with the likely requirement for a step change in rail accessibility to London and beyond, if new surface access demand is to be accommodated sustainably. Enhancements to road infrastructure will be required, including widening of M23, M25 and M11.

Environment – Significant increase in exposure to noise and reduced air quality at Heathrow due to added third runway

capacity. Well documented impacts on Sipson village and other residential areas in close proximity. Part of the South West London Waterbodies SPA, a reservoir and two SSSI are located within 2km. The Thames Basin Heaths SPA is located within 13km of Site 23. Therefore the development is considered to be highly constrained and further investigations would be needed to confirm whether the development of Site 23 could meet the requirements of the Habitats Regulations.

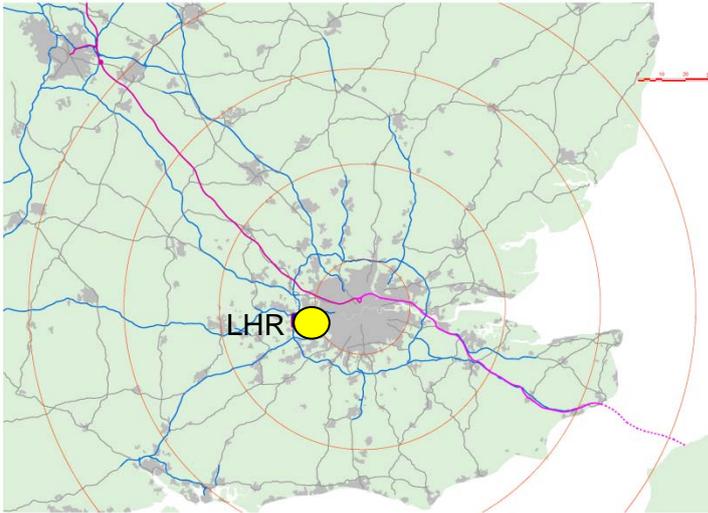
With a new second runway, Gatwick will see a significant increase in noise and air quality impacts. The towns of Horley and Crawley would be affected by an increase in the noise and Horley will experience a diminution in air quality as the airport expands. Ashdown Forest SPA is located within 13km and Glovers Wood SSSI is located within 2km. As a result, further investigations would be required if there is the potential for likely significant effects for Natura2000 sites, and is considered to be constrained.

At Stansted there would be negative noise impacts on the local population with Bishop's Stortford lying within the noise contour. Inside the footprint and the 2km buffer zone of this site, there are two SSSI, therefore the development is considered to be potentially constrained. In terms of Air quality impact, Great Dunmow is very close and downwind of Stansted.

Development of the 3x2x2 Dispersed Hub is considered to be highly constrained and further investigations would be needed to confirm whether the development of this option could meet the requirements of the Habitats Regulations.

Deliverability – Achieving the relevant planning and consents approvals for a new runway and terminal expansion at Heathrow, Gatwick and Stansted would be a significant challenge due to the poly-centric nature of expansion. The amount of local opposition would be significant in all cases. Construction risks are substantial; the existing airports will need to remain operational throughout. There is no reason to believe that investment here could not prove attractive to the private sector.

16. Heathrow expansion: a 'limited scope' four runway option [runways not full-length or fully independent]



Key Facts:

- Existing hub (LHR) airport in Greater London – Located 20km West of central London
- Ultimate capacity – 4R close spaced runways: ~ 960,000ATMs / 120-140 mppa
- Population inside 55dB L_{den} Noise Contour – Extremely High
- Proposed by Policy Exchange – Bigger and quieter paper

Description – Proposes the development of Heathrow as a single hub airport through the addition of two runways to the north and south of the existing operation, based on a minimum intervention scenario. Unlikely that proposed runway configuration will provide sufficient capacity for ultimate forecast demand (180mppa).

Economic - Located in the high productivity West London / Thames Valley economy, and with access to a large demand pool including aviation-intensive activity. Location has strong potential to support some sectoral rebalancing by supporting growth of surrounding firms in Thames Valley and West London. The area has significant physical and infrastructure capacity constraints. It frequently experiences congestion and well documented environmental disbenefits. There is therefore limited capacity to support significant growth in local jobs and in the local economy. Scale of growth therefore unlikely to align with local and regional environmental policy objectives. There is some alignment with local regeneration objectives and aspirations (Feltham, Hayes and Southall).

Airport operations – Expanding existing facilities rather than providing a new optimised facility will significantly compromise some of the key operational characteristics of the airport, with the ability to achieve acceptable minimum connect times particularly questionable. The development of the existing infrastructure will fail to remove current site capacity and operational constraints in the same way that a new airport build would achieve. Additional runways at Heathrow will remain subject to night flight restrictions due to dense areas of population in proximity.

Surface Access – The site is well located with respect to a number of strategic road links. However there are already substantial capacity constraints during peak times on existing road networks, with the western side of the M25 amongst the most congested parts of the national strategic road network. Rail provision is relatively good towards central London – and capacity constraints will be alleviated with Crossrail (in 2018) and the Piccadilly line Upgrade. But public transport connections to the north, west and south of the airport remain poor. Airport expansion would require a step change in rail capacity, both to central London, and key catchment areas to the west. This is necessary to achieve a sustainable surface access mode share, without which the road network would fall over; even with this, the road network will also require upgrading.

Environment – The increase in overall traffic will however significantly increase exposure to noise and reduced air quality at Heathrow due to added two runway capacity. There will be significant impacts on existing developments and residential areas to the west of the site. The expansion to a four-runway plus hub would continue to expose a large area of population to noise impacts. The downwind area is a large and densely populated area, including many Air Quality Management Areas. The area is also highly constrained regarding Habitats Regulations and designations. Part of the South West London Waterbodies SPA and

Ramsar site, a reservoir/lake site, is located within the footprint, and then extends into the 2km buffer zone. Thames Basin Heaths SPA, designated for small populations of extremely rare heathland birds, is located within 13km. Within the footprint and the 2km buffer zone of Site 19, there are a total of four SSSI. The development is considered to be highly constrained and further investigations would be needed to confirm whether the development could meet the requirements of the Habitats Regulations.

Deliverability – Achieving the relevant planning and consents approvals would be a significant challenge. Bridging over the M25 to build the new runways will be very disruptive and costly. The strength of local opposition would be significant. Construction risks are substantial and the existing airport will need to remain operational throughout. There is no reason to believe that investment here could not prove attractive to the private sector.
