



# Landing the right airport

**MAYOR OF LONDON**

Why we must do better than Heathrow

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“Heathrow has no silver bullet for its noise nightmare: you can shift flight routings all you like – but you can’t avoid the suffering – you just end up it inflicting it on thousands of new people.”

# The Mayor's message

**When it comes to our place in the world, we are at a crossroads.** The UK has served for centuries as a junction between countries, continents, economies, cultures, businesses, people – a place where the world gathers to trade goods and ideas in equal measure. Our openness to the world has been our strength and this nation has been enriched by all that the world has to offer. We thrive on our cultural, economic, academic and social links to every corner of the globe.

As the world changes, Britain is uniquely placed to engage: with the rapidly growing economies of Asia and Latin America, with established trading partners in Europe and North America, with the burgeoning nations of the African continent and Oceania. A more multi-polar world presents more challenges and uncertainties but building on established ties and forging new partnerships, the UK can and must continue to be a force for good, while at the same time able to take advantage of the new opportunities presented to deliver economic growth and prosperity.

**When it comes to our access to the world, we are at a crossroads.** At one time ensured by our command of the seas, today it is the corridors of the skies which connect these isles to the world. As an island nation, the UK

is disproportionately reliant on aviation and accounts for a quarter of all EU air passengers. Once our air connectivity was the envy of the world and in Heathrow we could claim a hub airport offering more international routes and carrying more international passengers than any other.

Neither applies today. Heathrow has been a victim of its own success and is effectively full. As the UK's only hub airport, Heathrow still dominates UK aviation – it accounts for 40% of UK passengers yet 80% of UK long haul passengers – but it is a diminished force. Its connectivity has been steadily eroded by its lack of slots, unable to serve a raft of new destinations in the emerging economies nor fully able to connect them to the rest of the UK, so depleted are the domestic routes it now offers. Heathrow performs heroically in the circumstances but is prone to delays and ultimately struggles in a cramped urban location not fit to accommodate a world class airport.

**A third runway at Heathrow fails to give us the access to the world we need.** This is borne out by the Airports Commission's own evidence, which found that an expanded Heathrow would effectively be full shortly after opening. It predicted that a three-runway Heathrow would offer just seven additional

long haul routes by 2030 – and three fewer domestic destinations than today. This is not the great increase in connectivity that UK businesses need.

Nor has the Commission been able to ignore the dire public health impacts of a third runway. While Heathrow Airport and the Commission have done their best to play down the noise exposure, undertaking multiple modelling iterations to optimise the flight routings, they still show at least half a million people exposed to significant aircraft noise. That's more than its five main European rivals together expose today. [And if one were to use assumptions more in line with today's operations, that figure is a million people exposed.] The Commission's modelling also showed between 100,000 and 300,000 people would be exposed to significant aircraft noise for the first time. In one scenario, this constituted 43% of the total numbers exposed. You see, Heathrow has no silver bullet for its noise nightmare: you can shift flight routings all you like – but you can't avoid the suffering – you just end up it inflicting it on thousands of new people. It is certainly no comfort for local communities that the Airports Commission's proposed night flights 'ban' (which, incidentally, Heathrow Airport has declined to accept) would actually lead to 32% more flights in the 23:00-07:00 night period. ✈

“If we are to secure the connectivity we need to support our future growth and prosperity - and do so without dire impacts on public health - then we must do better than Heathrow”

The Department for Transport published new guidance for monetising the public health impacts of noise in December 2015. Using this methodology, we have calculated the harm to be valued at £20-25bn over 60 years – that’s a colossal amount which reflects the increased risk of heart attack, stroke, dementia and other disorders shown to be linked to prolonged exposure to aircraft noise.

Air quality remains a serious issue for Heathrow expansion. The revised Government Action Plan now forecasts compliance with legal limits for NO<sub>2</sub> concentrations in 2025. A third runway, opening in the late 2020s, will lead to increased NO<sub>2</sub> concentrations, risking non-compliance of the entire Greater London zone – and aside from any legal ramifications this would have serious implications for public health.

The Commission and its consultants recognised that key to tackling air quality is the right package of surface access measures, moving trips from road to rail. They identified that this requires both new rail capacity and travel demand measures, including road user charging. Both will be challenging – and, in particular, the Commission has failed to grasp the scale of new rail infrastructure that a three-runway Heathrow will require. In the context of a city which is growing, one might question the wisdom of trying to accommodate a substantial uplift in demand in a location where road and rail networks will already be nearing capacity.

So, let us be in no doubt: the Airports Commission’s evidence shows that a three-

runway Heathrow offers little improvement in connectivity while raising serious concerns about its public health impacts. Even Government was not convinced that the case for Heathrow had been made – and pointedly declined to adopt the Commission’s recommendation.

**Nor does a second runway at Gatwick solve the connectivity gap.** Gatwick is a great airport playing a useful role in the London airports system – but it is not a hub. The Chief Executive of Gatwick Airport has accepted there will be some destinations the airport would be unable to support. While there might be other reasons to expand Gatwick, it will not provide the new connectivity that the UK needs.

**We need an alternative that gives all of the UK access to all of the world.** The Airports Commission’s evidence makes clear that a) this needs to be a hub and b) this hub needs to have at least four runways. Moreover, we need to avoid the dire public health impacts associated with Heathrow. This is essential if we are ever to achieve a political consensus and smooth the path to delivery of new capacity. The only credible solution is a new hub airport, located to the east of London, away from populated areas but connected by fast rail services to London and much of the UK.

Having considered a longlist of locations we identified three: the Inner Thames Estuary, Outer Thames Estuary and Stansted. Each could accommodate the four-runway hub that London and the UK needs. Our analysis predicts that they would offer around double the

number of long haul and domestic destinations served by Heathrow today, while exposing 95% fewer people to significant aircraft noise.

A four-runway hub to the east of London, rather than jarring with the growth of London will support it, catalysing regeneration and housing to the east. It is forecast to contribute £92bn to UK GDP in 2050 and support 336,000 jobs nationally. This would be truly transformational for London and the UK.

Government has a bold decision to make – but not a difficult one. Yes, it has to inspire those lacking the imagination to look beyond the constrained site that serves as our severely impaired hub today. Yes, it has to face down the vested interests who are set on a non-solution that does not serve the national interest. But the Airports Commission’s evidence is clear: if we are to secure the connectivity we need to support our future growth and prosperity – and do so without dire impacts on public health – then we must do better than Heathrow.

We need a long term vision for the right airport that sustains our economy and safeguards our public health. That airport is a new four-runway hub airport at the Thames Estuary or Stansted – one that can support a United Kingdom fully engaged with the world. I would urge Government not to turn its back on our future.





## How life might look for a typical family living in the shadow of an expanded Heathrow



Grandad is tired and grumpy because he doesn't get enough sleep

Mum struggles to get to work in the morning because the shiny new Crossrail trains are always full

Dad has to go to the doctor very often because of his high blood pressure

My big sister has to use an inhaler because her asthma is getting worse

I'm falling behind in my reading compared to my friends in other schools

For more about how an expanded Heathrow will disturb people's sleep, see Section \_ 06 Noise

For more about how an expanded Heathrow will exacerbate crowding on the rail network, see Section \_ 08 Surface access

For more about how an expanded Heathrow will have serious public health impacts, see Section \_ 06 Noise

For more about how air quality will worsen due to an expanded Heathrow, see Section \_ 07 Air quality

For more about how an expanded Heathrow will impact learning in school children, see Section \_ 06 Noise

# Heathrow: summary of key evidence

## Capacity and connectivity

- A three-runway Heathrow would be “operating at around 80-90% of capacity by 2030” according to the Airports Commission. That level of capacity will erode resilience and constrain slots, particularly at peak times.
- An expanded Heathrow will offer just four UK destinations according to the Airports Commission – down from seven today. Options for Government to force domestic routes into Heathrow – such as Public Service Obligations (PSOs) – are severely limited.
- An expanded Heathrow will offer 68 daily long haul routes in 2030 according to the Airports Commission, only seven more than today.

## Noise

- All sides agree that a three-runway Heathrow would expose over half a million people to noise at 55dB Lden. That is more

than the numbers exposed by its five main rival European airports combined.

- Noise modelling for TfL – in line with current operating assumptions – indicated one million people will be exposed by an expanded Heathrow at 55dB Lden.
- Noise modelling for the Commission – which included multiple iterations of flight routing optimisation – showed it will expose 46% more people than a two-runway Heathrow at 55dB Lden (comparing the median ‘Minimise Total’ scenario against an ‘Alternative Future Baseline’ which also assumes flight routing optimisation).
- It will also result in 124 more schools and 43,200 more school-age children resident in the 55dB noise contour (in the ‘Minimise Total’ scenario, compared to the ‘Alternative Future Baseline’).
- 43% of those exposed by a three-runway Heathrow (in the Commission’s ‘Minimise

Total’ scenario) are exposed to noise at 55dB Lden for the very first time – that’s almost 300,000 people.

- Even the Commission’s ‘Minimise Newly Affected’ scenario – where the flights routings were optimised to reduce the numbers newly affected – exposes around 100,000 people to noise at 55dB Lden for the first time. That’s more than the total number exposed by the UK’s second noisiest airport, Manchester.
- The monetised health impact of an expanded Heathrow has been calculated as £20-25bn over 60 years, based on the new DfT WebTAG published in December 2015.
- Night flights at Heathrow would still increase by around 32% compared to today if the Commission recommendation for a (partial) night flights ban is implemented as part of expansion.

### Air quality

- The Airports Commission found that, with Heathrow expansion, the adjacent Bath Road would, unmitigated, have the worst NO<sub>2</sub> emissions of any location in Greater London. However, even with mitigation, it failed to show that legal limits for NO<sub>2</sub> could be met.
- The new DEFRA air quality action plan was published in December 2015. An initial review of the DEFRA modelling indicates that (without expansion), the Bath Road will have the third highest NO<sub>2</sub> concentration in Greater London and be just 4µg/m<sup>3</sup> (10%) below legal limits. This presents a very serious risk that a third runway, in these conditions, would trigger non-compliance with legal limits.

### Surface access

- London is forecast to grow by 1.8m by 2040, increasing surface access demand. The Airports Commission recognises that this creates severe crowding on key road and rail corridors serving Heathrow.
- The Commission only modelled a partially utilised three-runway Heathrow (125mppa). Adopting similar assumptions but for a fully utilised three-runway Heathrow, TfL found this resulted in 230,000 additional trips per annum – a 115% increase on today.

- To address the surface access challenge, the Commission proposed holding airport car and taxi trips at current levels. They recognised that this will require both new public transport capacity and travel demand management. For the latter, the Commission's consultants state that an airport access charge of £20-40 for cars and taxis "may be enough".
- The Commission underestimated the scale of new rail infrastructure required to accommodate the increase demand, and to do so without impacting background traffic. As a result, it estimated the total surface access costs at less than £5bn. TfL has calculated a cost of £15-20bn to provide the capacity and connectivity to enable Heathrow expansion.

### Economy

- The Airports Commission's expert advisers "[counselled] caution in attaching significant weight to either the absolute or relative results" of a key part of the Commission's economic case and so casting doubt on the economics benefit figure quoted.
- The omission of a key factor in the Commission's calculations for staff suggests it might have overstated the numbers. Following CAA methodology

indicates that, in 2050, an expanded Heathrow might directly employ 60,000 staff – 24% fewer than today.

### Airspace

- NATS, requested by the Commission to look at airspace, concluded that "adding a third runway to the north of Heathrow in close proximity of Northolt, Luton, Stansted and London City will require a complicated airspace redesign."
- Some flight routings adopted by Heathrow Airport and the Airports Commission for noise modelling were deemed unfeasible by NATS.

### Financing

- The Commission's consultants calculated that Heathrow Airport would have to triple its existing debt and equity levels to finance a third runway.
- A 45% increase in aeronautical charges has been assumed, which the Commission deemed to have no impact on passenger demand.
- It is not credible to suggest that expansion can be delivered without Government playing a critical role in managing risk and securing funding.



# Beyond the Commission: next steps for Government



# How the Airports Commission got it wrong

[AC]

This symbol, used throughout this document, indicates that a statistic or reference is directly attributable to the Airports Commission and/or its consultants.

The Airports Commission pulled together a considerable body of evidence, much of it helpful in furthering understanding of a third runway at Heathrow and its implications. Key evidence from the Commission on an expanded Heathrow is set out in Appendix A.

However, the Commission's own process was impaired by its approach and the way it framed its question. This included:

## An objective based on delivering tarmac, not connectivity

The Commission should have identified the options that would deliver the increased routes and frequencies that are paramount to the UK economy. Instead, delivery of a single additional runway served as its primary focus, without having initially considered the full connectivity implications. Yet new runways will deliver wildly differing levels of connectivity depending on where they are located and in what combination. This was not properly considered until the end when many

expansion options – that could have better met the UK's connectivity need – had already been ruled out.

## A focus on the short-to-medium term

The Commission declined to properly consider the runway capacity needed beyond 2030 – even though it identified that a further runway would be required soon after. This was flawed because a) if a second new runway is required, the planning process would need to start before a first runway had opened and b) if it is clear that multiple runways will be required, this might change the conclusion about where the first new runway should be built.

## A failure to reach an early conclusion on the need for a hub

Only at the final stage did the Commission decide that a hub option offered better connectivity. By leaving this until the end of the process, there was only one shortlisted

airport location left – Heathrow – that could serve as a hub, albeit imperfect, the Commission having discarded all other hub airport options in previous stages.

## An approach to deliverability that favoured existing airport operators

The Commission placed a strong emphasis on schemes which already had a promoter offering to deliver the new capacity. This biased the process towards schemes supported by existing airport operators – and against new airport location options, regardless of their national economic benefit.

None of these approaches was envisaged by the Terms of Reference of the Airports Commission that was announced by Government on 2 November 2012.

The Airports Commission's approach has led it to recommend expansion at Heathrow without being able to fully consider the alternatives. This is despite the Commission's own evidence raising serious concerns about a third runway at Heathrow and leaving a number of unanswered questions.

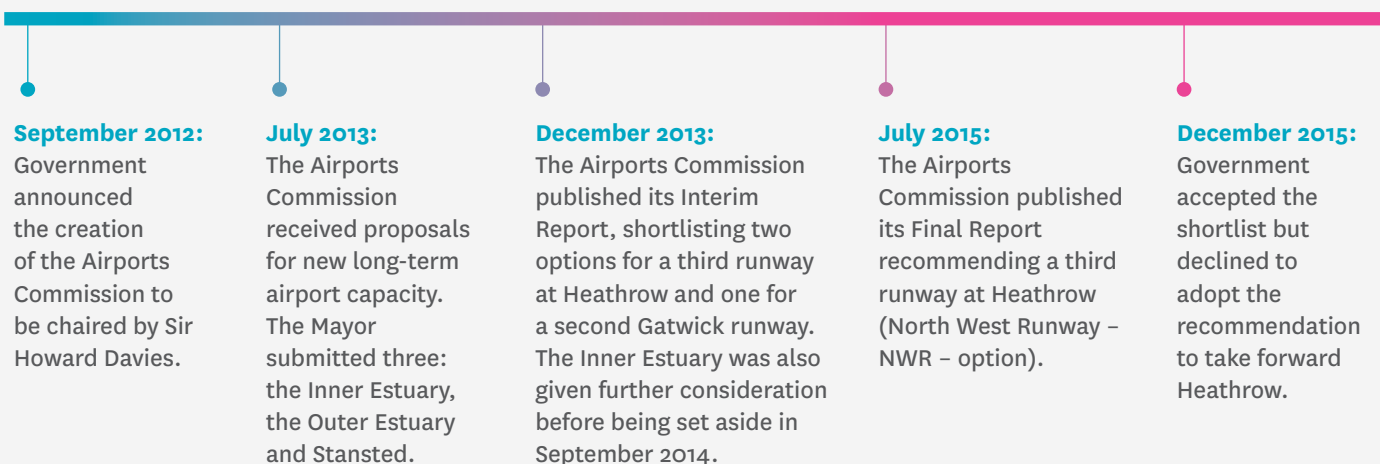
That is why, several months after the publication of the Airports Commission Final Report, we are no closer to agreeing an airport expansion strategy that meets the economic and environmental needs of London and the UK.

This document reviews the evidence and considers why Heathrow expansion does not meet that need – and revisits the potential alternatives.

## New runways: the journey so far

How to expand airport capacity to cope with growing air travel is an issue that successive governments have battled with. The last new full length runway in the South East of England opened in 1946.

In 2009, the Labour Government endorsed a third runway at Heathrow – but this was cancelled by the incoming Coalition Government in 2010. In the face of increasingly scarce capacity, the Mayor of London and others pressed for a solution which would address the capacity gap.





# Government must avoid the same mistakes

“It’s vitally important we get the decision right so that it will benefit generations to come. We will undertake more work on environmental impacts, including air quality, noise and carbon.”

Secretary of State for Transport,  
10 December 2015

The Government had committed to making a decision on airport expansion by the end of 2015.

However, in December 2015, the Government recoiled from accepting the Airports Commission recommendation to expand Heathrow. Instead the Government pledged to undertake a further package of work in relation to the shortlisted options to greater understand their impacts including noise, air quality/emissions, and more generally on local communities.

This was a recognition that the environmental challenges associated with Heathrow expansion had not been fully addressed. Ultimately, they will prove incapable of being fully addressed.

## Consideration of alternatives

The Government also announced that an Airports National Policy Statement (NPS) is the planning mechanism to be used for the delivery of new airport capacity. This will be prepared by the Secretary of State for Transport and will need to incorporate a Strategic Environmental Assessment (SEA).

To be valid, an SEA must give proper consideration to all credible alternatives. This has not been done to date. As such, it is insufficient for Government merely to consider the three options set out in the Airports Commission Final Report. It is required to go back to the Interim Report – and re-examine several options which were prematurely and unwisely discarded. Failure to do so would leave the Airports NPS vulnerable to legal challenge.



## SEA: legal basis

The Planning Act 2008 states that “Before designating a statement as a national policy statement for the purposes of this Act, the Secretary of State must carry out an appraisal of the sustainability of the policy set out in the statement.”

The precedent of previous national policy statements confirms that the Appraisal Sustainability should incorporate an SEA.

The SEA Directive 2001/42/EC sets out the requirements of an SEA, including “evaluating...reasonable alternatives taking into account the objectives and the geographical scope.”



## No Mayor of London can ignore the aviation debate

Whoever is Mayor of London, it will be incumbent on them to discharge the statutory duties of the office and satisfy themselves that for any airport expansion proposal to be taken forward:

- The noise, air quality and surface access challenges can be met;
- Any associated development and resulting land requirements can be accommodated.

These issues must be considered within the wider London growth context.

### Greater London Authority Act 1999

Section 41 sets out the duties of the Mayor including responsibility for:

- the transport strategy
- the spatial development strategy
- the London air quality strategy
- the London ambient noise strategy [Part 1]

It states that in preparing and revisiting Mayoral strategies, the Mayor shall have regard to the health of persons in Greater London. [Part 4]





A hub that  
works for Britain



# We need a hub with sufficient capacity

Hub airports remain the bedrock of global aviation. They are efficient consolidators of demand, combining transfer flows with strong O/D (origin and destination) flows i.e. to and from the airport's catchment area.

The resulting networks allow hundreds of cities to be connected via the hub where, in most cases, direct flights would not be viable.

## Airlines benefit

The hub gives the airlines economies of scale and enables them to offer an extensive route network that is commercially viable.

## Passengers and freight benefit

The hub maximises the travel options, ensuring more routes and frequencies while helping keep fares competitive.

## The particular benefit of the hub for the host country

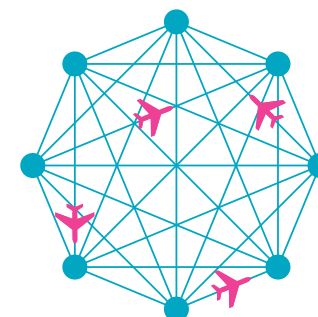
The region and nation hosting the hub benefit in particular, as the combination of O/D and transfer traffic allows many more routes and frequencies to be served than could be supported by O/D traffic alone.

An effective UK hub can maximise the connectivity to established and emerging markets around the globe, enabling trade and exports, as well as encouraging inward investment and facilitating inbound tourism.

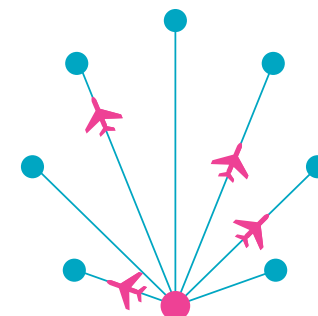
## The hub is transformative in terms of the long haul connectivity that can be offered:

Heathrow accounts for 40% of all scheduled air passenger traffic – yet 80% of all UK scheduled long haul air passenger traffic.

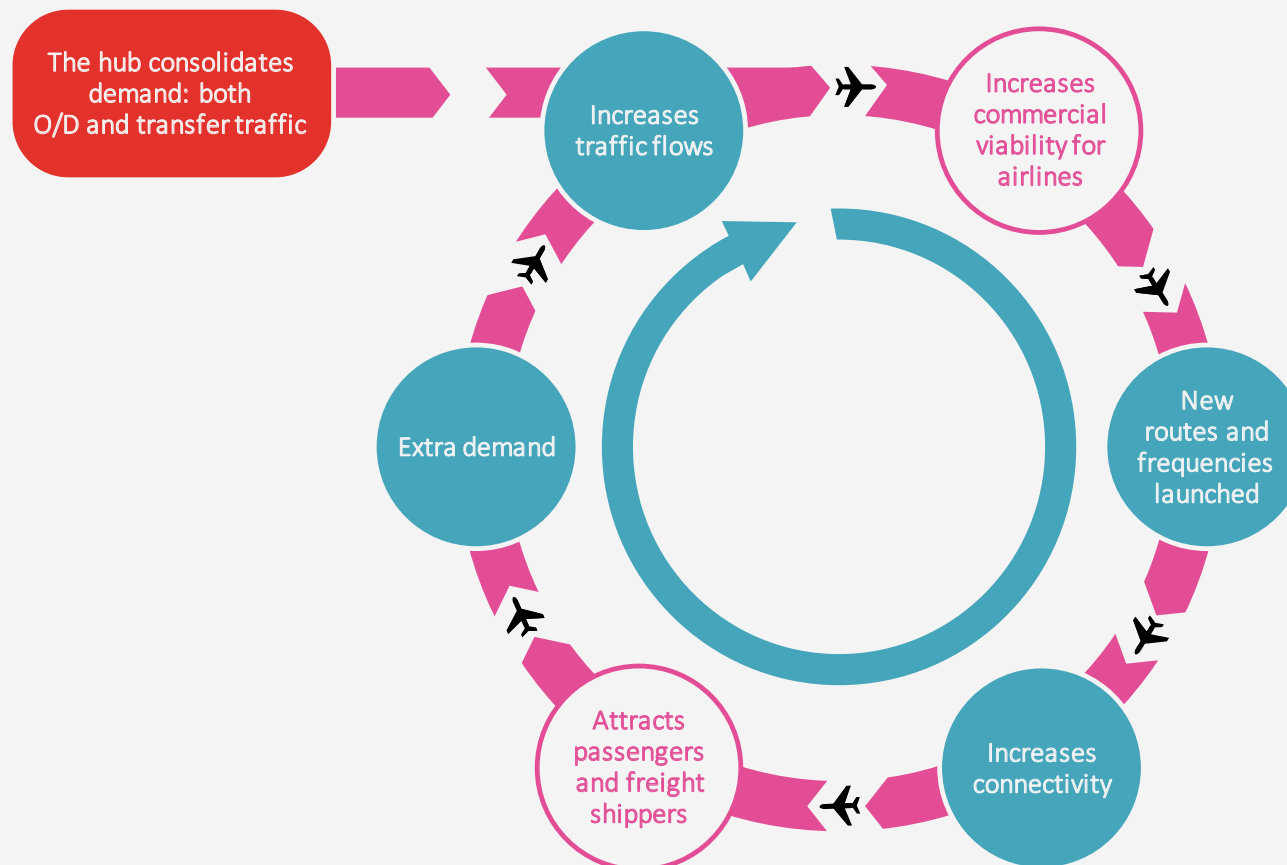
## The efficiency of the hub model



In this example of a network, just seven routes are required to enable journeys between 28 different city pairs.



## Virtuous circle of hub connectivity





## What an effective hub needs

### Sufficient (spare) capacity

- To enable new routes and frequencies
- To allow flights in connecting banks that minimise transfer times for passengers
- To maximise resilience and minimise delays in the event of disruption

### Good access to strong catchment area

- Drawing on a critical mass of passengers – including substantial numbers with an above average propensity for air travel
- Excellent surface access, which given busy UK networks must be focused on rail

### Ability to support 24-hour operations

...without dire noise impacts on communities

- To allow early morning long haul arrivals – meeting business demand on key routes
- To allow night-time freighter services – supporting just-in-time supply chain etc.

### Optimised facilities

...to maximise the attractiveness of the hub for airlines, passengers and freight, including:

- Smooth, speedy journey through airport
- World-class passenger amenities
- Minimising costs and turnaround times





## International example: Seoul Incheon

A new hub was built on reclaimed land away from populated areas in 2001 to replace the existing, cramped Seoul airport.

Served by three runways, it is the world's eighth busiest international airport and fourth busiest for freight.

It is connected by rail to the city and wider region and is also served by the Korean high-speed rail network.



## International example: Paris CDG

A new hub airport for Paris with room to expand was built in 1969. Today, its four parallel runways and three terminals offer over 300 destinations worldwide.

It is located 25km north of Paris, but well connected by suburban trains and by high speed rail to cities across France.

Its location away from the city allows it to operate 24 hours a day and is home to significant freight activity including the main European centre for FedEx.

## The future shape of aviation

A picture of increased competition between hubs (and their anchor carriers) is emerging, not only within but also between regions. Previously each world region was effectively a fortress, access to which was only possible by entering through a gateway hub in that region.

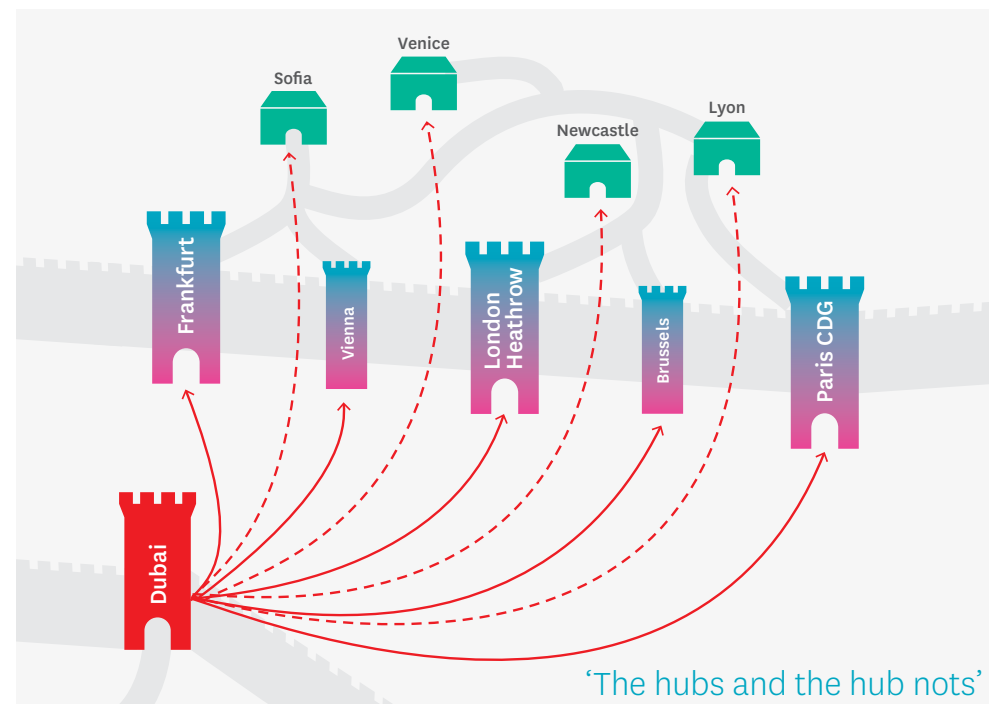
Today, aircraft like the 787 and the rise of new, rapidly expanding hubs such as those in the Persian Gulf, mean that hubs from other regions are able to penetrate the fortress and directly serve secondary European cities. At the same time, the largest European hubs are in turn serving secondary cities in regions such as North America, South Asia and the Far East.

This means hubs in Europe are now competing more directly, not just against each other, but against hubs in other parts of the world, in providing access to primary and secondary destinations both in Europe and beyond.

### 'The hubs and the hub nots'

The result of this intense hub competition is an increasing division between the 'hubs' and 'hub nots' – as only the most effective hubs, able to offer the optimal passenger experience and a truly global reach survive as a class of 'super hubs', while others are left by the wayside.

In this world of 'super hubs', London cannot assume it will have a major role to play if it does not have a hub airport with sufficient capacity. If London's connectivity fails to keep pace, business will begin to look elsewhere.



## The main arguments put forward against the future of hubs – and why they do not stack up...

### The 'hub buster' aircraft

**Claim:** both the Airbus A350 XWB and Boeing 787 Dreamliner allow hubs to be by-passed, carrying as few as 200 passengers on long haul routes, at a lower cost per seat kilometre.

Yet, considering the new routes launched with these aircraft – including Heathrow-Austin, Tokyo-Boston, Doha-Adelaide, Singapore-Dusseldorf and Houston-Lagos – almost all are linking to a major hub at one or both ends. This is because they still need to draw on the critical mass of demand a hub offers, including a proportion of premium passengers.

### Low-cost carrier growth

**Claim:** the low-cost carrier phenomenon is evidence of the decline of the hubs, with such airlines focused on point-to-point traffic.

Yet low-cost carriers are not averse to hub airports: easyJet is the second largest airline at Paris CDG and Amsterdam while Ryanair is a major operator at Madrid. They will use hub airports – and take advantage of the critical mass of demand – where there is sufficient spare capacity to obtain slots (at little or no cost) and to be able to operate with minimal delays.

# Where to locate a new hub

There is a pressing need for a hub airport to serve London and the UK, taking advantage of London's uniquely strong catchment to support the UK's aspiration for better access to global markets.

As such, the hub airport needs to have:

- Sufficient space to be able to accommodate four runways (the minimum scale of hub, if it is not to be capacity constrained)
- Located away from densely populated areas so as to absolutely minimise the public health impacts: noise and air quality
- Excellent surface access capability so passengers and staff can access the airport quickly, reliably and sustainably, from London and beyond

Having considered a longlist of locations across the south east in 2013, the Mayor's team identified three sites deemed best able to meet these criteria:

- **Inner Thames Estuary** (on Isle of Grain)
- **Outer Thames Estuary** (offshore)
- **Stansted**

This document will set out the key aspects of the Inner Estuary and Stansted as hub airport locations (alongside Heathrow).

Of the three, the Outer Estuary presents a few more challenges, located further from central London and to be built entirely on reclaimed land. In its favour, it does not directly require any loss of housing nor does it expose any

households to significant aircraft noise. While it remains an option worthy of consideration, for simplicity, this document will focus on the other two sites.







Destination	Status	Time
MUNICH	DELIVERED	1992
DENVER	DELIVERED	1995
OSLO	DELIVERED	1998
HONG KONG	DELIVERED	1998
KUALA LUMPUR	DELIVERED	1998
ISTANBUL	UNDER WAY	2018
MEXICO CITY	UNDER WAY	2020
BEIJING	UNDER WAY	2020
LONDON	DELAYED	????


### A new hub: tried and tested

Building a new hub airport for London and the UK may be perceived a bold step – but it is not breaking new ground. Many, many cities, faced with a hub nearing capacity, have taken the far-sighted decision to relocate

their main airport away from densely populated areas, giving it an opportunity to cater to future growth while minimising the impact on public health.

It is not clear why this would be any less achievable for London.





Why Heathrow expansion  
gets us nowhere – and  
where a new hub takes us

# Connectivity

“The Commission’s forecasts indicate...  
the expanded airport operating at  
around 80-90% of capacity by 2030”

[AC]

A hub airport with spare capacity is key to UK connectivity. It would provide greatly improved links to the UK regions and a step-change in long haul routes, securing access to markets around the globe.

But a three-runway Heathrow fails to deliver because it will effectively be full shortly after opening: according to the Airports Commission, it will be “operating at 80-90% capacity by 2030”. This is well above the 70-75% represented by international best practice and the level of utilisation observed at rival European hubs.

This constrained level of capacity at a three-runway Heathrow will erode resilience leading to delays and will constrain slots, particularly at peak times.

The effect of the slot constraints can be dramatically seen in the weak connectivity offered by a three-runway Heathrow – limiting long haul routes offered and reducing access to the UK regions.





7

The number of additional daily long haul routes served by an expanded Heathrow in 2030 [AC]

9

The number of cities in China today which are served by rival European hubs but not by the UK

## Long haul connectivity

According to the Airports Commission, a three-runway Heathrow adds just seven new daily routes in 2030 compared to today – and just seven more by 2050.

### Additional daily long haul destinations at a three-runway Heathrow [AC]

#### 2-runway today



#### 2030



#### 2040



#### 2050



## Destinations served in Mainland China

There are four Mainland Chinese destinations served from the UK, all served from Heathrow: **Beijing**, **Shanghai**, **Guangzhou** and **Chengdu**.

There are a further nine cities in China with direct flights to rival European hubs – but without flights to the UK.

If the UK is to develop trade, investment and tourism links with what will soon be the world's largest economy, we should be looking to serve these and other destinations in China.



Destinations not served from the UK

- |            |             |            |
|------------|-------------|------------|
| 1 Hangzhou | 4 Chongqing | 7 Changsha |
| 2 Nanjing  | 5 Wuhan     | 8 Shenyang |
| 3 Xian     | 6 Xiamen    | 9 Qingdao  |

\*Starting June 2016, Manchester will also receive four flights a week to Beijing.

7

The number of domestic destinations served by Heathrow today

4

The number of domestic destinations that will be served by Heathrow in 2030 with a third runway

[AC]

## Domestic connectivity

Over the last quarter century, the slot constraints at Heathrow have led to a dramatic fall in domestic connections to Heathrow, reducing access from much of the UK to global markets and opportunities.

Given that a three-runway Heathrow will effectively be full shortly after opening, it is no surprise that the Airports Commission predicted that the number of UK destinations served by Heathrow will continue to fall, even with expansion.

If this trend is not reversed, it will harm the ability of the UK regions to export and attract inward investment and tourism, undermining attempts to rebalance the UK economy.

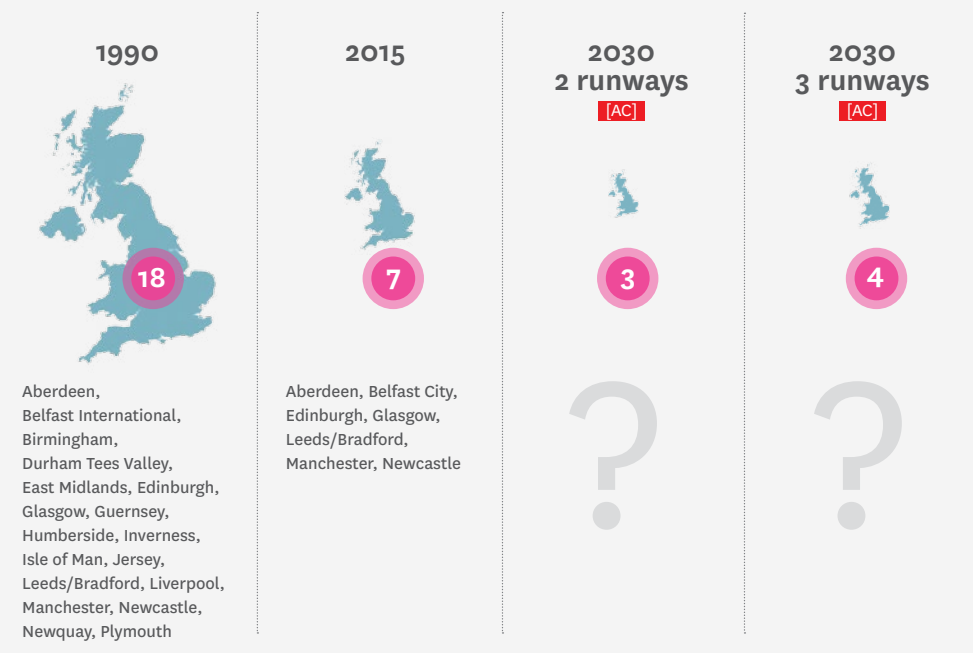
## Are PSOs the answer?

The Airports Commission suggested using PSOs (Public Service Obligations) to keep domestic flights to Heathrow. These are EU-sanctioned state aid interventions for maintaining access to peripheral or development regions. However there are substantial obstacles to use of PSOs for this purpose:

- It cannot be determined years in advance – so no guarantees of a route possible
- It will not be permitted where a flight is already offered to another London airport
- It will not be possible to specify a particular London airport (i.e. Heathrow)

The Airports Commission recognised that slots could not be legally reserved for domestic flights outside the PSO mechanism.

## The decline in domestic routes from Heathrow




## How is it possible that having more flights leads to fewer destinations?

At a constrained airport, a new service can only be started if another service is lost. So, it is not enough for a service to be profitable – it has to be more profitable than any other use of that slot. That leaves smaller domestic services competing with flights operated by large aircraft with first/business class on established long haul routes such as New York or Dubai. Even if the airport offers discounts, airlines will be hard-pressed to justify a thin domestic route when slots are scarce.

This scarcity is reflected in the price paid for Heathrow slots on the rare occasions they become available. In February 2016, it was revealed that a pair of slots changed hands for a record \$75m (approximately £50m).

## UK destinations lost from Heathrow

Domestic routes served in 2015 

Domestic routes lost since 1990 

With a new four-runway hub forecast to serve 16 domestic routes, many of the domestic destinations lost from Heathrow over the last 25 years could be served again, as well as other cities such as Cardiff, Blackpool, Derry, Prestwick or Dundee.

**Newquay** plays a vital role as gateway to Cornwall, a county with relatively poor access by road and rail. It is currently served from Gatwick though the route was only retained thanks to Government subsidy. It is unlikely to be served by a three-runway Heathrow – but a commercially viable route from a new four-runway hub is a strong possibility.

**Plymouth** did not recover from the loss of its Gatwick flights in 2011 and closed a few months later. A new four-runway hub could support reopening of the airport underpinned by direct flights.

**Inverness** is the main airport serving the remote Scottish Highlands but its Heathrow route has had a chequered past. It was retained by British Airways after its takeover of Dan Air but then terminated in 1997. bmi reinstated the route in 2004, only to close it in 2008. British Airways has announced that it will resume the route in Summer 2016, but at just one flight a day – of limited use for many passengers. The future of the route at Heathrow is questionable – but the route to a four-runway hub would likely be more secure.





11%

The increase in daily long haul destinations with a three-runway Heathrow

87%

The increase in daily long haul destinations with a new four-runway hub to the east of London

Connectivity: what a hub with spare capacity can offer

A four-runway hub airport to the east of London would have sufficient spare slots to avoid the trade-offs between flights that plague Heathrow today – and which would be a feature of a three-runway Heathrow.

Instead, a four-runway hub could offer many new routes to the regions of the UK – as well as several additional long haul services, including the under-served emerging economies of the future.

The market, without state intervention, would determine the routes served. The combination of London-bound and transfer traffic would help support the viability of these routes to the hub, without being constrained by limited availability of slots.

Analysis undertaken for the Mayor indicates a step-change in both the long haul and domestic destinations that would be served by a new four-runway hub airport.

Destinations served by a hub	Current 2015	3-runway Heathrow 2050 [AC]	New 4-runway hub* 2050
Daily long haul destinations	61	75	114
Daily domestic destinations	7	4	16

\*These have been recalculated based on the definitions employed by the Airports Commission, notwithstanding concerns about their suitability.



## Gatwick's contribution to connectivity

Gatwick has been the main beneficiary of Heathrow's capacity constraints and serves a mixture of main line and low cost carriers operating both short haul and some long haul routes.

It will continue to make a useful contribution to London's connectivity. However, it is not a

hub – and without the critical mass of traffic that a hub entails, there will be a limit to the connectivity it can offer, particularly to long haul markets.

Gatwick can offer links to established centres, foreign hub airports and holiday destinations. But its ability to serve new long haul business destinations, especially in emerging markets, will be limited – even with a second runway.

“[He] accepts there may be some destinations, for example Chinese cities, that Gatwick would be unable to support even with a second runway.”

Chief Executive of Gatwick Airport in the Financial Times, 22 Sep 2013



## Gatwick's long haul network: recent additions

### Long haul low cost

This has grown quickly, led by low-cost airline Norwegian. However, the routes are either to established business destinations (e.g. New York) or leisure focused routes (e.g. Fort Lauderdale).

### Heathrow spillover

A number of Far East airlines have launched long haul flights to Gatwick when unable to get the slots required at Heathrow. These include Air China, Garuda Indonesia, Korean Air and Vietnam Airlines. However, each subsequently switched the flights to Heathrow when the slots became available.

Over half a million people will be exposed by an expanded Heathrow to noise at 55dB Lden, all sides agree; this is more than its five main European rivals combined

# Noise

No issue concerning airport expansion causes more anguish and consternation than the aircraft noise experienced by local communities – and this is especially true for Heathrow. Recent debate has, however, been mired in a raft of statistics and assumptions. This chapter will seek to navigate these, to build a comprehensive and comprehensible picture of Heathrow's noise impacts.

## The basics

There are two inescapable facts:

1. Jet-engined aircraft cannot take-off and land silently
2. An airport located amidst a densely populated area cannot avoid serious noise impacts

With regard to 1, it is true that aircraft are getting quieter, however the rate of improvement has been slowing – and is also reliant on airlines' ability to invest in fleet replacement. There is also an increasing need to make trade-offs as airlines juggle competing priorities: to reduce noise,

lower emissions and decrease fuel use (lowering costs).

With regard to 2, the location of Europe's busiest airport amidst Europe's largest urban area is not a combination which will ever bode well for Heathrow's noise exposure.

## Where there is consensus

A number of three-runway Heathrow scenarios have been modelled by the CAA (Civil Aviation Authority) using assumptions provided by a) Heathrow Airport and the Airports Commission and b) Transport for London (TfL) on behalf of the Mayor of London.

Though there is a wide variation in the results, there is one aspect common to all the scenario tests – on which all sides can agree: a three-runway Heathrow in 2050 will expose **at least** half a million people to noise at 55dB Lden. This is greater than the number of people exposed by its five main rival European airports – Paris CDG, Frankfurt, Amsterdam, Madrid and Munich – combined.

**55dB Lden** is a weighted average metric of day, evening and night noise which serves as the standard pan-European metric for measuring airport noise.







## What the Commission did **not** do

### 1. It did not model an expanded Heathrow consistent with today's operations

The Airports Commission instead accepted Heathrow Airport's approach which entailed multiple iterations of flight routing optimisation. This amounts to a continuous process of tweaking the flight routings and re-running the model until the best possible noise outcome is achieved.

However, such changes are in no way dependent on a third runway. Moreover, this process of optimisation makes any meaningful comparison with today's Heathrow very difficult.

Modelling undertaken for TfL of a **three-runway** Heathrow is more closely aligned with current operations and does not assume any flight routing optimisation. This facilitates comparison between the expansion scenario and today.

### 2. It did not model a future two-runway scenario consistent with its three-runway scenarios

In contrast to the above, no flight routing optimisation was assumed by the Commission in its 'no expansion' future year baseline, despite such changes being wholly independent of expansion. Other operational assumptions – unrelated to expansion but included in the modelling of the expansion scenarios – were also not assumed for the future year baseline.

This makes meaningful comparison between the expansion and non-expansion future year scenarios all but impossible, with the scenarios differing in terms of flight routing and operational assumptions in addition to the 50%+ increase in aircraft movements.

TfL has subsequently commissioned modelling of an '**Alternative Future Baseline**', based on no expansion in 2050 but which seeks to replicate the flight routing optimisation, as well as the other operational assumptions in the Commission's expansion scenarios. The aim is to provide a more meaningful comparator future year baseline for the Commission expansion results.

## The Commission's three expansion scenarios

### Minimise Total

In this scenario, the flight routing optimisation was undertaken to minimise the total number of people exposed to noise.

Of the three Airports Commission scenarios, this is the closer to existing Government policy; it also largely sits between the two other scenarios in terms of noise impact. For both these reasons, we have focused on this scenario when analysing the Commission's modelling results. The Minimise Total scenario appears also to have been treated by the Commission as its core scenario.

### Minimise Newly Affected

In this scenario, the flight routing optimisation was undertaken to minimise the number of people newly affected by noise compared to a two-runway Heathrow today.

### Respite

This scenario marks a more radical approach. Unlike the other two, it breaks with the principle followed today of one departure route per runway per departure direction (for example, all flights departing from the North Runway to the west, bound for destinations to the south/south west, currently follow the same route).

By increasing the number of flight routings used, this approach is able to spread the total noise exposure over a wider area, such that many homes fall below the 55dB Lden average noise metric threshold. However, even if not captured by the noise metric, the noise has not disappeared.

A greater challenge to the respite approach comes from the Government policy as set out in the Aviation Policy Framework. It makes clear that concentration of flights on a routing is the norm but that “...in certain circumstances... and following engagement with local communities, it may be appropriate to explore options for respite which share noise between communities on an equitable basis, provided this does not lead to significant numbers of people newly affected by noise.”

However, given that the Respite scenario exposes over 100,000 people to aircraft noise at 55dB Lden for the first time, this scenario is inconsistent with current Government policy.



## Flight routings: unfeasible

When NATS – advising the Airports Commission on airspace – came to undertake the airspace fast-time simulation modelling, it found that some of the flight routings provided by the promoter for the Heathrow option were ‘unfeasible’ and, as such, discarded.

This undermines the credibility of the flight routing optimisation process undertaken by Heathrow Airport and adopted by the Commission.

More information about the NATS review can be found in Section \_11 Airspace.

1 million

The number of people exposed to noise at 55dB Lden by a three runway Heathrow broadly in line with current operational assumptions

People exposed to noise – the key numbers

Presented here are the populations exposed by Heathrow under a range of scenarios.

The first part of the table shows populations exposed to noise by a two-runway Heathrow, today and under the two different future baseline scenarios which have been presented by the Airports Commission and TfL.

The second part of the table shows populations exposed to noise by a three-runway Heathrow, with the three scenarios assessed by the Commission alongside the scenario from TfL.

It is difficult to draw any firm conclusions on the absolute numbers from the three Airports Commission expansion scenarios. This is because these scenarios incorporate assumptions with a significant impact on noise exposure – notably flight routing optimisation – which could be delivered without airport expansion.

Scenario	Year	Runways	Flight Route Optimisation	Population >55dB Lden
Two-runway Heathrow				
Current [CAA]	2011	2	No	766,100
Future Baseline [AC]	2050	2	No	583,500
Alternative Future Baseline [TfL]	2050	2	Yes	435,600
Three-runway Heathrow				
Respite [AC]	2050	3	Yes	516,700
Minimise Total [AC]	2050	3	Yes	637,700
Minimise Newly Affected [AC]	2050	3	Yes	726,600
Three-runway [TfL]	2050	3	No	986,600

See Appendix B for full set of assumptions by scenario

Can an expanded Heathrow really be less noisy than if there is no expansion?

The Airports Commission has claimed that a three-runway Heathrow could expose fewer people to noise than a two-runway Heathrow in the future. Indeed, the Commission’s Respite scenario (516,700) above exposes fewer people than the Commission’s Future Baseline (583,500) .

However, as has been set out, the Commission’s future baseline neglected to include a range of factors unrelated to expansion – but which were included in the three-runway scenarios. These included flight routing optimisation and various operational assumptions. This has left the Commission’s Future Baseline with artificially high numbers of people exposed compared to the expansion scenarios.

However, using the Alternative Future Baseline (435,600) commissioned for TfL – which assumes similar flight routing optimisation and operational assumptions – a better comparison can be made. This shows a clear increase in noise exposure for a third runway.



# 46%

The increase in people exposed to noise at 55dB Lden (assuming flight routing optimisation [AC]) compared to a future no expansion scenario

## People exposed to noise – comparing apples with apples

If you are to draw meaningful conclusions from the noise figures, it is essential to compare like with like.

**To make direct comparison with today,** ➔ Aligned with current operational assumptions, as per TfL modelling (comparing TfL Three-runway scenario with Current):

**220,000 additional people exposed to noise at 55dB Lden compared to today – that's a 29% increase in numbers exposed**

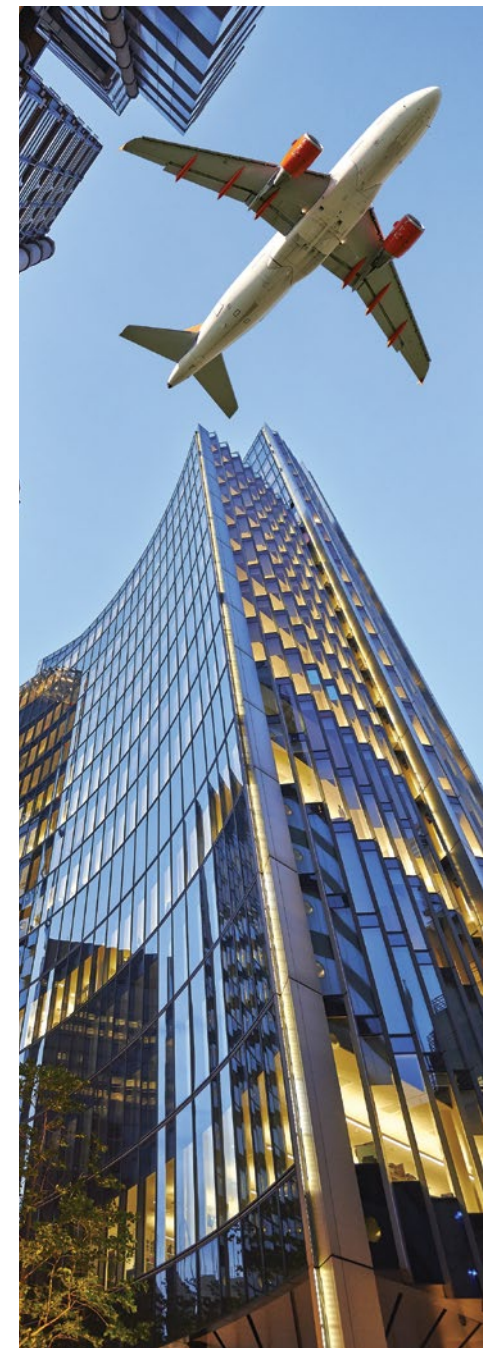
**To make direct comparison with the Airports Commission's three-runway scenarios,** ➔ Assuming flight routing optimisation, as per Airports Commission modelling (comparing Minimise Total with the Alternative Future Baseline):

**200,000 additional people exposed to noise at 55dB Lden compared to no expansion in the future, a 46% increase in numbers exposed**

### Noise improvements: for the benefit of airlines or people?

It is implicit in the Airports Commission analysis that any reduction in noise that results from future technological and operational changes should, in the first instance, accrue to the aviation industry, not local communities.

Given that Heathrow today exposes more than double the number of people of the next noisiest airport in Europe, hundreds of thousands of people would contest such a presumption.





## People exposed to noise by a three-runway Heathrow in 2050 (vs no expansion)

— 3-Runway Minimise Total  
— 2-Runway Alternative Future Baseline

Minimise Total used as the median scenario



### If my homes appears outside the 55dB Lden noise contours, does that mean I won't be exposed to future aircraft noise?

The noise contours are purely indicative. They are based on flight routes modelled which, in the case of the Airports Commission scenarios (as, for example, the above), are very different from those flown today and would be subject to consultation and approval, as well as being dependent on Government policy. Some of the Airports Commission flight routings modelled

were found to be unfeasible by NATS, while at least one of the Commission scenarios is contrary to existing Government policy.

If the operational and future aircraft design assumptions and flight routing optimisations do not materialise, then the noise contour will be more akin to the three-runway Heathrow modelled for TfL, which is more aligned with today's operations; this shows a greatly enlarged 55dB Lden noise contour.

The 55dB Lden noise contour is an average noise metric. It represents a weighted average noise threshold; it is possible to be below that threshold on average and still experience times when there are high levels of noise from aircraft flying overhead. Indeed, when the Commission uses multiple flight paths to disperse aircraft, in those circumstances many of those affected by high levels of noise will not be captured by the average noise threshold, as the periods of aircraft overflight will likely be less frequent.

This is why it is vitally important to move to a suite of metrics to fully understand the noise impacts. This also has implications for noise compensation and mitigation schemes which are triggered by a particular noise contour.

At a minimum, around 100,000 people will be newly exposed to noise by a three-runway Heathrow [AC] – this is more than the **total exposed** by Britain’s second noisiest airport, Manchester

43%

The proportion of the total number of people exposed by an expanded Heathrow (Minimise Total scenario) who will be experiencing aircraft noise at 55db Lden for the first time.

Many more people newly affected by noise

Making significant changes to flight routings on top of adding 50% more flights, it is inevitable that all three Airports Commission expansion scenarios for Heathrow show a significant number of people newly affected:

Scenario (2050)	Newly affected >55dB Lden
Respite [AC]	121,400
Minimise Total [AC]	277,100
Minimise Newly Affected [AC]	98,900

Of the total number of people affected by a third runway, this the proportion who do not experience aircraft noise (at 55dB Lden) today.

The Minimise Total scenario is by some margin the worst, exposing almost 300,000 local residents to aircraft noise at 55dB Lden for the first time. This constitutes 43% of the total number exposed by an expanded Heathrow.

It is unsurprising that the scenario which involves optimising flight routings to minimise those newly affected produces the lowest figure. But at almost 100,000, this is more people newly affected by aircraft noise at 55dB Lden than the **total exposed** by Britain’s second noisiest airport, Manchester.

These are significant numbers for all three scenarios. Given the residents in question will not have experienced this extent of aircraft noise exposure before, there will be a particular concern about the impact on their health and wellbeing.

Heathrow’s limited noise insulation offer

Noise insulation measures such as window replacement and secondary glazing are currently available for residents close to Heathrow who are exposed to specified levels of day or night noise.

Based on two schemes, up to 50,000 homes are eligible (the extent of overlap between the two schemes is unclear). However, take up of the schemes has been very low since in most cases only a proportion of the cost is paid for by the airport.

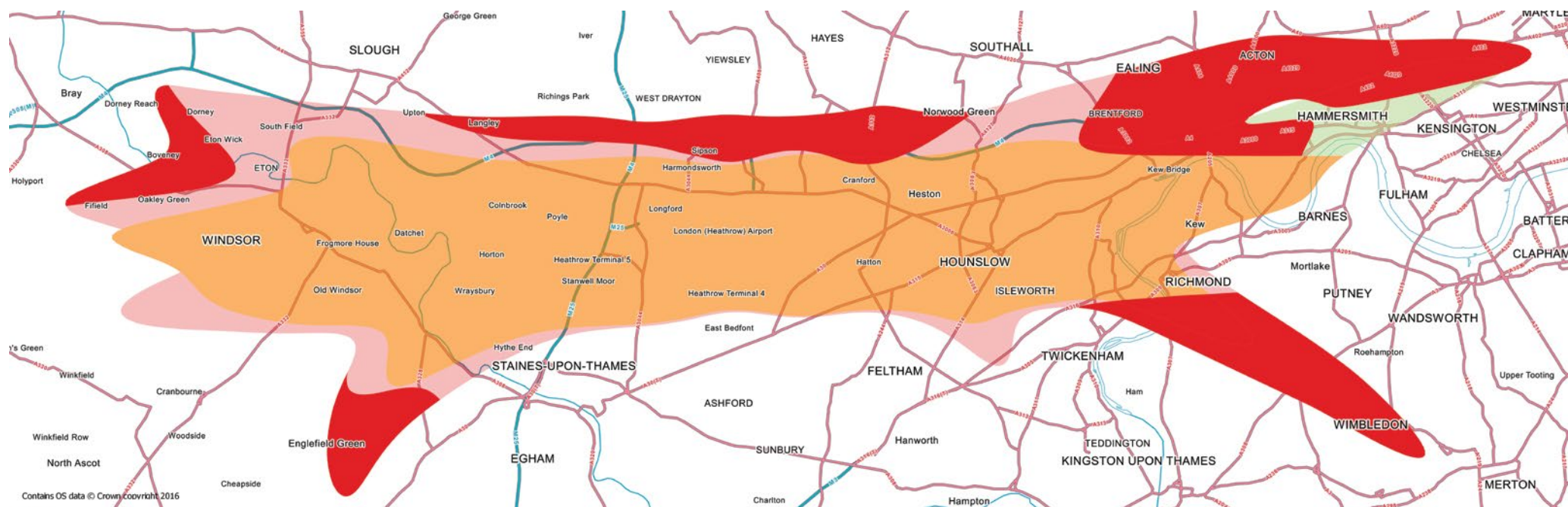
The schemes are less generous (in terms of eligibility and funding) than those offered by other UK airports, notably Gatwick and London City.

It is worth noting that limited information about the schemes is made publicly available, even to the local authorities. It is difficult to ascertain which specific properties are eligible, who has applied and whether they were rejected or approved, where the measures were installed and if they have been successful.

An enhanced scheme has been proposed in conjunction with Heathrow expansion – but for many, only a proportion of the costs are funded. This could leave thousands of extra properties exposed to significant noise without noise insulation.

## Breakdown of population exposed at 55dB Lden by an expanded Heathrow (Minimise Total)

Description of area	Newly affected		Newly re-affected, after having gained from future developments		Affected whether or not Heathrow expands		Affected by future two-runway Heathrow but not after expansion	
Area colour and number of people		277,100		51,160		321,700		Approx. 30,000
Exposed today (2011, two runways)	No		Yes		Yes		No	
Exposed under Alternative Future Baseline (2050, two runways)	No		No		Yes		Yes	
Exposed under Minimise Total (2050, three runways)	Yes		Yes		Yes		No	
Explanation	These are people newly affected by a three-runway Heathrow who are not exposed at 55dB Lden today.		These people would benefit from the approach to flight routing optimisation modelled by the Commission, and are taken out of the 55dB Lden contour without expansion. But with a third runway, they are re-exposed to noise at 55dB Lden.		These people are exposed at 55dB Lden today and in the future, with or without expansion.		Included for completeness, these people are exposed in the future two-runway scenario, but not the three-runway scenario. Tweaking the flight routings could likely be used to reduce this (unlike the three-runway scenario, which is constrained by the runway location and the greater volumes).	



To note, there are also a few pockets, totalling around 3,000 people, who are exposed by the current and future 2-runway scenarios, but not in the expansion scenario, due to small differences in routings modelled.

# 124

The increase in the number of schools exposed to noise at 55dB Lden (assuming flight routing optimisation [ACI]) compared to a future no expansion scenario.

# 43,200

The increase in school-age children exposed to noise at 55dB Lden (assuming flight routing optimisation) compared to a future no expansion scenario.

## The public health impacts of noise

The DEFRA Noise Policy Statement for England states that:

‘Noise exposure can cause annoyance and sleep disturbance both of which impact on quality of life.

It is also agreed by many experts that annoyance and sleep disturbance can give rise to adverse health effects’.



**The stress associated with long term noise exposure can lead to long term health effects such as hypertension, acute myocardial infarctions, strokes and dementia.**

World Health Organisation analysis and various UK, US and continental European studies have outlined a link between cardiovascular disorders and exposure to aircraft noise.

The risk of stroke, coronary heart disease and other cardiovascular disease increases by to 10-20% in areas plagued by aircraft noise.



**Noise exposure at night results in sleep disturbance, which leads to reduced work output and quality.**

Studies have found that aircraft noise can increase the time taken to fall asleep and that during the hours of 04:00 and 07:00, sleepers keeping conventional hours are both more easily awakened by ambient noise, and have more difficulty going back to sleep.

This is because the noise threshold for awakening is lower in shallow sleep than in deep sleep.

**Evidence from recent studies links noise to significantly reduced reading comprehension and memory recall in school children.**

A five decibel increase in noise exposure for school-age children was seen to correspond to a two month delay in reading age among UK pupils.



To allow children to play outside when aircraft are flying overhead, Heathrow Airport is erecting a number of noise-insulated igloo-like adobe domes in school playgrounds. Previously used in disaster zones, while they succeed in keeping noise out, it is difficult to claim these are comparable to the experience of running around in the open air.



Monetisation of the impacts of noise on public health

Government recognises the fundamental health impacts of noise

In December 2015, the DfT (Department for Transport) published an update to its guidance for quantifying the environmental impacts of transport schemes (“WebTAG”), reflecting World Health Organisation guidance on the link between environmental noise and health impacts.

For the first time in WebTAG, noise impacts are formally treated as a health concern rather than purely an annoyance. This includes health impacts such as acute myocardial infarction (heart attacks) and dementia.

Monetised health impact of Heathrow expansion noise has been underplayed

Utilising this updated DfT guidance, we have assessed the noise-related health impacts for a three-runway Heathrow:

Monetisation of health impacts of noise	Per annum	Over 60 years
Respite	£343.2m	£20.3bn
Minimise Total	£365.8m	£21.3bn
Minimise Newly Affected	£419.8m	£24.6bn

This shows how – however much one optimises the flight routings – expansion at Heathrow places a very serious social cost on society and can be shown objectively to be harmful to public health.

The Airports Commission applied a methodology based on the World Health

Organisation guidance, but it focused on the relative impacts. This may allow comparison between different options at the Heathrow site – but fails to acknowledge that other locations, away from populated areas, would dramatically reduce the monetised health impacts.



# 32%

The increase in Heathrow night flights if the Commission package for an expanded Heathrow – including its night flights ‘ban’ – is implemented

## Night noise and sleep disturbance

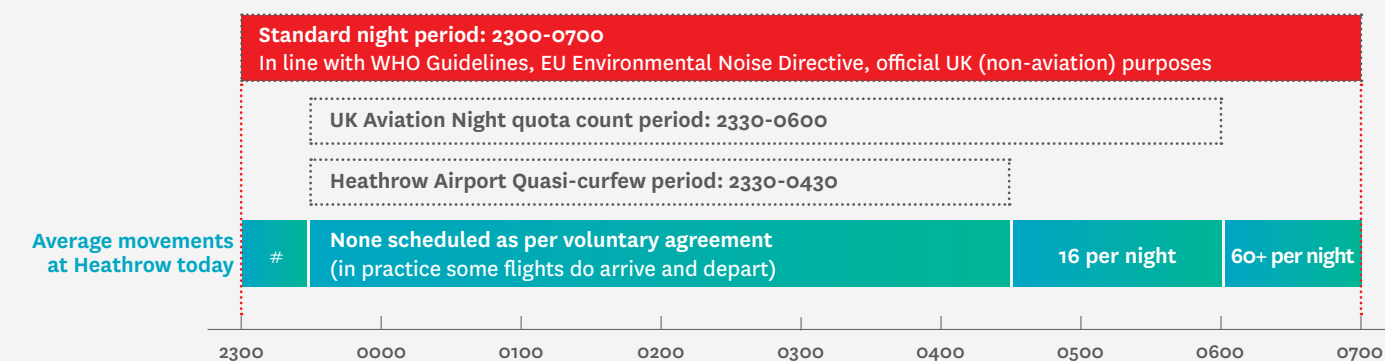
Aviation noise at night is perhaps the most severe impact of Heathrow Airport’s operations today. The sleep disturbance caused by aircraft at night is understood to be the key factor in the public health impacts associated with aviation noise.

The importance of this issue is reflected in the Commission’s decision to propose a condition for restricting night time flights at Heathrow. Below are laid out the various night noise regimes – and how this would change were the Commission proposals to be implemented.

The effect of the Commission’s condition will be to increase the flights in the standard night period by 32%, primarily due to the steep increase in flights between 0600 and

0700. It said it rejected a ban until 0700 because there would be insufficient capacity to accommodate the additionally displaced flights – even though its own analysis showed it would have offered five times as much monetised health benefit. Nonetheless, the restrictions that this partial night flights ban would place on key early morning arrivals means it has been opposed by airlines; moreover Heathrow Airport has declined to accept this condition.

### Night noise regimes



### Airports Commission: Third runway package



# Typically no movements are scheduled in this period - but it is used to accommodate late-running flights; 20 movements per night is not unusual.

95%

The reduction in the number of people exposed to noise at 55dB Lden by a four-runway airport at the Inner Estuary or Stansted – compared to Heathrow today

Only a new location delivers a step-change reduction in noise

It is clear that – regardless of the assumptions one makes – there is no escaping the severe noise impacts of Heathrow in its urban location.

By contrast, a four-runway airport at the Inner Estuary or Stansted would offer a 95% reduction in the people exposed to noise at 55dB Lden compared to a two-runway Heathrow today.

Noise impacts of a new hub	Population >55dB Lden
Heathrow today	766,100
New Stansted hub	37,800
New Inner Thames Estuary hub	31,500
New Outer Thames Estuary hub	<50



# Air quality

Air quality is a key public health concern for expansion of Heathrow Airport and one with legal ramifications. Concentrations around the airport already breach EU limits and a third runway poses the risk that the UK will not be able to meet its legal obligations under the EU Air Quality Directive.

**For the protection of human health, the EU Ambient Air Quality Directive requires Member States to ensure that annual mean concentration levels of NO<sub>2</sub> do not exceed 40µg/m<sup>3</sup>.**

According to the Commission, with Heathrow expansion, the adjacent Bath Road would, unmitigated, have the worst air pollution of any location in Greater London. As a result, it concludes:

**“Absent of mitigation, both [Heathrow expansion] schemes would delay compliance with the Directive and hence would not be deliverable within the legal framework.”**

However, even with the speculative mitigation schemes tested by the Commission, it was only able to show a small reduction in NO<sub>2</sub>,

to between 45.1 and 46.3µg/m<sup>3</sup> – in clear breach of the EU limit values and still resulting in overall increases in pollution concentrations – that is to say, it could not demonstrate compliance.

The Commission’s answer to this was to show that this was lower than the predicted next worst location in London, namely Marylebone Road. However, this goes against the spirit of the legislation – to protect human health by improving air quality – and the legality of such an approach is questionable.

## Why is air quality such a problem for Heathrow?

An increase of over 50% in aircraft movements will result in a substantial increase in aircraft emissions. Some of the measures envisaged to manage noise impacts – such as steeper ascents – require greater engine thrust and so will further increase emissions. The Commission modelling shows that the impact of airport emissions could increase concentrations of NO<sub>2</sub> by up to 4-8µg/m<sup>3</sup> – equivalent to 10-20% of the EU limits.

Road traffic is also a key contributor to poor air quality. The roads around Heathrow, including the M25, M4 and A4, are amongst the

busiest in the UK. Both airport and non-airport related traffic would increase were expansion to proceed, as a result of the additional passengers and freight and generally induced traffic flows in the area.

The public health impacts of air pollution at Heathrow are exacerbated by its location in close proximity to densely populated residential areas.



## The new context: the DEFRA air quality plan

Following a ruling by the UK Supreme Court, in September 2015, DEFRA (the Department for Environment, Food and Rural Affairs) published a draft air quality action plan, seeking to bring forward UK compliance with EU limit values. Following consultation, the final air quality action plan was published in December 2015 and submitted to the European Commission.

DEFRA forecast that, if the plan is implemented in full, compliance in London and the UK will be brought forward to 2025 (from 2030). Nonetheless, DEFRA recognises the sensitivity of the results to a range of assumptions including the delivery of real world vehicle emissions improvements from the Euro 6 and upcoming Euro 6c standards.

## What this could mean for Heathrow expansion

Bringing forward the compliance date would mean air quality limits being achieved in advance of any new airport capacity being delivered. This presents the risk that having achieved compliance for air quality, an expanded Heathrow would make London – and therefore the UK – non-compliant, risking fines from the EU.

An initial review of the DEFRA modelling indicates that, following implementation of the air quality action plan, the worst link on the Bath Road will be around  $4\mu\text{g}/\text{m}^3$  below (or within 10%) of EU limit values. Only two links are predicted to have higher concentrations (up to  $1\mu\text{g}/\text{m}^3$  higher) in the whole of London (the A40 and A501 Marylebone Road).

### In theory, this is the headroom offered by the action plan for an expanded Heathrow to worsen air quality. In practice:

- This headroom might be eroded or eliminated, if the sensitivity of the model to a range of assumptions translates into actual  $\text{NO}_2$  levels which are higher than forecast.
- If the scheme sought to take advantage of other efforts to improve air quality in order to then worsen it again, there would be public health implications and it would likely face political and legal challenge.
- Expansion cannot rely on the action plan measures used to mitigate emissions without expansion for mitigating the further impacts with expansion. The action plan indicates that the impact of measures on the Bath Road will be around  $0.2\mu\text{g}/\text{m}^3$  or less than 1%.

- There is a real risk that, combined with increased aircraft emissions, locations on the A4 Bath Road near the third runway will witness increases of between 4 and  $8\mu\text{g}/\text{m}^3$   $\text{NO}_2$  - pushing concentrations above  $40\mu\text{g}/\text{m}^3$  and so rendering the Greater London zone non-compliant.

Notwithstanding any further changes following review of the plan by the European Commission, it is imperative that Heathrow expansion is retested against the new baseline and the uncertainties of risks to compliance are more fully investigated.

## Tackling air pollution: the role of surface access

Given the significant proportion of NO<sub>2</sub> that is generated by road traffic, shifting journeys onto public transport is essential. As the Airports Commission recognised, key to achieving this at Heathrow are:

1. Providing sufficient additional surface access capacity
2. Employing a range of measures to encourage behaviour change and so support mode shift

These will be discussed further in the next section.

## Air quality: other locations

Air quality is much less of an issue at other locations such as Gatwick, Stansted and the Inner Estuary, which are not located amidst residential areas. Nor are they adjacent to major – and highly congested – road corridors to the extent that Heathrow is.

There is also potential to design a new hub airport with public transport integral to its offering, minimising car journeys from the start.



## Why does air quality matter?

Air pollutants can have a detrimental effect on the health of people and ecosystems, and are linked to climate change. Fine particles can penetrate deeply into the lungs and enter the blood stream. Chronic exposure to these particles contributes to the long term risks of developing cardiovascular and respiratory diseases.

The health impacts of NO<sub>2</sub> are less understood but it is now accepted that longer term exposure to high levels of NO<sub>2</sub> can affect lung growth and function in children, particularly those with underlying health conditions such as asthma. NO<sub>x</sub>/NO<sub>2</sub> is also an important precursor in the formation of particles and ozone.

The GLA and TfL recently commissioned King's College London to quantify the health impacts of PM<sub>10</sub>/2.5 and NO<sub>2</sub>. For the first time, the health burden of these pollutants was estimated; it was found, in 2010, to be around 9,400 equivalent deaths brought forward. The study highlighted the importance of air pollutants on both short and long term health effects including hospital admissions due to respiratory and cardiovascular difficulties as a result of air pollution, alongside the potential economic costs.

It is essential that we continue to work to reduce emissions to help improve air quality and reduce the health impacts on our growing population.



# 1.8m

Forecast growth in London  
population by 2040

## Surface access

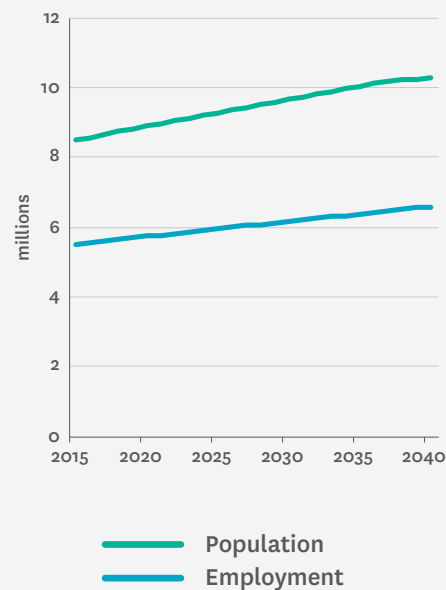
London's population is forecast to grow by around 1.8 million people by 2040, with employment forecast to grow by around a million jobs.

This growth will put pressure on London's transport network increasing congestion on the roads and crowding on rail services.

This is a particular challenge for Heathrow, located in west London amidst one of the busiest parts of the UK's transport network. There remain serious concerns about trying to accommodate the demand from expansion at this road and rail congestion hotspot.

Certainly, without significant investment in surface access, airport expansion will add to severe congestion and crowding levels forecast on the transport network over a wide area by 2030. This would mean longer, more uncomfortable and less reliable journeys for airport and non-airport users alike – and would ultimately erode the airport's effectiveness and its attractiveness to potential users.

London's population and  
employment growth

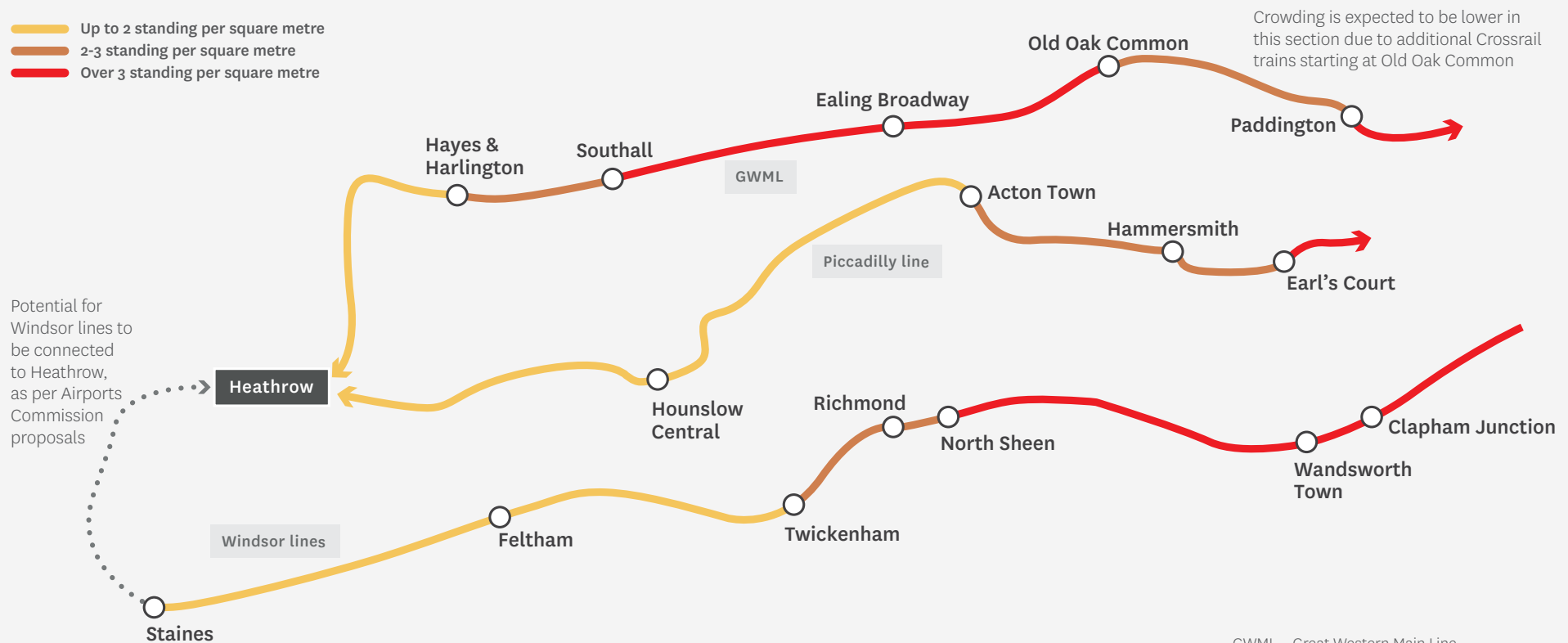


## Even without Heathrow expansion, road and rail links are forecast to be increasingly congested

In west London, road and rail links are forecast to become increasingly congested because of the growth in population and employment, even with planned investment including Crossrail, the Piccadilly line upgrade and improvements to the Windsor lines. Each are forecast to be crowded by the 2030s, affecting both airport and non-airport trips.

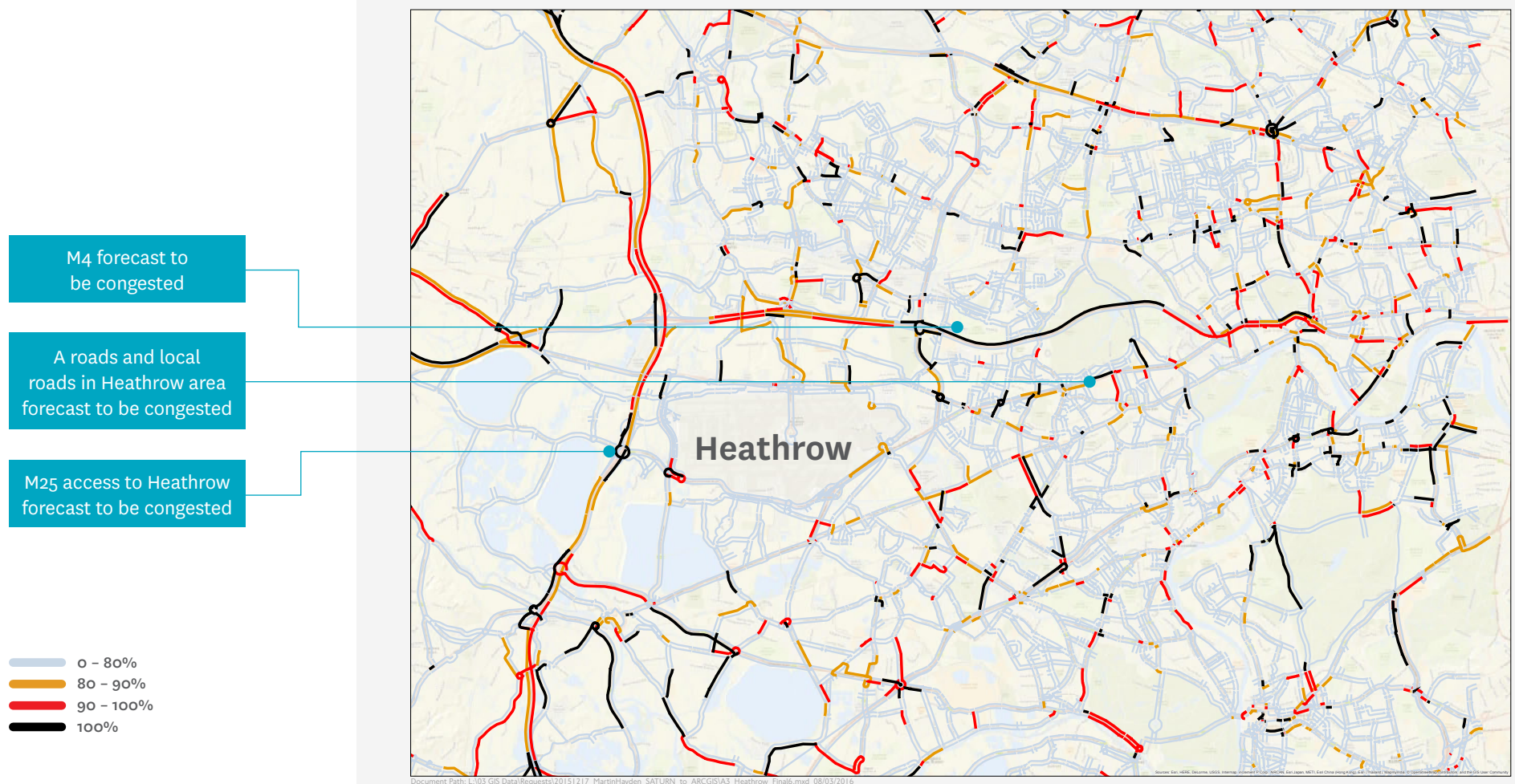
### Crowding on rail lines serving Heathrow in 2040 · without expansion · London-bound AM peak hour

- Up to 2 standing per square metre
- 2-3 standing per square metre
- Over 3 standing per square metre



West London's road network is similarly forecast to be congested with limited spare capacity for extra trips on key routes to/from Heathrow.

Congestion on roads around Heathrow in 2040 · [without expansion](#) · Percentage volume over capacity





# 115%

The increase in the additional trips generated by a three-runway Heathrow compared to today

## The scale of demand will be challenging to accommodate

Even with the highly conservative demand assumptions used by the Airports Commission, Heathrow is expected to generate around 230,000 additional daily passenger and staff trips and thousands of extra freight movements, compared to today.

With at least 60% of Heathrow demand forecast to use London's transport network the unprecedented scale of increased demand from the airport cannot easily be accommodated.



## Heathrow surface access demand

Heathrow expansion will add an unprecedented number of airport passengers with luggage and staff trips to an already congested transport network in west London.

Heathrow today



200,000 daily trips

Expanded Heathrow  
(full utilisation)



430,000 daily trips

## Heathrow surface access demand scenarios

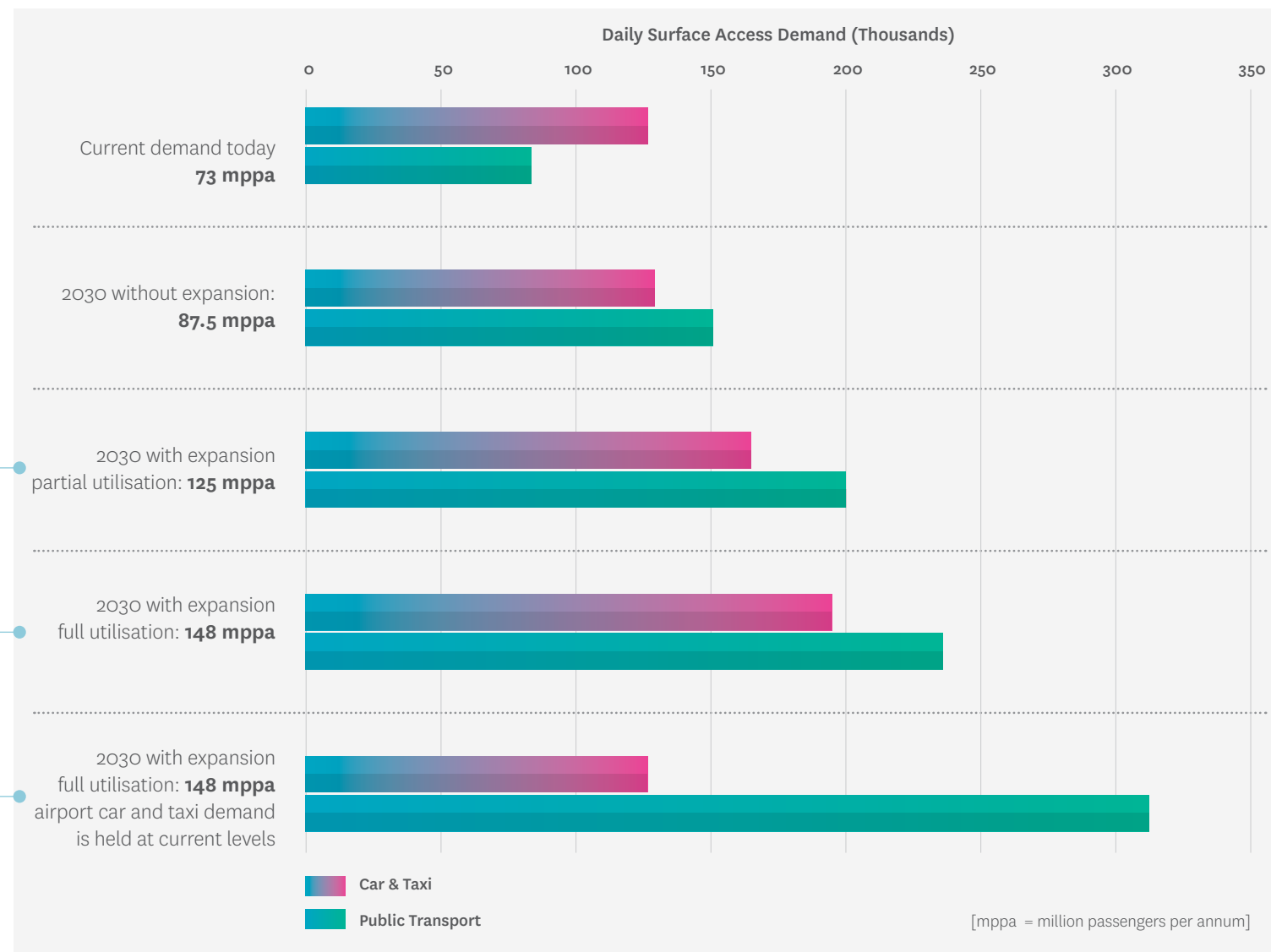
In building up these scenarios, Airports Commission assumptions have been used for mode share, car occupancy, staff numbers, transfer passengers and total passengers per annum.

The Commission only tested partial expansion (125 mppa) in 2030 as it does not predict the airport will reach full capacity until after that date. However it is clearly important to understand the implications of a fully utilised airport – and TfL has tested the additional scenarios accordingly.

This was the only expansion scenario tested by the Commission

This represents the Commission estimate for the fully utilised airport (using same mode share)

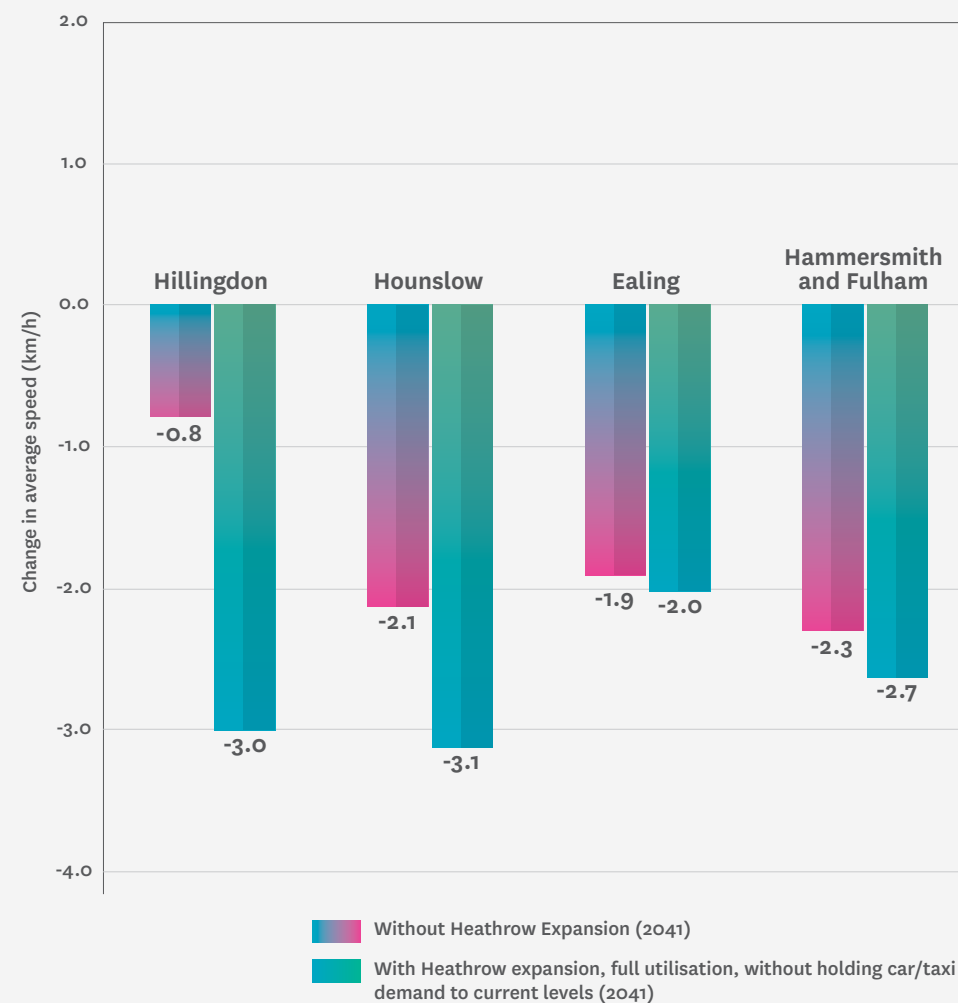
This shows same total demand but holding car/taxi trips to today's levels as suggested by Commission



The additional demand from Heathrow expansion will add significantly to congestion and result in a substantial worsening of average speeds. This will affect airport and non-airport journeys alike, adding to delays and worsening journey time reliability - which is particularly important to airport passengers. Bus routes to and from the airport will also be adversely affected.

On the rail network, which is expected to be crowded without airport expansion, conditions for airport and non-airport passengers will worsen. At some locations, non-airport passengers will be unable to join rail services because of crowding exacerbated by passengers travelling with luggage towards central London. In the reverse direction, airport passengers will be competing with non-airport passengers for limited space on crowded trains.

Change in average borough-wide speeds in AM peak (vs today)





# £20-40

The scale of airport access charge for cars and taxis likely required to ensure no increase in airport-related traffic compared to today's levels. **[AC]**

## How to address the surface access challenge

If the surface access networks are to be able to accommodate airport demand following expansion, reliably and sustainably, then, as a minimum, the Airports Commission proposals for holding car and taxi demand constant at current levels should be adhered to. To achieve this requires:

1. Significant investment in public transport infrastructure to ensure sufficient capacity is available to airport and non-airport users
2. A package of measures to modify the behaviour of passengers and staff in order to shift them from car/taxi to public transport

## Modifying travel behaviour

Though the Airports Commission's Final Report avoids making any firm recommendations on this issue, it indicates that consideration should be given to road user charging. However, its accompanying consultant's technical document\*, makes clear that highway demand management measures will be key to fostering mode shift from car/taxi to public transport.

**"A £20 access charge on all passenger vehicles (including taxis) combined with a 20% reduction in employee car demand...may be enough to reduce overall 2030 airport-related traffic (with runway capacity expansion) to 2013 levels."**

The report goes on to state that if there was no reduction in employee car demand, the access charge would need to be £40 to achieve this. These are significant amounts dwarfing the drop-off fees introduced by several UK airports in recent years, typically £1-2, which have been the source of much controversy.

Moreover, the Commission's technical document recognises that reducing staff car use will prove challenging and raises doubt about the effectiveness of many measures. Heathrow Airport Limited has a programme for reducing staff car journeys, but its success to date has been limited, with over half still driving to work. The situation is complicated by the multiple employers on site at the airport and the shift pattern nature of many roles.

The Commission's consultants also raise the option of a wider area congestion charge - as opposed to one focused solely on airport users. It cites the benefit in addressing background traffic, but raises the likely local opposition it would attract from residents and businesses. It would also risk pushing traffic to local roads away from the charging area, many of which would be ill suited to the increased traffic flows.

None of these options have been tested, nor are they straightforward to deliver, with potentially difficult political and technical consequences.



\*Airports Commission/Jacobs, Surface Access: Demand Management Study, May 2015

## Ensuring sufficient highway capacity

Even with keeping airport road trips to today's levels, there will still be a challenge to keep the roads moving.

The Airports Commission has primarily assumed the enabling works required to construct the expanded airport. This amounts to an investment of £3.2bn by 2030 to tunnel the M25 under the new runway, re-route and tunnel the A4, widen the M4 between junctions 2 and 4a and reconfigure the M4/M25 junction and local airport access roads.

However with the rise in background growth, TfL estimates a further £3bn will need to be invested in roads serving the Heathrow area, providing sufficient capacity to allow the airport to operate. Area traffic management measures will need to be implemented, along with the enhancement of key bus corridors and the maintenance of the additional roads and tunnels.

## Squeezing more buses onto congested roads

Bus will remain the primary mode of public transport for many accessing the airport, particularly staff. As such, improving bus access will be important in discouraging car access to Heathrow.

Making the bus a more attractive mode and able to accommodate thousands of additional passengers will require a substantial number of extra bus services operating on existing and new routes.

Bus reliability is a key challenge on a number of corridors approaching Heathrow. However, it will be challenging to implement options for bus priority measures on already congested main roads trying to reconcile competing pressures for road space.



## Ensuring sufficient rail capacity

Significant rail infrastructure will be required to attract Heathrow passengers and staff to

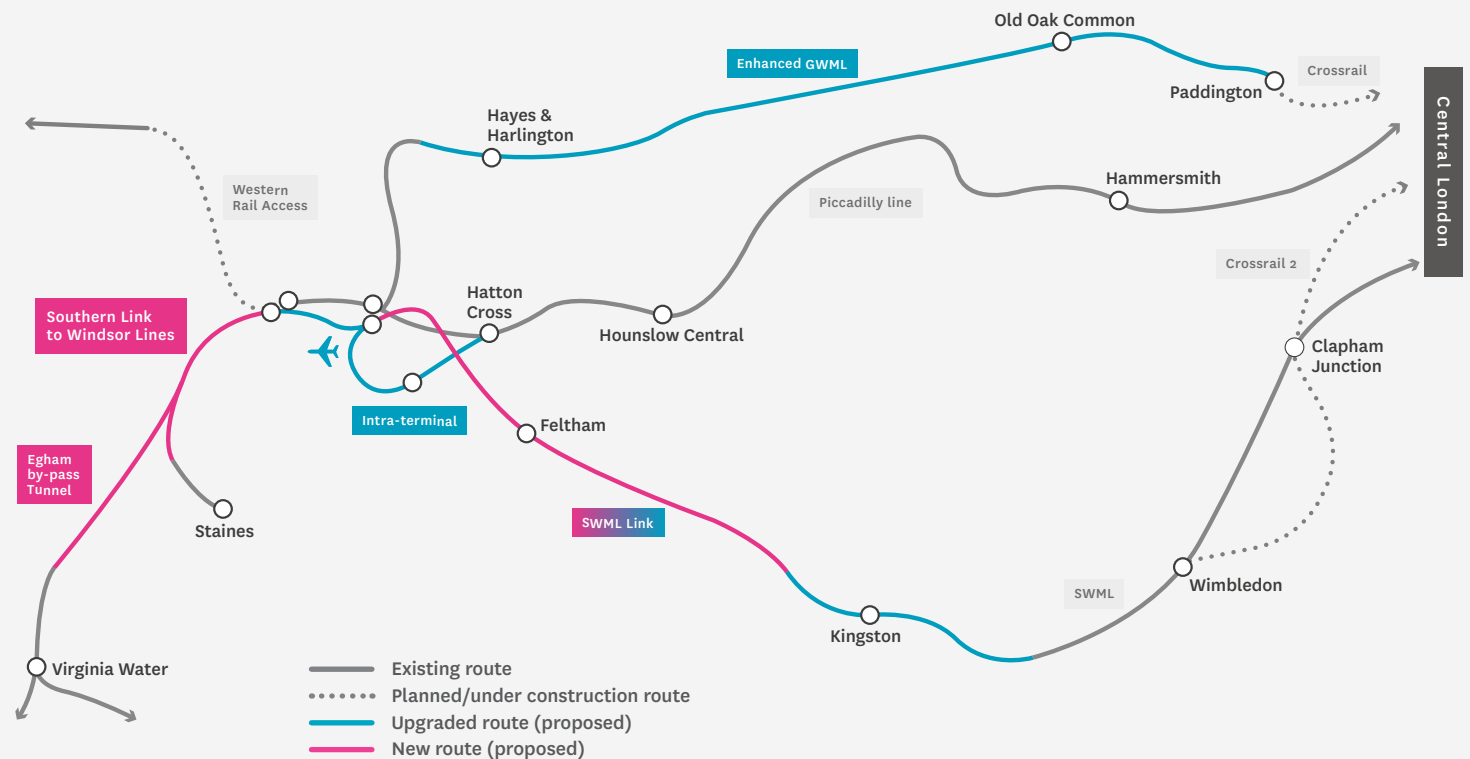
switch from their cars – and allow that the network might accommodate this increase in demand, without impacting non-airport journeys. TfL has identified a number of

potential infrastructure schemes which together could provide the capacity needed to accommodate passengers from an expanded airport while also enhancing connectivity.

**A new link to the SWML** (South West Main Line) – mostly in tunnel – could provide useful access to south London as well as much needed additional capacity to central London. This scheme would only be feasible were Crossrail 2 to be delivered, freeing up capacity on the SWML. Services from the airport could serve either Waterloo or the Crossrail 2 core route, subject to determination of final service patterns.

The Airports Commission assumed that the Southern Link to Windsor lines (described as the ‘**Southern Rail Access**’) would be the only new rail infrastructure required.

## Potential new rail infrastructure required to support expansion





Surface access costs for Heathrow

TfL estimates that the required long-term investment in road and rail enhancements necessary to enable Heathrow expansion is of the order of £15-20bn.

The cost of inaction

If Heathrow expansion is allowed to proceed without this scale of infrastructure intervention and road user charging, there will be significant consequences, both for the airport and the wider region:

- Journey times for Heathrow passengers and staff will be lengthy and unreliable due to congestion and crowding. This will erode the attractiveness of the airport.
- There will be significant delays and crowding for non-airport road traffic and rail users. This will have serious implications for the west London economy.
- Increased congestion will also exacerbate the air quality problem.

Indeed, one might question the wisdom of attempting airport expansion in a location where the surface access network faces such constraints.

	Cost Estimates (£bn)	
	*Airports Commission [AC]	TfL
Highway		
Expansion enabling works and M4 widening, Junction 2-4a	3.2	3.2
Further main road capacity enhancement	-	1.1
Area traffic management measures	-	0.8
Bus corridor enhancements	-	0.5
Maintenance for new roads/tunnels (to 2050)	0.1	0.9
Total	3.3	6.4
Rail		
Southern link to Windsor lines	0.8	0.8
Egham by-pass tunnel	-	1.8
Link to SWML (tunnel, upgrading)	-	4.8
Enhanced GWML (tunnel, additional track)	-	3.6
Intra-terminal capacity enhancements (tunnel, platforms)	-	1.0
Total	0.8	12.0
Grand total	4.1	18.4

[Rail costs exclude costs of operating and maintenance as some of this is offset by revenue]  
\*interpreted from Airports Commission/Jacobs, Cost and Commercial Viability: Heathrow Airport North West Runway, June 2015

The above TfL costs are calculated using the unit cost prices published by the Airports Commission for highway and TfL unit costs for rail. The same level of risk/optimism bias as the Airports Commission has been applied, +44% for highway costs and +66% for rail.

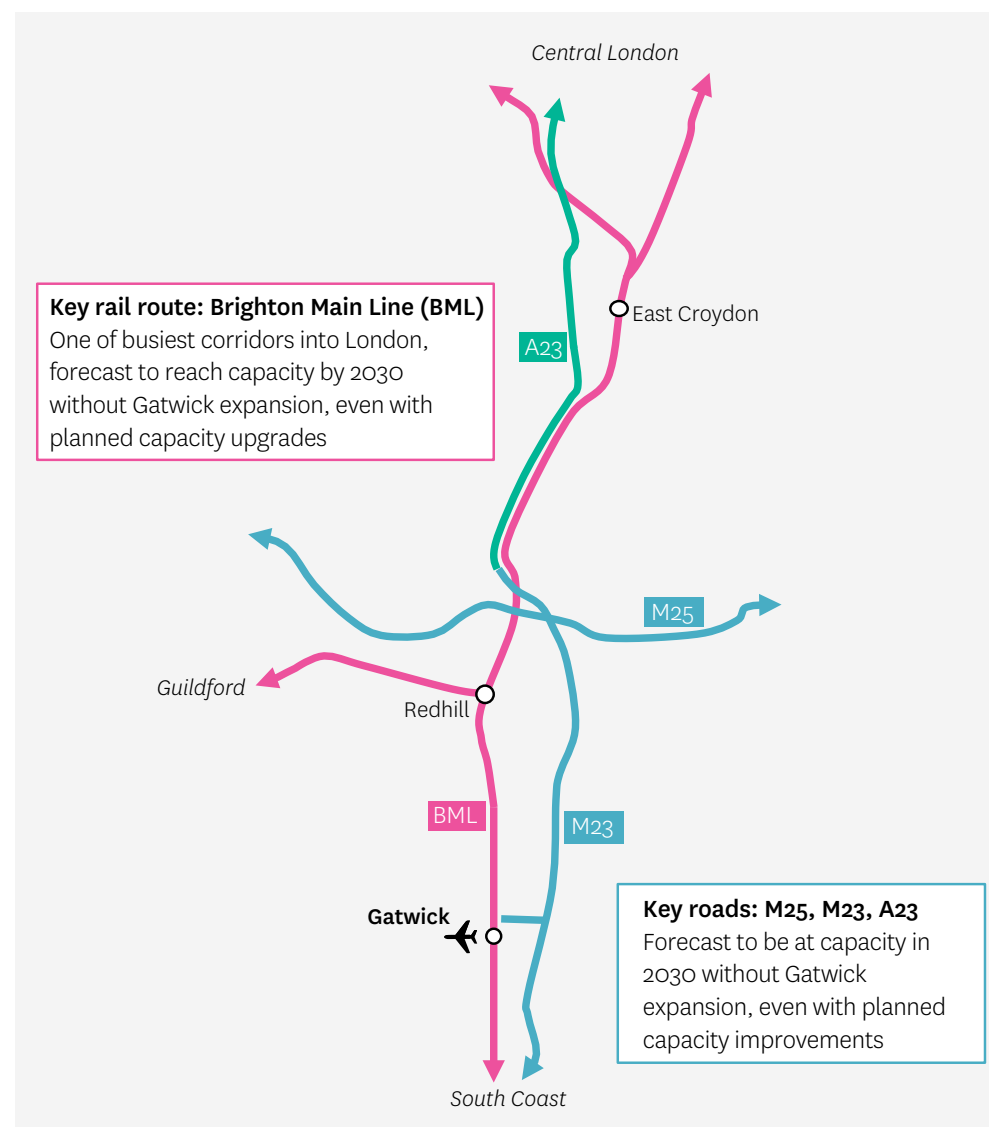
## Access to Gatwick

Taking into account population and employment growth rates, road and rail links in south London are forecast to be crowded to a similar level as west London, despite some planned upgrades. Moreover, the Brighton Main Line has previously been identified as the rail corridor facing the greatest demand challenge.

Even using the highly conservative demand assumptions applied by the Airports Commission, Gatwick expansion is expected to add 40,000 extra car/taxi and 95,000 extra public transport passenger and staff trips to the congested network each day.

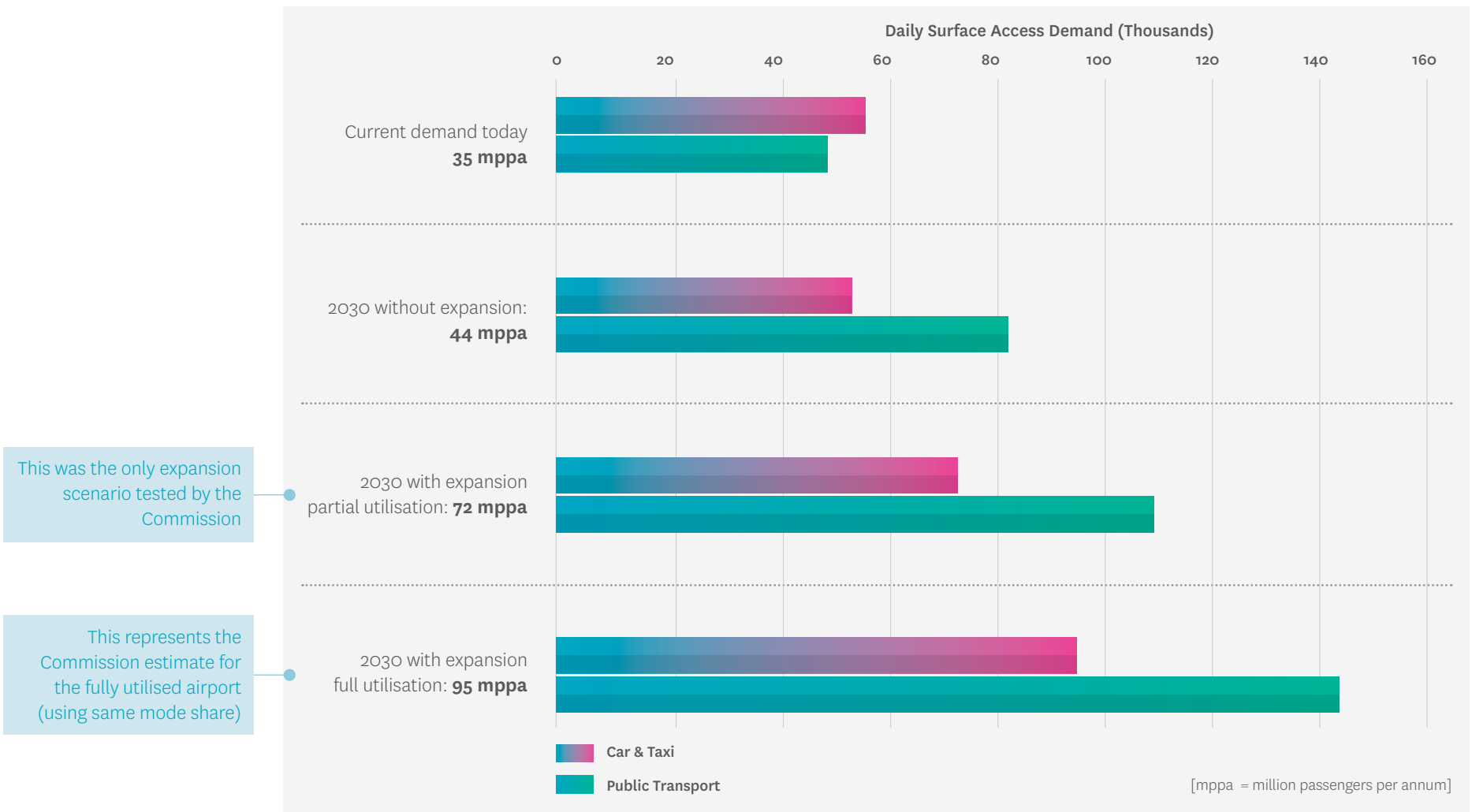
The Commission estimates that £0.8bn of highway investment will be required to enable Gatwick expansion in the short-term, by 2030 – with no allowance made for additional rail infrastructure improvements.

However, to accommodate full expansion on the road and rail networks, TfL estimates at least £10bn will be required, focused on upgrading rail access to deliver a more sustainable mode share for Gatwick without worsening crowding levels for the region's commuters.



## Gatwick surface access demand scenarios

In building up these scenarios, Airports Commission assumptions have been used for mode share, car occupancy, staff numbers, transfer passengers and total passengers per annum.



## Accessing a new hub: from road to rail

**Wherever future airport capacity is to be provided, rail, not road, will need to become the primary mode of access.**

The Commission has demonstrated this for expansion at Heathrow and Gatwick. But it equally applies to a new hub airport. A new hub airport has the advantage that a sustainable mode share can be designed into the proposition from the very start.

Rail transforms access to the airport, shifting the focus from distance to journey time. Rail has the potential to offer a reliable, affordable, hassle-free alternative to car – but it requires a holistic approach that considers the whole passenger journey experience.

### Moving the airport front door

Delivering a seamless passenger experience relies on integrating the rail journey to the airport with the onward flight beyond. This means relocating the airport front door nearer to the places people live, work and visit. This is underpinned by:

**Direct rail services from gateway stations** in both London and the south east as well as the wider United Kingdom (or via a simple interchange)

**Good onward connections to/from the gateway station** by train, bus and taxi

**Airport facilities at key gateway stations**, potentially including:

- airport departure screens
- check-in and boarding pass pick-up
- bag drop facilities (whereby bags checked through to final destination)
- airline information and ticketing desks

**Integrated ticketing** that includes both rail and air segments:

- simplified (single purchase)
- affordable (especially for families/large groups)
- flexible (in case of flight delay)





### Case study: DB Rail&Fly

German Railways (DB) works with most airlines to offer combined rail-air tickets between the airport and any station in

Germany - on almost any train. Some airlines offer the rail add-on for €29 (£22) while others provide it at no extra cost.



### Case study: SL Travel guarantee

Stockholm Transport (SL) offers to refund passengers for alternative means of transport when its services are more than 20 minutes late.

### Case study: SBB Flight luggage

Swiss Railways (SBB) offers the passengers of some airlines the opportunity to check in luggage at one of 35 stations in Switzerland direct to their final destination.

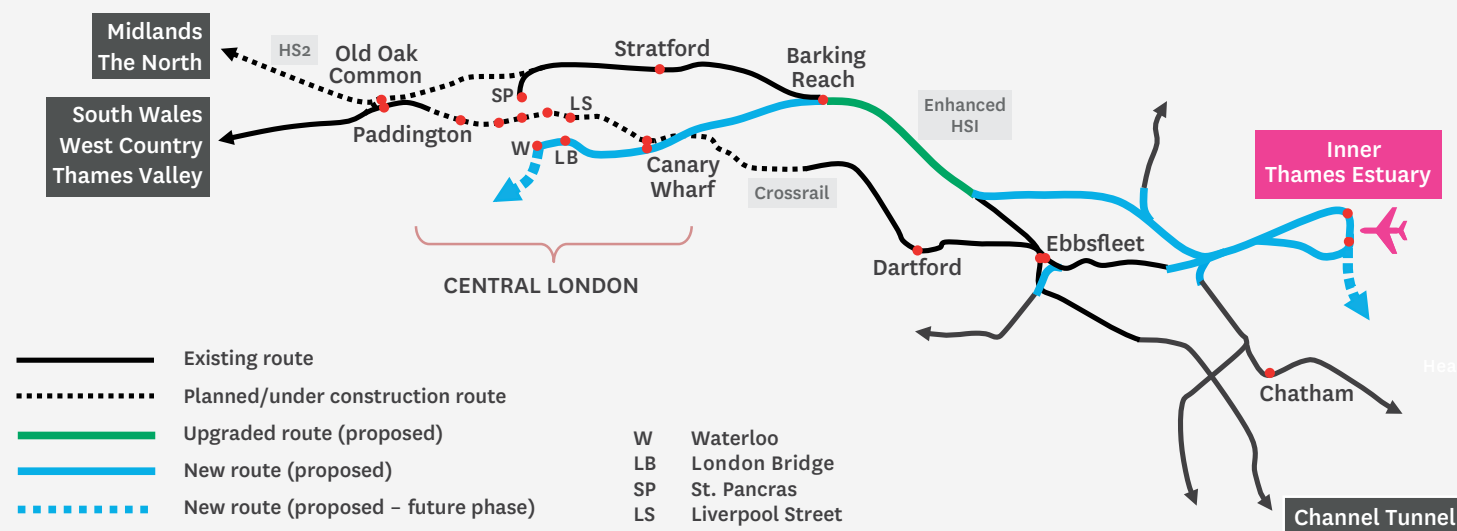


## Serving a new hub to the east of London

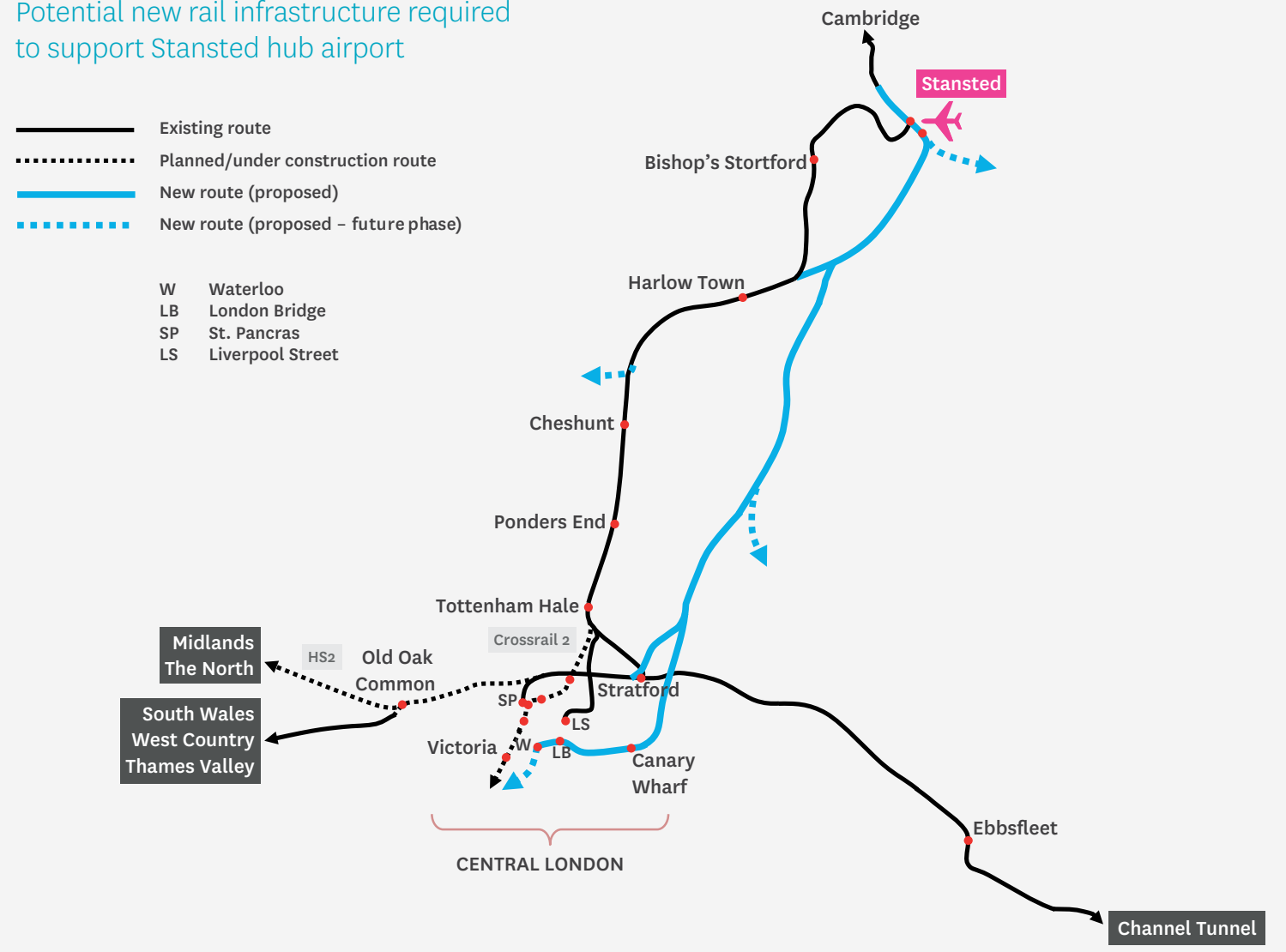
Serving a new hub airport to the east of London, whether at Stansted or the Inner Estuary, will require a similar quantum of intervention as for Heathrow expansion. This means ensuring sufficient rail capacity to meet airport demand and support background growth, taking advantage of existing infrastructure – supplemented by new infrastructure as required (some possibly phased).

Our initial work suggests that the surface access costs associated with Stansted or the Inner Thames Estuary would be £15-20bn.

### Potential new rail infrastructure required to support Inner Thames Estuary hub airport



## Potential new rail infrastructure required to support Stansted hub airport



## Accessing a new hub: spotlight on South Wales and the West Country

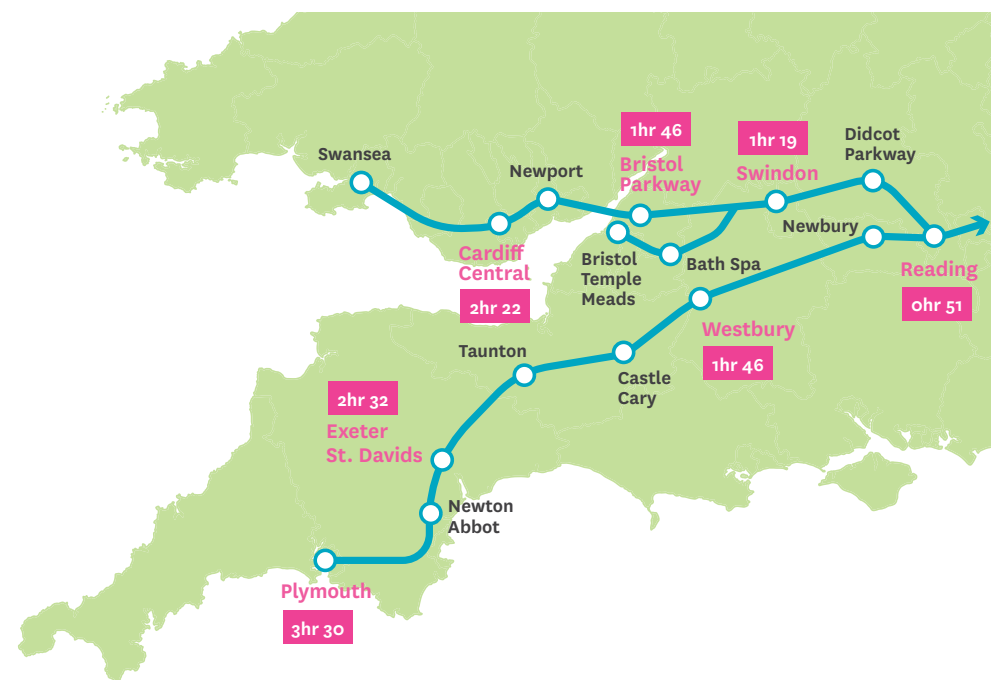
For many in the West Country and South Wales, surface transport will remain the primary mode of access to a London hub airport. Road access will prove increasingly challenging as background growth contributes to increased congestion on the key routes into London from the west, notably the M4.

As such, wherever the hub is located, rail will need to be the key form of access. A combination of new, planned and existing infrastructure would allow direct services from a hub airport at Stansted or the Inner Estuary to stations across the region.

One could envisage at least 3-4 trains a day timed to connect with arriving and departing long haul flights at the new hub airport.

## Potential direct services to Inner Thames Estuary/Stansted

**Estimated journey times shown for selected stations**



## It's about journey time, not distance

Journey times to a new hub airport to the east of London would be faster than it takes to reach Heathrow today - and at most half an hour more than Heathrow if its rail access were similarly improved.

Fast rail services bring a London hub closer to the region, wherever that hub is located. Together with integrated ticketing and remote airport facilities, the regional gateway station is transformed into the hub airport's front door - and the beginning of a seamless hassle-free journey.



# Economy

“Overall, therefore, we counsel caution in attaching significant weight either to the absolute or relative results.”

Airports Commission expert advisers on key plank of its economic case

[AC]

## The Airports Commission has overstated the economic benefits of Heathrow

The Airports Commission's own expert advisers, Professor Peter Mackie and Brian Pearce, raised significant concerns about the calculation of the economic benefits employed by the Commission. They concluded:

“While the content of the model itself has been well-tested, the same cannot be said of the front end... Furthermore the interpretation of the result...is an issue. Overall, therefore, we counsel caution in attaching significant weight either to the absolute or relative results of the GDP/GVA S-CGE approach within the Economic Case.”

## Key concerns about the Airports Commission's approach included:

- “That the aero charges can be passed through [to passengers] with no effects on demand and net user benefits seems to us a very strong assumption.”
- “There is likely to be some double counting between the direct and wider impact channels.”
- The calculation of the economic benefit in part relies on induced investment elsewhere in the economy (and wholly unrelated to airport expansion).
- The impact of additional seat capacity on productivity appears to have been overestimated – suggesting that the increase in GDP has been overstated.
- “Some of the scenarios...rely on combinations of economic assumptions which are...at the optimistic end of the spectrum.”

The House of Commons Treasury Committee has been among those raising concerns about the air passenger demand and allocation models used to calculate economic benefits. In particular, insufficient distinction was made between long haul and short haul, business and leisure and domestic and international.

The extent to which the constrained nature of a three-runway Heathrow has been taken into account is also not clear, in particular with regard to the limited new routes and the lack of operational resilience.

Taken together, these concerns suggest that the £147bn figure for Net Present Value quoted by the Airports Commission has been overstated. This is emphasised by the doubts cast on it by the Commission's own independent experts.



## The future for the airport's staff

Staff are the lifeblood of an airport. Whether customer-facing or behind the scenes, whether employed by the airport, airlines or one of countless on-site agents and suppliers, they keep the airport functioning.

It is often automatically assumed that Heathrow expansion will be good for staff, generating hundreds of new jobs. It is worth considering the likely change in staff numbers, as well as proposed measures for staff travel to the airport.

### Staff numbers

Focusing on the direct employment at the airport and using the Airports Commission's methodology\*, it is possible to calculate that an expanded Heathrow will employ 87,900 staff directly in 2050. This compares to 80,400 in 2010 – an increase of just 9%. This is because the Airports Commission has taken account of the likely staffing efficiencies over time. It assumed that approximately 1.5% in staff efficiencies per year could be achieved.

However, the Airports Commission failed to consider the elasticity of operating costs (i.e. staff numbers) that has been identified by the CAA. Rather than a linear relationship between increased passengers and increased staff, the CAA has determined that for every 10% increase in passengers, only 3.5% more

staff are required. Applying this factor results in a figure of 60,700 staff in 2050, 24% fewer than today.

While an expanded airport will continue to be an important employer, it appears that even the relatively low estimate by the Airports Commission could be substantially overstating the likely future direct employment.

#### Staff directly employed at Heathrow

➤ <b>2-runway</b> Current (2010)	80,400
➤ <b>3-runway</b> , 2050: Airports Commission methodology	87,900
➤ <b>3-runway</b> , 2050: including opex elasticity	60,700

### Staff travel

In order to meet public transport mode share targets and reduce the pressure on the road network, the Airports Commission has considered options for modifying travel behaviour of both passengers and staff. This includes road user charging and an increase in staff parking charges.

Such charges will hit staff disproportionately hard compared to passengers. Many staff are on low wages and are more reliant on road access because they work shift patterns or because the public transport options available to many areas with high numbers of airport staff are limited or unreliable.

\*The Airports Commission has not published the number of direct jobs an expanded Heathrow would provide using its most recent assumptions

# £92.1bn

Total contribution to the UK economy in 2050 by a new hub airport

# 336,000

Total new jobs delivered nationally by a new hub airport

## What a new hub offers

A new four-runway hub airport, by offering spare capacity, will deliver far greater connectivity for the UK through increased links both to the UK regions and the global economy. It is estimated that it will provide a national connectivity contribution of £92.1bn to UK GDP in 2050.

It will support 336,000 jobs nationally, two thirds of which will be located within London and the Thames Gateway.

### Benefits the UK

A new hub airport, by offering sufficient capacity to offer a step-change in routes and

frequencies, will provide significant support for the UK's ambition for increasing trade in goods and services globally.

### Exports

World trade is projected to increase by over 90% by 2021 and the UK Government is targeting a doubling of current levels of trade to £1 trillion by 2020.

Improved connectivity will benefit UK businesses looking to trade with emerging markets in Asia, Latin America, and the Middle East, whose middle class markets are expanding rapidly.

In 2013 the UK exported £12.5bn worth of goods to China however this compares poorly

to both Germany (£35bn) and France (£14bn). This shows that there is unfilled potential to expand exports.

### Tourism

The UK is the world's sixth most popular tourist destination and tourism was worth £106.3bn to the UK economy in 2012. New global links will allow the UK to potentially attract more than 70 million non-business travellers by 2050 and capture the benefits that flow from the £1,100 spent, on average, by each long haul visitor.

### Foreign Direct Investment (FDI)

In 2010, over 94,000 jobs depended on FDI in the regions and countries of the UK. It is particularly important to the North East, the West Midlands, Northern Ireland and Wales. There is a strong correlation between air connectivity and inward investment and 63% of firms stated that air transport was vital or very important to investment decisions.

### Linking the regions to the global market

Sixteen UK cities will be served by a new hub airport providing them and key regional industries such as manufacturing with unprecedented global access. Airlines will have sufficient slots to maintain and develop vital access to the regions, bringing them closer to their markets and helping rebalance the UK economy.





# Housing and regeneration

## London's population challenge

London is growing. By 2030 the number of people living in the city will grow by 1.4 million to 10 million. By 2050 this number is forecast to be about 11.3 million.

This represents a huge housing challenge for the boroughs and districts of London and the South East in accommodating this exponential growth in population.

## Exacerbated by Heathrow

The Airports Commission expects an expanded Heathrow to generate an additional 80,000 new direct, indirect and induced jobs by 2050 (notwithstanding the issues with staffing numbers raised earlier). A significant proportion of these new employees will need to be accommodated in the region. West London and the areas surrounding the airport are, however, already struggling to keep up with background growth, in the face of overheated property markets and increasingly limited land supply.

The Airports Commission believes that expansion can be accommodated without placing additional pressure on housing. Primarily, it claims this by drawing on local unemployment to fill the new jobs; however, this is not borne out by experience of similar schemes; expansion will require a variety of skills levels and will attract employees from across the London area.





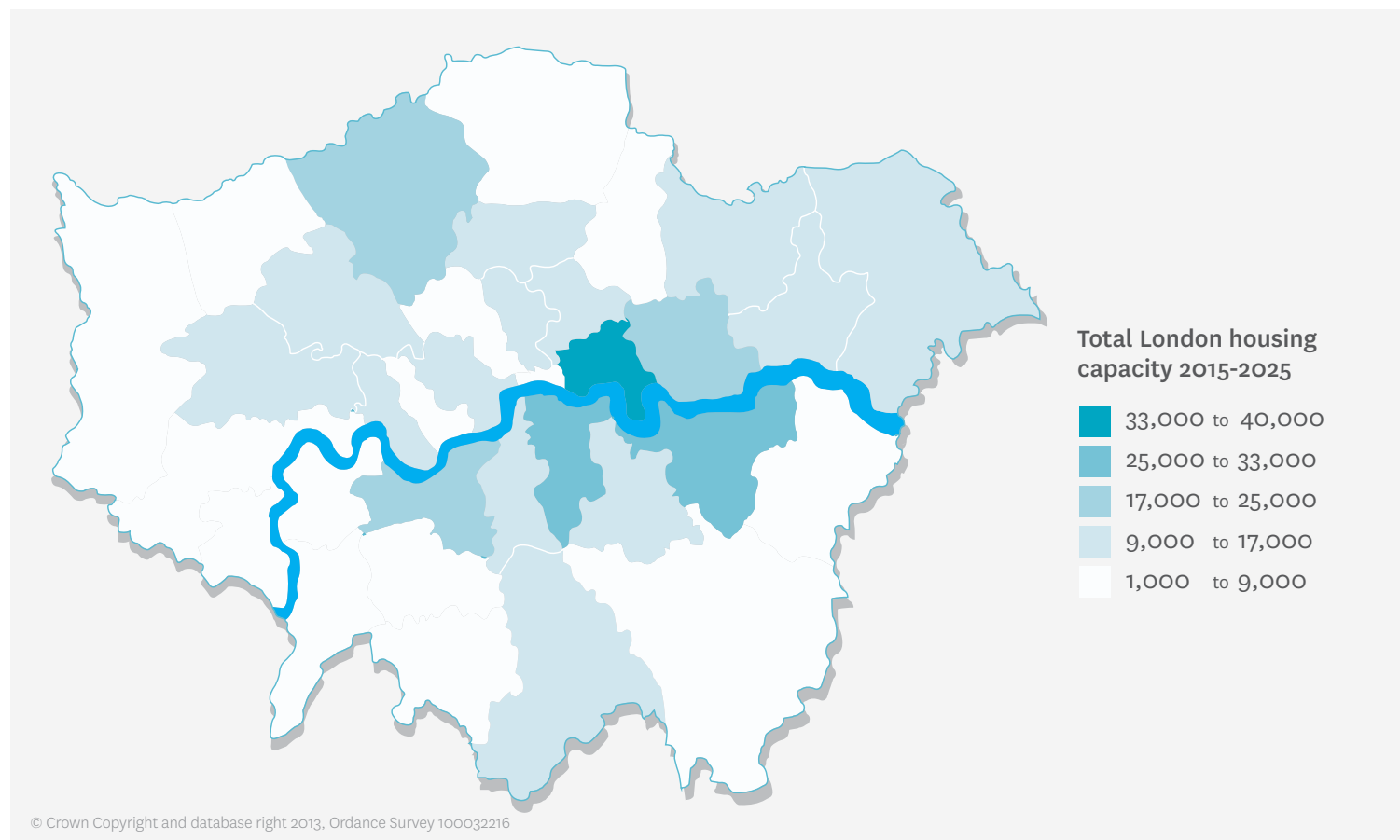
## An airport to the east unlocks new potential

This plan below demonstrates the substantial role for east London to play in meeting London's housing need over the next decade.

This amounts to almost 200,000 homes, 280,000 jobs and 600,000 Londoners.

A new airport to the east has a critical part to play in unlocking and accelerating this development and helping rebalance the

economic geography of London. As a powerful generator of economic activity, it will help deliver the Mayor's 'City in the East' Masterplan, underpinned by regeneration in the Thames Gateway and the Upper Lea Valley.



## Inner Thames Estuary: Corridor of opportunity

A new Inner Thames Estuary has the potential to unlock and catalyse development in the multiple opportunity areas and growth clusters located along its rail corridors – including key sites in east London.

### Inner Thames Estuary

#### London Riverside (Barking/Dagenham)

Key airport gateway zone  
OA: 26,500 homes · 16,000 jobs

#### Stratford

Most important regeneration zone in London  
OA: 32,000 homes · 50,000 jobs  
Olympicopolis  
Regional retail hub

#### King's Cross St. Pancras

International high-speed rail hub  
Major new commercial quarter  
OA: 1,900 homes · 25,000 jobs  
Academic and research cluster

#### Ebbsfleet

International high-speed rail hub  
Plans for new garden city, 15,000 homes  
Proposal for new theme park and resort  
Regional retail hub

#### Bexley Riverside

OA: 4,000 homes · 7,000 jobs

#### Custom House/Royal Docks

International exhibition and convention centre  
OA: 11,000 homes · 6,000 jobs

#### Canary Wharf

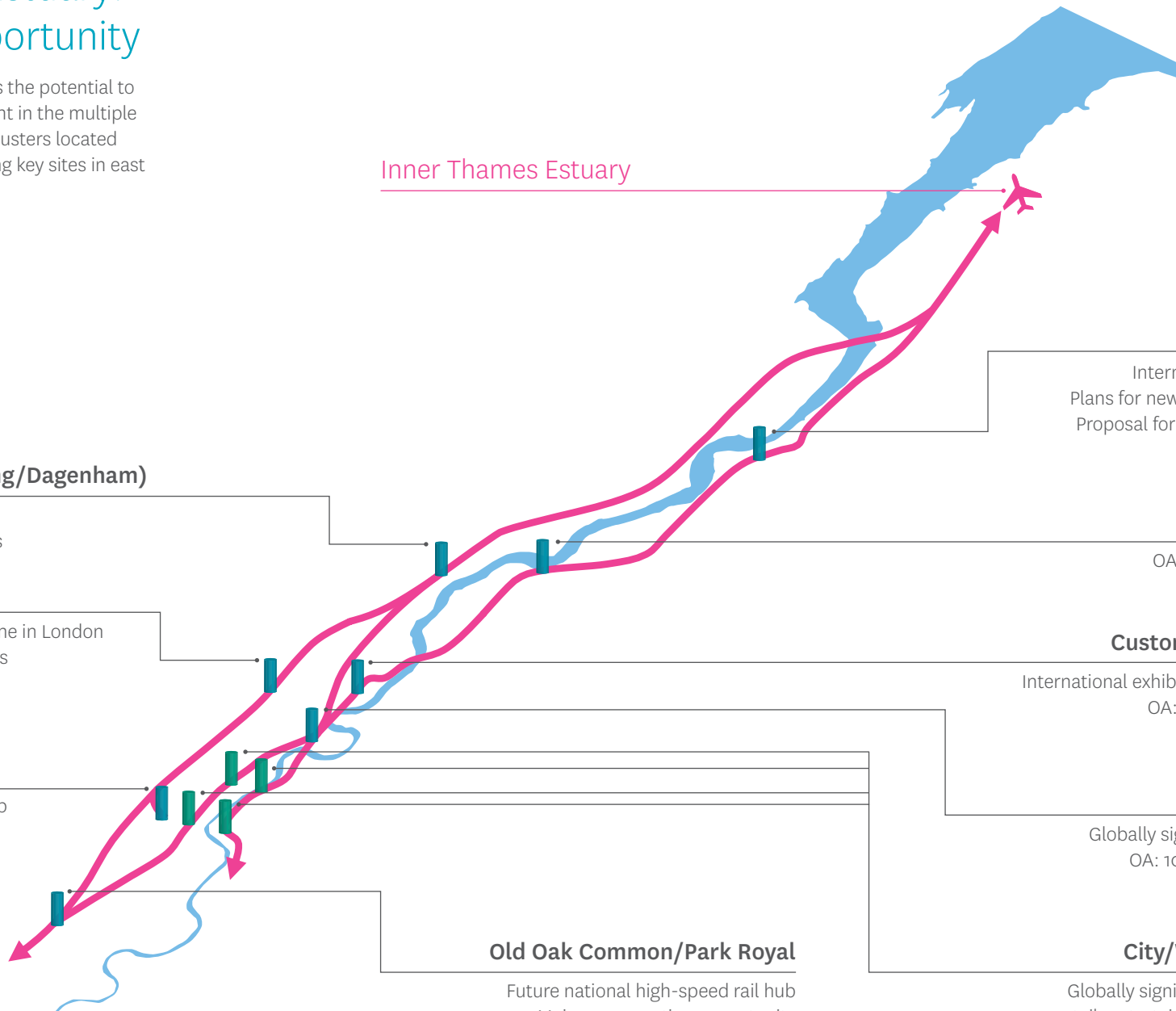
Globally significant commercial centre  
OA: 10,000 homes · 110,000 jobs

#### Old Oak Common/Park Royal

Future national high-speed rail hub  
Major regeneration opportunity  
OA: 25,500 homes · 65,000 jobs

#### City/West End/South Bank

Globally significant commercial, cultural, retail, entertainment and academic centre



# Airspace

“The London [airspace] would need to be substantially redesigned... to enable an additional runway, wherever located, as well as the forecast growth at the other London airfields to be efficiently supported”

[AC]

The debate about the delivery of new aviation capacity tends to focus on what happens on the ground. What happens in the sky is no less important; any increase in aircraft as a result of new runways needs to be accommodated by the London airspace, already one of the most congested in the world.

NATS (formerly National Air Traffic Services), a public-private partnership, is the main air navigation service provider in the UK. It provided technical input to the Airports Commission on the airspace implications of new airport capacity, published by the Commission. This section highlights the key findings of that work’.

## Key findings

- **No new runway in the London area could operate without a complete redesign of the London airspace...**

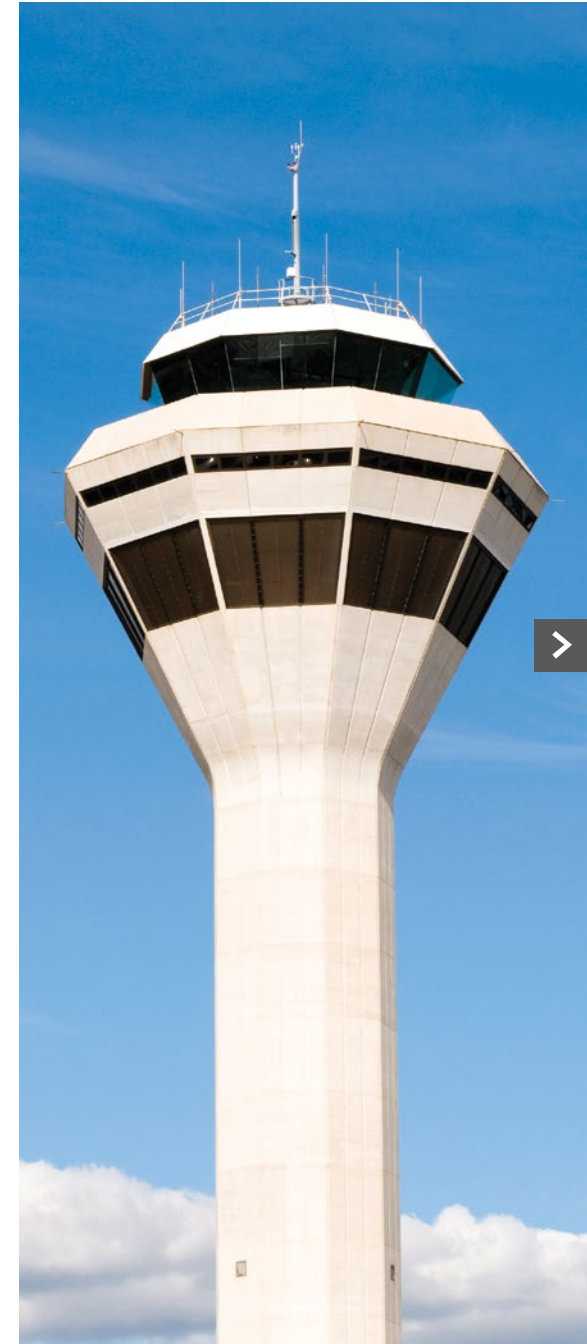
“The London [airspace] would need to be substantially redesigned...to enable an additional runway, wherever located, as well as the forecast growth at the other London airfields to be efficiently supported.” [para 8]

Moreover, the specific challenge facing a third runway at Heathrow is explicitly identified:

“Adding a third runway to the north of Heathrow in close proximity of Northolt, Luton, Stansted and London City will require a complicated airspace re-design.” [para 7.1]

- **It has not been proven that Northolt will be able to operate without being impacted by a third runway at Heathrow.**
- **Delays and stacking will be a feature of a three-runway Heathrow’s operations, as the airport struggles to meet demand.**

“As indicated by the Hold Dwell Times, a number of aircraft were in excess of the standard hold time, indicating demand in excess of available capacity.” [para 7.1.2]



“..the routes provided by the Heathrow Airport North West Runway proposal... considered unfeasible...were discarded”

[AC]

### Key findings (continued)

- **Accommodating a third runway at Heathrow would require international co-operation.**

“The impact on Sector 18 could be mitigated through re-design of the existing routes and the addition of new routes...Sector 18 interfaces directly with the French FIR so such re-design of the sector is dependent on inter-state collaboration.” [para 7.1.5]

- **The operational approach in the Heathrow and Gatwick proposals is heavily dependent on assumptions that cannot be verified at this stage.**

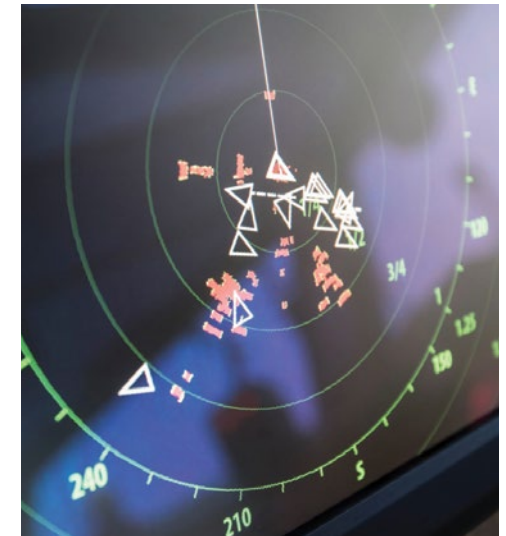
“The key determinate in safe and efficient air traffic services will be the use of advanced operating concepts and techniques, underpinned by expected future Air Traffic Movement technological advances. Many of the concepts required are currently being deployed or are in development, such as through SESAR, and will start to be validated over the next 5-10 years.” [para 8.4]

The extent to which these concepts can be validated will determine whether the arrival and departure flows forecast by the promoters and the Commission are achievable and to what extent the measures they have employed to minimise the noise impacts are effective.

- **Some of the routes adopted by Heathrow Airport and the Airports Commission for noise modelling were assessed to be unfeasible.**

“...the routes provided by the Heathrow Airport North West Runway proposal... considered unfeasible...were discarded.” [para 3.1.1]

This is despite it being suggested in the Commission’s local noise assessment “that NATS had reviewed and approved the proposed route designs.”



### Implications for other location options

Fast-time simulation modelling has now been undertaken for the Heathrow and Gatwick options. NATS has indicated similar modelling would be required to gain a fuller understanding of the airspace implications of other location options and so confirm its initial findings that new capacity at the Inner Estuary or Stansted could be accommodated.

But such is the complexity of the London airspace, wherever new runway capacity were to be provided – whether at an existing or new airport site – it would require a substantial redesign to the airspace.



# 3x

It is estimated that funding expansion would require Heathrow Airport to triple its existing debt and equity levels. [AC]

## Financing

The Commission's starting point is that Heathrow expansion "would be privately funded and delivered." Indeed, this has been portrayed as an key advantage of the scheme. It is important that this assumption is tested and the implications considered.

### Heathrow's existing investors – why they invest

With the exception of Ferrovial (with a 25% stake), all of Heathrow Airport Holdings Limited's investors are professional asset managers:

- Sovereign wealth funds – managing their own money  
Qatar Investment Authority – QIA (20%), Government of Singapore Investment Corporation – GIC (11.2%), China Investment Corporation – CIC (10%)
- Investment or pension funds – managing others' money  
Caisse de dépôt et placement du Québec – CDPQ (12.62%), Alinda Capital Partners (11.18%), Universities Superannuation Scheme – USS (10%)

Investors such as these invest in a range of asset classes as part of a balanced portfolio, achieving the desired mix of geographical, currency and industry exposure as well as risk profile.

For such institutional investors, an existing regulated hub airport is an attractive low-risk investment with reasonable returns – helped by steady cashflows and a regulatory framework which is perceived to guarantee the rate of return on investment.

For these investors, investing in Heathrow is an alternative to fixed income securities – another low risk yielding investment – typically bonds from issuers with strong credit ratings (such as TfL offering 3%, with an AA+ credit rating).

As such, key to their investment in Heathrow Airport is its risk profile today.



45%

The increase in Heathrow aeronautical charges that has been assumed – and moreover deemed to have no impact on passenger demand AC

Heathrow expansion: transformative in scope

An expanded Heathrow airport is an entirely different proposition with a wholly dissimilar risk profile. It requires a large capital investment up front and entails multiple risks including:

- Political risk (delay or cancellation in face of mounting opposition)
- Planning risk (delay or material conditions arising from planning approval process)
- Legal risk (delay or cancellation following successful legal challenges on noise or air quality grounds)
- Enabling works risk (key supporting works – notably upgraded surface access – not ready on time)
- Regulatory risk (CAA five-year settlement for airport charges less generous than expected)
- Demand risk (scale of demand does not materialise; this is a particular concern given that the Commission has assumed a 45% increase in aeronautical charges – and yet that there would be no impact on passenger demand)

Taken together, these demonstrate how expansion fundamentally alters Heathrow as an investment proposition. With this risk

profile – and without Government intervention (as the Airports Commission has suggested), expansion is likely to be of little interest to most of the current investors.

However, such are the extent of the risks, it is not clear, without Government intervention, which investors would choose to invest in the project.

Heathrow expansion: transformative in scale

The scale of investment of the investment required is no less transformative. According to the Airports Commission, it means more than doubling the size of the airport’s total assets – the ‘Regulatory Asset Base (RAB)’ – adding £17.6bn to the existing £14.9bn RAB.

What this would mean for the debt/equity profile was set out by the Airports Commission’s consultants:

Heathrow Airport Limited: Debt & Equity <span>AC</span>	Equity	Debt
Existing	£2.7bn	£11.7bn
Proposed – to fund expansion	£8.2bn	£33.8bn
Proposed – sensitivity	£8.5bn	£39.0bn

Source: Cost and Commercial Viability: Funding and Financing Update, PwC for Airports Commission, July 2015

This effectively requires tripling the existing equity and debt levels.

The Commission’s consultants described the quantum of finance as “a major challenge”. It is likely that many of the existing investors would balk at tripling their stake (even assuming they all had the ability to fund such an increase). If new investors are to be attracted for this scale of financing, the consultants add that “the financing will have to command returns sufficient to attract a wide range of investors and be structured in a way to ensure it is of sufficient credit quality.” On the debt side, the Commission’s consultants recognised that it would raise the “debt balance to a similar level of that of BP, which holds the largest debt balance of any UK corporate (excluding financial entities).” The consultants highlighted that it would be comparable to the debt balance of Network Rail but that its debt was a) incurred for incremental enhancements to a significant network of assets and b) guaranteed by Government.

All of this leaves the Commission’s consultants to conclude that the Heathrow expansion scheme is “at the highest end of the range of financing for infrastructure projects and is unprecedented for privately financed airports.”

## Mitigating measures to secure private investment

Indications from the existing investors that they would consider investing in a third runway are easily made when there are no terms on the table.

Given the scale of the financing required, coupled with the extent of the risks, it is worth considering what mitigating steps might be taken to secure private investment:

- **Redefine regulatory framework**  
This entails suspending the CAA's existing regulatory approach. Instead, it could mean lengthening the interval between the review of aeronautical charges (i.e. beyond five years) and/or allowing a greater level of return to accommodate the higher level of risk and scale of the financing requirements.
- **Government funding**  
This entails transferring more of the project costs from the RAB to the taxpayer – noting that the Commission has already assumed that all surface access infrastructure outside the airport perimeter will be paid for by Government. But there are political and legal limits to Government funding in support of privately owned infrastructure. Indeed, in October 2015, the Government was clear\* that [“it expects the scheme promoter to meet the costs of any surface access proposals that are required as a direct](#)

[result of airport expansion and from which they will directly benefit.”](#) Restrictions also arise as a result of EU State Aid law.

- **Government guarantees**  
This is a more politically acceptable way of providing Government support – and one that does not count against public sector borrowing (though any State Aid implications would need to be carefully examined). The Government could, for example, guarantee a level of revenue based on forecast passenger throughput. Government guarantees have been used to kickstart other major infrastructure projects such as Hinkley Point C nuclear power station and the Thames Tideway Tunnel.



## Government has a key role to play

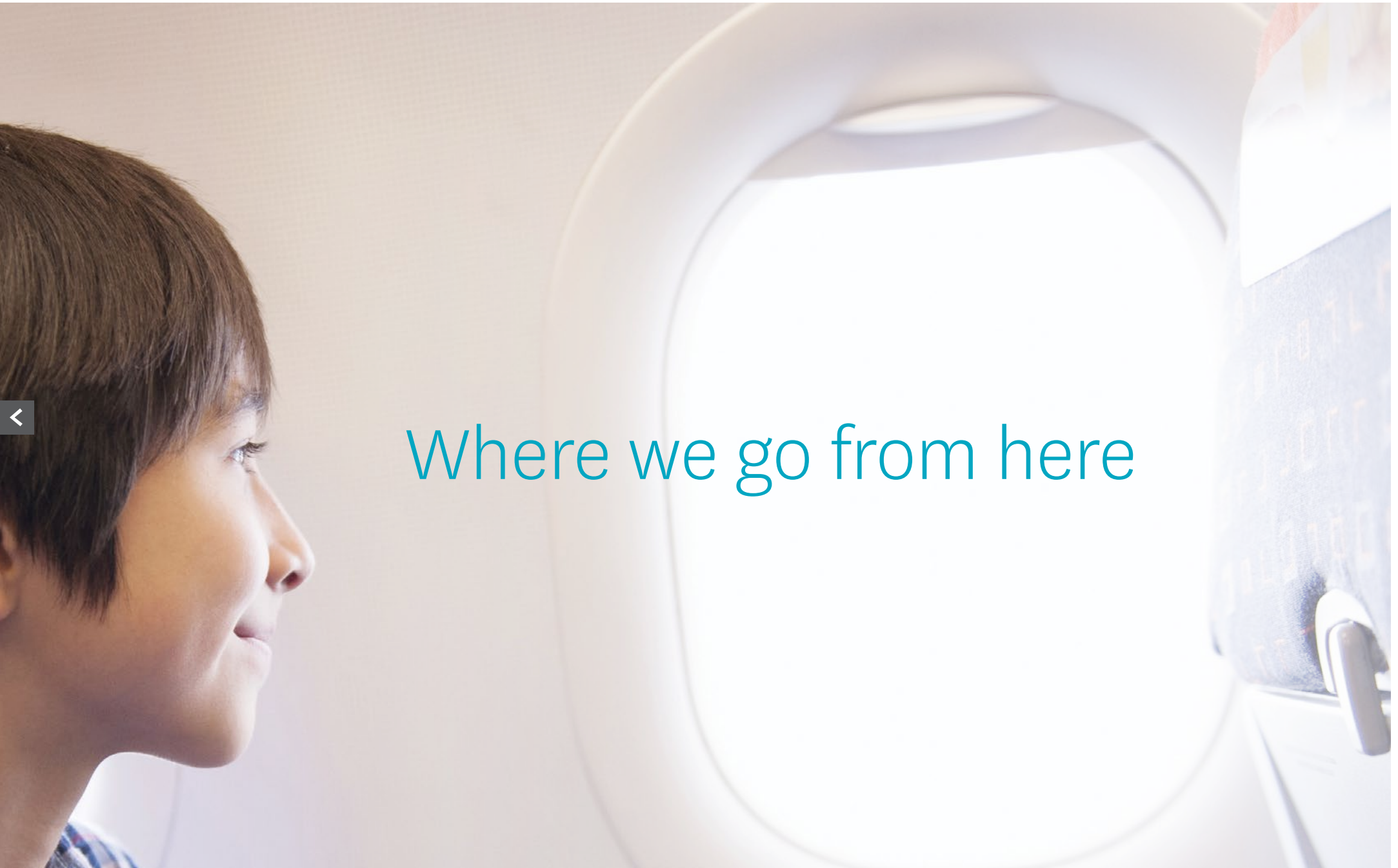
The above constitutes significant Government action to de-risk the project and provide direct or indirect financial support. All of these are alluded to as options in the Airports Commission's consultants' report, though nothing definitive is recommended.

It is very difficult to envisage Heathrow expansion proceeding without at least some of the above Government interventions. This fundamentally undermines the claim that a third runway can be delivered entirely by the private sector.

Similarly, work undertaken on a new four-runway hub airport, with a comparable quantum of investment and risk, indicates that it will also be most effectively delivered with Government support.

Whether expanding Heathrow to three runways or delivering a new four-runway hub to the east of London, Government will have a critical role to play in managing the risk and securing the funding. It is unhelpful to claim, on the slenderest of evidence, that a project as complex as Heathrow expansion can be financed solely by the private sector.

\*Minister of State for Transport, responding to House of Commons Written Question 10490, 14 October 2015



Where we go from here





# Conclusion and next steps

It is clear from the Airports Commission evidence presented that Heathrow expansion is wrong for the economy and wrong for the environment. It neither provides the connectivity the UK needs, nor is it able to avoid dire impacts on public health, whether the hundreds of thousands exposed to significant aircraft noise, or the risk to legal limits for NO<sub>2</sub>. It places considerable pressure on already congested surface access networks, which would require significant interventions if they are to function effectively.

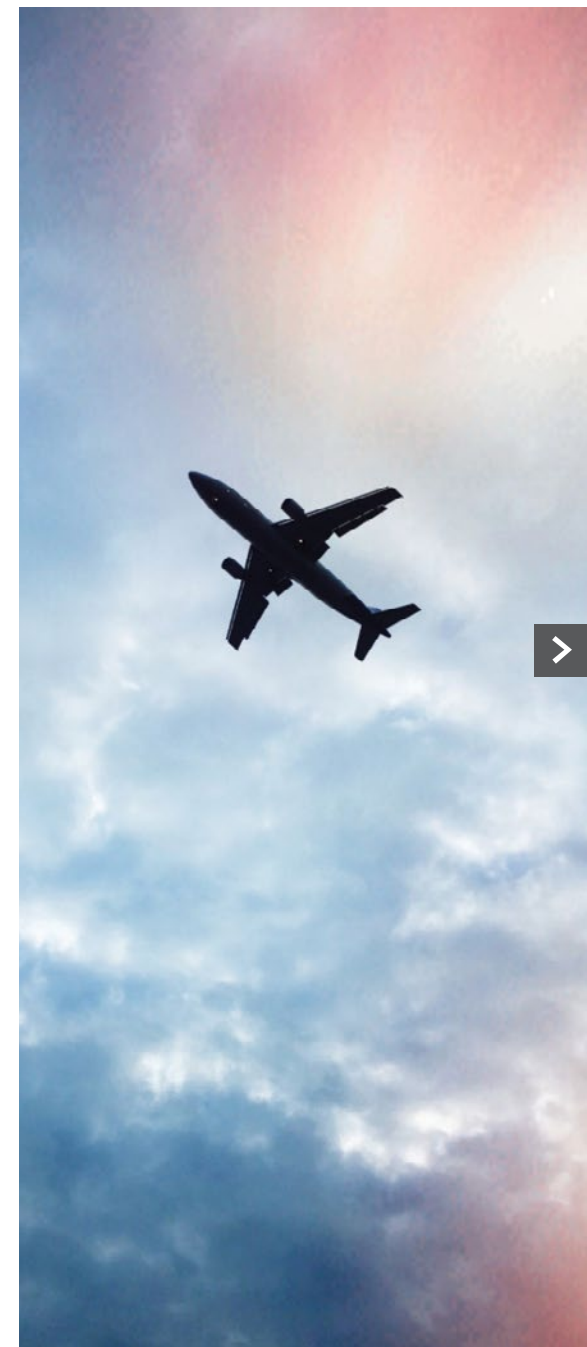
Gatwick expansion is at best a stop gap. Its environmental impacts are lower, but not serving as a hub, its connectivity is more limited and it will not offer the wide range of long haul routes that a hub can offer. It also requires more surface access capacity if extra demand is to be accommodated on already crowded routes.

If we are to secure the connectivity that meets the UK's long-term economic need, then the only option is a four-runway hub. The Inner Thames Estuary and Stansted, located to the east of London, away from densely populated areas, are each able to deliver that connectivity whilst absolutely minimising the local noise and air quality pollution impacts. A mixture of new, planned and existing surface access

infrastructure would ensure fast, reliable access and help unlock key development and regeneration sites along the corridor.

In December 2015, the Government rightly recognised that it did not have robust evidence to be in a position to take forward expansion of Heathrow. This is no surprise: Heathrow expansion remains environmentally and politically undeliverable. As part of its next phase of work, it is incumbent on Government to revisit the entire Airports Commission process and consider a full range of credible options – including alternative hub locations. A failure to do so will undermine any attempt to bring forward a National Policy Statement and leave a decision vulnerable to legal challenge.

The Government has a critical responsibility: in making a decision, it will set the parameters for the UK's ability to export goods and services and attract investment and tourism for decades to come. No longer should we be detained by a solution which does not even answer the basic question, the need for a step-change in connectivity, not to mention its disastrous consequences for public health. We need a hub airport that can fully connect the UK to the world, support UK growth and prosperity and deliver benefits for generations to come.



# Appendix

Appendix A      Overview of key Airports Commission evidence

Appendix B      Noise modelling assumptions

Appendix C      New hub airport Q&A



# Appendix A: Overview of key Airports Commission evidence

[unless otherwise stated, references are sourced from the Airports Commission Final Report]

Area	What the Commission and its consultants said <b>[AC]</b>	What this means	What can be inferred
<b>Capacity</b>	<p>“The Commission’s forecasts indicate ...the expanded airport operating at around 80-90% of capacity by 2030”  <i>[Interim Report, 6.88]</i></p>		<p>This is an airport which is effectively full, with slots scarce at peak times and impacting resilience.</p> <p>It is well above the 70-75% represented by international best practice and the level of utilisation observed at rival European hubs.</p>
<b>Domestic connectivity</b>	<p>Daily short-haul destinations from airport (excluding domestic), 2030, Carbon-traded: 86  <i>[Table 6.1]</i></p> <p>Number of daily destinations for each scheme, carbon-traded, shorthaul including domestic, 2030, Carbon-traded: 90  <i>[Figure 13.2]</i></p>	<p>90-86 = 4 daily domestic destinations served by an expanded Heathrow in 2030.</p>	<p>This is a further fall from the seven domestic destinations served by Heathrow today and reflects its lack of capacity, even with expansion.</p> <p>A third runway does nothing to support UK regional access to Heathrow and will be unable to halt the trend of reductions in domestic routes.</p>
<b>Long haul connectivity</b>	<p>Daily long-haul destinations from airport, 2030, Carbon-traded: 68  <i>[Table 6.1]</i></p> <p>Destinations outside of Europe with at least a daily service from Heathrow, Gatwick or both, 2014: Heathrow only (59 total), Both (2 total)  <i>[Figure 2.8]</i></p>	<p>68-(59+2) = 7 additional daily long haul destinations served by an expanded Heathrow in 2030.</p>	<p>This is not the step-change in connectivity that has been promised by proponents of a third runway. Heathrow has already fallen behind rival European hubs – and this will do very little to close the connectivity gap.</p> <p>Indeed, in China alone, there are today 9 cities served direct by rival European hubs but not served from Heathrow or the UK.</p>
<b>Noise: overall numbers</b>	<p>Contour &gt;55 dB Lden</p> <p>Heathrow 2050 Minimise newly affected: 726,600</p> <p>Heathrow 2050 Respite: 516,700</p> <p>Heathrow 2050 Minimise total: 637,700  <i>[Noise Modelling for the Airports Commission: Compendium of Results, ERCD, A35, A38, A41]</i></p>	<p>Under all three scenarios tested, more than half a million people are exposed to noise at 55dB Lden</p>	<p>This is more than the number of people exposed by the five main rival European hubs – Paris CDG, Frankfurt, Amsterdam, Madrid and Munich – combined.</p>

Area	What the Commission and its consultants said [AC]	What this means	What can be inferred
Flight routings	“Routes provided by the Heathrow Airport North West Runway proposal...were modelled... Routes considered unfeasible ... were discarded.” [3.1.1, 14 Operational Efficiency - Fast Time Airspace Simulation Issue 2, NATS, April 2015]	Some of the flight routings devised by Heathrow Airport and endorsed by the Commission were not feasible.	In developing the three Heathrow expansion scenarios, multiple iterations of the flight routings were undertaken by Heathrow Airport to optimise the results (and these were adopted by the Commission) – even though this is in no way enabled by a third runway (and renders comparison with the Commission’s Current and Do Minimum scenarios all but meaningless).  However, it is clear from NATS that some of the routings thus produced are simply unfeasible.
Noise: newly affected	Newly affected people, Heathrow Airport, criterion Lden>55dB, versus Baseline scenario H11-2R Heathrow 2050 Minimise newly affected: 98,900 Heathrow 2050 Respite: 121,400 Heathrow 2050 Minimise total: 277,100 [Noise Modelling for the Airports Commission: Compendium of Results, ERCD, C4]	The number of those newly exposed at 55dB Lden for the first time ranges from 100,000 to 300,000.	This is a result of the flight routing optimisation undertaken for the Airports Commission scenarios.  Even at the lower end, this is more than the total number of people exposed to aircraft noise at Manchester Airport, the second noisiest airport in the UK.
Noise: night flights	Monetised sleep disturbance: incremental difference compared to do minimum, £ million/year Heathrow Northwest Runway no core night flights (11:30pm-6:00am): -37.1 Heathrow Northwest Runway no night flights (11:00pm-7:00am): -198.2 [Table 14.1]	A night flights ban from 11pm to 7am would deliver 5 times as much benefit in terms of reduced sleep disturbance compared to a ban from 11.30pm to 6am.	Despite this, the Commission recommends only a ban between 11.30pm and 6am because the expanded airport would not have the capacity to cope with the larger number of flights being rescheduled.  As a result of this partial ban – and the greater throughput possible from a three-runway Heathrow, we estimate that this night flight ‘ban’ will allow 32% more flights in the 11pm-7am night period.



Area	What the Commission and its consultants said [AC]	What this means	What can be inferred
<b>Air quality</b>	<p>Unmitigated 2030 impacts of the Heathrow schemes on Bath Road NO<sub>2</sub> Concentrations, Scheme forecast (µg/m<sup>3</sup>), Heathrow Northwest Runway: 48.7 [Table 9.4]</p> <p>“Overall, the mitigating actions that the Commission has been able to quantify show a total potential reduction in the change in NO<sub>2</sub> concentrations at the Bath Road PCM exceedance area of between -2.4µg/m<sup>3</sup> and -3.6µg/m<sup>3</sup> for Heathrow Northwest Runway.” [9.86]</p>	<p>Unmitigated: 48.7 µg/m<sup>3</sup> Mitigated: 48.7-2.4 or 3.6 = 46.3 or 45.1 µg/m<sup>3</sup></p>	<p>Even with mitigation, the Airports Commission failed to demonstrate that Heathrow expansion would meet compliance (40 µg/m<sup>3</sup> or less).</p>
<b>Surface access: background demand</b>	<p>“For Heathrow, the Southern Rail Access link and the central sections of Crossrail are forecast to be highly congested during the morning peak (on a par with the busiest sections of the London Underground network today and busier than current surface rail links), while the Piccadilly Line will also be reaching the limits of its capacity as it approaches central London.” [8.22]</p>	<p>There is a serious demand challenge – without expansion – on the key lines linking the airport with central London.</p>	<p>The Commission recognises that Government has to take action to deal with the congested network, albeit to a great extent due to background growth. But, regardless of how it is paid for, it is clear that expansion could not proceed at Heathrow unless the surface access capacity gap was addressed. It does the raise the question of the merits of subjecting one of the most congested areas of the transport network to such an uplift in demand.</p>
<b>Surface access: achieving mode shift</b>	<p>“If employees are exempt from paying a charge and no reduction in employee car demand is achieved from the core 2030 scenario, a £40 charge covering all passenger vehicles including taxis would need to be applied to reduce 2030 AM peak hour traffic generation with a North West Runway in place to 2013 levels. If a 20% reduction in employee car demand can be achieved from the core scenario, a £20 charge covering all vehicle trips would be required.” [4.1.3, Surface Access: Demand Management Study, Jacobs for AC, May 2015]</p>	<p>To hold road traffic at current levels would require applying a £20 or £40 access charge to all passenger vehicles, dependent on whether sufficient reduction in employee numbers was achieved.</p>	<p>The scale of intervention required to achieve no increase in car trips is unprecedented and will be very challenging to deliver.</p>

Area	What the Commission and its consultants said [AC]	What this means	What can be inferred
Surface access: added pressure on rail	<p>“Any significant transfer from car to rail as a result of demand management measures including congestion charging would increase demand on sections of the rail network that are already forecast to be congested in 2030.”</p> <p><i>[4.2.13, Surface Access: Demand Management Study, Jacobs for AC, May 2015]</i></p>		<p>If an airport surface access proposition is successful in achieving no increase in airport car trips, it would place even greater strain on already public transport congested networks.</p> <p>The Commission proposals for new rail infrastructure fall woefully short, if this level of demand is to be met.</p>
Economy	<p>While the content of the model itself has been well-tested, the same cannot be said of the front end... Furthermore the interpretation of the result...is an issue. Overall, therefore, we counsel caution in attaching significant weight either to the absolute or relative results of the GDP/GVA S-CGE approach within the Economic Case.”</p> <p><i>[Conclusion, Airports Commission expert advisor note: Economic Case, May 2015]</i></p>		<p>The Airports Commission’s own economic peer review experts have cast serious doubt on several aspects of the analysis of the economic benefits – including the headline £147bn figure.</p>

# Appendix B: Noise modelling assumptions

Area	Year	Runways	Fleet mix %			Arrival glide slope	Navigation performance	Departure flight routings	Arrival flight routings	Threshold
			C	I	F					
Two-runway Heathrow										
Current	2011	2	100	–	–	3.0°	Current	Current	Current	Current
Future Baseline <span>[AC]</span>	2050	2	8	11	80	3.0°	Current	Based on Current	Based on Current	Current
Alternative Future Baseline [TfL]	2050	2	8	11	80	3.2°	PBN	Optimised	Optimised	Displaced
Three-runway Heathrow										
Respite <span>[AC]</span>	2050	3	10	10	80	3.2°	PBN	Optimised	Optimised	Displaced
Minimise Total <span>[AC]</span>	2050	3	10	10	80	3.2°	PBN	Optimised	Optimised	Displaced
Minimise Newly Affected <span>[AC]</span>	2050	3	10	10	80	3.2°	PBN	Optimised	Optimised	Displaced
Three-runway [TfL]	2050	3	23	58	20	3.0°	PBN	Based on Current	Based on Current	Displaced

## Fleet Mix

This is split between different technologies: C Current, I Imminent, F Future. Each has a different noise profile, with Current the loudest and Future the quietest.

## Arrival glide slope

A steeper glide slope allows aircraft to increase the height at which residential areas are overflown and so reduce noise impacts.

## Navigation performance

PBN (Performance-based navigation) takes advantage of precision navigation (“RNAV”) to fly more accurate routes. Typically this concentrates noise on a smaller number of people than current technology, where aircraft are randomly dispersed over a wider corridor.

## Departure/Arrival flight routings

For the three Commission scenarios, multiple iterations were undertaken by Heathrow Airport to optimise the flight routings with a particular objective in mind (achieving

‘respite’, minimising total numbers affected, minimising numbers newly affected). TfL’s Alternative Future Baseline has been optimised to minimise total numbers affected.

## Threshold

Displaced thresholds can be used when aircraft do not require the full runway length to allow them to land part of the way along the runway. Like increasing the arrival glide slope, this increases the height at which residential areas are overflown and so reduces noise impacts.

What primarily distinguishes the Airports Commission expansion scenarios from that put forward by TfL is the extensive use of flight routing optimisation, as well as the more optimistic fleet mix assumptions.

All the modelling was undertaken by the CAA Environmental Research and Consultancy Department using assumptions provided by a) Heathrow Airport and the Airports Commission and b) Transport for London (TfL) on behalf of the Mayor of London. For more information about the modelling commissioned by TfL, please visit [www.tfl.gov.uk/aviation](http://www.tfl.gov.uk/aviation).

# Appendix C: New hub airport Q&A

## How does a new hub airport square with climate change objectives?

It is important that aviation plays its full and fair part in addressing its carbon impacts. These are inherently cross-border and best tackled on a cross-border basis. In the absence of a global agreement, incorporation of aviation into the EU Emissions Trading Scheme (ETS) has been a positive step.

As a market-based measure, the ETS is deemed to be the most cost-effective and environmentally beneficial option for controlling aviation emissions. By contrast, constraining capacity to limit emissions is a blunt tool, of limited effect and potentially with perverse results.

Heathrow's severe capacity constraints result in increased taxiing on the ground and stacking in the air (and this will largely continue at a three-runway Heathrow). Both contribute to increased carbon emissions. By contrast, a new

four-runway hub would have sufficient spare capacity to operate more efficiently, minimising taxiing and stacking of aircraft. Moreover, being constructed from scratch, a new hub airport would be able to incorporate state-of-the-art energy efficiency technologies and other carbon-sensitive measures in its design (for example infrastructure to support use of biofuels).

Were no new hub capacity to be provided, it would likely entail more London passengers having to change planes to reach their final destination. Forcing a passenger flying from London to Osaka to connect in Amsterdam – rather than fly direct – would not be a better result for carbon emissions.

In terms of meeting the UK carbon cap, this is a question of the optimal distribution of flights across the UK and one which, with capacity restrictions at the hub eased, the market would be best placed to address.

## How does an Estuary airport deal with the birds issue?

There are a number of designated sites within the vicinity of the proposed Inner Thames Estuary airport and these would be re-provided through compensatory habitat. Although the scale of compensatory habitats would be substantial, there is no reason to believe that the appropriate habitat compensation could not be delivered. There may also be opportunities to integrate new habitats with wider long-term management schemes within the estuary, such as the Environment Agency's TE2100 Plan.

The issue of bird strike has also been raised. This is an issue, to varying degrees, for all airport locations. A number of major international airports operate within coastal and estuary locations around the world. Although the new four runway hub's estuary location could slightly increase the potential

risk of bird strikes, airports around the world show how the risk can be managed effectively.

## Is an Estuary site more prone to fog?

Work previously done by the Airports Commission confirmed that the Inner Thames Estuary does not experience significantly worse visibility conditions than Heathrow or Gatwick.

Nonetheless, in the event of visibility affecting London's airports, a four-runway hub at the Estuary or Stansted would have the resilience and operational flexibility to avoid severe flight disruption and cancellations in contrast to a three-runway Heathrow.





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