



RAMBOLL



OXFORD
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Impacts upon the local and national economy



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Executive Summary

This report sets out the principal findings of modelling work undertaken by Oxford Economics to estimate the direct, indirect and induced impacts of building and operating a new hub airport and associated ground transport links.

It is part of a series of technical notes by Oxford Economics and Ramboll, prepared for Transport for London in support of Lot 4 of the Mayor’s Aviation Work Programme – the assessment of socio-economic effects. The Aviation Work Programme, in turn, has been conducted in order to develop a submission to the Airports Commission (or “Davies Commission”) which has been charged with examining the need for additional UK airport capacity.

The notes prepared by Oxford Economics have been designed to address specific questions and issues posed within paragraph 3.16 of Aviation Commission (2013) *Guidance Document 01*: While the notes prepared by Oxford Economics are separate, there is nonetheless some degree of interaction between the issues they examine. The issues and results from some of the key technical notes prepared by Oxford Economics are summarised in the table below:

Table 1: Summary of key Oxford Economics Technical Notes

Davies Commission Question/Issue	Results/Key messages
<i>Impacts on the UK economy through the provision of international connectivity - Alignment with the likely growth in demand for travel and ability to service that demand.</i>	<ul style="list-style-type: none"> ■ This note used an econometric model to examine connectivity benefits likely to be generated through building a new hub airport in the South East. ■ The model suggests that a 10 per cent increase in business related connectivity increases economy-wide productivity – and hence GDP - by 0.5 per cent in the long-run. ■ The long-term economic benefit of expanding airport capacity in the London area, consistent with the Department for Transport’s “unconstrained” capacity forecasts for 2050, is found to be equivalent to a GDP boost of £6.9 billion a year (at today’s prices).
<i>Impacts on the local economy through the direct effects of airports - Impacts on the local and national economy through both direct and indirect effects on employment</i>	<ul style="list-style-type: none"> ■ This note examined the employment and Gross Value Added (GVA) impacts of construction and operation of a new hub airport at Stansted, the Isle of Grain or the Outer Estuary. ■ On a <i>gross national</i> basis, the total economic impacts of operating a new airport and associated ground transport at Stansted, the Isle of Grain or the Outer Estuary in 2050 vary from 377,000-392,000 jobs (depending on the option chosen) and £42bn of GVA ■ On a <i>net local</i> basis, the operation of a new hub airport at Stansted, the Isle of Grain or

<p><i>and skills.</i></p>	<p>the Outer Estuary means employment in the local area is 123,000-134,000 higher and GVA is £16.2-£16.6 billion higher than would otherwise have been the case in 2050.</p>
<p><i>Impacts on the local economy through the direct effects of airports - Impacts on other airports.</i></p>	<ul style="list-style-type: none"> ■ This note modelled the economic impacts of the closure of Heathrow in the event of a new hub airport being developed. ■ Excluding local redevelopment impacts, Heathrow local area employment would be 77,000 lower in 2050 (compared to a business as usual baseline) if the airport were to close though unemployment is only modestly higher (3.5% rather than 3.0%). ■ If the effects of a subsequent residential redevelopment scenario of the old Heathrow site are allowed for, in addition to the impacts of closure, then local area employment would be 33,500 lower compared to the baseline, while unemployment would stand at 3.6%. ■ Local area employment falls should not be confused with increases in unemployment. A local area resident who is subsequently re-employed outside the local area (e.g. at the new hub or elsewhere) would be a “job loss” <i>from the point of view of the local area</i> but would not be unemployed. ■ Regardless of closure, local population, employment and housing stock all increase between 2029 and 2050. This is even more true for the closure plus redevelopment scenario, where local population is 136,000 <i>higher</i> than the baseline population.
<p><i>Consumer impacts - Impacts on the air freight industry, its customers and associated business sectors</i></p>	<ul style="list-style-type: none"> • This note examined how increased airport capacity (or conversely the lack of additional new capacity) could affect airfreight and the economy. • Capacity constraints at Heathrow may have set in as early as 2005 and future cargo growth is threatened by the inability of London area airports to keep up with demand. • Modelling using the central case of a range of forecast scenarios suggests that by 2050, the value of air cargo lost to London due to capacity constraints would equate to £106 billion per annum. However, this is not equal to a net national GDP loss as much of this freight may be traded via other UK airports, or enter the UK indirectly.

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| | <ul style="list-style-type: none"> • An alternative, economic welfare based approach, suggests that by 2050 <i>net national</i> losses due to airfreight capacity constraints could equate to £3.9 billion per annum. |
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The direct output (GVA) impacts of construction have been modelled using construction expenditure data from Atkins within a national and local input-output modelling framework. The employment associated with this output was estimated using productivity assumptions. The direct employment impacts of operating the new hub airport are based on trends in the number of jobs per million passengers at Heathrow, applied to TfL's assumptions about passenger levels at the new airport. GVA is estimated from the employment figures using productivity assumptions. In the case of Stansted, the modelling has been undertaken on the basis that the new hub is constructed alongside the existing airport. The results represent the additional economic activity generated at the new hub, over and above natural growth of the existing airport.

The indirect, or supply chain, impacts associated with construction and operation have been estimated using national and local input-output models. The induced impacts of expenditure by direct and indirect employees have also been estimated using input-output models.

Results from economic impact modelling can be calculated on a gross or net basis. *Gross* figures indicate the scale of resources required to construct and operate the new airport and ground transport infrastructure. In the absence of a new hub airport some of these resources would be put to alternative uses in other sectors or regions of the economy. *Net* results are therefore calculated to show the impact of the new airport, after allowing for this 'displacement' impact on economic activity elsewhere.

Under the current modelling framework we assume that at the UK level, and in the long run, the *actual construction and operation* of a new hub airport and associated ground transport infrastructure would not increase total employment and GVA. In other words, we assume all of the resources needed to construct and operate the new airport represent a reallocation away from other parts of the economy. We therefore only present gross results for the UK to indicate the initial impact before such a reallocation occurs¹.

However, it is critical to distinguish the effects of constructing and operating the airport itself from the benefits to the broader UK economy which its development would entail. Development of a new hub airport could enhance the UK's productivity in a variety of ways, including improved connectivity with the outside world, improved ground transportation systems and improved airport efficiency (via new plant and operations). The benefits stemming from improved connectivity with the outside world are discussed in the technical note dealing with *Impacts on the UK Economy through the provision of International Connectivity*. That paper identifies that, based on an econometric model, a 10 per cent increase in business related connectivity increases economy-wide productivity – and hence GDP - by 0.5 per cent in the long-run. Similarly, though not covered in the connectivity note, the fixed ground transport links could also bring productivity improvements for the country by reducing journey times for airport users and non-users alike.

Moreover, at the local level (i.e. ringfencing economic impacts to just consider the defined local area) there would be a net change in employment and output that persists in the long run as capital

¹ It has been necessary to make this assumption given the time and resources available for the modelling tasks. Net national effects could be estimated using a Computable General Equilibrium (CGE) approach. Such an approach may be pursued as part of future work, time and resources permitting.

and labour are attracted away from other regions of the UK towards the airport local area. In particular, a significant proportion of airport operational jobs requiring aviation-specific skills (e.g. air traffic controllers, airline jobs etc.) are likely to be transferred over from Heathrow, or the relevant workers drawn from elsewhere in the UK, as the local area may not have people with the requisite skills. We present both gross and net results for the defined local areas that adjoin the airport.

Table 2 summarises the economic impacts of each new airport in terms of GVA and employment. Focusing on the Isle of Grain, by way of example, the main points are as follows:

- The **gross national** estimates suggest that in 2050, the direct, indirect and induced impacts of operating a new airport on the Isle of Grain and associated ground transport would be 388,000 jobs and £42bn of GVA.
- The **gross local** impacts are lower than at the national level, since some of the indirect and induced impacts of the new airport spill out of the local area. During the period of operation (2029 to 2050) the Isle of Grain option would create an average of 162,000 jobs between 2029 and 2050. The average annual GVA impact of the airport would be £16bn during this period.
- Our preferred estimates are calculated on a net basis, to take into account that the new infrastructure will absorb resources that would otherwise have been employed elsewhere ('displacement'). On this **net local** basis, employment in the Isle of Grain local area is 134,000 higher than would otherwise have been the case in 2050.. Over the entire period of operation, local employment is an average of 116,000 higher each year, and GVA is an average of £12bn higher each year.

The employment impact of the Stansted option is slightly lower than for the other two options. This is because we expect the new hub airport to generate productivity benefits for the existing airport, which is itself growing. This means fewer workers are needed at the existing airport than would otherwise have been the case, slightly offsetting the employment gain at the new airport.

Table 2: Summary of modelling results – employment and GVA created by construction and operation of the new hub airport and ground transport links

		2050		Cumulative, 2015-2050		Av. annual impact during operation, 2029 to 2050	
		Employment 000s	GVA £m, 2013 prices	Employment 000s of job years	GVA £m, 2013 prices, undiscounted	Employment 000s	GVA £m, 2013 prices, undiscounted
Stansted	Gross National	377	42,156	8,164	731,038	327	30,725
	Gross Local	170	21,415	3,613	362,522	149	15,601
	Net Local	123	16,352	2,597	274,450	108	11,892
Isle of Grain	Gross National	388	42,295	8,340	726,373	333	30,452
	Gross Local	188	21,972	3,913	367,578	162	15,875
	Net Local	134	16,647	2,783	276,456	116	12,013
Outer Estuary	Gross National	392	42,295	8,688	742,292	339	30,619
	Gross Local	188	21,260	4,005	359,869	164	15,432
	Net Local	134	16,227	2,839	272,137	117	11,755

The results produced within our I-O modelling framework do not include:

- impacts on businesses reliant on the off-airport expenditure of passengers, such as hotels;
- impacts on off-airport firms whose work is directly reliant on proximity to an airport, but which are not part of the airport supply chain, such as freight companies that are users of the airport; and

- economic activity attracted to the local area due its proximity to the airport, but which is not directly related to the airport or its supply chain. Examples of such 'catalytic' impacts might include science parks or headquarters functions for international business services firms.

In addition to the economic impact modelling, we have undertaken a preliminary assessment of impacts on the local population and labour markets. This suggests the local area in which the new airport is located would need to increase its housing stock to accommodate between 31,000 and 35,000 extra households, above and beyond what is required under baseline population growth forecasts. This is a conservative estimate based on the effects captured within this part of the modelling. Incorporating other factors, such as the 'catalytic' impacts discussed above would be expected to further increase local employment, and the associated housing need.

1 Introduction

1.1 Modelling the impact of the new airport options

Oxford Economics has been commissioned to model the national and local economic impact of building and operating a new hub airport at each of three locations identified by Transport for London (TfL). The locations are:

- Stansted
- Isle of Grain
- Outer Estuary

Section 2 describes our modelling approach, and the main assumptions and data sources used. Section 3 reports our main findings for the UK and local level impacts of each new airport. We briefly consider areas for further research in Section 4.

2 Approach and methodology

2.1 Overview of impacts modelled

The modelling work identifies two sets of economic impacts. The first are those from the capital expenditure associated with building a new airport, and road and rail links. The second set of impacts is concerned with operation of the airport and the transport links.

The development and operation of the new airport and transport links will generate new employment and productive activity. The effects of this will also flow through to other parts of the local and national economy as the businesses building and operating the infrastructure increase their requirements for goods and services from other industries in their supply chain. What is more, those building or working at the airport, on the transport links, or in the associated supply chains, will spend some of the money they earn, creating a further round of impacts. All of these impacts can be estimated through economic impact analysis.

Economic impact analysis focuses on the employment and gross value added (GVA) effects of change in demand, such as the 'shock' created by a new airport development. It seeks to evaluate three aspects of such increases in demand:

- **Direct impacts** quantify the effects of the businesses directly involved in a given project or industry. In this case they relate to the employment and GDP generated by firms which will build and operate the airport and transport links.
- **Indirect effects** occur in the wider supply-chain as firms directly involved in developing and operating the airport purchase goods and services from UK-based suppliers, in turn generating output, profits and employment among suppliers.
- **Induced effects** arise because the direct and indirect effects mean additional wages are paid to workers, some of which are used to purchase goods and services for their own consumption. This spending supports additional businesses (and so additional output and jobs) in the industries that supply these purchases.

Indirect and induced benefits are also termed "multiplier" effects. The sum of the direct, indirect and induced impacts equates to the total economic impact of a project such as a new airport, as conventionally measured.

Within the time available, and given the defined project scope, it has not been possible to model the impacts of off-airport spending by passengers, or off-airport activity amongst firms whose work is directly reliant on purchasing the services the airport provides. Such impacts would principally be reflected in increased demand for services such as hotels, restaurants and car parking in the airport local area, or increased activity amongst certain firms linked to the aviation sector such as express couriers. Issues relating to the definition and potential scale of this type of "direct off-airport" activity are discussed further in Section 4.

It has also not been possible to model the potential impact of economic activity attracted to the local area due its proximity to the airport, but which is not directly related to the airport or its supply chain. Typical examples of such 'catalytic' impacts might include science parks or headquarters functions for international business services firms.

For these reasons, the modelling results outlined in this paper should be regarded as conservative.

A new airport may generate other impacts on the long-term productive potential of the local area, or indeed the UK. These effects are discussed in a separate technical note, which considers the benefits of improving the UK's connectivity.

A further consideration is the extent to which the resources used by the new airport represent a reallocation away from other parts of the economy, rather than a net addition to economic activity. Our treatment of such 'displacement' effects is discussed in Section 2.9.

2.2 Approach to modelling the direct impact of capital expenditure on a new hub airport and associated ground infrastructure

Atkins has provided estimates of the capital expenditure necessary to develop a new hub airport at each of the three locations, and to link the new airport to ground transportation networks. The majority of this expenditure is construction related, with the remainder consisting of professional fees associated with programme management, engineering consultants, and so on.

Phase 1 of airport construction starts in 2019 (2020 at Stansted) and lasts until each airport enters operation in 2029. A second phase of construction starts in 2025 (Isle of Grain) or 2026 (Stansted and Outer Estuary) and runs to 2050.

There are land costs associated with acquiring the site for a new airport. These costs have been excluded from the modelling due to uncertainty around the precise nature and effects of this expenditure. For example, it is unclear who the land is acquired from, whether all of the expenditure goes to the land owners, and how the transferred funds might subsequently be used.

There are also capital costs associated with developing road and rail links for the airport. Construction of road and rail links starts in 2015, and the initial capital expenditure is complete by 2029 or 2030. Beyond that there is annual expenditure on renewals (maintenance and replacement). Further capital expenditure is undertaken from 2035 (Stansted), 2037 (Outer Estuary) or 2041 (Isle of Grain).²

Key to the modelling of the impacts of this capital expenditure are the 2005 UK Input-Output (IO) tables published by the Office for National Statistics (ONS)³. Input-Output tables provide a complete picture of the flows of goods and services in the economy between industries. In other words, they show who buys what from whom in the economy. Importantly, the IO tables also enable us to calculate 'GVA ratios'. These tell us, for an average pound of a good or service produced in a particular sector, the input requirements (in terms of intermediate purchases, labour costs, profits) and the GVA generated by the firm producing the good or service. We can therefore use these GVA ratios to convert the capital expenditure on the airport and infrastructure construction into GVA.

Construction GVA ratios are applied to expenditure on construction. For this sector typical intermediate inputs might include materials, design costs, and the cost of sub-contracting certain elements of the work. The Atkins figures provide a breakdown of the main work packages to be delivered, such as terminals, demolition and car parks. The direct construction output is the estimated GVA from the injection of capital associated with each of these packages. It may be interpreted as the GVA for the contractor directly responsible for undertaking the work in each

² Note the capital expenditure calculations in this report were based on a slightly earlier iteration of costs. While not precisely the same as the final iteration they are very similar to it..

³ Office for National Statistics (2011) Input-Output Analytical Tables 2005 Edition, available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-237341>

package. A similar approach has been taken to expenditure on professional fees, using GVA ratios for “architectural activities and technical consultancy”.

Employment is estimated from GVA by applying productivity assumptions. We assume labour for the construction phase will be drawn from the region and the rest of the UK. We therefore assume construction labour productivity is equal to the average of that for the region and that for the UK as a whole. Productivity is expected to change over time, and we take account of this using information from Oxford Economics’ regional forecasting models.

We assume all direct GVA and employment associated with the capital expenditure at the airport site is captured within the local area where the new hub is situated. The capital expenditure on the road and rail networks has been split between that which occurs inside and outside the local area on the basis of information provided by Atkins. All of the GVA and employment estimates for this project have been calculated on a ‘workplace basis’, so output and employment are recorded for the area where work actually takes place.

2.3 Approach to modelling the direct operational impact of a new hub airport

It is assumed that the new hub will accommodate 90 million passengers per year upon opening in 2029. This gradually increases to reach 170 million by 2050. The passenger assumptions are the same across all three airports (Table 2.3).

Table 2.3: Passenger assumptions for the new hub airport

	2029	2030	2035	2040	2045	2050
Stansted	90,000,000	95,807,556	121,526,581	134,800,938	150,412,367	170,103,034
Isle of Grain	90,000,000	95,807,556	121,526,581	134,800,938	150,412,367	170,103,034
Outer Estuary	90,000,000	95,807,556	121,526,581	134,800,938	150,412,367	170,103,034

To understand the employment associated with a major hub airport we referred to the 2008/09 Heathrow employment survey⁴. We combined this information with ONS employment data⁵ for the Heathrow ward to estimate a time series for employment at Heathrow. This enabled us to estimate a time series for jobs per million passengers per annum (MPPA) at Heathrow. The datasets revealed that between 1998 and 2011 Heathrow employment grew by 7.4 per cent. During the same period, Heathrow passenger numbers grew by 14.4 per cent, i.e. each 1 per cent increase in passengers equated to a 0.52 per cent increase in employment on average. We used this relationship to estimate future employment at Heathrow with “natural” passenger growth to 2030 and 2050. Similarly, we can use this information on the number of operational jobs associated with varying levels of air traffic to estimate employment at the new hub airports, in accordance with the passenger projections for each option.

In the case of Stansted, the employment estimates are the additional workers over and above what would be required under the natural growth of Stansted. The latter is taken from the London Stansted Employment Strategy 2010-2015⁶ which suggests employment is projected to be around

⁴ Heathrow Airport Ltd (2010) Heathrow: On-airport Employment Survey, 2008/09, available at: <http://www.heathrowairport.com/static/Heathrow/Downloads/PDF/Employment-survey.pdf>

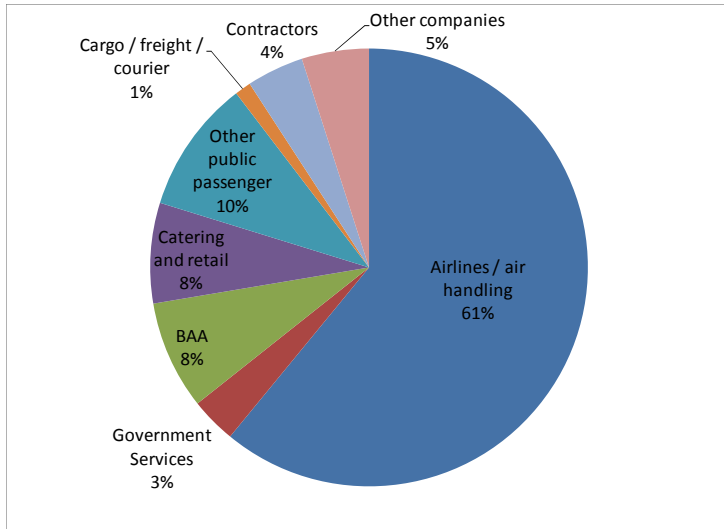
⁵ From the Business Register Employment Survey and Annual Business Inquiry

⁶ London Stansted Airport (2010) Looking to the Future, London Stansted Employment Strategy 2010-2015, available at: http://www.stanstedairport.com/static/Stansted/Downloads/PDF/STAL_Emp_Strategy_Web.pdf

17,000 when the airport handles 36 MPPA. This passenger forecast is consistent with the natural Stansted passenger growth in our study.

The methodology above produces an estimate of total employment at each airport. This has been allocated across sectors using data from the Heathrow employment survey, as shown in Chart 2.3.

Chart 2.3: Heathrow employment, 2008-09



To work with the data within the Oxford Economics forecasting models it is necessary to map the employment types in the Heathrow survey to industries in the Standard Industrial Classification. Based on Oxford Economics' projections of industry productivity for Hillingdon (the borough within which Heathrow is located), the GVA per worker for each job in each sector could then be estimated. Aggregating this up provides an estimate of the direct GVA generated by operational jobs.

This approach assumes productivity is the same as productivity would have been at Heathrow (the expected level of productivity at Heathrow is also assumed to grow over time). This assumption seems reasonable on the basis that many of the new hub jobs will be transferred from Heathrow and are aviation-specific (such as those within airlines or BAA). Aviation-specific employment which is not transferred from Heathrow (additional jobs will be required at the new hub due to its greater capacity) may have to be attracted from outside the local area. On balance, productivity levels at Heathrow should provide a better guide to the productivity of new jobs than jobs than productivity levels in the area where the airport will be located.

2.4 Approach to modelling the direct operational impact of rail links to the new hub

Atkins estimates operational expenditure on rail links to the new hub will be approximately £200 million per year. We need to consider how much of the impact associated with this expenditure occurs within the local area of the new hub and how much occurs in the rest of the UK. If we are measuring GVA and employment on a workplace basis this activity should be allocated according to where employees are based (e.g. stations, operation centres), which may be across various sections of the rail route. We assume that very little of this operational employment will be based at the new hub itself. Therefore the impacts from rail operations have been allocated outside the local area, i.e. there are no *local* employment and GVA impacts from rail operations, but there are impacts at the *national* level. The GVA impact of the operational expenditure was estimated by

applying the GVA to output ratio for “rail transportation” from the I-O tables. The associated operational employment was estimated via Oxford Economics’ productivity forecasts (GVA per worker) for the transport services industry.

2.5 Modelling the indirect impacts of construction and operation

As described above, I-O tables provide an account of who buys what from whom in the economy. They therefore enable us to take the direct GVA generated during construction and operation, and identify the supply chain associated with this output. These supply chain impacts on GVA are then converted into employment using Oxford Economics’ data and forecasts of productivity in each sector.

To estimate the national level impacts, we can use the ONS I-O table directly. Local area multipliers were estimated from the UK I-O tables following a methodology developed by Flegg *et al.*⁷ which adjusts the UK tables to reflect each local area’s industrial structure and size. Local level multipliers will be much smaller than those for the UK. This is because a smaller local economy is less self-sufficient, so more of the supply chain effects ‘leak out’ of the local area to other parts of the UK or abroad.

Indirect labour productivity is assumed to be the same as that forecast for the relevant industry in the local area.

2.6 Modelling the induced impacts of construction and operation

The economic activity generated by building and operating a new airport and transport links will generate additional wages for those directly and indirectly employed. These wages are estimated using the I-O tables, and are adjusted to take into account income tax and national insurance. We then estimate how this additional disposable income would be spent, using the patterns of household consumption expenditure reported in the I-O tables.

2.7 Modelling local demographic impacts

In addition to our estimates of the GVA and employment impacts, we have undertaken an initial assessment of the demographic impacts in the local areas surrounding each hub location.

Using information on commuting flows from the 2001 Census, it is possible to estimate how much of the employment generated at each airport could be taken up by residents of the local area, and how much could be taken up by those commuting into the local area. In making these estimates we have taken into account that workers in different sectors may have different propensities to commute. For example, airline-related employment may be more likely to attract commuters, whilst low-paid jobs in retail and hospitality are more likely to be filled by local residents. We have also taken into account commuting patterns for Heathrow. As the new jobs increase employment rates

⁷ Flegg A. T., Webber C. D. and Elliott M. V. (1995) “On the appropriate use of location quotients in generating regional input-output tables”, *Reg. Studies* 29, 547–61.

in the local area, new residents are attracted to migrate into the area. We have also incorporated this effect within our modelling⁸.

2.8 Local definitions

To model the impact of each option on its local area, it is necessary to define the “local area” for each of the proposed locations.

One approach would be to use the 2001 Travel to Work Areas (TTWAs) developed by the ONS⁹ which identify patterns of commuting and can be used as an indicator of the boundaries of local labour markets. The current criteria for defining TTWAs are that generally at least 75 per cent of an area's resident workforce work in the area and at least 75 per cent of the people who work in the area also live in the area. The area must also have a working population of at least 3,500. Although the TTWAs are dated they remain useful as a rough guide to regional employment markets.

Past data on Stansted Airport employment can also be used as a cross check on the TTWA. Analysis of Stansted employment survey data for 2002-03 suggests the main employee catchment area roughly conformed to the defined TTWA of Harlow and Bishop's Stortford. Nearly two-thirds of Stansted employees live within the local authorities of Uttlesford, East Hertfordshire, Braintree and Harlow.

For the Isle of Grain, the Maidstone and North Kent TTWA would appear to be relevant. This would roughly include Medway, Swale, Maidstone, and Tonbridge and Malling. Gravesham and Dartford could also be added to this to allow for the potential of labour market changes with the attractor of a new airport close to denser population centres. (West of Dartford, and entering the boundaries of Greater London, the distances become substantial. For example it is 28 miles from Crayford in south-east London to the Isle of Grain.)

For the Outer Estuary, the Canterbury TTWA could be used with some modifications. This suggests inclusion of Swale, Canterbury and Thanet.

Of course the local labour markets would themselves be affected by the airport and new transport links. However, if the assumption is that industries/people move to be close to the airport, a case could be made that, if anything, the number of LAs forming the “local area” could be smaller.

Based on the factors above, the local areas for the modelling have been defined as shown in Table 2.8. below. These definitions have been agreed with TfL.

Table 2.8: Local area definitions

Stansted	Isle of Grain	Outer Estuary
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⁸ The modelling only captures migration within the UK – no allowance is made for international migration.

⁹ <http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/other/travel-to-work-areas/index.html>

Uttlesford East Hertfordshire Braintree Harlow	Medway Swale Maidstone Tonbridge and Malling Gravesham Dartford	Swale Canterbury Thanet
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2.9 Displacement: gross versus net impacts

The construction and operation of a new (larger) hub and transport infrastructure will create direct, indirect and induced jobs and GVA for the local area, and the UK as a whole, as described in the previous section. However, these benefits are ‘demand-side’ impacts. Under the modelling approach used for this paper, if the economy is operating to its full potential levels of employment and productivity, a new hub airport will not increase total employment and GVA at the UK level in the long run, since the labour and capital would be drawn to the airport away from other sectors and regions. It has been necessary to make this assumption given the time and resources available for the modelling tasks. Net national effects could be estimated using a Computable General Equilibrium (CGE) approach, and such an approach could be pursued as part of future work, time and resources permitting.

A second limitation of the I-O modelling approach is that it does not enable us to take into account the impact of a hub airport on the UK’s long-run productivity and attractiveness as a destination for skilled migrants and Foreign Direct Investment. Whilst we can model the direct, indirect and induced impacts of *operating* the airport, the approach does not take into account the economic benefits provided by the *connectivity* a hub airport provides. Such effects could be significant and are explored separately in the technical note dealing with connectivity issues. That paper identifies that, based on an econometric model, a 10 per cent increase in business related connectivity increases economy-wide productivity – and hence GDP - by 0.5 per cent in the long-run. Similarly, though not covered in that technical note, the fixed ground transport links could also bring productivity improvements for the country by reducing journey times for airport users and non-users alike.

Whilst our I-O model does not permit the consideration of international movements of labour and capital, it does permit for migration and commuting between regions of the UK. At the local level it is likely there would be a net change in employment and output that persists in the long run as labour and capital are attracted away from other regions of the UK towards the airport local area. These flows could be reflected in new workers migrating into the airport local area, or commuting into the area to work each day.

In particular a significant proportion of airport operational jobs requiring aviation-specific skills (e.g. air traffic controllers, airline jobs etc.) are likely to be transferred over from Heathrow, or the relevant workers drawn from elsewhere in the UK as the local area may not have people with the requisite skills. That said, there will still be some displacement of local jobs and our local modelling makes the following assumptions for the direct employment and GVA impacts:

- lower-skill job types at the airport, such as retail, taxis, etc. will have higher displacement impacts on local employment and GVA than higher-skill jobs. Lower-skill jobs can be filled by existing workers in the local economy and/or may displace similar jobs elsewhere in the local area. We have assumed around 30 per cent of the direct jobs generated displace local employment growth that would have occurred in the absence of the airport, based on the

average displacement at the regional level reported in 2009 research by BIS¹⁰. This means the gross local impacts are reduced by around 30 per cent to arrive at the net figure;

- aviation-related jobs with specific skills requirements (e.g. airlines, air traffic controllers, government services) are more likely to see workers transferring to the new hub from Heathrow as these workers are trained to perform functions within a specific industry. The local area may not have people with these specific skills in the existing workforce, so any additional demand for these jobs (due to the greater capacity of the new hub) is more likely to be met by workers from outside the area. Displacement effects from these jobs are therefore likely to be relatively low and we halved the displacement assumption to 15 per cent for this group of jobs. We assume this applies to jobs in “airlines/air handling”, “BAA” and “government services” as categorised by the Heathrow Employment Survey; and
- direct jobs associated with the construction phase are assumed to have a displacement effect of 30 per cent.

The indirect and induced multiplier effects are based on the net direct impacts. The multiplier effects themselves are then reduced by 30 per cent across all sectors to account for displacement effects within the supply chain.

2.10 Data sources

A number of data sources are identified throughout this report. All other data have been taken from Oxford Economics’ UK local database which is, in turn, built with data from a number of ONS datasets, including mid-year population estimates, the Census, Regional Accounts, the Business Register Employment Survey, and the Annual Population Survey.

¹⁰ BIS (2009) Research to improve the assessment of additionality, available at: <http://www.bis.gov.uk/assets/biscore/economics-and-statistics/docs/09-1302-bis-occasional-paper-01>

3 Impact on employment and output

3.1 National impacts

As described in the previous section, under the modelling framework adopted we would not expect the new hub airport and its road and rail links to make a net addition to total UK employment and GVA in the long run because our modelling approach assumes the economic activity generated will displace activity in other sectors and regions of the economy.

It is nonetheless informative to consider the scale of resources the new infrastructure would require for its construction and operation. Table 3.1 summarises the gross modelling results for the year of peak construction (first block), in 2050 (second block)¹¹, and the cumulative impact between 2015 and 2050 (third block). The third block of the table shows the total impact over the whole of the period 2015-2050. The employment data in cumulative section of the table are represented as “job years” – one job year is equivalent to one person being employed for one year.

In the case of Stansted, the figures assume the new airport sits alongside the existing airport, which is itself expected to continue to expand. As with all the other data in this paper, the figures represent the positive effects of the new infrastructure only. The impact of closing Heathrow is considered in a separate technical note.

Table 3.1: Summary of gross national impacts of a new hub airport

			Direct	Indirect	Induced	Total
Peak construction	Stansted (2023)	Employment (000s)	43	51	30	124
		GVA (£m, 2013 prices)	2,408	2,921	1,666	6,995
	Isle of Grain (2020)	Employment (000s)	50	58	35	143
		GVA (£m, 2013 prices)	2,531	3,095	1,752	7,378
	Outer Estuary (2026)	Employment (000s)	47	55	33	135
		GVA (£m, 2013 prices)	2,689	3,335	1,865	7,889
2050	Stansted	Employment (000s)	110	141	125	377
		GVA (£m, 2013 prices)	16,298	14,560	11,297	42,156
	Isle of Grain	Employment (000s)	116	144	129	388
		GVA (£m, 2013 prices)	16,328.0	14,651.8	11,314.8	42,295
	Outer Estuary	Employment (000s)	116	144	132	392
		GVA (£m, 2013 prices)	16,328.0	14,651.8	11,314.8	42,295
Cumulative impact 2015-2050	Stansted	Employment (000s of job years)	2,474	3,111	2,579	8,164
		GVA (£m, 2013 prices, undiscounted)	279,619	257,286	194,133	731,038
	Isle of Grain	Employment (000s of job years)	2,573	3,132	2,636	8,340
		GVA (£m, 2013 prices, undiscounted)	277,594	256,103	192,676	726,373
	Outer Estuary	Employment (000s of job years)	2,668	3,255	2,765	8,688
		GVA (£m, 2013 prices, undiscounted)	282,924	262,979	196,389	742,292

Key points from the table are:

- At its peak, construction of the airport and ground transport links would create 43,000 to 50,000 jobs on a **gross national** basis. This range increases to 124,000 to 143,000 once indirect and induced impacts are taken into account (construction phase employment

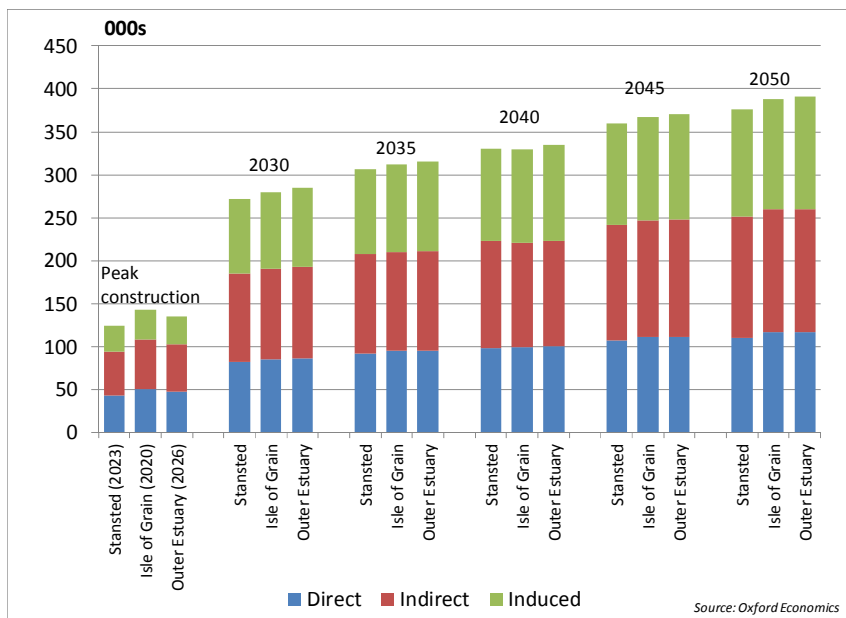
¹¹ Even though the 2050 figures for the Isle of Grain and Outer Estuary are based on a common set of assumptions for airport operation, and construction expenditure, the employment impacts are very slightly different. This reflects different productivity levels within the two areas.

peaks in different years under each option, according to the phasing of the work in the Atkins assumptions);

- the gross direct, indirect and induced impacts of building and operating a new hub airport and ground transport infrastructure would make a cumulative contribution to UK GDP of £726bn to £742bn (2013 prices) between 2015 and 2050. This is an average of around £20bn per year during this period; and
- employment impacts at Stansted are slightly lower than in the other scenarios. This is because we assume developing the new hub both adds new jobs in the new part of the airport, and enables productivity to increase in the existing part of the airport. This is because the existing airport becomes part of a much larger operation and is able to benefit from greater economies of scale. These higher productivity levels mean fewer jobs are generated in the existing part of the airport than would otherwise have been the case, slightly offsetting the overall employment impact of the new airport.

Chart 3.1 shows the gross UK employment associated with the direct, indirect and induced effects of a new hub airport and ground transport links. Around a third of the jobs under each option would be generated by the direct impact of construction and operation.

Chart 3.1: Gross increase in employment versus Oxford Economics baseline scenario



3.2 Local employment and GVA impacts

Table 3.2.1, below, sets out the direct, indirect and induced impacts on employment and GVA at the peak of construction, in 2050, and across the whole study period from 2015-2050. Consistent with the national figures above, these are gross figures that do not take into account displacement of other jobs and output in the local area. It is immediately clear that the local employment impacts during construction and operation are smaller than those reported for the national level. This is because some of the indirect spending in the supply chain will ‘leak out’ of the local area as the construction and operation of the airport and transport links draws on suppliers from elsewhere in the country. Some of the induced spending of the direct and indirect employees will also occur outside of the airport local area.

The third block of the table shows the total impact over the whole of the period 2015-2050. The employment data are represented as “job years” – one job year is equivalent to one person being

employed for one year. This suggests that over the entirety of construction and operation, the greatest gross local impact on employment would be generated by the Outer Estuary option. Gross cumulative impacts on employment are smallest at Stansted where, as discussed above, the employment generated by development and operation of the new infrastructure is slightly offset by efficiency gains at the existing airport.

Table 3.2.1: Gross local impacts of a new hub airport

			Direct	Indirect	Induced	Total
Peak construction	Stansted (2023)	Employment (000s)	34	6	9	49
		GVA (£m, 2013 prices)	1,930	337	446	2,713
	Isle of Grain (2020)	Employment (000s)	36	6	10	53
		GVA (£m, 2013 prices)	1,838	306	455	2,599
	Outer Estuary (2026)	Employment (000s)	32	6	9	47
		GVA (£m, 2013 prices)	1,836	311	406	2,554
Operation - 2050	Stansted	Employment (000s)	108	10	53	170
		GVA (£m, 2013 prices)	16,098	944	4,373	21,415
	Isle of Grain	Employment (000s)	112	10	65	188
		GVA (£m, 2013 prices)	16,031	873	5,068	21,972
	Outer Estuary	Employment (000s)	112	11	65	188
		GVA (£m, 2013 prices)	15,976	870	4,415	21,260
Cumulative impact 2015-2050	Stansted	Employment (000s of job years)	2,335	229	1,048	3,613
		GVA (£m, 2013 prices, undiscounted)	271,442	18,035	73,045	362,522
	Isle of Grain	Employment (000s of job years)	2,399	240	1,274	3,913
		GVA (£m, 2013 prices, undiscounted)	267,647	16,439	83,491	367,578
	Outer Estuary	Employment (000s of job years)	2,435	264	1,307	4,005
		GVA (£m, 2013 prices, undiscounted)	269,525	16,901	73,443	359,869

Whilst Table 3.2.1 provides an indication of the jobs and GVA supported by constructing and operating a new hub airport, not all of the jobs and GVA shown will represent a net addition to the local economy. Our preferred estimates of local impacts take into account that some of the activity associated with the airport will be drawn away from other aspects of the local economy. These *net* results are presented in Table 3.2.2, below.

Table 3.2.2: Net local impacts of a new hub airport

			Direct	Indirect	Induced	Total
Peak construction	Stansted (2023)	Employment (000s)	25	3	5	32
		GVA (£m, 2013 prices)	1,404	171	232	1,807
	Isle of Grain (2020)	Employment (000s)	26	3	5	35
		GVA (£m, 2013 prices)	1,337	155	237	1,729
	Outer Estuary (2026)	Employment (000s)	23	3	5	31
		GVA (£m, 2013 prices)	1,328	157	209	1,694
Operation - 2050	Stansted	Employment (000s)	87	5	31	123
		GVA (£m, 2013 prices)	13,286	521	2,545	16,352
	Isle of Grain	Employment (000s)	91	6	38	134
		GVA (£m, 2013 prices)	13,219	481	2,948	16,647
	Outer Estuary	Employment (000s)	90	6	38	134
		GVA (£m, 2013 prices)	13,180	480	2,567	16,227
Cumulative impact 2015-2050	Stansted	Employment (000s of job years)	1,866	125	606	2,597
		GVA (£m, 2013 prices, undiscounted)	222,353	9,822	42,274	274,450
	Isle of Grain	Employment (000s of job years)	1,917	130	736	2,783
		GVA (£m, 2013 prices, undiscounted)	219,182	8,939	48,335	276,456
	Outer Estuary	Employment (000s of job years)	1,942	143	754	2,839
		GVA (£m, 2013 prices, undiscounted)	220,515	9,183	42,439	272,137

The main points from table 3.2.2 are:

- the direct impact during the year of peak of construction will be a net addition of between 23,000 and 26,000 jobs in the local area. This range increases to between 31,000 and 35,000 once the indirect and induced multipliers are incorporated. Taking the three effects together, this economic activity translates to between £1.7bn and £1.8bn of additional GVA for the local area in the year of peak construction;
- by 2050, operation of the airport (and a small amount of construction and maintenance activity) directly generates between 87,000 and 91,000 additional jobs in the local area. Incorporating the indirect and induced impacts increases this range to 123,000 to 134,000. In total, this equates to just over £16bn of additional GVA for the local economy in 2050; and
- over the entire study period, and including direct, indirect and induced impacts, the new hub airport would generate £272bn to £276bn of local GVA. It would also support 2.6m to 2.8m job years, equivalent to an average of 72,000 to 79,000 per year.

From the net data for operations in 2050 it is possible to calculate employment 'multipliers' to indicate the extent to which the direct impacts of the airport generate further knock-on impacts throughout the economy. For Stansted, the overall modelled impact of the airport (direct, indirect and induced) is 1.4 times the direct impact. For the Isle of Grain and Outer Estuary options the equivalent figure is 1.5. A separate technical note identifies that, based on a literature review of studies using a range of definitions, multiplier effects for airports are typically in the range of 2 to 3. It is perhaps unsurprising that our modelled numbers of 1.4 to 1.5 are conservative in comparison, given that the results from our I-O modelling framework do not include:

- impacts on businesses reliant on the off-airport expenditure of passengers, such as hotels;
- impacts on off-airport firms whose work is directly reliant on the new airport, but which are not part of the airport supply chain, such as freight companies that are users of the airport; or
- the effects for economic activity attracted to the airport local area due its proximity to the airport, but which is not directly related to the airport or its supply chain. Typical examples of such 'catalytic' impacts might include science parks or headquarters functions for international business services firms.

3.3 Composition of generated employment

The charts below split out the net local employment generated in each scenario (direct, indirect and induced) to show the amounts attributable to construction of the airport, construction of ground transport infrastructure, and operation of the airport (employees responsible for operating the transport links is assumed to be based outside of the local areas).

The charts make clear that the vast majority of employment generated arises as a result of operating the airports. Almost 90 per cent of jobs created are attributable to this. Nonetheless, the charts also highlight the ongoing 'tail' of construction work that continues after the airports enter operation, to further develop and renew the airports and ground transport links.

Chart 3.3.1: Sources of net local employment generated in the Stansted local area

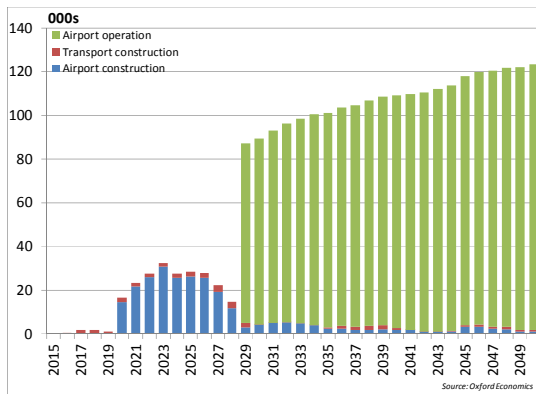


Chart 3.3.2: Sources of net local employment generated in the Isle of Grain local area

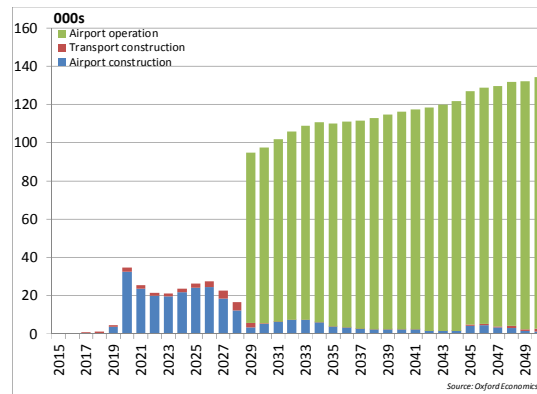
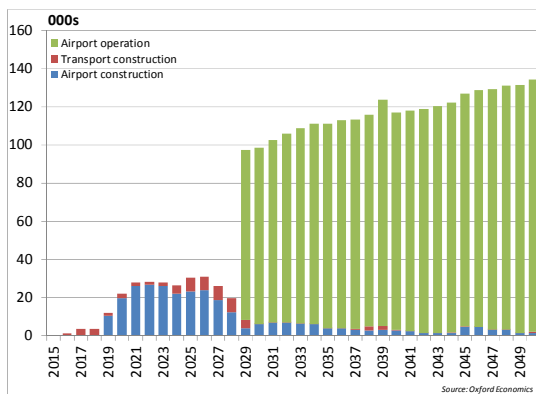


Chart 3.3.3: Sources of net local employment generated in the Outer Estuary local area



3.4 Impact on local employment structure

Constructing a new airport and transport links will have a significant impact on the *structure* of the local economy. To consider this, Charts 3.4.1 to 3.4.3 look at the employment structure of each of the local areas in 2012, at the peak of construction, and once the airport is fully operational in 2050. For the latter two years, the charts compare the level and composition of employment with and without the airport and transport links to highlight how developing the new infrastructure would change the nature of the area’s economic development in the period to 2050. The figures in this section are *net* and so take into account the combined impact of the direct, indirect and induced effects, after allowing for displacement of other jobs in the local labour market.

The white numbers on the charts denote the employment level within those sectors most affected by the infrastructure development. As would be expected, construction of the airport and transport links leads to significantly higher employment in construction sector in the year when construction is at its peak. This effect is partly temporary: construction employment drops back when the airport enters the operational phase, though is still higher than in the no airport case, reflecting the airport-related Phase 2 construction work at the airport, and further capital and renewals expenditure on ground transport infrastructure.

Comparing the situation in 2050 with and without the airport indicates the influence of the operation of the airport on the local employment structure. Unsurprisingly, developing a new hub airport

would mean significant employment growth within the transportation and storage sector. For example, in the local area for the Outer Estuary option, transportation and storage employment is forecast to represent five per cent of the total in 2050 if there is no airport, but this rises to 26 per cent with an airport. There is also an increase in wholesale and retail employment, some of which will be directly within the airport, and some of which results from additional consumer spending in the airport local area by direct and indirect employees. Similarly, the areas see a noticeable increase in employment in the accommodation and food service sector.

Chart 3.4.1: Employment structure of the Stansted local area

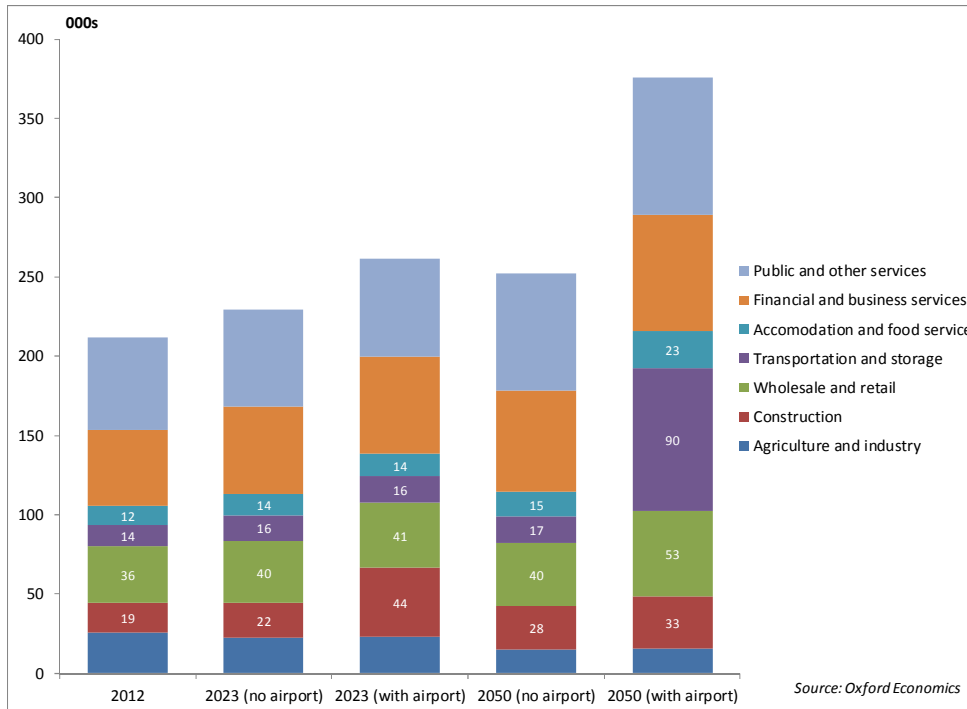


Chart 3.4.2: Employment structure of the Isle of Grain local area

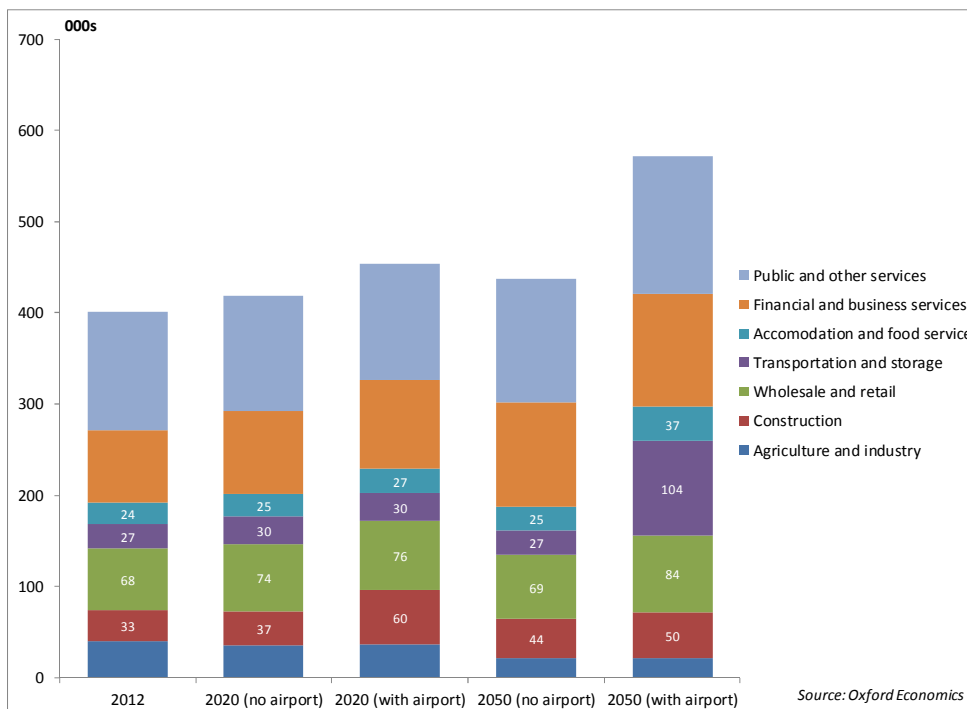
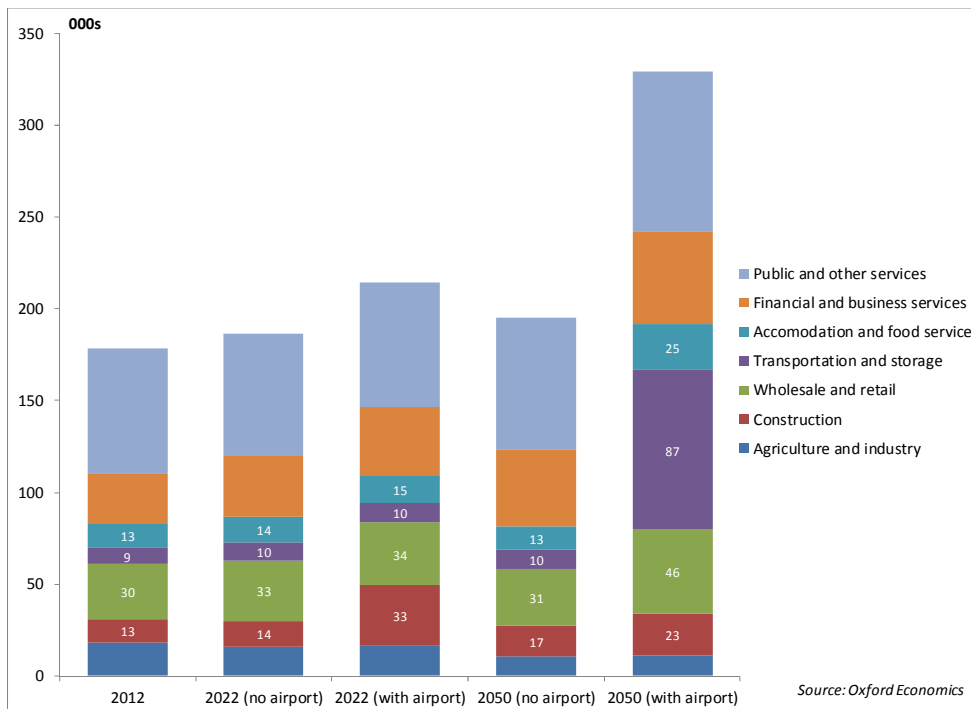


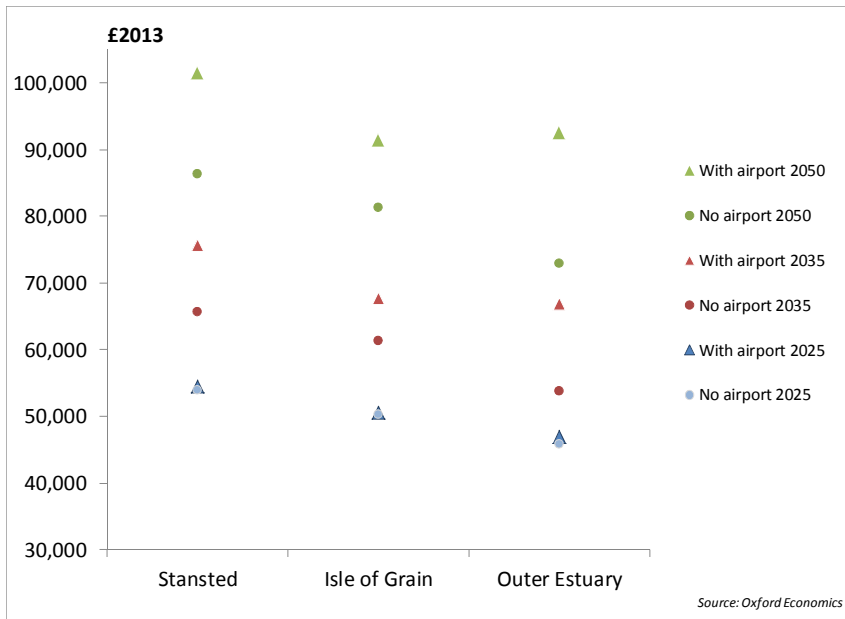
Chart 3.4.3: Employment structure for the Outer Estuary local area



The changes in employment structure highlighted above also influence productivity levels (Chart 3.4.4). Whilst the construction of an airport will lead to more economic activity within each area, the blue markers in Chart 3.4.4 suggest there will be little impact on the average productivity per employee during construction. This implies that productivity levels in the direct, indirect and induced jobs associated with construction of the infrastructure will be broadly in line with the average that would have prevailed without the new development.

Whilst operation of a new hub airport will generate a range of low-skill and high-skill jobs, our modelling suggests that it will, on average, raise productivity levels in the local area. This gap is particularly marked for the Outer Estuary option, where our modelling suggests that by 2050, average productivity levels would be around one quarter higher than without the airport.

Chart 3.4.4: Output per employee in airport local area

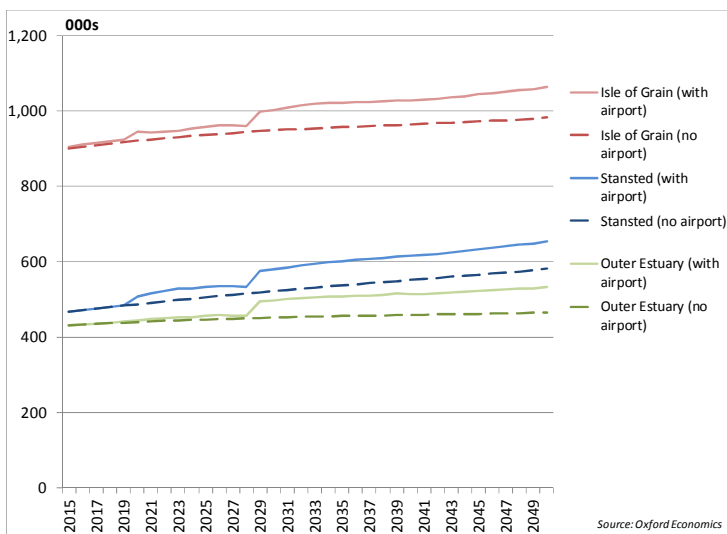


3.5 Local demographic impacts

The Outer Estuary local area had the highest unemployment rate amongst the four areas in 2012, but at 4.3 per cent in 2012 it was only slightly above the UK average of 4.0 per cent. To fill the additional jobs required to construct and operate a new airport, all of the areas would need to attract extra workers to either migrate to the area, or to commute into the area each day.

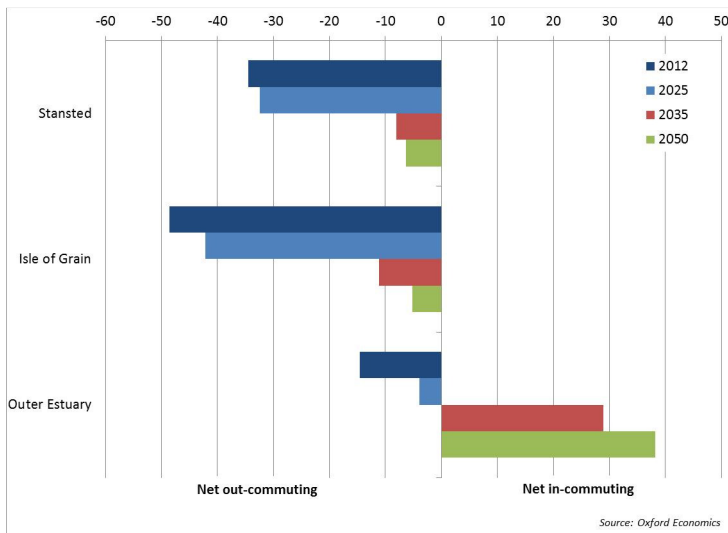
Our modelling confirms that the area around a new airport would experience stronger inward migration from elsewhere in the UK. For example, the Isle of Grain local area would receive an additional 81,000 UK migrants by 2050. This is reflected in stronger population growth than would otherwise have been the case (see Chart 3.5.1) and this will, in turn, increase local housing needs. We estimate the local area in which the new airport is located would need to increase its housing stock to accommodate between 31,000 and 35,000 extra households, above and beyond what is required under the baseline population growth forecasts.

Chart 3.5.1: Population change in the airport local areas, 2015-2050



In common with other areas close to London, the potential airport locations all see negative net commuting at present – the outflow of people travelling to work outside of the local area is greater than the inflow of people coming in to work from elsewhere. The additional employment created by a new hub airport could have a significant impact on commuting patterns (Chart 3.5.2). The change is most marked for the Outer Estuary local area, where there is currently a net commuter outflow of 15,000 workers. With a new airport this negative flow is expected to turn positive to become a net inflow of 38,000 by 2050. For the Stansted and Isle of Grain local areas, the net commuting flow would remain negative, but the inflow of workers to the new airport means the net balance is much smaller than would otherwise have been the case.

Chart 3.5.2: Airport local area net commuting flows with a new hub airport



More detailed tables of demographic and labour market indicators are included at Annex A.

4 Areas for further work

This technical note has set out the main results from Oxford Economics' modelling of the direct, indirect and induced impacts of a new hub airport at Stansted, on the Isle of Grain, or in the Outer Estuary. Within the time available, and given the defined project scope, it has not been possible to model the impacts of off-airport spending by passengers, or off-airport activity amongst firms whose work is directly reliant on purchasing the services the airport provides. Such impacts would principally be reflected in the demand for services such as hotels, restaurants and car parking in the airport local area, or reduced activity amongst certain firms linked to the aviation sector such as express couriers.

For these reasons, the modelling results outlined in this paper should be regarded as conservative.

Further work could include development of a Computable General Equilibrium (CGE) model to more fully assess the net UK-level impacts of developing a new hub airport and ground transport links.

Annex A: Demographic and labour market modelling results

Demographic and labour market indicators for Stansted

Baseline	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	453	487	506	522	537	551	566	581
Working age population (000's)	277	302	308	312	319	335	342	347
Migration (000's)	3	2	2	2	2	2	2	2
Employees (000's)	176	187	191	193	198	202	205	209
Self employment (000's)	35	38	39	40	41	42	43	44
Total employment (000's)	212	226	231	234	239	244	248	253
People based employment (000's)	197	208	211	213	218	222	226	230
Unemployment (000's)	7	6	6	5	6	5	5	5
Unemployment rate (% of working age)	2.7%	2.0%	1.8%	1.7%	1.7%	1.6%	1.6%	1.5%
Participation rate (% of working age)	86.3%	83.6%	83.1%	82.9%	83.3%	81.2%	81.0%	81.5%
Residence employment (000's)	231	246	250	254	260	267	272	278
Residence employment rate (% of working age)	83.6%	81.6%	81.3%	81.2%	81.5%	79.6%	79.4%	80.0%
Net commuting (000's)	-34	-38	-39	-40	-42	-44	-46	-48
Housing stock (000's)	191	206	214	221	227	233	239	246
Households (000's)	187	203	212	221	228	236	243	252

With new hub airport	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	453	507	533	579	601	615	634	653
Working age population (000's)	277	320	332	364	377	393	404	412
Migration (000's)	3	22	2	3	1	1	4	3
Employees (000's)	176	201	214	268	282	292	303	310
Self employment (000's)	35	41	44	55	58	61	63	65
Total employment (000's)	212	243	259	323	340	354	366	376
People based employment (000's)	197	224	237	295	310	321	333	342
Unemployment (000's)	7	6	6	5	6	4	3	4
Unemployment rate (% of working age)	2.7%	1.9%	1.7%	1.5%	1.5%	1.0%	0.8%	0.8%
Participation rate (% of working age)	86.3%	82.4%	82.8%	85.2%	85.8%	84.6%	84.7%	85.2%
Residence employment (000's)	231	258	269	305	318	329	339	348
Residence employment rate (% of working age)	83.6%	80.6%	81.1%	83.7%	84.3%	83.7%	83.9%	84.3%
Net commuting (000's)	-34	-34	-32	-10	-8	-7	-6	-6
Housing stock (000's)	191	215	226	245	254	260	268	276
Households (000's)	187	212	224	245	255	263	273	283

Differences (impact of new hub airport)	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	0	20	27	57	64	64	68	72
Working age population (000's)	0	18	24	52	58	58	62	65
Migration (000's)	0	20	0	1.4	-0.4	-0.9	2.5	0.9
Employees (000's)	0	14	23.5	74	84	90	98	101
Self employment (000's)	0	3	5	15	17	19	20	21
Total employment (000's)	0	17	28	89	101	109	118	123
People based employment (000's)	0	15	26	81	92	99	107	112
Unemployment (000's)	0	0	0	0	0	-2	-2	-2
Unemployment rate (% of working age)	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.7%	-0.8%	-0.7%
Participation rate (% of working age)	0.0%	-1.2%	-0.4%	2.3%	2.5%	3.4%	3.8%	3.7%
Residence employment (000's)	0	11	19	51	58	62	67	70
Residence employment rate (% of working age)	0.0%	-1.1%	-0.2%	2.5%	2.8%	4.1%	4.6%	4.3%
Net commuting (000's)	0	4	7	30	34	37	40	42
Housing stock (000's)	0	8	11	24	27	27	29	30
Households (000's)	0	8	11	24	27	27	29	31

Demographic and labour market indicators for the Isle of Grain

Baseline	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	884	921	937	948	957	965	972	982
Working age population (000's)	543	571	568	560	557	570	567	561
Migration (000's)	3	0	0	0	0	0	0	0
Employees (000's)	341	355	357	358	362	366	368	371
Self employment (000's)	58	63	63	63	64	65	66	66
Total employment (000's)	401	419	421	422	427	432	435	438
People based employment (000's)	376	391	391	390	394	398	400	404
Unemployment (000's)	19	16	14	12	11	10	8	7
Unemployment rate (% of working age)	3.6%	2.9%	2.5%	2.1%	1.9%	1.7%	1.5%	1.2%
Participation rate (% of working age)	81.6%	79.8%	80.0%	80.6%	81.8%	80.7%	81.3%	82.6%
Residence employment (000's)	424	439	440	440	445	450	453	457
Residence employment rate (% of working age)	78.1%	76.9%	77.5%	78.6%	79.9%	79.0%	79.9%	81.5%
Net commuting (000's)	-49	-49	-49	-50	-51	-52	-53	-54
Housing stock (000's)	371	388	395	401	405	409	412	417
Households (000's)	359	380	389	398	405	412	419	427

With new hub airport	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	884	945	958	1,003	1,022	1,029	1,044	1,063
Working age population (000's)	543	594	587	610	616	628	632	634
Migration (000's)	3	17	2	3	-2	0	3	1
Employees (000's)	341	384	379	441	455	464	476	484
Self employment (000's)	58	68	67	78	81	83	85	86
Total employment (000's)	401	453	448	520	537	548	562	572
People based employment (000's)	376	423	416	480	496	505	517	527
Unemployment (000's)	19	16	14	10	10	7	6	6
Unemployment rate (% of working age)	3.6%	2.7%	2.4%	1.6%	1.6%	1.1%	1.0%	1.0%
Participation rate (% of working age)	81.6%	80.6%	80.4%	82.7%	83.8%	83.1%	83.8%	84.9%
Residence employment (000's)	424	462	458	495	507	515	524	532
Residence employment rate (% of working age)	78.1%	77.9%	77.9%	81.2%	82.3%	82.0%	82.8%	83.9%
Net commuting (000's)	-49	-39	-42	-15	-11	-10	-7	-5
Housing stock (000's)	371	399	404	424	432	436	443	451
Households (000's)	359	390	398	421	432	439	450	462

Differences (impact of new hub airport)	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	0	25	21	55	65	64	72	81
Working age population (000's)	0	22	19	50	59	58	65	73
Migration (000's)	0.0	16.6	2.1	2.7	-1.8	-0.1	3.4	1.5
Employees (000's)	0	30	22.5	83	93	99	108	113
Self employment (000's)	0	5	4	15	17	17	19	20
Total employment (000's)	0	35	27	98	110	116	127	133
People based employment (000's)	0	32	25	90	101	107	117	123
Unemployment (000's)	0	0	0	-2	-1	-3	-2	-1
Unemployment rate (% of working age)	0.0%	-0.1%	-0.1%	-0.5%	-0.4%	-0.6%	-0.5%	-0.2%
Participation rate (% of working age)	0.0%	0.8%	0.3%	2.1%	2.0%	2.4%	2.5%	2.2%
Residence employment (000's)	0	23	17	55	62	65	71	75
Residence employment rate (% of working age)	0.0%	1.0%	0.4%	2.6%	2.4%	3.0%	3.0%	2.4%
Net commuting (000's)	0	10	7	35	40	42	46	48
Housing stock (000's)	0	10	9	23	27	27	30	34
Households (000's)	0	10	9	23	27	27	31	35

Demographic and labour market indicators for the Outer Estuary

Baseline	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	424	440	447	452	456	459	462	466
Working age population (000's)	252	262	258	252	250	255	254	251
Migration (000's)	2	1	1	1	1	1	1	1
Employees (000's)	149	154	155	155	158	160	161	162
Self employment (000's)	29	31	31	32	32	33	33	34
Total employment (000's)	178	185	187	188	191	193	195	197
People based employment (000's)	167	173	173	173	175	177	177	180
Unemployment (000's)	11	9	8	6	5	5	4	3
Unemployment rate (% of working age)	4.3%	3.5%	2.9%	2.3%	2.1%	1.9%	1.6%	1.3%
Participation rate (% of working age)	76.5%	74.4%	74.8%	75.5%	76.7%	75.4%	75.8%	76.8%
Residence employment (000's)	182	186	185	185	186	188	188	189
Residence employment rate (% of working age)	72.2%	70.9%	71.8%	73.2%	74.6%	73.5%	74.2%	75.6%
Net commuting (000's)	-15	-13	-12	-12	-12	-11	-11	-10
Housing stock (000's)	189	198	202	206	209	212	215	219
Households (000's)	177	188	193	198	203	207	212	217

With new hub airport	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	424	445	457	497	508	513	523	533
Working age population (000's)	252	266	267	293	298	305	309	311
Migration (000's)	2	4	4	2	1	-2	4	3
Employees (000's)	149	172	180	237	255	256	265	272
Self employment (000's)	29	35	36	48	52	53	55	56
Total employment (000's)	178	207	217	286	307	309	321	329
People based employment (000's)	167	193	201	263	282	283	292	301
Unemployment (000's)	11	5	3	3	3	3	3	3
Unemployment rate (% of working age)	4.3%	2.0%	1.3%	1.0%	1.0%	1.0%	1.0%	1.0%
Participation rate (% of working age)	76.5%	77.1%	78.1%	82.8%	84.3%	83.6%	84.4%	85.5%
Residence employment (000's)	182	200	205	240	248	252	258	263
Residence employment rate (% of working age)	72.2%	75.2%	76.8%	81.8%	83.3%	82.6%	83.4%	84.5%
Net commuting (000's)	-15	-7	-4	24	29	32	35	38
Housing stock (000's)	189	200	206	226	233	237	243	249
Households (000's)	177	190	198	218	226	232	240	248

Differences (impact of new hub airport)	2012	2020	2025	2030	2035	2040	2045	2050
Population (000's)	0	5	10	45	52	55	61	66
Working age population (000's)	0	4	9	41	48	50	56	60
Migration (000's)	0	2	2	1.1	-0.7	-3.8	3.0	1.6
Employees (000's)	0	18	25.3	82	97	96	104	110
Self employment (000's)	0	4	5	17	20	20	21	23
Total employment (000's)	0	22	30	99	117	116	126	133
People based employment (000's)	0	20	28	91	107	106	115	121
Unemployment (000's)	0	-4	-4	-3	-2	-2	-1	0
Unemployment rate (% of working age)	0.0%	-1.5%	-1.6%	-1.3%	-1.1%	-0.9%	-0.6%	-0.3%
Participation rate (% of working age)	0.0%	2.8%	3.3%	7.3%	7.6%	8.2%	8.6%	8.6%
Residence employment (000's)	0	14	20	55	61	64	70	73
Residence employment rate (% of working age)	0.0%	4.2%	4.9%	8.5%	8.7%	9.1%	9.3%	8.9%
Net commuting (000's)	0	6	8	36	41	43	46	49
Housing stock (000's)	0	2	4	20	24	25	28	31
Households (000's)	0	2	4	20	23	25	28	31

Annex B: Heathrow employment and passenger assumptions

The numbers in the table below were used as the basis for calculating the direct on-airport employment associated with a given number of passengers at a hub airport.

	Estimated Heathrow direct on-airport employment	Heathrow PAX
1998	60,874	60,683,988
1999	60,837	62,268,292
2000	61,681	64,620,286
2001	59,462	60,764,924
2002	55,713	63,362,097
2003	63,428	63,495,367
2004	70,016	67,342,743
2005	73,112	67,913,153
2006	73,954	67,527,923
2007	78,058	68,066,028
2008	76,028	67,054,745
2009	73,436	66,036,957
2010	69,540	65,881,660
2011	65,400	69,433,230
2012	65,400	70,037,417
2013	65,720	70,702,005
2014	66,040	71,366,593
2015	66,360	72,031,181
2016	66,680	72,695,769
2017	67,000	73,360,357
2018	67,320	74,024,945
2019	67,640	74,689,533
2020	67,960	75,354,121
2021	68,280	76,018,709
2022	68,600	76,683,296
2023	68,920	77,347,884
2024	69,240	78,012,472
2025	69,560	78,677,060
2026	69,880	79,341,648
2027	70,200	80,006,236
2028	70,520	80,670,824
2029	70,840	81,335,412
2030	71,160	82,000,000
2031	71,406	82,550,000
2032	71,652	83,100,000
2033	71,898	83,650,000
2034	72,144	84,200,000
2035	72,390	84,750,000
2036	72,636	85,300,000
2037	72,882	85,850,000
2038	73,128	86,400,000
2039	73,375	86,950,000
2040	73,621	87,500,000
2041	73,867	88,050,000
2042	74,113	88,600,000
2043	74,359	89,150,000
2044	74,605	89,700,000
2045	74,851	90,250,000
2046	75,097	90,800,000
2047	75,343	91,350,000
2048	75,590	91,900,000
2049	75,836	92,450,000
2050	76,082	93,000,000

Employment numbers are Oxford Economics estimates based on ONS data for the Heathrow ward

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