



Taking Britain further

Heathrow's plan for connecting the UK to growth

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Foreword



Heathrow today is one of the biggest and, according to passengers, one of the best airports in the world. Over the last ten years we have used over £11 billion of private investment to transform Heathrow into a national asset of which Britain can be proud.

For 350 years the world's largest port or international airport has been in Britain. Today, that source of competitive advantage is being gradually eroded. The Airports Commission process is the last and best chance for Britain to take action to maintain its global connections before it is too late.

The UK is in a global competition for trade, jobs and economic growth. Direct flights support the economic growth that Britain needs. They support exports to fast-growing markets, make the UK a more attractive location for business, and bring tourists to our shores.

Connections to long-haul markets are important to Britain's competitiveness. The fastest growing markets of the next 50 years will be in Asia, Latin America and North America while traditional markets in Europe face a slower growth future.

That is why our competitors are investing in their airports, and in one type of airport in particular – the hub. Hub airports are the only airports that support frequent and direct long-haul flights. By combining transfer passengers, direct passengers and freight they are able to fill long-haul aircraft and serve destinations that cannot be served by airports which rely on local demand alone.

This is why Heathrow, as the UK's only hub, accounts for only around 20% of the flights from the UK but nearly 80% of long-haul flights. Having a successful hub airport is uniquely important for reaching the markets that are critical to Britain's economic future.

There are only six airports in the world that have more than 50 long-haul routes. Heathrow is one of them. But while Britain has good air connections today, it has not invested in the capacity it needs for the future. For 50 years the debate about new runways has been beset by delay, prevarication and indecision. Now, our hub airport is running at 98% capacity and growth can't wait.

In 2010, Heathrow received a very clear message from all three major party leaders – "We reject your plans for a third runway". We accepted this and stopped work on our proposals. The economic case for Britain was strong, but we had not developed a good enough solution on aircraft noise, compensation or environmental impacts. The establishment of the Airports Commission put the issue of airport capacity back on the political agenda. But we have been clear that any option needed to be significantly different from what was previously rejected.

We have listened to people - local residents, local businesses, national businesses, local politicians, MPs around the country, airlines, our employees - about what was wrong with our previous plans and what they would want to see in any revised proposal.



We called our submission to the Airports Commission last July “A New Approach”. It was a very consciously chosen title. Compared to the 2007 proposal, our new plans deliver greater benefits with fewer impacts. They will generate more jobs, have more capacity for freight exports, and link every region of the UK to growth while seeing fewer people affected by noise, fewer homes demolished, and providing new green space for local residents. We will continue to listen to those with an interest in our plans.

Britain faces a choice. Heathrow is one of the world’s most successful hub airports. We can decide to build on this strength. Or we can start again from scratch with a new hub or gamble on uncertain alternative airport models. Building on our existing strength at Heathrow will connect the whole of the UK to growth, keep Britain as an ambitious global nation and help the UK win the global race. Starting from scratch will see the UK fall behind.

Only Heathrow will connect every part of Britain to every part of the world.

Heathrow will take British people and businesses farther with the long-haul routes it provides that no other UK airport can.

Heathrow will also take Britain further by supporting the trade, inbound tourism and investment that will deliver the jobs and economic growth we need.

Now more than ever Britain needs to be connected. Instead, with each passing year we are cutting ourselves off from jobs and growth.

It’s time to have the vision and the courage to connect Britain to the growth it needs.

It’s time for a third runway at Heathrow.

John Holland-Kaye, CEO Designate

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**Executive
summary**

International



Executive summary

Taking Britain further – Only Heathrow will connect the whole of the UK to growth.

The UK is engaged in a global race for jobs and economic growth. As an island trading nation, for us growth has always meant trading with the world. As the global economy changes, trade will increase with nations further afield. Connections to the great centres of the world economy are essential to support trade with our markets. Long haul connections are even more critical. A successful hub airport is uniquely valuable because it is the most certain way to deliver the connectivity we need to compete. Heathrow embraces competition, including expanding point-to-point airports elsewhere in the UK. Yet the UK urgently needs capacity at its hub airport to win the global race.

We already have a successful hub airport. As the most efficient two-runway airport with world-beating terminals, Heathrow is a national asset of which we can be proud. Building on Heathrow's strength, the UK can compete with its rivals to win the race for connectivity. Heathrow is in the right place to take Britain further - by road, rail or air. A globally competitive hub can be built quickly with private investment. We have developed our plans to reflect our commitment to deliver expansion sustainably and fairly. We will continue to listen to improve our plans further.

The UK must act now to secure its global hub status. Alternatives risk the UK losing its long held position at the centre of world connectivity. Heathrow's proposal is the credible, deliverable option to ensure the UK's connectivity to the world. Ours is a £15.6 billion private investment that provides new capacity by 2025. We will create 123,000 new jobs, £100 billion in value for the UK and connect the UK to 40 new destinations by the 2030s. At the same time we will reduce aircraft noise by 30% compared to today, delivering the lowest noise levels since the 1960s. The idea has support with 48% of local people backing Heathrow expansion against 34% who oppose.

The growth at Heathrow will benefit the whole country. It is time to make a positive decision for all of Britain. Only Heathrow can take the whole of the UK further.

Connecting for growth

The international economy is changing. While emerging markets such as Brazil, Russia, India and China are rapidly expanding, traditional markets in Europe are facing a future of slower growth.

In the decades ahead, McKinsey forecasts that the distribution of upper and middle-income households will shift towards emerging economies. Europe and North America will fall from 66% of such households in 2011 to only 43% in 2030. Only 13% of world GDP will be in western Europe, down from 19% as recently as 2010. The UK is in a global race to improve its links with these emerging economies in particular. We need to stay in that race for connectivity to win the trade, jobs and future economic growth that will otherwise go to international competitors.

Yet Britain's competitive position is under threat at this pivotal moment. As an island trading nation, connectivity has been central to the UK's global trading position. For more than 350 years London has been the world's busiest international port or airport. Now Dubai is overtaking Heathrow as the world's No. 1 airport in terms of international passengers.


“Now more than ever the UK needs to maintain its hub status as the balance of world economy shifts”

Our rivals are seeking precisely the benefits of international connectivity from which we have benefited. They are investing heavily in air connectivity, particularly long haul connections, as a key to competing in the global race for jobs and economic growth.

Our global hub at Heathrow is under threat, running at 98% capacity. Hub airports at Paris, Frankfurt and Amsterdam, not to mention the Middle East, have spare capacity. They are adding new flights to growth markets like China. Britain has not invested in the runways it needs for the future. The debate about new runway capacity in the UK has been beset by delay and prevarication. Taking Britain further is now more essential than ever. The need for hub capacity is urgent if the UK is to maintain its status as the balance of the world economy shifts.



“Hub airports are different. They pool demand to make frequent long haul flights possible”



16:50	Copenhagen	AC9447	E
17:00	Dubai	EK030	C
17:00	Tehran	IR710	E
17:05	Amman	RJ112	D
17:15	Hong Kong	VS238	A
17:15	La Coruña	VY9851	F
17:30	Oslo	BD3790	E



Why direct is best

Direct air connections support economic growth. UK businesses trade 20 times more with emerging markets that have direct daily flights than with those with less frequent or no direct services. Where there is no daily flight from Heathrow, the rate of growth in UK trade is substantially lower. These effects come from the flow of people and air freight that is fostered by a direct connection.

The strong correlation between the amount of trade and the volume of direct flights does not only exist in the UK. It is evident in competitor countries such as Germany, France and Holland too. Many nations or leading cities around the world from Asia, the Middle East and North America to our European counterparts explicitly place improved connectivity at the core of their economic strategies. They back this strategy by investing in competitive hub airports. Increased international direct connectivity through a hub airport is vital for supporting increased trade and economic growth. Conversely, a lack of connectivity could choke trade that would otherwise develop.

Retaining one of the world's best connected hub airports in the UK is therefore vital to support economic growth and maintain the UK's position as a world economic power.

“For more than 350 years London has been the world's busiest international port or airport”

Fortunately the UK has a strong starting point. London is one of the world's leading cities and has all the attributes needed to win the global race for direct connectivity. These include:

- A strong local base of demand focused on a large, productive, affluent, metropolitan area. There is also the relative strength of London's services sector with its high propensity to travel.
- Scale and productivity that position London as the economic capital of Europe, making us a natural European hub. With a Gross Metropolitan Product (GMP) of €390 billion, London is placed well ahead of Paris (€190 billion) and Amsterdam (€70 billion)
- A sophisticated aviation market that means London and the South East is the world's largest direct, long-haul aviation market. It has also long been amongst the most competitive and innovative. Heathrow is at the end of six of the world's ten busiest intercontinental routes. The UK is the home base of a number of the world's leading airlines, including major network carriers. At Heathrow, we benefit from the competition of 83 global airlines, one of the largest ranges of any airport in the world.
- The UK is in a good geographical location for direct links including to Asia, as well as Europe-Americas traffic flows. Heathrow is within a 12 hour flight of 96% of the world's household disposable income compared to just 63% from Dubai. It is about 40% further to fly from London to Beijing via Dubai than it is to fly direct. Minimising flight distance also has implications for travel times, air fares and emissions.

Connecting for growth

The unique value of a hub

Hub airports are different. They are proven the world over as the most effective way to deliver economic connectivity, particularly long haul connectivity. They do this well because the airlines that operate at a hub pool the demand for passengers and freight from multiple destinations to make frequent long haul routes viable.

As the UK's only hub airport, Heathrow is one of only six airports in the world serving more than 50 long-haul destinations. 120 of the UK's top 300 companies are located within 15 miles of Heathrow. The Thames Valley has 60% more international businesses than the national UK average. It is no coincidence that these companies and business clusters choose to locate close to the country's hub airport. Passengers can fly direct to 75 destinations worldwide from Heathrow that are not served by any other airport in the UK.

Building the right type of capacity is critically important. Hub and point-to-point airports do different things; hubs serve long-haul business destinations and point-to-point airports serve short-haul and leisure destinations.

The urgent need is for hub capacity. Heathrow is full today. Britain is losing routes to other hubs in Europe and beyond. We could see £50 billion (in present value terms) lost from Gross Domestic Product (GDP) because of missed trade and foreign direct investment (FDI) through a lack of connections. Meanwhile there is spare capacity at point-to-point airports in the UK and London like Gatwick, Stansted and Luton until 2040.

Heathrow needs an additional runway as soon as possible to compete internationally to take Britain further.

Heathrow is not opposed to adding point-to-point capacity elsewhere in the London system. We welcome competition. Other airports can and should be able to flourish alongside a successful Heathrow. However this should not be at the expense of critical hub capacity.

Alternative aviation business models are often proposed. While it is possible that they will play a part in the industry over time, their success is uncertain. Betting the UK's hub status on unproven or previously attempted and failed models is a risky gamble. History has demonstrated – both in the UK and overseas – that splitting hubs does not work as well as a single hub. It halves the pool of transfer passengers, reducing viable connections. The evidence shows that there is no city in the world where a dual hub model successfully operates. In the last 40 years it has been suggested several times that new aircraft technology will mean the end of the hub model. In each case so far the new aircraft have reinforced the hub model or been used for seasonal tourist traffic. Current network airline order books suggest the B787 and A350 will be similar. We cannot categorically predict the evolution of a dynamic industry like aviation. The question for the UK is - what is the most robust choice given all the potential scenarios?



“Our overseas competitors are investing billions of pounds in expanding their hubs”



Competitor countries have already realised the value of hub airports. They are investing billions of pounds in expanding their hubs:

- **Schipol, Amsterdam** – sixth runway opened in 2003
- **Madrid Barajas** – two new runways opened in 2006
- **Al Maktoum Airport, Dubai** – new airport opened in 2010 with five runways
- **Frankfurt** – a fourth runway opened in 2011
- **Istanbul** – construction of a new hub airport commenced in 2013 with plans for 6 runways.

Further afield leading cities such as Hong Kong, Chicago, Singapore, Atlanta and Seoul are doing the same.

Without additional capacity, Heathrow will continue to slip out of the ‘Premier League’ of international hub airports. Our European competitors continue to add the capacity necessary to connect to emerging markets. All four of Heathrow’s competitor European hub airports — Paris, Frankfurt, Madrid and Amsterdam — have enough runway capacity to serve around 700,000 flights per year each. Heathrow is capped at 480,000 flights. All four of our major European competitors are adding destinations to emerging markets that the UK cannot because Heathrow is full. Ironically they are often doing so on the back of the UK market. Our regional airports are now better connected to our European competitors than to Heathrow because of the capacity constraints at the UK’s hub.



This matters to people right across Britain because we are making competitor countries a more attractive location for business rather than attracting investment to the UK. The use of overseas hubs by UK passengers decreases the UK’s direct connectivity to the world. By “off-shoring” this connectivity, the UK misses out on economic benefits. There is a two-way relationship between connectivity and trade. Countries and cities with better connected inter-continental hubs have higher levels of trade, foreign investment, tourism and consequently economic contribution and employment. Passengers are paying for airport infrastructure through the aeronautical charge levied on each air fare. Flying via a British hub ensures that British money is spent on expanding British infrastructure rather than expanding foreign infrastructure.

The UK can build on its existing strength by supporting its hub airport. The debate needs to be about where is best placed to represent Britain in competition with France, Germany, Holland, Turkey and the Gulf. Heathrow has the scale and business model to compete. Britain already has one of the world’s most successful hub airports. We have invested £11 billion in transforming Heathrow into one of the world’s best airports, offering unequalled surface access, some of the world’s safest and most efficient runways and world-class terminals. It is a national asset of which the UK can be proud. Heathrow is better located for the UK economy, multiplying the benefits of hub connectivity from business travel, freight and tourism. Heathrow is best placed to represent Britain in the race for jobs and growth to take Britain further.

Connecting for growth

Better for passengers, the UK economy and local jobs

Heathrow is the best option for passengers. An expanded Heathrow will deliver more flights to long-haul destinations from a greater choice of airlines. 40 new destinations will be added by 2030. Direct regional links from across the UK to the hub will be restored. Expansion will lead to fares £300/passenger lower by 2030 than at a constrained two runway airport. With growth we will be able to complete the transformation of the airport so all passengers benefit from modern facilities. Heathrow will see a step change in its excellent road, rail, bus and coach links. Located to the west of London near the centre of UK population, it will be more accessible to home for most passengers from the rest of the UK.

Heathrow is the best option for British business. Adding capacity at Heathrow will connect the UK more quickly to emerging markets and boost the UK economy. Network airlines are already established at Heathrow and want to further expand their operations here. The catalytic effect of trade will create jobs that boost the local and national economy.

We estimate benefits of £100 billion present value to the UK from Heathrow expansion. Growth at the hub will improve public finances from more tax revenue. It will attract more inward investment. Heathrow is already the UK's largest 'port' by value, with freight carried in the hold of passenger aircraft at the airport accounting for over a quarter of all trade. Expansion will double our air cargo capacity. Heathrow uniquely runs a 'trade surplus' in goods and services. Expansion will help rebalance the economy. Expanding Heathrow is the best option for the national economy.

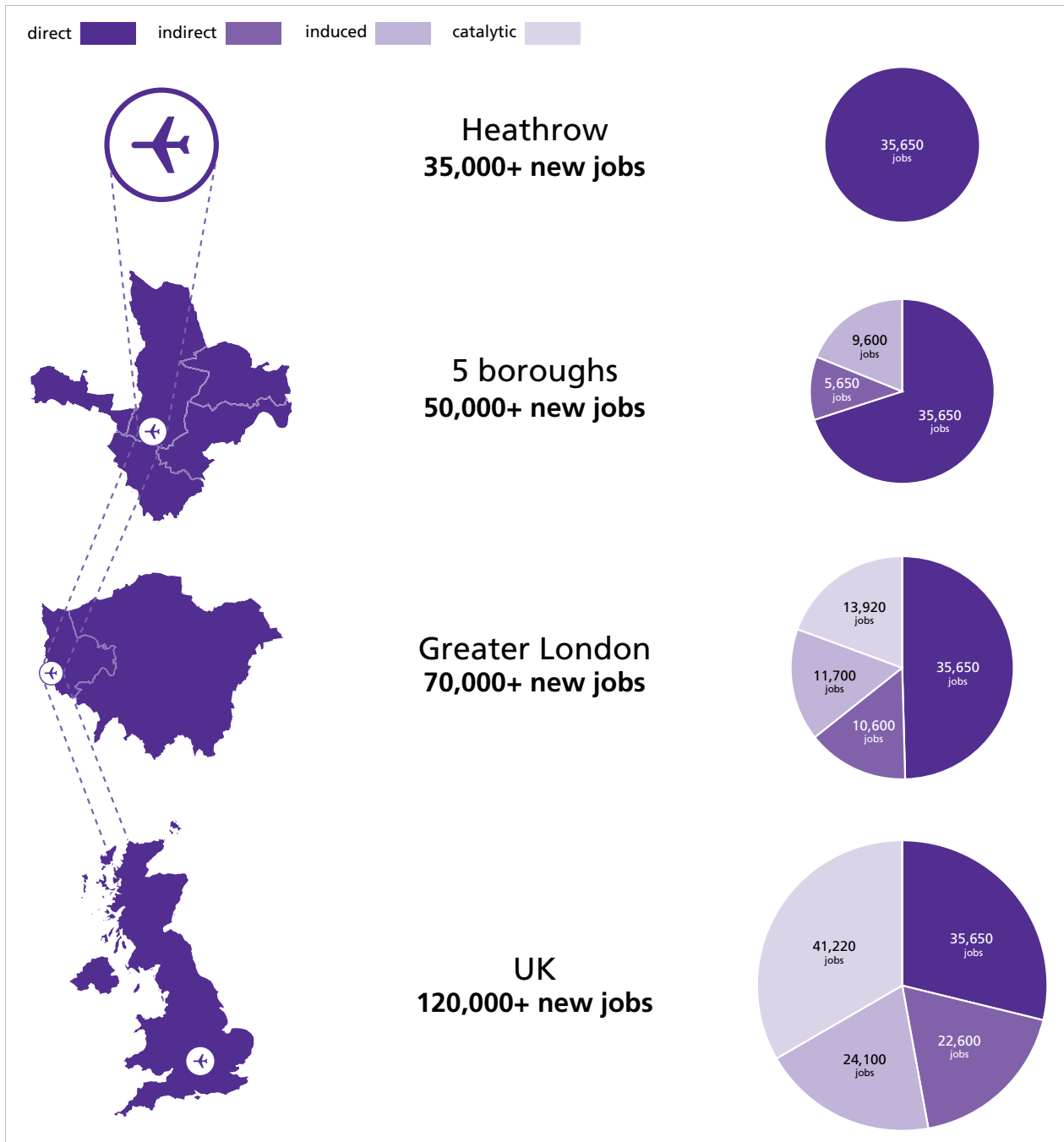
Expanding Heathrow is the quickest way to deliver the greatest socio-economic benefits. We have direct access to a large and flexible labour market. Expansion will protect the existing 114,000 jobs that depend on Heathrow. As importantly it will create 123,000 new jobs. Our location will enable these jobs to be created in existing communities, putting no further pressure on local housing or infrastructure. These jobs will be where they are needed, where people live and where many are unemployed today. Heathrow is the best option for British jobs.



“Expanding Heathrow will boost the UK economy and create 123,000 new jobs”



Figure A Growth at Heathrow – 2040 employment projections



Listening to what our stakeholders say

We have shared our proposals widely. We are clear that any proposal needed to be significantly different from what was previously rejected in 2010. We have listened to people – local residents, the wider public, businesses, passengers, airport users, statutory consultees and elected representatives – about what they would want to see in any revised proposal.

We launched a six week public consultation shortly after publication of the Airports Commission's interim report. This allowed us to reflect the public's views in our refreshed scheme. 13,479 responses were submitted and over a thousand residents attended a series of 15 public exhibitions.

We have improved our plans in response to the feedback. We have located the runway further south than proposed in July 2013. This reduces noise impacts, keeps periods of when residents will not be overflown and protects more homes and important heritage sites in local areas. The number of people affected by significant noise is at least 12,000 lower compared to our submission last July. The number of properties requiring compulsory purchase has fallen by 200. The revised scheme also avoids redeveloping the M4/M25 junction.

We have talked to businesses and others such as the CBI, IoD, Chambers of Commerce and Local Enterprise Partnerships across the UK. They told us to place more emphasis on freight for importers and exporters. They also reinforced the need to focus on connectivity to the UK nations and regions. We have reflected these priorities in our plans for cargo, surface and air access and our proposals for a Regional Connectivity Taskforce.

We have reflected the priorities of passengers and airlines in our plan. We undertake extensive research into what makes a great airport for passengers.



We have adapted our design to focus on simpler, more reliable journeys for both direct and transfer passengers. We have built upon many years of work to understand airline needs in developing the airport layout and facilities. We have also begun more intensive engagement with airlines and other users on the details of the proposed airport. We are keen to work further with them to deliver additional capacity at a commercially competitive price.

We have also begun conversations with statutory bodies. These have started to shape both our design and mitigation options in areas such as road layout, flood relief and the impact on historic buildings. We have held face to face meetings with elected representatives and attended Conservative, Labour, Liberal Democrat, SNP, Plaid Cymru and UKIP party conferences. These have shaped our plans in terms of jobs and growth, noise and compensation and regional connectivity.

We are committed to further consultation. We believe it is important to listen and understand our stakeholders' priorities and then propose a way forward at each stage. We look forward to receiving further feedback on our refreshed design. We will start by working with local people to consult on proposals for noise and blight in the summer of 2014. If our proposals are supported in 2015 there will be further opportunities in the National Policy Statement (NPS) and planning process to work with all interested parties to improve our plans further.

“We will continue to listen to people in our local area and across the UK. Our plans have improved in response to what we have heard”



A New Approach

In 2010, all three major political parties rejected plans for a third runway. Since then we have listened to stakeholders - to local residents, to local politicians, to businesses and to MPs around the country - about what was wrong with our previous plans and what they would want to see revised. We have been clear from the beginning that what we submitted to the Airports Commission needs to be significantly different from what was previously rejected.

That is why we have taken a new approach – including on runway location, aircraft noise, public transport connections and jobs. Today 48% of local people support Heathrow expansion compared to 34% who are opposed. We continue to listen and modify our proposals. Since our submission to the Airports Commission in July 2013, we have built on the commitments we made then, based on feedback from our local community and stakeholders. We have strengthened our commitment on lessening noise impacts and also included one specifically for freight.

Figure B Our ten commitments

	Our commitments	Our approach
1	Connect Britain to economic growth	by enabling airlines to add new long-haul flights to fast-growing markets
2	Connect UK nations and regions to global markets	by working with airlines and Government to deliver better air and rail links between UK regions and Heathrow
3	Protect more than 100,000 existing local jobs and create more than 100,000 new jobs nationwide	by developing our local employment, apprenticeships and skills programmes and supporting a supply chain throughout the UK, including during construction
4	Connect exporters to global markets	by doubling Heathrow's freight handling capacity
5	Build more quickly and at lower cost for taxpayers than building a new airport	by building on the strength the UK already has at Heathrow
6	Reduce aircraft noise and lessen noise impacts for people under flight paths	by encouraging the world's quietest aircraft to use Heathrow, routing aircraft higher over London, delivering periods with no aircraft overhead and allocating £250m to provide noise insulation
7	Treat those most affected by a third runway fairly	by proposing compensation of 25% above market value, all legal fees, and stamp duty costs for a new home for anyone whose home needs to be purchased
8	Increase the proportion of passengers using public transport to access Heathrow to more than 50%	by supporting new rail, bus and coach schemes to improve public transport to Heathrow and considering the case for a congestion charge
9	Keep CO₂ emissions within UK climate change targets and play our part in staying within local air quality limits	by incentivising cleaner aircraft, supporting global carbon trading, and increasing public transport use
10	Reduce delays and disruption	by eliminating the routine use of aircraft stacks and further improving Heathrow's resilience to weather and unforeseen events

Our vision for a world-class hub airport

Heathrow should be a world class transport hub for the UK. Our masterplan will deliver a globally competitive hub airport in terms of passenger experience, resilience and reliability, transfer journeys, surface connections, cargo and commercial facilities.

With 740,000 air traffic movements (ATMs) and facilities to handle any type of aircraft, 130 million passengers and 3 million tonnes of cargo through all the critical operating periods of the day we will be competitive with the world's leading hubs for decades to come. We have built in the flexibility for future options as well. Our vision also minimises local impacts in its design, while creating the opportunity for new green spaces and better flood protection.

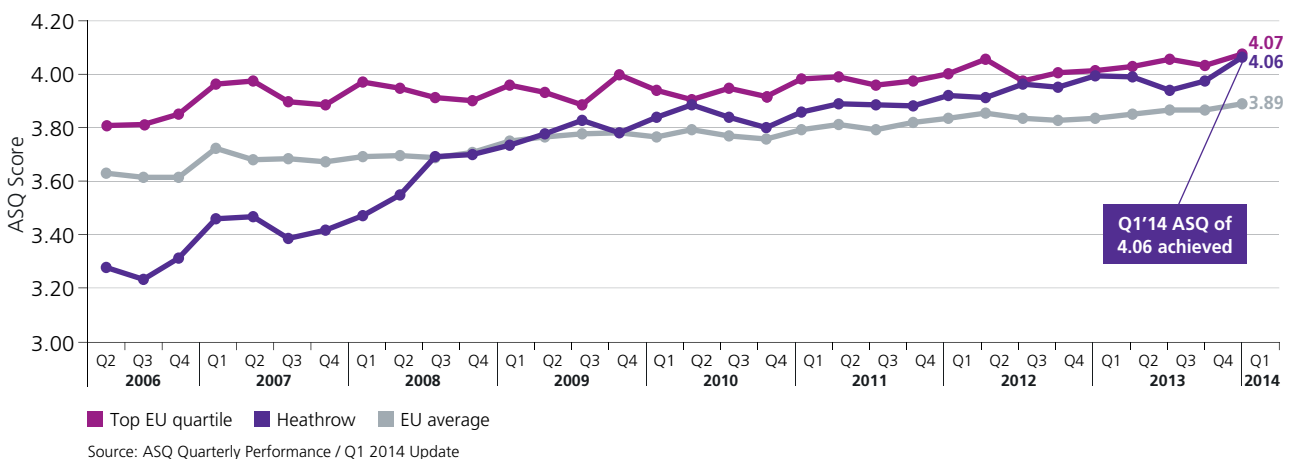
Heathrow is building on world class facilities. We have invested over £11 billion in new terminals, systems and infrastructure in the last decade. Today over 80% of our passengers rate Heathrow as 'Very good' or 'Excellent', among the highest in Europe. Terminal 5 has been voted the world's 'Best Airport Terminal' for a third year in a row. Heathrow is now rated by passengers one of the top 10 airports in the world.

Construction of Terminal 5 was the first step towards rebuilding Heathrow for the 21st century. We are increasing operational efficiency by moving to a more efficient 'toast rack' layout. In June we will open our new Terminal 2 following a £2.5 billion investment. 60% of our passengers will travel through new terminals by the end of 2014, with Terminals 3 and 4 already extensively refurbished. New airfield and baggage systems are improving reliability and punctuality at Heathrow too. With these investments we expect journeys to keep getting better for passengers.

Transforming the airport

Yet we are only halfway through Heathrow's transformation process. Our vision for an expanded Heathrow is to continue to transform the airport into one integrated airport campus offering passengers a quicker, smoother experience. The new Heathrow will be safer, more reliable and resilient. During the next five years we will develop an Airport Operations Control Centre consolidating operators across the airport to smooth the flow of aircraft, passengers and bags, cutting delays from beyond UK airspace right through to the baggage hall. Adding a third runway will improve the airport's ability to respond to adverse

Figure C Increase in passenger experience compared to best in Europe



“Our plans will create a seamless passenger experience to compete with the best hub airports in the world”



weather or unforeseen events. We have also improved resilience in other ways, for example by proposing an additional access road to the central terminal area. Critical safety zones will come entirely within the airport boundary thanks to runway thresholds inset by 700 metres. Runway crossings and time spent taxiing will fall. We can eliminate routine ‘stacking’ of aircraft in the air over London.

Our single integrated campus will complete the ‘toast rack’ terminals configuration. A complex of terminals will simplify into two main ‘front doors’ in the west and the east. These two terminal complexes and all satellite buildings will be connected by one integrated underground passenger and baggage system. Passengers will have one simple journey to any gate. The layout will give us the flexibility to co-locate airlines and alliances, simplifying connections for passengers and cargo as well as airline operations. Connection times will compare with the best in Europe at no more than 60 minutes for the very longest transfer.

“Heathrow is now rated by passengers as one of the top ten airports in the world”

A transport hub

Our plans will bring together rail, bus and coach services to form the UK’s only fully integrated transport hub. Changing to surface transport at Heathrow will take five minutes from the platform or kerb to the terminal door. New public transport interchanges will combine all modes of transport with easy access to both the M25 and M4. Our plans will increase capacity on the M25. The busiest bus and coach station in Britain will be served by more local and national services. By 2019, Heathrow will be connected to London by Heathrow Express, Piccadilly Line and Crossrail. By 2021, Western Rail Access will provide fast direct services to the Thames Valley and reduce journey times to the West and South Wales. Southern Rail Access will connect Heathrow to Waterloo and improve connections to key catchments in South London, Surrey, Hampshire and the South Coast. By 2026 the new HS2 rail line will provide fast access to Heathrow from the Midlands and the North, bringing over 70% of the UK within three hours of the terminal door. Over half of people travelling to the airport come on public transport. Our plans will place Heathrow, West London and the Thames Valley at the heart of the UK transport network.



Our vision for a world-class hub airport

Making the most of an opportunity

A development of this scale offers further opportunities beyond more passengers travelling through. Our plan is designed to allow local and regional businesses to flourish. Our planned redevelopment of Heathrow's airfield allows for the complete overhaul of our cargo facilities so that they can handle 3 million tonnes. This is twice the capacity they are today, comparable to Dubai or Frankfurt, and more than 100 times the size of Gatwick's facility. This will create modern climate controlled cargo environments, improved transit facilities, and dedicated freight transit points. Faster, more efficient cargo services via a hub will improve the UK's export competitiveness and maximise economic benefits.

Our plans safeguard land for commercial developments such as office or hotel facilities. These commercial areas can provide prime locations for commercial premises that will be lost as a result of a third runway – such as British Airway's Waterside offices. Alternatively the space could be suitable for companies that place a

high value on mobility – such as professional services firms – or for hotels and conference facilities for international visitors.

Our plans would increase the amount of publicly accessible green space around the airport. We have thought about how best to mitigate the effects of the development on local rivers and flood protection. We have produced a plan to enhance the quality of rivers, biodiversity and landscape in an enhanced Colne Valley. Our measures will protect people and properties against flooding, offering the potential for an improved situation compared to today, particularly for the residents of Colnbrook and Poyle. We will also create new green corridors that link together existing outdoor recreation areas such as those in the existing Colne Valley Regional Park. Other flood prevention measures will be introduced to give better flood protection than today for local communities in the Colne Valley.

Figure D Enhancing the biodiversity and landscape of Colne Valley



“Our plans would provide enough runway, terminal and cargo capacity for Britain’s hub to compete on an equal footing”



A winning proposal that looks to the future to win for Britain

The 740,000 flights that a third runway would deliver will allow Heathrow to compete effectively with other European hubs. Paris, Frankfurt and Amsterdam currently have capacity for around 700,000 flights a year. It will also give Heathrow similar capacity to the very biggest global hubs such as Atlanta, Beijing and Dubai. Our route network would reach 90% of country GDP and most of the world’s main centres with direct flights. Our fully developed masterplan could process over 130 million passengers per annum, again at a globally competitive scale.

Britain’s hub would have enough runway, terminal and cargo capacity to compete on an equal footing. We would be offering better passenger terminals, better surface access and a better transfer experience. Our plans would allow Heathrow to win the global race for connectivity by taking Britain further.

Our proposal provides sufficient hub capacity until at least the 2040s. Beyond this it is impossible to accurately predict demand. We have therefore designed our proposals so that a fourth runway could be added if it were ever needed. Terminal and cargo space have also been safeguarded to allow future development if required.



Connecting all of the UK

Heathrow is already the UK's best connected transport hub. Only Heathrow can deliver the benefits of global connectivity to the whole of the UK. It has a world leading dedicated non-stop express airport rail link in Heathrow Express, a direct connection to the London Underground and the UK's largest bus and coach station.

It is also the best connected airport to the strategic road network, with the M25, M4, M40 and M3 motorways all within close proximity. 20% of the UK's population live within 60 minutes of Heathrow. Expansion will build on that strength. Rail access will get better. As a result, along with new air links, all of the UK will have access to Heathrow's global connectivity. Improved transport access will also be critical to managing local impacts sustainably. Our plan puts Heathrow at the heart of the UK transport network.

Heathrow will take Britain further by connecting UK regions to global markets. HS2, Western Rail Access and Southern Rail Access will make Heathrow more convenient for passengers to the North, South and West. Journey times will be transformed.



“Heathrow’s rail capacity will increase from 18 to 44 trains per hour”

“Our plan puts Heathrow at the heart of UK transport”

Direct flights to Heathrow from regions and nations across the UK will become possible again. We propose establishing a Regional Connectivity Taskforce led by regional business to work with the aviation industry to develop these links. We can make regions throughout the UK more attractive locations for international business. Our ambition is to bring more than 70% of the UK population to within 3 hours travel of Heathrow.

Better public transport

Major new public transport schemes are already committed for Heathrow. Crossrail (2019), Western Rail Access (2021) and High Speed Rail Phase 1 (2026) will make it easier for people to travel to or from Heathrow. Southern Rail Access will ensure Heathrow is served by rail from all points of the compass. Heathrow's rail capacity will increase from 18 to 40 trains per hour and seat capacity will more than treble from 5,000 to 15,000 seats per hour. No other UK airport will be able to boast this level of rail connectivity. The coach network will expand beyond the current 540,000 per annum and we will provide better integrated bus and coach stations.

Five different railways, four different motorways, and the UK's largest bus and coach station will ensure unparalleled transport resilience and choice for passengers travelling to Heathrow compared to other UK airports.

Travellers will be able to switch between train, coach, car and plane quickly at Heathrow's new interchange in one consolidated location. 35 million passengers a year will use public transport in 2030. This will rise 55% in 2040. Over 50% of our passengers will use public transport in 2030, rising to over 55% in 2040.



Figure E Heathrow West – an integrated transport interchange

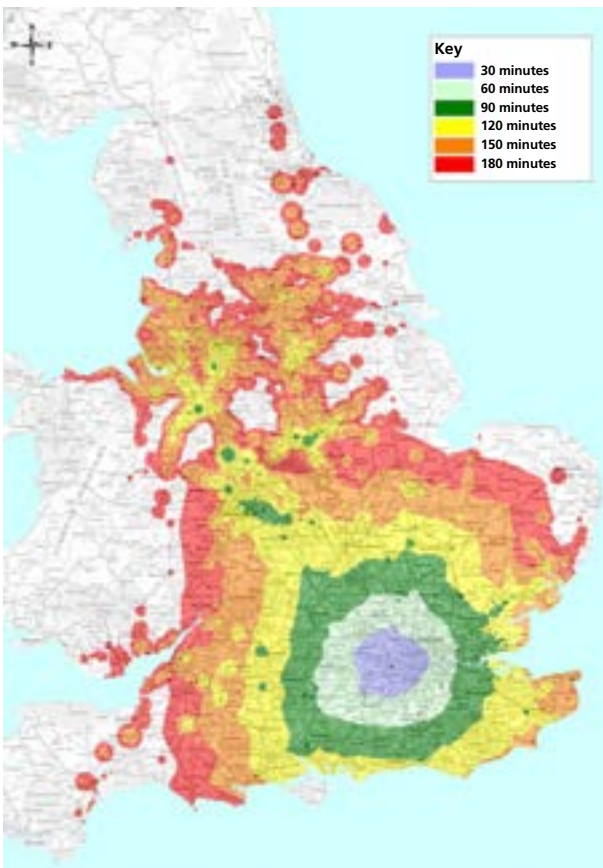
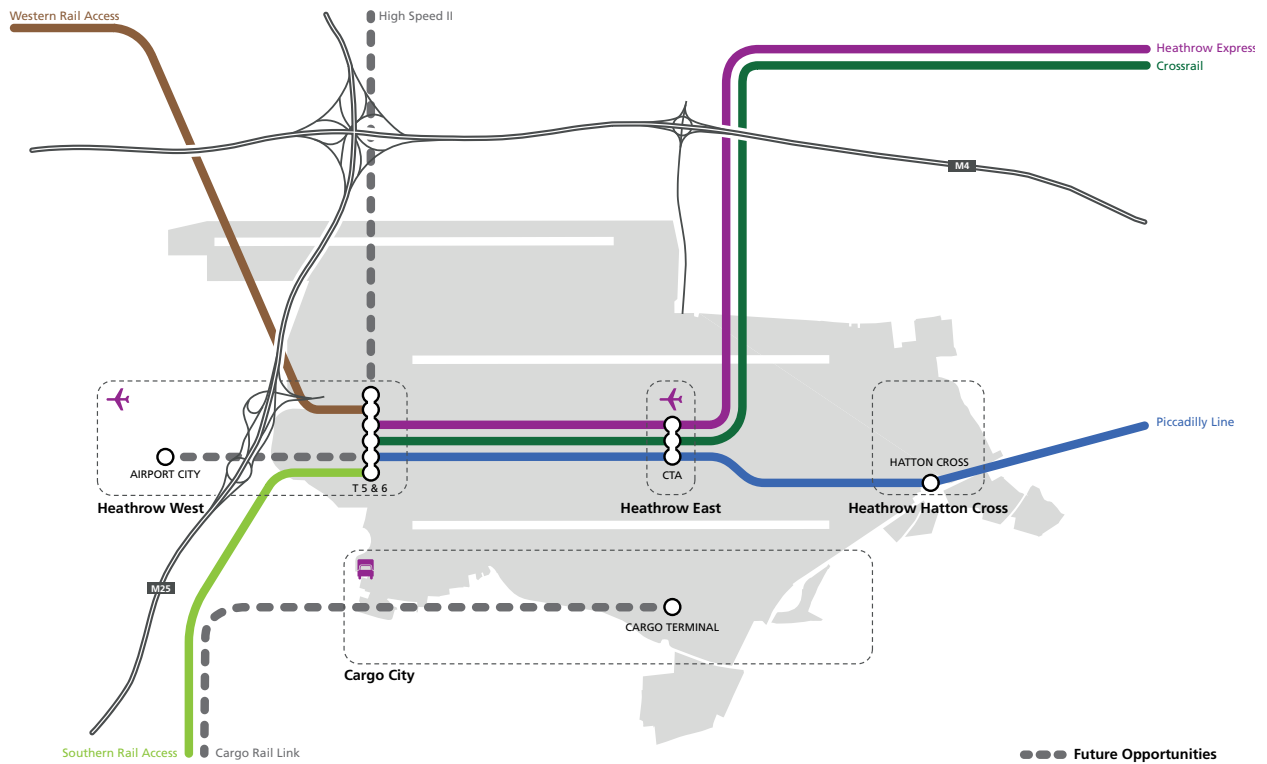


Figure G HS2 Phase 1 – Car and public transport times - 30-180mins

Connecting all of the UK

Figure H Heathrow public transport mix



“50 million more passengers will use public transport to access Heathrow by 2040”



Promoting sustainable travel for employees and passengers

We will grow the number of airport employees travelling to Heathrow by sustainable modes to 80%. Through our award-winning Heathrow Commuter Programme, we have seen a significant decrease in the number of employees that drive to work alone – down from 61% in 2008 to 51% in 2013. We will also expand Heathrow’s employee car share scheme, at the same time we will reduce the number of employee car parking spaces. We also plan to extend the existing airport travel card providing subsidised public transport to airport employees.

Beyond 2030, once our comprehensive network of public transport services is in place, we believe there is

a case for introducing a new congestion charge zone to further reduce vehicle journeys to Heathrow. Revenues could be ring-fenced to fund major rail, London Underground and road infrastructure improvements. It could also be used to fund sustainable travel initiatives, public transport service improvements and local community projects. If expansion were to proceed we would work with local people and relevant authorities to define how such a zone would be applied. These public transport improvements will enable Heathrow to deliver more flights, without increasing airport related traffic on the road.

Figure I Airport passenger public transport demand in 2013, 2030 and 2040

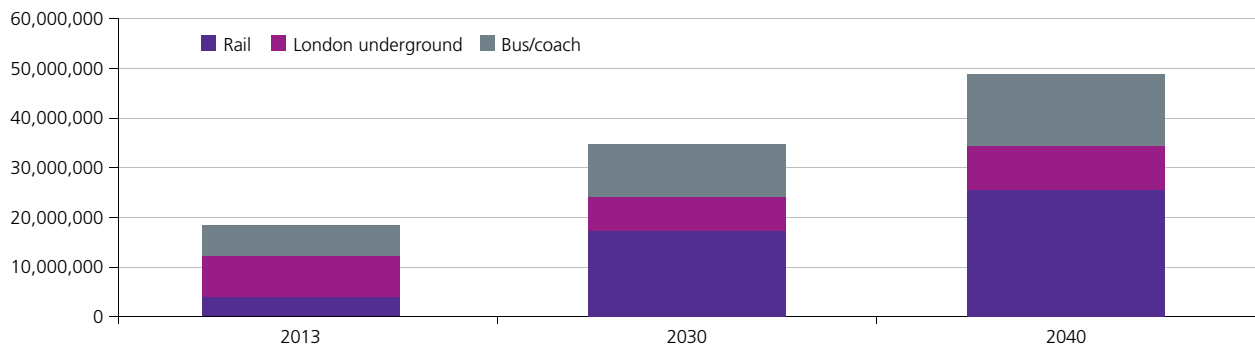
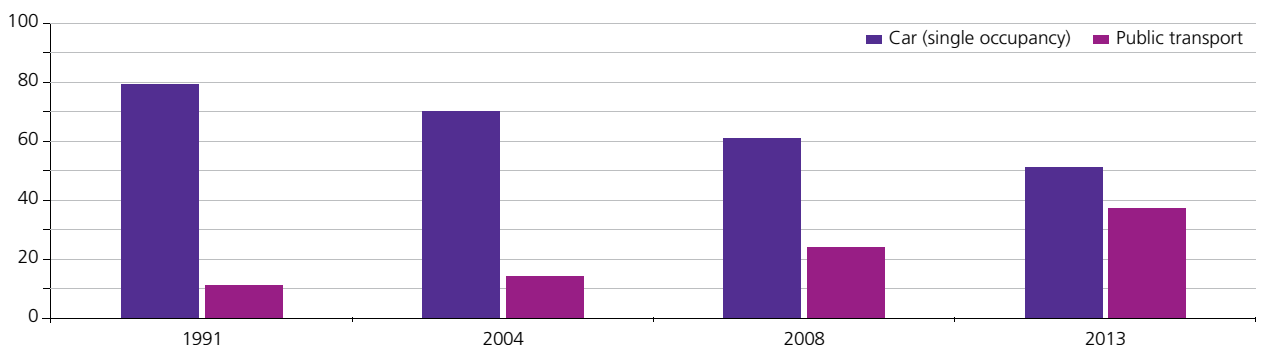


Figure J Workforce mode share at Heathrow (1991-2013)



Connecting all of the UK

Managing roads and traffic

A third runway at Heathrow provides an opportunity to improve one of the most congested sections of the M25. Our proposals will require a new, tunnelled section. The tunnel will be constructed alongside the existing route and minimise disruption to existing users of the motorway. Once built, new collector/distributor roads will run parallel to the motorway which will segregate airport and local traffic from the main carriageway, adding capacity to the M25. Separating traffic will reduce the weaving of cars from lane to lane and smooth the traffic flow for non-airport M25 traffic. Having listened to public feedback, we have also revised our proposals to avoid changes to the M25/M4 interchange.

We recognise that traffic and parking on local roads, including HGVs, are issues of concern for local people. We will work with local authorities, operators and TfL to identify ways to reduce these activities from local roads.

Heathrow handles more UK air freight than all other airports in Britain put together. So we will develop a new cargo consolidation centre to reduce the number of lorries making freight deliveries to and from the airport. We will also look at whether there is a case for connecting the cargo centre to the rail network – our plan would allow such a spur. We will work with industry to deliver more efficient use of vehicles and a cleaner vehicles fleet.

“The M25 would have faster journey times than today”



Source: Highways Agency

Building a sustainable Heathrow

People have legitimate concerns about the environmental impact of expansion. A third runway at Heathrow should not go ahead at any cost. Our plans should comply with strict environmental limits on noise and local air quality, whilst remaining within the UK's climate change targets.

We have sought to avoid, reduce or compensate for the environmental effects of the development. Since our initial proposal was submitted to the Commission in July 2013 we have moved the runway south and shrunk the airport boundary. This means that compared to our 2013 plan:

- The number of residential properties to be compulsorily purchased has fallen by 20%
- We no longer need to redevelop the M4/M25 junction
- There is the potential to retain in-situ valuable historic buildings including the Harmondsworth Great Barn and St Mary's Church in Harmondsworth
- The land-take has shrunk, reducing impacts on flood risk, landscapes, recreation areas and biodiversity

Continuing to reduce noise

Heathrow is already significantly quieter than in the past. Since the early 1970s, both the area and the number of people within Heathrow's noise footprint have fallen tenfold, despite the number of flights doubling.

Adding a third runway at Heathrow would require airspace to be redesigned. This would include the redesign of arrivals and departures flight paths for Heathrow. The main objective when redesigning airspace would be to minimise and where possible reduce the impact of noise. However, there are choices in how airspace could be redesigned to achieve this objective. The table shows how many people would be affected by noise compared to 2011 if airspace was designed in three different ways.

Airspace redesign option	Contour boundary	Difference in population inside noise contour in 2030 relative to 2011
Minimise the total number of people overflown	55 Lden	-48%
	57 LAeq	-35%
Minimise the total number of new people exposed to noise	55 Lden	-45%
	57 LAeq	-31%
Maximise the periods of predictable noise relief for people	55 Lden	-46%
	57 LAeq	-31%

Figure K Difference in population inside the Heathrow noise contour in 2030 compared to 2011 under three different airspace redesign options

While we recognise that determining which approach should be pursued is ultimately a matter for Government we believe that maximising periods of noise relief offers clear advantages. This approach would cut the number of people inside the noise contour by at least 30% while delivering the periods of relief from noise which people expressed a clear preference for in our recent consultation.

Quieter technology and operations

We already encourage quieter aircraft to land at Heathrow by charging less. By the time a new runway opens, 90% of aircraft will be 'next generation' technology such as the A380, B787 and A320NEO which have been designed with Heathrow in mind. We also believe the Government should consider introducing 'green slots' through which new capacity would only be given to airlines willing to operate quieter aircraft.

"A third runway should not go ahead at any cost"

Building a sustainable Heathrow

Figure L Aircraft will fly higher over London

- ④ Approach for new runway location with displaced threshold and steeper 3.2 degree descent
- ③ Approach for new runway location with displaced threshold and 3 degree descent
- ② Approach for new runway location and 3 degree descent
- ① Approach for equivalent existing runway with 3 degree descent

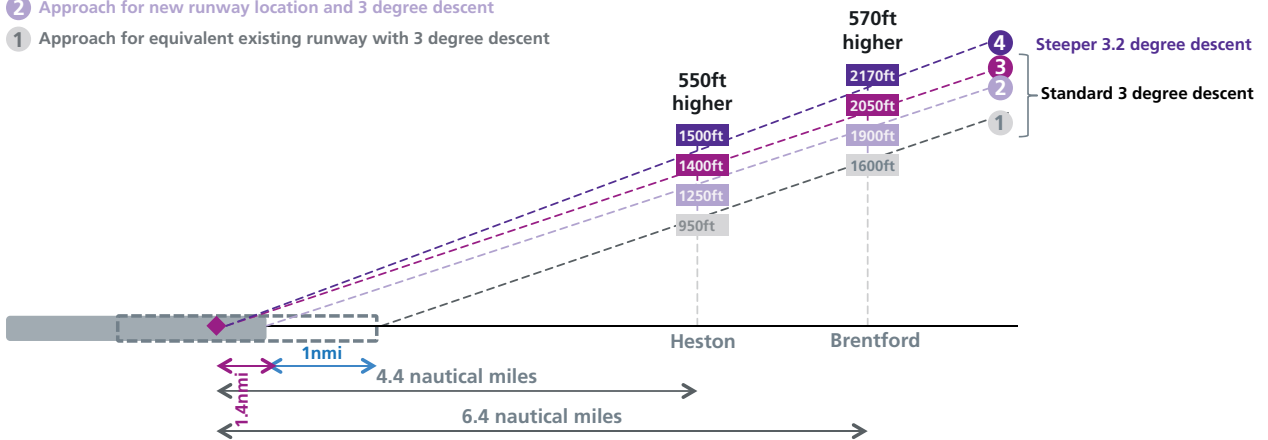
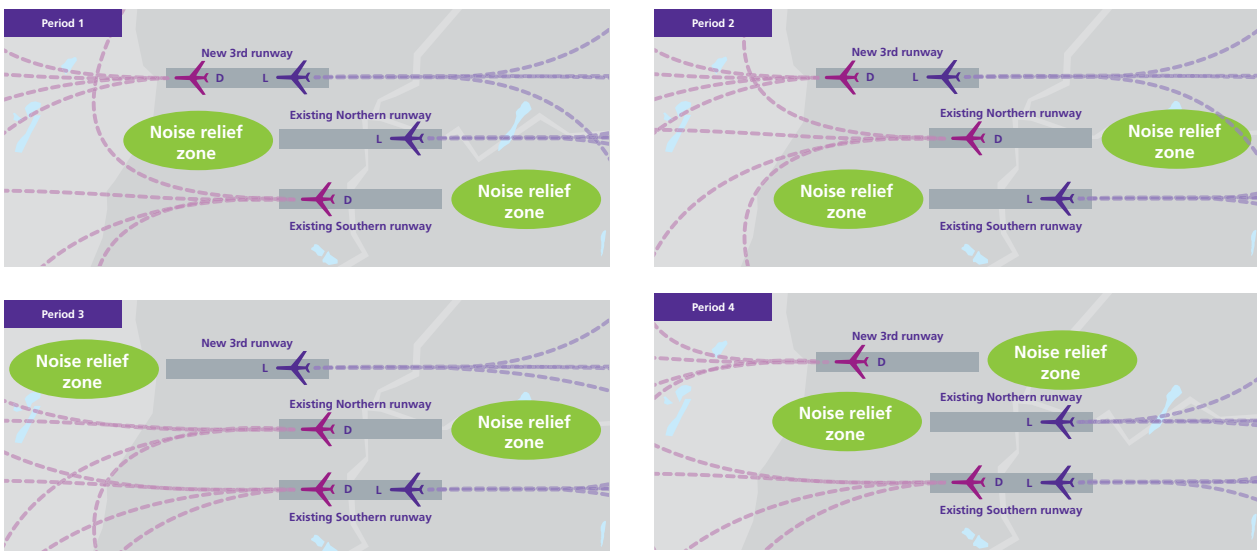


Figure M Respite relief zones



“We are proposing that anyone whose home needs to be compulsorily purchased will receive 25% above market value plus all legal fees and stamp duty costs on their new home”



We propose the new runway further to the west than our current two runways. Combined with steeper landing approaches, and inset ‘thresholds’ where aircraft will land on runways, this means aircraft flying higher over London.

Our public consultation has highlighted the importance of relief from noise for our local communities. So we have maintained the principle of runway alternation for periods of noise respite for all communities around Heathrow.

Night flights are also a concern for local communities. Compared with other European hub airports, Heathrow already has the strictest limits on operations and fewer flights between 11pm and 6am. Our plans do not propose any extra night flights and would reduce the number of night flights on existing flight-paths. Because we only operate one runway for night flights, residents under existing flight-paths would have night flights only every third week rather than every other week at the moment. This means that areas such as Richmond would experience fewer night flights with a third runway than they do today.

Treating those affected by noise fairly

We believe that a new approach to noise insulation and compensation is required. We have allocated a £250 million fund to ensure this happens. This compares to £90 million scheme for the previous third runway proposals. There are many considerations to take into account in how best to allocate this fund. We believe those affected are best placed to inform and influence the details of our noise insulation and compensation schemes should a third runway go ahead. We are therefore planning to consult local communities over the summer to identify the fairest way to allocate this fund. We will also continue working with the local education authorities to enhance the level of noise insulation provided to local schools to ensure that local young people are not adversely impacted by our proposals.

A fair property compensation scheme

We are committed to treating those most affected by a third runway fairly. We recognise that the compulsory purchase of 750 homes deserves exceptional compensation for residents.

We are therefore proposing that anyone whose home needs to be compulsorily purchased will receive 25% above market value compensation plus all legal fees will be covered and 100% of their stamp duty costs. We will be asking for further views on whether this represents a fair package of compensation in our July consultation.

Building a sustainable Heathrow

Better air quality than today

Similarly, we can add capacity at Heathrow without exceeding air pollution limits that protect human health. There will be no more Heathrow-related vehicles on the roads than today. Those vehicles that are travelling to the airport will be more environmentally friendly. Combined with new aircraft technology and operating procedures, this means that nitrogen dioxide (NO₂) levels will be within EU limits. Levels of fine particles (PM₁₀ and PM_{2.5}) are already within the limits.

Meeting environmental responsibilities

The Airports Commission's interim report and the Committee on Climate Change have found that a third runway is compatible with the UK meeting its climate change targets. We are also committed to making the operation and construction of a third runway as low carbon as possible.

We have set tough environmental targets for a third runway in terms of the airport's use of natural resources – water, waste and energy. This means that compared to our baseline of 2010 the expanded airport will consume less water, produce at least 60% less carbon from energy and result in less waste per passenger. This will be achieved by investing in new technology and practices that will improve the efficiency of the airport.

Boosting local employment

Heathrow's growth will create over 120,000 new jobs. Our detailed modelling shows these jobs will not cause an influx of new workers, straining housing and other services. Instead, it will provide jobs for the growing local population. We can do this thanks to the large, sophisticated labour markets around Heathrow, improved public transport access from elsewhere in the region and the opportunities for regeneration in our area. Thousands of local people who would otherwise be without work, or would have to travel long distances, will be able to take jobs at the airport. Jobs will also be created across the UK, spreading the benefits of expansion widely rather than in just one place. We will help fund replacement housing schemes within land already earmarked for development by local authorities for houses lost to airport expansion.



“A new runway is compatible with meeting climate change targets. We will not exceed air pollution limits”



Innovative approach to managing effects on green space and local heritage

Our revised proposal provides the option of preserving the Grade I listed Harmondsworth Great Barn and the Grade II* listed St Mary’s Church in their current locations. Both are significant community and heritage assets. People may feel that moving the Great Barn to another location is a better option than preserving it in its current location, so we plan to consult on this point in more detail if Government supports our proposals.

We also recognise that the new runway will have significant effects on local river courses. We have thought innovatively about how best to mitigate these effects and have produced an integrated plan to enhance biodiversity, river quality, flood protection and landscape in the Colne Valley.

Our plans would increase the amount of publicly accessible green space around the airport. We will also create new green corridors that link together existing outdoor recreation areas such as those in the existing Colne Valley Regional Park. Our measures will protect people and properties against flooding offering the potential for an improved situation compared to today, particularly for the residents of Colnbrook and Poyle. Other flood prevention measures will be introduced to give better flood protection other for local communities that will directly benefit from our flood prevention works in the Colne Valley.

Figure N Colne valley green corridor



- 1. Sports pitches
- 2. Formal gardens
- 3. Allotments
- 4. Visitor centre and cafe
- 5. Natural swimming pond and deck
- 6. Wet woodland
- 7. Wildlife ponds and wetlands

The deliverable solution

Heathrow offers the safest, fastest, lowest risk solution for delivering new hub capacity. We already have one of the most successful track records for private infrastructure delivery in the UK.

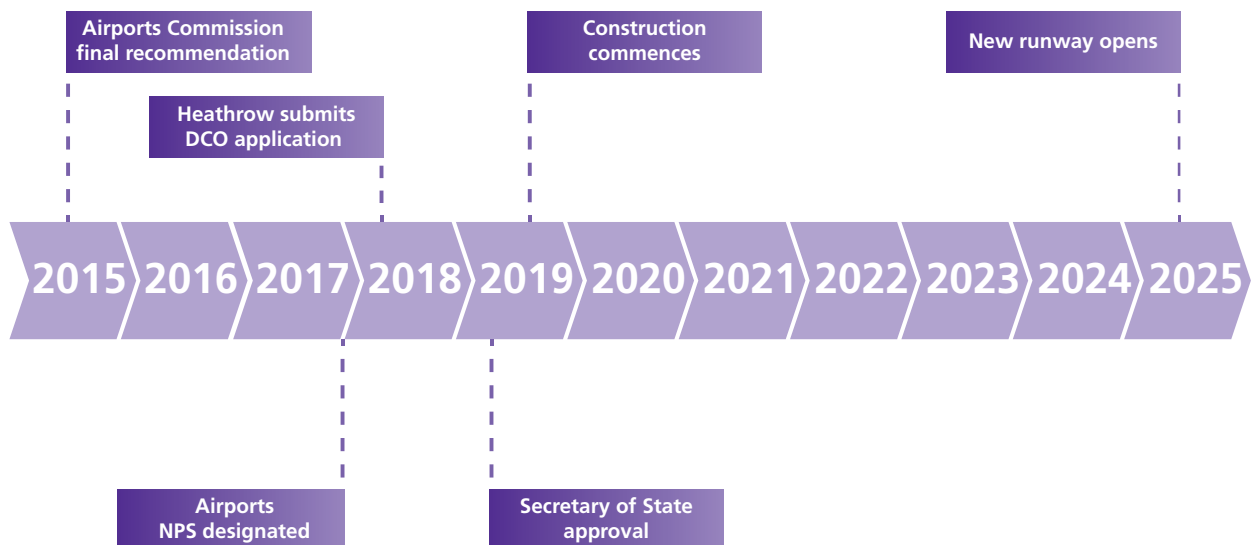
The £15.6 billion costs can be privately financed. There is a strong underlying business case at Heathrow with clear evidence of demand. The projected price increase is affordable. The new runway will be operational in 2025 if Government gives policy support in 2015. We anticipate a policy and planning process running to 2019 which will provide extensive opportunities for further consultation and engagement. We have led innovation in the UK construction industry and have been at the forefront of emerging thinking, now taken for granted within the industry.

Our procurement strategy would help sustain and create thousands of jobs throughout the UK. 35,000 people worked on the Terminal 2 project and more than 60,000 on Terminal 5. The investments and skills developed in expanding Heathrow would have lasting benefits for the UK firms involved.

Our plan assumes an incremental increase in capacity which provides flexibility in the face of changes in demand or other commercial factors. It also means that excessive costs are not incurred up front ahead of passenger demand to fund further expansion.

Above all, our proposal is predicated on delivering our 10 commitments for a new approach that can sustain public support.

Figure O Timeline



“The new runway could be operational in 2025 if Government gives policy support next year”



A privately funded business case

Our proposals are financeable. Heathrow has already delivered one of the UK's largest private sector investments through our £11 billion transformation programme. With an asset base of over £14 billion and revenues of £2 billion per annum, Heathrow is uniquely positioned to fund a new runway. We have three of the world's largest sovereign wealth funds, some of the world's largest private infrastructure investment funds and a UK pension fund as shareholders. We have an investment grade credit rating for the fourth largest issue bonds in sterling. Our balance sheet and investment strength are something no other airport can match.

There is a good commercial business case. Demand for landing slots at Heathrow already outstrips supply, with airlines willing to spend tens of millions of pounds to secure scarce slots.

For any airport development to be privately funded there must be a clear business case for investors. The total cost of new infrastructure, the complexity of construction and the uncertainty of future demand

are all factors that affect investment risk. To attract investment, returns need to be commensurate with risk. A fair regulatory framework – with an appropriate and predictable cost of capital – is critical to a privately funded business case. The UK operates in a competitive global marketplace and international investors can choose anywhere in the world.

Any scheme must be commercially viable for airlines and offer airport charges that are competitive with other European hubs. Airlines have a choice of airports and aircraft are highly mobile assets. Some costs might be more appropriately funded by Government than by airport users – for example surface access improvements. We are committed to working with airlines to minimise costs and develop a tariff path that is affordable. Our initial business case suggests that airport charges would average £24 between 2019 and 2049 compared to around £20 in the current regulatory period. They then fall back to below levels that they are today. We plan to work with airlines on alternative funding models that may make new capacity more affordable for passengers, airlines and the airport.



The deliverable solution

Working with our airline partners and our local communities

Heathrow is committed to undertaking meaningful and transparent consultation and engagement with both our airline partners and our local communities. We recognise that there is a statutory requirement to consult extensively in the event that Government policy supports Heathrow's expansion. Heathrow also recognises the important on-going responsibility it has to those affected by the airport and its growth. Heathrow has an extensive communications and engagement programme through which we are already sharing our aspirations and plans for growth. This will be supplemented and enhanced to ensure that our proposals for growth are properly communicated.

Safety first

The safety of passengers and all airport staff is our number one priority. Heathrow has an excellent operational safety record. Heathrow also has extensive experience of delivering major airport infrastructure projects to time and budget. In fact, our £11 billion transformation is the UK's largest privately funded construction project. Both Terminal 5 and Terminal 2 have been delivered in the centre of the world's busiest international airport without any disruption to operations. Terminal 2 has the best safety record of any engineering and construction project in the UK.

"Safety is our number one priority. T2 has the best safety record of any engineering and construction project in the UK"

Engineering our plans

There are no insurmountable problems to expanding the airport as envisaged. We have extensive experience delivering very large, nationally significant infrastructure projects. River diversion, flood mitigation and landfill works are key challenges. These will need to be completed early in the programme as enabling works. All the engineering solutions identified employ well understood techniques. The costs of the work have been developed based on experience of construction at Heathrow and other appropriate industry benchmarks.

Tested and costed

The refreshed scheme has been reviewed on various technical aspects. There will be extensive landfill associated with the new runway and M25 tunnel. Provisional levels have been established and tested against all relevant regulation. Local ground, dominated by London clay, is suitable for major works. Significant river diversions and flood mitigation will be required, but will maintain watercourse flows and provide additional flood mitigation. Airspace, airfield and utilities requirements can all be met by building on existing infrastructure. Total build costs are estimated at £15.6 billion. This includes provisions for project risk and other elements. £11.1 billion will be airport infrastructure associated with the new runway. Just under £3 billion is estimated for land purchase and other community costs. The remainder of the costs are for environmental mitigation, including noise and surface access.

Figure P Increase in passenger experience compared to best in Europe

Item	Costs
Airport infrastructure	£11.1 billion
Surface access	£0.9 billion
Community compensation and environmental mitigation	£3.6 billion
Total	£15.6 billion

“By 2030 the airport will be producing 60% less carbon from its own energy use than in 2010”



Sustainable by design

We have set ambitious environmental targets. This means that compared to our baseline of 2010, the expanded airport will consume less water, produce less carbon from energy and less waste per passenger. We will achieve these by investing in new technologies and practices that increase the airport's efficiency.

We have a track record of leading architects and designers – such as Richard Rogers and Luis Vidal – creating cutting edge designs in T5 and T2. We have delivered world firsts to increase efficiency by incorporating technology into the design of our airport.

We have designed an integrated plan for mitigating the effect of the new runway on local rivers, flood plains, ecology and landscape that, as a minimum, maintains the water, ecological and landscape quality of the area affected by the new runway.

The deliverable solution

Building for Britain

As an island trading nation, good international transport links have been a source of competitive advantage for the UK. Now that advantage is being eroded. Our global hub airport is full, and is unable to add flights to fast growing destinations.

Britain's other airports have an important role to play but cannot compete with European hubs who make long-haul flights viable by mixing transfer passengers, direct passengers and freight.

So Britain faces a choice.

We can have the confidence and vision to develop our hub into a world-class gateway for the 21st century, or we can accept that in future much of the world will not be able to fly to Britain direct.

Heathrow's proposal is deliverable – environmentally, practically, financially, and politically. It offers a different and improved approach from the previous proposals for a third runway, with less noise and less environmental impact.

The potential prize to be gained by taking a positive decision is huge: thousands of new jobs, more trade, more investment, and more growth. With new rail and air links the whole country will benefit.

Britain already has one of the world's most successful hub airports in Heathrow. Building on this strength will connect the UK to growth and help the UK win the global race.

Heathrow will take Britons farther with the long-haul routes it provides that no other UK airport can.

Heathrow will also take Britain further by supporting the trade, inbound tourism and investment that will deliver the jobs and economic growth we need.

It's time to make a positive decision for all of Britain.

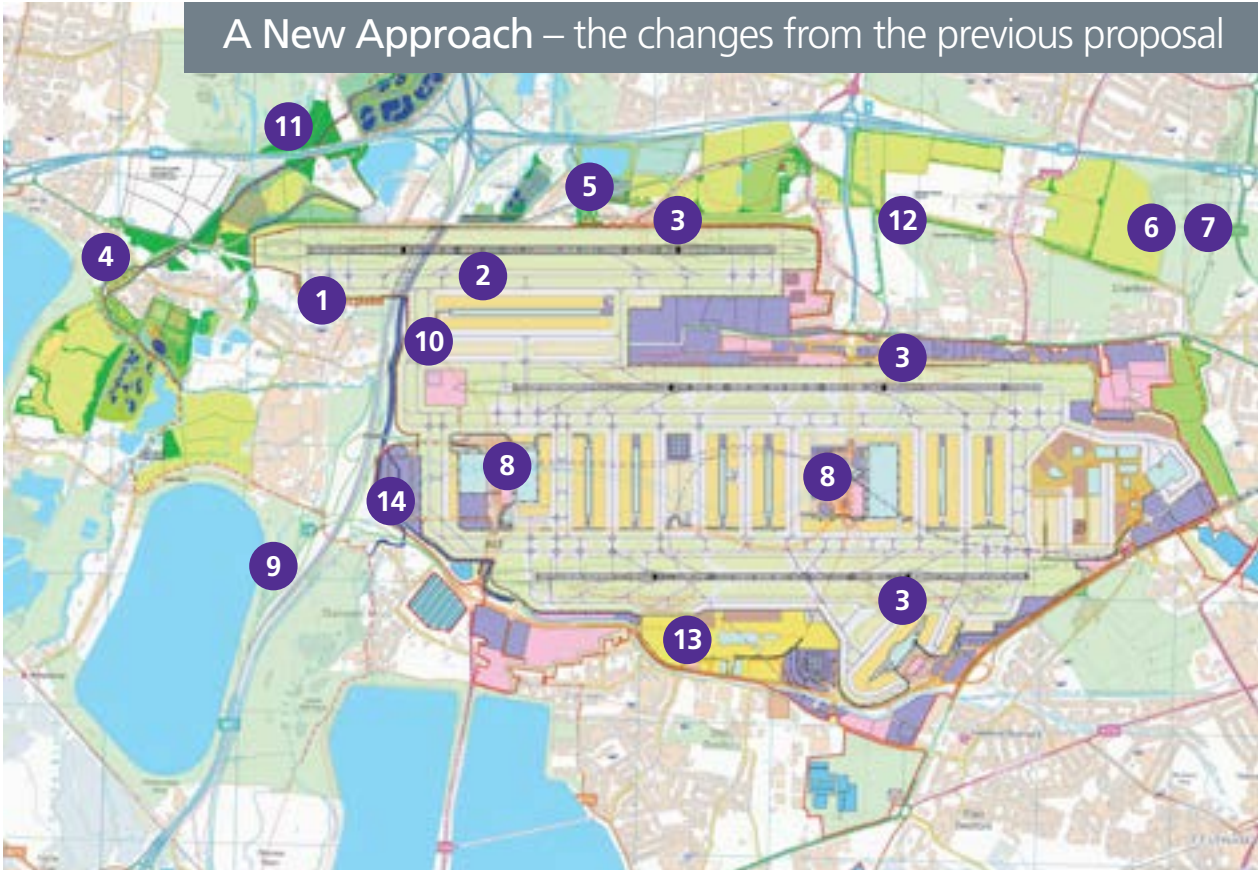


“Only Heathrow can connect the whole of the UK to growth.”



The deliverable solution

A New Approach – the changes from the previous proposal



Better for communities


- 1 Runway located further west to reduce noise
- 2 Runway length allows for periods of relief from noise
- 3 Aircraft touch down further along runways to reduce noise
- 4 New green spaces and flood protection for communities
- 5 More generous compensation for home owners
- 6 Better noise insulation schemes – £250m allocated
- 7 Steeper landing flight paths to reduce noise

Better for passengers

- 8 Two main passenger terminal and public transport areas
- 9 M25 redeveloped to improve traffic flow
- 10 Underground passenger transit makes for easy transfers
- 11 Western Rail link
- 12 Fast connection to HS2

Better for business

- 13 Doubling the capacity of freight facilities
- 2 Full length runway allows every aircraft type to take off
- 2 Total capacity for more flights than previous proposal
- 14 New space for commercial development



6:30	Istanbul	TK1992	C
6:35	Chicago	AA091	
6:35	Tokyo	JL404	
6:40	Barcelona	BA486	
6:40	Bilbao	VY2435	F
6:45	New York	AA131	B
6:50	Copenhagen	AC9447	E
7:00	Dubai	EK030	C
7:00	Tehran	IR710	E
7:05	Amman	RJ112	D
7:15	Hong Kong	VS238	A
7:15	La Coruna	VY9851	F
7:30	Oslo	BD3790	E
7:35	Madrid	LA5721	F
7:35	Vigo	VY3204	F
8:00	Copenhagen	SK1516	E
8:00	Stockholm	BD3846	E

Part 1

Connecting
for growth

1.1 Connecting for growth

The UK is engaged in a global race for jobs and economic growth. Connections to the centres of the world economy are the essential catalyst for trade with new and emerging markets. A successful hub airport is uniquely valuable as it delivers the connections necessary to access global markets and compete with our international competitors. A hub provides the engine for growth. Heathrow welcomes competition and recognises the importance of point-to-point airports. However, they are no substitute for the hub capacity that the UK needs to win the global race for growth.

1.1.1 Connections in the global economic race

The UK is in a global race for trade, jobs and economic growth. The international economy is changing; while emerging markets like Brazil, Russia, India and China are growing quickly traditional markets in Europe are facing a future of slower growth. McKinsey estimates that in 2030 only 43% of households with annual incomes over \$70k will be in Europe and North America as against 66% in 2011. Nearly 80% of world GDP growth to 2025 will be in Asia and the Americas. By 2025 McKinsey forecasts only 13% of world GDP will be in Western Europe, down from 19% as recently as 2010.¹ Only a generation ago the UK could assume it was at the natural centre of the world's economy. In this new world we must compete to maintain our status as a world economic power. Our longstanding status as an aviation hub is a valuable competitive edge for the UK's in that global race. As the world economy shifts, direct air connections with emerging markets further afield will be an important factor supporting British economic growth in the 21st century.

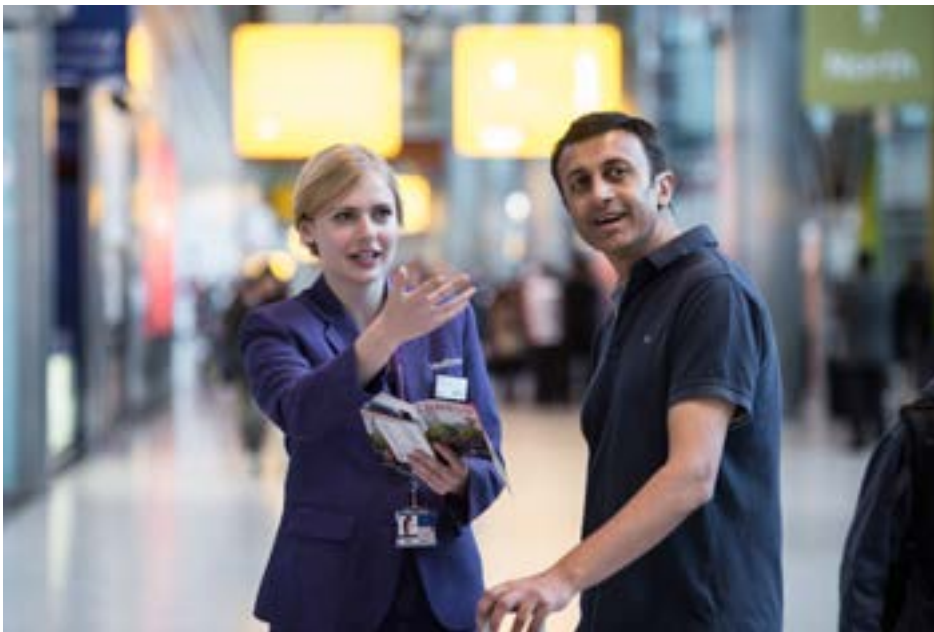


As an island trading nation, connectivity has been central to the UK's global trading position for centuries. Staying connected is now more essential than ever. UK businesses trade 20 times more with emerging markets connected with daily flights than those with less frequent or no direct service². Trade drives jobs, prosperity and growth. Yet in 2014 London is losing the position of the world's largest international airport to Dubai. This is symbolic of an historic shift - for the first time in over 300 years Britain will not have either the world's greatest international port or airport. Continuing to have one of the world's best connected hub airports is vital to the UK to support economic growth and maintaining the UK's position.

While it has good air connections today, the UK has not invested in the runways it needs for the future. We now face a shortage of capacity at the hub. The Commission's remit is to identify how to maintain the UK's position as Europe's 'most important aviation hub'. The debate about new runway capacity in the UK has been beset by delay and prevarication – while our global competitors have pressed ahead and built the new runways they need. Our hub at Heathrow is currently running at 98% capacity. Our competitors pressed ahead and built the new runways they need, investing tens of billions of dollars. Hub airports at Paris, Frankfurt, Amsterdam and Dubai have spare capacity – at around 700,000 Air Traffic Movements (ATMs) each they have around 50% more capacity than Heathrow. With that capacity they are adding new flights to growing markets.

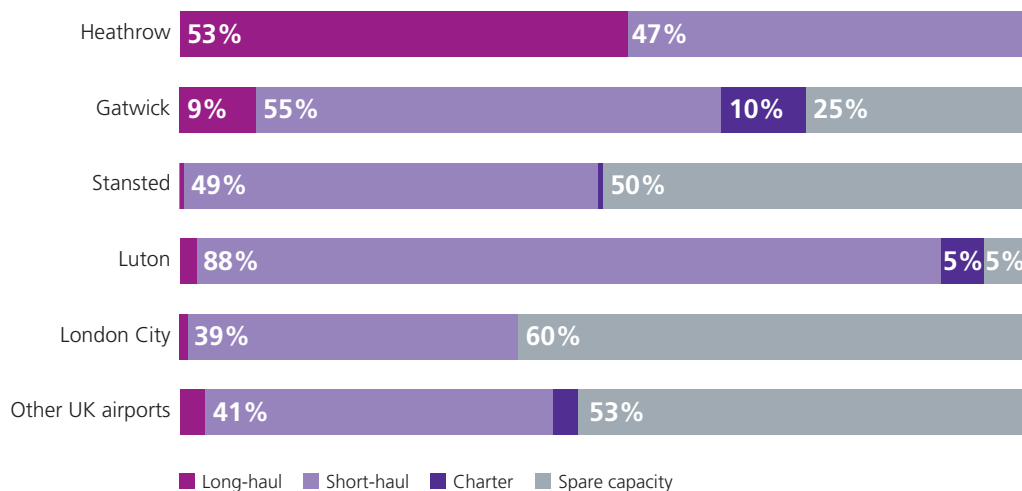
1.1 Connecting for growth

Hubs are uniquely able to offer frequent, sustainable long haul connections because they pool demand. These dynamics are indicated by the role of transfer passengers. Transfers account for 37% of Heathrow’s total passengers³. Transfer passengers at other London airports, Gatwick, Stansted and Luton are a much lower proportion of the total (7%, 4% and 2% respectively)⁴. People can fly direct to 75 destinations worldwide that are not served by any other UK airport. That is why with less than 20% of all flights from the UK, Heathrow offers over 80% of long haul services. These long haul connections are what the UK needs to win in the 21st century global race for growth.



The uniqueness of hubs is also shown by the spare capacity elsewhere in the London system. Spare point-to-point capacity exists in at London City, Stansted, Gatwick and Luton (60%, 50%, 25% and 5% spare ATM capacity respectively, as shown in Figure 1.1)³. The South East’s point-to-point airports will not be full until at least 2040. Meanwhile airlines continue to pay multi-million pound prices for slots at Heathrow. If all aviation capacity were alike in economic terms we would not see the disparity between Heathrow and other nearby airports. Flights from a hub airport are critical to connecting Britain to long haul markets. The urgent need is for hub capacity.

Figure 1.1: Need is for capacity at the hub



1.1 Connecting for growth

The UK's connectivity is suffering as a result of our hub capacity constraint. A survey by the Board of Airline Representatives in the UK, which represents almost 90 scheduled airlines, shows that more than half (53%) are locating flights in other countries. They say services would have come to Heathrow, if there were spare capacity⁵. 86% of airlines said they would put on more flights to the UK if additional take-off and landing slots were available at Heathrow⁵. Growth is not waiting – it is going to the UK's competitors.

The UK's needs hub capacity urgently. Only Heathrow creates the intercontinental connectivity that directly connects the UK to global growth. The current lack of hub capacity is cutting us off from this growth opportunity. That cuts off us and our children from investment, jobs and prosperity. Heathrow needs a third runway as quickly as possible or Britain will fall behind our competitors for want of links to these markets.

Figure 1.2: The changing global economy⁶

The world's largest economies				Economic growth 2010-2050							
2010		GDP \$tn	2050		GDP \$tn	TOP 10		%	BOTTOM 10		%
1	US	14.12	1	India	85.97	1	Nigeria	8.5	1	Spain	2.0
2	China	9.98	2	China	80.02	2	India	8.0	2	France	2.0
3	Japan	4.33	3	US	39.07	3	Iraq	7.7	3	Sweden	1.9
4	India	3.92	4	Indonesia	13.93	4	Bangladesh	7.5	4	Belgium	1.9
5	Germany	2.91	5	Brazil	11.58	5	Vietnam	7.5	5	Switzerland	1.9
6	Russia	2.20	6	Nigeria	9.51	6	Philippines	7.3	6	Austria	1.8
7	Brazil	2.16	7	Russia	7.77	7	Mongolia	6.9	7	Netherlands	1.7
8	UK	2.16	8	Mexico	6.57	8	Indonesia	6.8	8	Italy	1.7
9	France	2.12	9	Japan	6.48	9	Sri Lanka	6.6	9	Germany	1.6
10	Italy	1.75	10	Egypt	6.02	10	Egypt	6.4	10	Japan	1.0

GDP (\$tn) by purchasing power parity (PPP)

% GDP change year on year

Source: Global Growth Generators, Citi Investment Research and Analysis, 2011



1.2 Unique role of a hub airport

1.2.1 Hubs and London's airport system

The UK has two types of airports: most clearly seen in the London Airport System. Heathrow is the UK's hub. It serves long haul business destinations. British Airways is its biggest customer. Other airports are largely point-to-point. For example Gatwick flies passengers largely to short haul and leisure destinations. easyJet is its biggest airline.

1.2.1.1 The unique role of a hub

Competition between these two different airport models is marginal. For example, the CAA concludes that:

“The most likely source of any Substantial Market Power (SMP) that Heathrow has, stems from its position as the operator of the UK's only hub airport and the combined package that Heathrow offers of strong demand, including premium passengers, cargo and connecting passengers. This makes Heathrow attractive for both based and inbound airlines.”

It goes on to say,

“The airline network effects available at Heathrow means that very few airlines would be able and willing to switch sufficient capacity.”⁷

Heathrow, as the UK's only hub airport, does compete directly with other hubs in Europe (e.g. Paris, Frankfurt, Amsterdam and Madrid) and the Middle East (e.g. Dubai, Istanbul and Abu Dhabi). This is supported by the fact that other hubs in Europe and the Middle East openly declare they compete with Heathrow. Likewise, despite the constraint on capacity, Heathrow continues to shape its proposition to ensure it remains competitive with these foreign hubs. Network carriers at these foreign hubs declare openly that they compete against the UK's and other network carriers and not low cost airlines based at point-to-point airports.

Hub airports are not better or worse than point-to-point, they are different. To be competitive hubs need to attract network airlines and their passengers. That means delivering a great passenger experience, facilities that deliver short connection times, strong local demand for air travel, good road and rail connections and enough capacity to support a network. It requires dedicated infrastructure such as a range of aircraft stands and baggage systems

Hubs require dedicated facilities and designs that are hard to replicate from scratch. Airlines will compete with each other and will move operations to hubs that improve their profitability.

Critically, while airlines can choose a hub outside the UK, our choice is not where in the UK to have a hub. Our choice is if Britain will still have one at all.

This competition is good for consumers and business travellers – delivering lower prices and a greater choice of services.

Heathrow, as a hub airport that offers network demand which materially differentiates it from the other airports in the UK. This is demonstrated by:

- **Long haul routes:** Heathrow offers 80% of all long haul routes from the UK. This is not a coincidence – it is precisely the market segment the hub airline model is designed to serve³
- **Transfer passengers:** As a hub, Heathrow facilitates transfer passengers – approximately a third of Heathrow passengers either buy a single ticket with a transfer at Heathrow or self-connect. No other UK airport has significant transfer of passengers, bags or freight
- **Network carriers:** Heathrow is the home of the UK's network carriers that offer a full service for all types of passenger. These carriers, based in the UK or elsewhere, deliberately pursue a hub and spoke route model and rely on transfer 'feed'
- **Alliances:** As a hub, Heathrow is home to all the major international airline alliances based in the UK, such as oneworld, SkyTeam and Star Alliance
- **Business travellers:** Heathrow accounts for the majority of business travel within London (nearly 70% of all business journeys for London overall with just 44% of movements)³

1.2 Unique role of a hub airport

- **Visiting Friends and Family (VFR):** Over 70% of UK passengers that travel to visit friends and family do so through Heathrow³. Heathrow has the highest ratio of VFR of all London Airports. This has been one of the fastest growing segments in demand for air travel in Europe as people become more comfortable with working and studying in a foreign country
- **Air Freight:** Around 66% of international air freight volume (approximately 20% of the UK's total trade by value^{3, 8, 9}) flying into the UK comes through Heathrow despite Heathrow having less than a quarter of total movements³. The capability to move cargo is intrinsic to network carrier economics as they carry belly cargo to long-haul business destinations
- **Inbound tourism:** Heathrow delivers a tourism spending surplus for the UK by offering flights to destinations that attract foreign tourists to Britain. The majority of airports in the UK are tailored to delivering outbound leisure services for UK residents that create a tourism spending deficit.



Expansion of Heathrow would maintain the effective specialisation of the London Airport System. Passengers will benefit from strong competition within each model as well as any shifts between models over time. The London Airport System would have more point-to-point and hub capacity as airlines are able to consolidate activity more freely. Both the vibrant low-cost and network models would be free to compete for the London market. On the other hand, expansion at Gatwick would mean that adding more point-to-point capacity to a system that has excess point-to-point capacity today would imply that it would go unused for decades. The continued constraint at Heathrow would drive prices higher. Due to spare capacity at point-to-point airports, prices there would be unaffected.

Above all a third runway at Heathrow will address the urgent need for hub capacity, while allowing the London System to retain the flexibility to adapt to possible changes in aviation. Since hubs will remain important for long-haul connectivity, any option that does not add hub capacity is a risk to growth. That would see the UK fall behind international competitors who have invested in their hub airports. The hub model has proven ability to deliver the long-haul flights Britain needs. It is the model in which our global competitors are investing. Gatwick's assertions about changing business models are untested, uncertain and based on unproven assumptions. Betting the UK's hub status on unproven or previously failed models is a risky gamble.

1.2 Unique role of a hub airport

1.2.1.2 Dual hubs

A dual hub or constellation of airports is not the solution to the UK's lack of aviation connectivity. There are only a few examples of cities with two major airports. In every city where this is the case, only one airport is ever the hub airport. This is either because there is insufficient competition between them or they are used in different ways.

History shows that a dual hub in the UK does not work. Attempts to create a dual hub between Heathrow and Gatwick were tried in the 1970s and 1990s but both ended in failure because airlines were attracted back to the main Heathrow hub where they could maximise transfer opportunities.

Some commentators have cited New York, Tokyo, Paris and Moscow as examples of cities with successful dual hubs. In the case of New York, which has a significant presence from three of the world's largest network airlines which use the hub model, only one airport, Newark, functions as a hub whilst JFK is a point-to-point airport. In Japan there is a stark difference between the international role of Narita and the largely domestic role of Haneda. In Paris there is clearly only one hub with Charles de Gaulle playing this role - Orly is almost exclusively a point-to-point domestic and short haul airport. In Moscow, which has two main international airports, neither is a hub, other than for domestic transfers. All else held equal, even world cities pay a price in direct connections for the lack of a successful hub. Thus New York is four times the size of Frankfurt yet has fewer direct long haul routes.

Having two hubs in one area splits the value of the network. The bigger networks become, the stronger they become. Each destination served by the hub contributes transfer passengers who then help to make other flights viable. Splitting the hub halves the pool of transfer passengers available for marginal routes and additional frequencies.

1.2.1.3 Hubs versus point-to-point

Our views on aviation models do not mean we oppose more runway capacity at other airports.

We welcome competition and support all point-to-point airports being allowed to grow and flourish alongside ourselves. The case for Heathrow does not require capacity constraints or capacity regulation elsewhere. However, we are different to point-to-point airports. Our proposal for a future Heathrow is different. Heathrow is a hub and serves mainly long-haul business destinations, whereas point-to-point airports serve mainly short-haul and leisure destinations. While serving business and leisure destinations is important, capacity at a point-to-point airport is no substitute for another runway at Heathrow.

Heathrow needs capacity urgently. The Interim Report estimates the UK's hub reached capacity limits in 2010. We have seen the impacts on our networks for at least this long – we have been losing our relative advantage versus European competitors in destinations served for a decade.

Having two successful hubs in London is not possible as splitting the hub would half the pool of transfer passengers. Gatwick's proposal for a two-runway airport in the south-east would not deliver a UK hub with the size and scale to compete internationally. It will not provide the long-haul connectivity on which future jobs and growth depend. The UK will end up with two constrained hubs or two failed hubs rather than one constrained hub. The UK needs one premier airport, not three, second-tier airports.

Far better is that we allow the London Airport System to flourish; foster specialisation that supports competition between models and ensure UK residents benefit from a world class hub and successful point to point airports. As demonstrated by Frontier Economics, consumers benefit the most if both Heathrow and Gatwick are free to compete¹⁰.

1.3 Why hubs matter

1.3.1 Hubs make long-haul work

The success of the hub model for long haul flying is not an accident of technology, airline history or chance. The network model emerges from underlying demand. Longer distances mean that global demand for long-haul travel is much lower than for short-haul. Long-haul travel makes up just 12% of total air travel. On average, the demand between two cities requiring a long-haul flight between them is one seventh of that between cities requiring a short-haul flight. New connections usually occur once airlines assess that a new connection or an additional frequency can deliver a favourable yield. At a hub airport connectivity is not only determined by local demand but also by the transfer traffic on each route. Hubs enable this thinner demand to be pooled, such that there is the critical mass to make a route viable. The same is true of freight. Hubs make these long-haul routes viable by combining local demand with transfer traffic. Price sensitive transfer passengers allow all airlines to 'smooth' volumes thereby enabling high load factors across all hours of the day, all days of the week and all months of the year. Airlines smooth out the variability of origin-destination demand.



1.3.1.1 How does the long-haul network model work?

Network carriers use the scale effects of hubs to make their services viable. A hub's scale and connectivity are self-reinforcing. For example:

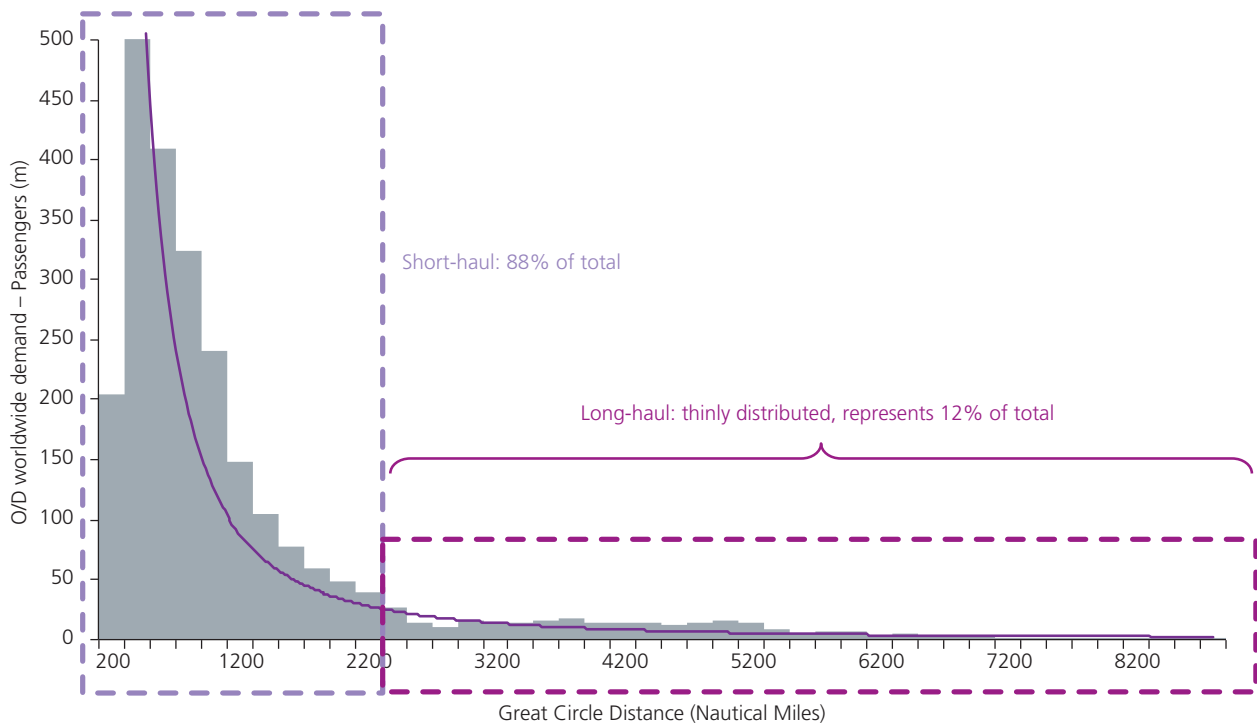
- One hub with 200 city destinations connects 39,800 origin and destination city pairs
- Two hubs with 100 city destinations each connect 9,900 city pairs – in total 19,800 city pairs¹¹.

Hence one new route at a large hub like Heathrow makes many more new connections than adding the route at a smaller airport, in turn making the route more viable.

Figure 1.3 shows that on a global basis, long-haul accounts for only 12% of worldwide passenger routes (short-haul routes account for the other 88%)¹². Only 10% of these long-haul routes are actually served by direct flights¹³. For example, a passenger originating at Manchester with a final destination of Accra will route via Heathrow. The lack of demand for the Manchester-Accra journey makes a regular, direct service unviable. This is true at almost any cost structure. Therefore, new aircraft will not fundamentally alter the equation. Making long-haul routes viable requires network airlines to consolidate the demand on the other 90% of origin-destination routings that passengers are travelling.

1.3 Why hubs matter

Figure 1.3: Origin-destination worldwide demand by Great Circle Distance

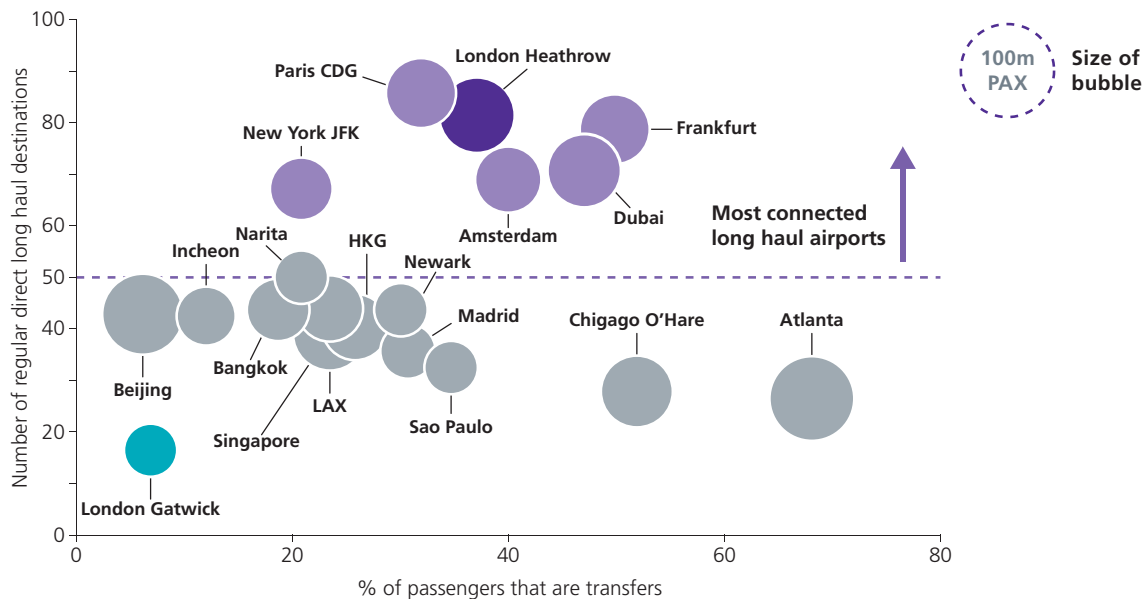


Taking Heathrow-Mexico City in 2012 as an example, the route offered a daily service throughout the year that carried passengers travelling on 1,121 different origin-destination routings. Similarly, Heathrow-Dallas was served four times per day, carrying passengers travelling on 7,532 different origin-destination routings¹⁴. Splitting the hub would radically reduce these possibilities. The pooling and smoothing of demand from thousands of routings to make a long-haul route network viable is in stark contrast to the point-to-point short-haul model, which focuses on a single origin and destination pair. The thin nature of long-haul demand means that scale hubs are necessary to pool demand and make routes viable.

The combination of low demand and larger aircraft make extensive long-haul direct connectivity relatively rare. Only six of the world's airports are able to offer regular, direct, long-haul services to more than 50 destinations – Heathrow is one of them (Figure 1.4)¹³. The smaller demand and the greater number of seats to fill on larger long-haul aircraft mean that demand must be gathered from both a strong local catchment and transfer passengers. Heathrow has both of these. No other UK airport has the potential to play in the 'Premier League' of hubs.

1.3 Why hubs matter

Figure 1.4: Best connected long-haul airports



1.3.1.2 Creating more economic long-haul routes

Evidence from the last decade indicates that fewer, larger network carriers are increasingly focusing their long-haul operations in fewer, larger intercontinental hubs. For example, the five major European hubs – Paris, Amsterdam, Frankfurt, Madrid and Heathrow – have added an average of 13 regular long-haul routes each (net) since 2003. Over the same period, the rest of Europe’s 25 biggest airports added an average of only three regular long-haul routes each¹⁵.

A recent Organisation for Economic Co-operation and Development (OECD) discussion paper provides a useful analysis of hubs¹⁶. This finds that bigger hubs deliver disproportionately greater connectivity (see Figure 6 of the paper), stating¹⁶:

“In general, hubs reduce time travel costs for consumers by providing more direct and more frequent links, with the main distinguishing effect being present in the supply of direct long-haul connectivity. By providing connectivity to transfer passengers, hubs generate connectivity for local consumers. These connectivity advantages for local and connecting passengers tend to get bigger when hubs grow larger. They increase in a non-linear way. One large hub generates more connectivity than the sum of two hubs of half the size.”

The OECD publication states:

“A strong path dependency is present in the development of hubs over time: there are clear cost, demand and connectivity advantages for the hub carrier to add new flights to an already established hub. Every new flight to the hub generates an increasing number of connections via the hub.”

The OECD publication assesses the relationship between the size of the metropolitan population and the level of connectivity delivered. They find that,

“For London, this means that the airport is underperforming in long-haul connectivity relative to its local market.”

This ‘underperformance’ in connectivity is the capacity constraint in action. The OECD’s analysis indicates that Heathrow ought to be operating to at least 20 more long-haul destinations – and probably many more given the scale of London’s population and Gross Metropolitan Product (GMP). This assessment aligns closely with Frontier Economics’ finding that there are 26 emerging market destinations with daily flights from other European hubs that are not served from Heathrow². The findings of both sources are strong evidence that London needs more economic long haul routes at a hub to compete in the race for global connectivity.

1.3 Why hubs matter

1.3.1.3 Alternative models are untested and uncertain

Alternatives to the hub model are often suggested but they are untested and uncertain. Alternatives usually rest on the idea that in the future hubs will be less important, especially for long haul flying. This is the case discussed in the Interim Report and proposed by Gatwick.

The argument for an alternative future builds on a number of changes or potential changes in aviation. Yet the case that these add up to a compelling alternative is uncertain at best. It is asserted that self-connecting passengers will by-pass networks and hybrid networks and point-to-point models are emerging. The evidence for this trend, rather than hybrid full service and low cost offers, is very scant. It is claimed that new aircraft, the B787 or A350 for example, will be “hub-busters”. For decades, new aircraft technology has been presented as the end of hubs. The proposition relies on a misunderstanding of the economic problem solved by hubs. This is why generations of “hub-busters” have largely reinforced networks to date. The evidence suggests they will end up doing so again.

Finally, new “low cost long haul” airlines are highlighted, with analogies made with the rise of short haul Low Cost Carriers (LCCs) since the 1980s. The prospects for these long haul LCCs transforming the industry on such a scale are dubious.

Technological and market change is inherently unpredictable. Some predictions made now will be wrong. The challenge is how to make long term choices in the face of inherent uncertainty. One approach is to look at the balance of probability. In this instance, alternative models might emerge, but the UK must judge the probability of them totally eliminating the role of hubs in the next 20 years. Another approach is to consider scenarios. Even if alternative models do overtake the hub completely by 2030, the location of additional airport capacity in the London system will be largely incidental. Capacity will be substitutable, competition intense and all will be able to benefit from the new economies. If this scenario does not play out, only capacity at Heathrow will allow the UK to continue to compete in both spheres. Anything other than allowing the hub to compete is a risky gamble with the UK’s position in world aviation.

1.3.1.4 Levels of self-connecting passengers are not material

The facts do not support the hypothesis that independent LCCs are becoming significant ‘feeders’ to long-haul airlines. Nor are we seeing ‘hybrid network’ players emerging. Numbers of passengers self-connecting from short haul LCCs onto network long-haul carriers will not grow to a material level for the following reasons:

- LCC success on short-haul means network carriers will continue to look for ways to reduce their costs, particularly on short-haul. The implied fare paid by long haul transfer passengers for the short haul leg is already extremely competitive compared to what an LCC would charge. This does not imply a merging of the point-to-point (P2P) and network business models. Rather, we are seeing hybrids of ‘low-cost’ and ‘full-service’, but not of P2P and network
- Some cite examples such as IAG’s acquisition of Vueling, or Lufthansa’s Germanwings, do suggest a hybrid type LCC/network model is emerging. Neither of these examples fits the model. IAG has been very clear that Vueling will continue to be a standalone LCC. Germanwings operates a point-to-point network that specifically does not include Lufthansa’s Frankfurt central hub. These developments again reflect cost pressures in the short-haul market, not a ‘hybridisation’ of the network model
- LCC schedules are necessarily too dispersed to provide meaningful levels of transfer passengers for long-haul. easyJet, for example, has 22 European bases¹⁷ and serves nearly five times as many destinations as British Airways, at a quarter of the frequency¹⁸. This is in stark contrast to the frequent, integrated schedule at a single hub – required to consolidate long-haul transfer feed competitively
- JetBlue, often referred to as a hybrid carrier, only connects with network carriers at the margins where it suits them to top-up demand. Only 0.5-1% of JetBlue passengers transfer onto another carrier at their largest bases (New York’s JFK and Boston Logan)¹⁴
- Most passengers will find ‘self-connecting’ difficult to book. Self-connecting is also unattractive, as they risk having to pay for a second long-haul flight if they miss their ‘self-connection’
- The relatively small numbers of LCC passengers who transfer today generally do so onto further short-haul LCC destinations, or long-haul charter type destinations such as Florida and the Caribbean.

1.3 Why hubs matter

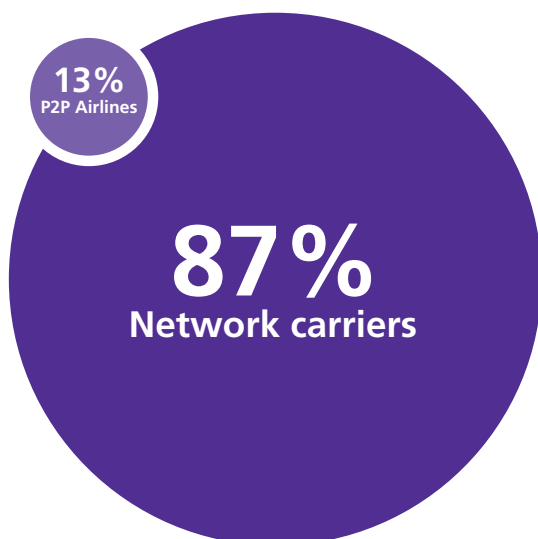
1.3.1.5 B787s and A350s will support rather than hinder the hub model

New, more efficient and longer-range aircraft represent important industry developments, but are unlikely to lead to the 'hub bypass' referenced by the Commission. In this, the industry is repeating a decade long cycle of new technology trumpeted as hub-busters only to end up as the workhorses of hub operations. These new, more fuel-efficient, longer-range aircraft support the network model in the same way they would help alternatives. Network airlines too will operate their existing network at lower cost and, critically, to better match aircraft type to the demand of a particular service by day of week, timing, season or route. Both hub and point-to-point airports would therefore experience benefits to connectivity provided by the introduction of new aircraft. However, the effects would be much larger at a hub than a point-to-point airport. This is because many more marginal, long-haul routes would become viable through the assistance of transfer passengers.

Heathrow has already seen evidence that aircraft such as the A350 and B787 have begun to strengthen rather than detract from the hub model.

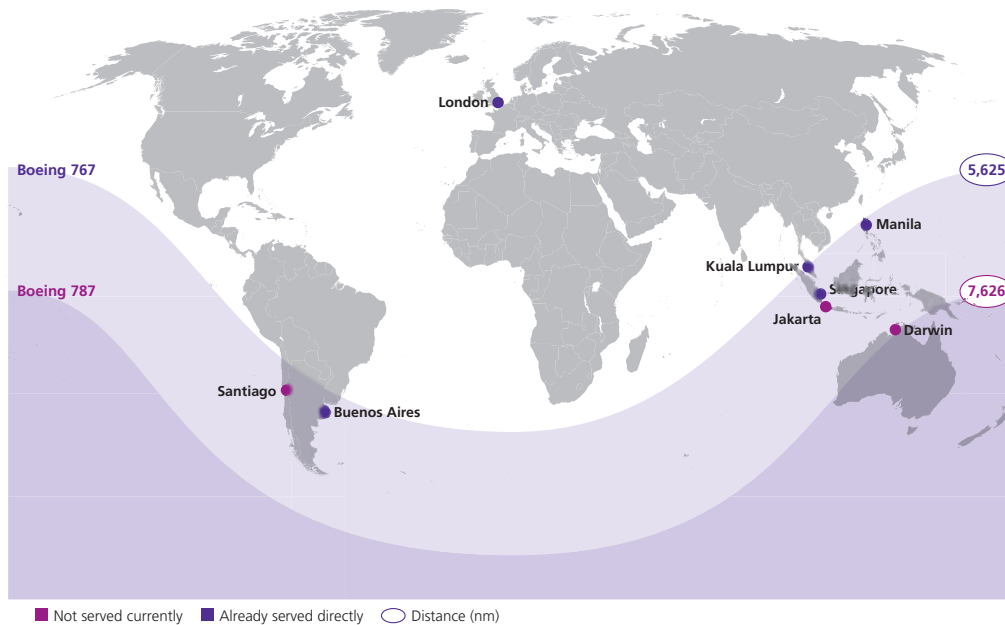
- Boeing has been taking orders for the B787 for ten years. Airbus has taken many orders for the A350 as well. Nearly 90% of the over 1,000 aircraft orders made have been placed by network carriers (see Figure 1.5)¹⁹. These carriers are not planning to use these new aircraft for 'hub bypass'. Quite the opposite - they are planning to use them to replace existing aircraft based at their hubs or add new services and destinations from their hubs.
- Heathrow already has nearly ten times more B787 departures than Gatwick.
- The contrast with LCCs could not be more stark. The world's largest LCCs, Southwest, Ryanair and easyJet, have some of the strongest balance sheets of any airline. They have over 300 aircraft on order worth £15 billion. Not a single aircraft is long haul, not a single order a B787 or A350.
- Seat numbers on these new aircraft types are similar to those on the aircraft they typically replace. The different versions of the B787 have 240-320 seats and the new A350 will have 270-350 seats. The Boeing B787 has similar number of seats to the B767 but fewer than the B777s. The new A350 has similar seat numbers to the existing A340²⁰
- This explains why B787s already in service today are primarily being used across the existing networks of network carriers. Again, there is no evidence of new 'hub bypass' routes. Heathrow already has nearly 10 times the number of B787 aircraft than Gatwick.
- The B787's increased range, relative to the B767 it typically replaces, does not bring that many new, serviceable cities into the range of a direct service from Western Europe. Most of the extended range lies over the world's oceans (see Figure 1.6). A high-level estimate indicates that 3 big new cities may become viable from London by a network carrier. None of these cities have a home-based network carrier and, as a result, British Airways would be the only airline likely to consider operations²¹

Figure 1.5: 90% of B787 orders are from network carriers



1.3 Why hubs matter

Figure 1.6: 787s would allow the UK to connect to three new cities



IAG is already operating a number of B787s. IAG CEO Willie Walsh has already expressed this view on the use of next generation long haul aircraft:

“There has been a lot of discussion about aircraft like the 787 Dreamliner...In the British Airways case the first eight aircraft were designed as replacement aircraft, so they will immediately replace aircraft that are currently operating. They therefore will primarily operate on routes that are already being served. The next batch of aircraft will then be used to expand our long-haul network. The expansion that we are looking at, principally to Asia and to Latin America, will require transfer traffic. So although those aircraft are much more efficient than the aircraft they are replacing, they will still require a hub airport to support the destinations that we are looking at. The vast majority of airlines that have ordered these aircraft are traditional hub operators and are likely to use them to replace existing aircraft but to operate out of their hub airports.”²²

British Airways has recently launched a new long-haul route from Heathrow to Austin Texas using the new Boeing 787 Dreamliner. This demonstrates that more efficient aircraft do not change the paradigm – they just shift the visibility threshold for individual modes¹⁰. The success of this route will be driven by the better operating economics of the aircraft, but equally by the ability of the hub to support loads with transfer traffic. There is no doubt that such a route would not be viable on a standalone basis.

1.3.1.6 Low-cost long haul is unproven

Following high-growth in the mid-1990s, Europe’s low-cost airlines have grown to account for a third of all European air travel. Their growth is now slowing. There are fewer new places to fly. Network airlines are defending their business by offering cheaper fares on short-haul routes. For example on some of its short-haul services, British Airways is offering hand luggage only fares and is planning to reconfigure cabins to take out business class seats.

Increasingly, more LCCs are flying to primary airports, moderating their ultra-low prices. Both easyJet and Ryanair have also begun to target business travellers and are offering services like priority boarding.

1.3 Why hubs matter

As growth slows in short-haul, some see an LCC revolution on long-haul routes. This appears superficially plausible. But the LCCs do run up against structural issues transferring their business model to long haul.

Any significant LCC diversification from the point-to-point model into long-haul operations is not commercially viable. This is because point-to-point and network models are structurally different. The point-to-point model is not competitive for long-haul because:

- Factors driving the cost advantages of LCCs on short-haul are physically harder to replicate. Fuel is 50% of long-haul costs – so cheaper labour costs make less impact. Faster turnarounds make for less difference to aircraft utilisation since planes spend longer in the air. Simplicity in fleets is harder to maintain with a mix of short and long-haul aircraft.
- Compromises customers will accept on short-haul service are less effective on long-haul. Seats cannot be squeezed together tightly. Business class offers are more important. Generally demand for long-haul travel is far less price elastic than for short-haul. Simply cutting fares has more muted effects on volumes.
- Sufficient demand remains the great hurdle for most long-haul, non-seasonal routes. If LCC's are to aggregate demand they need to move towards transfer feed. To date less than 4% of LCC passengers transfer, versus 30%-50% of those in integrated networks with through ticketing, bags and end-to-end network pricing models.

In reality, any LCCs choosing to re-focus their businesses on feeding long-haul would be exposing themselves to high commercial risk. There is a significant operating cost implications in doing this – for example through passenger and baggage connection handling costs, integrated sales systems, and the slower turnarounds that result in lower aircraft utilisation. These costs would leave these LCCs uncompetitive compared to pure LCCs.












These factors all help explain why, despite numerous attempts over decades, low cost long-haul has struggled. Examples include:

- Laker Airways – which famously began flights from Gatwick to New York's JFK airport in 1977. The Skytrain service did not include meals or drinks, making it the first 'no frills' airline. Its introduction led to a price war between the major airlines. Skytrain itself went bankrupt by 1982;
- Oasis Hong Kong – forced to withdraw its low fare service to Hong Kong from Gatwick in 2012, due to losses. Despite undercutting rival carriers it was unable to fill the flight;
- Malaysia's budget airline Air Asia X – which introduced a service to Kuala Lumpur from Stansted. Despite being able to obtain self-connecting passengers from sister company Air Asia in Kuala Lumpur, it was eventually relocated to Gatwick and then withdrawn entirely following substantial losses;
- Zoom – Canada's low fare scheduled transatlantic airline based out of Gatwick, which operated between Canada and the UK. It went into administration in 2008 following significant financial losses;
- Virgin Atlantic, Continental, British Airways and Delta have also all tried - and failed - to make cheap flights work between Gatwick and New York.

In both 2008 and 2013, Michael O'Leary mused that he would like to commence transatlantic flights with £8 fares. However, these plans have never materialised. All of Ryanair's orders are for short-haul aircraft.

1.3 Why hubs matter

Figure 1.7: History of Hub-busters

Decade	New aircraft	New players
70s/80s Tristar 200 DC-10		
		
90s/00s B767-300 B767-400		
		
2010s B787 A350		
		

1.3.1.7 The limits of long-haul, low cost services

Some will point to Norwegian (Air Shuttle) starting long-haul, low-cost services to the US from Gatwick using the new Boeing 787 aircraft as the example which will break through. Norwegian claims that it can make these flights viable through the lower cost associated with operating B787s. Norwegian has a formidable track record of innovation and success. However, as other airlines introduce the same type of aircraft in similar markets (for example, British Airways and United Airlines are already using B787s on North Atlantic services) Norwegian will be faced with tough competition.

On present plans, even if Norwegian were to succeed long term, it would be far from a revolution in the model for long-haul air travel. The volume of traffic to North America is vast. Norwegian, with its two- or three-weekly frequencies on an aircraft with a modest 291 seats, will at best capture less than 1% of the total market to a small handful of destinations.

The real test will be whether Norwegian is able to successfully build up frequencies on each route beyond daily, on a profitable, year-round basis. The North Atlantic market is highly seasonal. In winter much lower prices will be required to fill seats, as well as great efforts to obtain self-connecting feed traffic from short-haul services.

Norwegian's own short-haul network at Gatwick has limited potential to provide profitable feed. The majority of services are from Scandinavia from where it also offers direct transatlantic services. The rest of its services are principally to low-frequency Mediterranean destinations, many of which will not connect to its US operations. It will be difficult to obtain feed from the principal short-haul competitor at Gatwick, easyJet, without losing price competitiveness. This will be compounded by easyJet's stated unwillingness to deviate from its successful point-to-point model.

1.3 Why hubs matter

Other elements of the Norwegian model are untested.

Observers have been cautiously sceptical. A recent financial analyst report states:

“We remain open minded on whether Norwegian can make long-haul low-cost work – at this stage, we are unsure. We admire the resolute focus on cost and see logic in the network choices. But we see the project as vulnerable to operational issues, vulnerable to competitor response, as well as fuel and foreign exchange market²³”

IAG CEO Willie Walsh also stated:

“For us, Norwegian doesn’t really change the dial at all. We don’t see any impact from Norwegian. I think the fact that Ryanair hasn’t done it tells you a lot about the challenges that Norwegian will face. Because without question, Michael O’Leary is the most formidable character in the industry and probably one of the smartest. And he recognises that to make money operating on the transatlantic, it’s going to be incredibly difficult... I always show respect to competitors, but I think he’s got a real challenge to make it work.”

New models may emerge. It is good for consumers that they are attempted. But the alternative low cost, long-haul model is highly uncertain. The test before the UK gambles its future aviation industry on such a model has to be if the balance of probability suggests it will sufficiently overtake the existing models to negate their importance.

Scale matters in this competition. Global hubs typically have around 750,000 ATM capacity. A three runway Heathrow delivers that. Yet it is not just runway slots. It is the long-haul network – Heathrow is only one of six hubs with over 50 routes now. We can build that to over 120. It is cargo – where Heathrow is 15 times the size of Gatwick. It is airlines – where over 80 airlines and all major alliances fly to Heathrow already. It is over £13 billion in assets already at Heathrow, many specific to a global hub. Scale is represented in an investment grade credit rating for what is already a top 5 sterling bond issuer. It is represented in the ability to deliver major, world-class infrastructure – more than the entire rest of the UK airport sector combined.

An argument that building a globally competitive hub creates over dependence on one option misses the point. Britain does not have to choose between a hub and point-to-point airports. But we do need to choose if we want to compete to be one of the few nations that have a hub. If we want the benefits a hub brings we need a competitive option. An option with a head start in the race.



1.4 Direct flights support economic growth

1.4.1 Scenarios for growth

Direct air connections support economic growth. They are now more essential than ever. UK businesses trade 20 times more with emerging markets with daily flights than those with less frequent or no direct services². Continuing to have one of the world's best connected hub airports in the UK is vital to economic growth.

By 2030 there is expected to be significant growth in the number of long-haul destinations served by the world's top international airports. Heathrow's future could play out in two scenarios. In the first scenario, Heathrow remains constrained, with the number of long-haul destinations declining as the frequency of thicker trunk (main) routes increases. This would cause Heathrow to fall from being the leading international airport in the world to being ranked outside the top 10 (see Figure 1.8). Likewise Gatwick which used to be ranked number 7 in 2005 has fallen out of the top 10 and has continued to decline given the rapid growth of international hubs. This scenario would have serious adverse implications for UK connectivity, the UK economy, passenger choice and fares. Above all it is a scenario where the UK is losing the race to maintain its hub aviation status.

Figure 1.8: International passengers by airport in 2005, 2015 and 2030

	2005	2015	2030
1	Heathrow	Dubai	Dubai
2	Charles de Gaulle	Heathrow	Istanbul
3	Frankfurt	Hong Kong	Hong Kong
4	Amsterdam	Charles de Gaulle	Incheon
5	Hong Kong	Singapore	Singapore
6	Singapore	Amsterdam	Kuala Lumpur
7	Gatwick	Frankfurt	Bangkok
8	Narita	Bangkok	Amsterdam
9	Bangkok	Incheon	Charles de Gaulle
10	Dubai	Istanbul	Frankfurt

In the second scenario, Heathrow's capacity constraint is removed. Analysis of worldwide route demand and benchmarking against our airport peers leads us to estimate an unconstrained Heathrow would be able to regularly serve 102 long-haul destinations today in 2014. This is 20 more than Heathrow currently serves, including likely destinations such as: Kochi, Jakarta, Bogota, Harare, Santiago, Lima, Mombasa, Durban, Osaka, Ho Chi Minh City and Thiruvananthapuram (India)²⁴. Heathrow would also enable expanded connectivity to new cities within the developed world such as: Indianapolis, Portland, San Antonio, Adelaide, Brisbane, Christchurch, Perth, San Jose, St. Louis, Wellington, Salt Lake City and Cincinnati.

If this scenario is extrapolated to 2030, 122 long-haul destinations would be regularly served – a further increase of 20. These could include Astana, Hanoi, Caracas, Baghdad, Kabul, Quito, Lilongwe, Belo Horizonte, Nagoya, Khartoum, Porto Alegre, Tashkent, Port Harcourt, Peshawar, Fukuoka, Krabi, Penang, Chengdu and Fuzhou. Destinations alone do not capture all the advantages of a growing hub. In addition, new frequencies and services would become possible to existing destinations, boosting growth and trade with existing links.

1.4.1.1 New connections create growth

These conclusions are supported by a study undertaken by Frontier Economics that draws the following conclusions²⁵:

- By 2030, the expansion of Heathrow could facilitate 40 new connections for London
- Of these 40 new routes, 15 are likely to grow sufficiently quickly to become frequent connections
- In addition, there are 21 routes – currently served less frequently – that could expand to provide frequent connections by 2030 given sufficient airport capacity. All these routes connect London to emerging economies

1.4 Direct flights support economic growth

- Passengers' choice of connections is increased to a much greater extent by expanding Heathrow than to expanding Gatwick. A Heathrow expansion is likely to enable almost six times more new direct connections than an expansion of Gatwick, while frequent connections would be three times higher
- Expanding Heathrow would lead to a much higher level of connectivity to high growth economies than expanding Gatwick Airport. New connections from Heathrow are mainly to high growth emerging economies such as Jakarta (Indonesia), Quito (Ecuador), Lima (Peru), Caracas (Venezuela) or Mombasa (Kenya). In contrast, new connections at Gatwick are mainly to holiday destinations such as Kefalonia (Greece) or Izmir (Turkey)
- The impact of Gatwick expansion on connectivity would be improved marginally if the introduction of lower-cost long-haul aircraft makes long-haul flights viable at a lower passenger threshold. Even in this scenario, the network advantages hub mean the airport would be well placed – if not better – to take advantage of the opportunities created by efficient long-haul aircraft
- Frontier considered it unlikely that Gatwick would develop as a second hub – effectively splitting the London hub between two sites. If it did succeed the impact on connections would improve much less than if expanding a single hub connection. A split hub would be unlikely to produce any net growth in connectivity

Using the list of new destinations to which an expanded Heathrow or Gatwick could connect indicates that Heathrow would enable the UK to link to destinations with 10 times higher GDP than an expanded Gatwick. New connections from Heathrow would create direct connections to nearly \$3 trillion of additional GDP compared to just \$300 billion at Gatwick^{24, 26}. Expansion of Heathrow would connect the UK to the majority of the world's leading cities with a combined GMP of \$24 trillion (more than 70% of global city GMP, up from 50% today)^{26, 27}. It is Heathrow that connects the UK to growth.

These direct flights are vital for continuing to connect the UK to growing economies, offering several potential mechanisms to drive the UK economy:

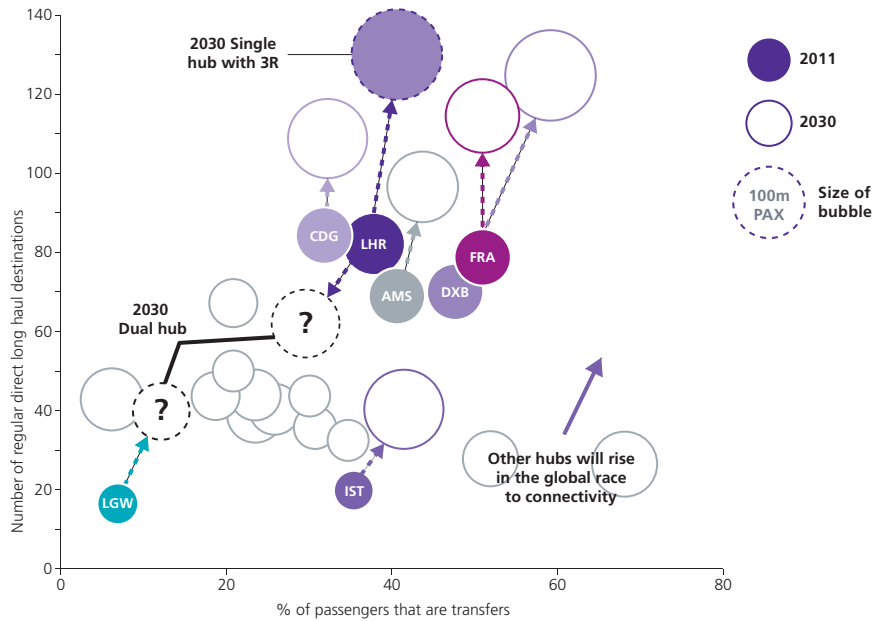
- Opening up multiple new business opportunities
- A source for cheaper raw materials
- New import and export partners
- A source of inbound tourism (particularly given rapid growth in middle-class incomes in emerging markets)
- Outbound leisure destinations for UK residents.

This analysis shows the stark choice faced by the UK. It can either add single hub capacity and win or delay and lose out to competitor countries. Standing still is not an option we can either add capacity at a single hub and maintain the UK's 'Premier League' global hub status while adding regular direct connections to the UK regions and 40 more long-haul destinations – or we can slide into the second division (see Figure 1.9).



1.4 Direct flights support economic growth

Figure 1.9: Future scenarios in 2030²⁴



1.4.1.2 More competition and choice for passengers

Capacity at Heathrow results in more competition and choice for passengers from London. When AeroMexico was unable to gain slots at Heathrow, it didn't fly to Gatwick instead. Spare capacity at Gatwick did nothing to introduce competition and choice on the Mexico route. Instead, British Airways remained the only carrier serving the route. After four years of trying, AeroMexico was eventually able to gain slots at Heathrow. Capacity at Heathrow created competition for British Airways on the Mexico route and more choice for passengers.

Capacity at Heathrow also results in more competition and choice for passengers from UK regions. Those travelling from Inverness to Beijing currently have no choice other than to travel via Amsterdam to reach their final destination. This is because regional flights have been squeezed out of Heathrow as slots do not exist. Having spare capacity at Gatwick or Stansted has done nothing to give passengers from UK regions an alternative route. If Heathrow had spare capacity, then passengers would have an alternative hub through which they could travel.

Expanding Heathrow would also create the capacity to connect to a number of routes within the British Isles, for example: Exeter, Cardiff, Newquay, Liverpool, Jersey, Inverness and Humberside (see Figure 1.10).

1.4 Direct flights support economic growth

Figure 1.10: Heathrow's current and potential regional connectivity



Connecting ten UK regional airports with an average of three services each per day, and connecting 40 more long-haul destinations with a daily service requires 50,000 ATMs (Air Transport Movements) per year. This represents about 20% of the full potential of additional ATMs offered by a third runway. The remaining 80% of additional capacity would be used over time to improve connectivity via increased frequencies on existing long-haul routes and across the short-haul network.

1.4.1.3 Improving regional connectivity

Heathrow will actively work with the Government to find solutions to maximise flights from the UK's regions. It is airlines that choose which routes to fly. EU rules constrain what government and airlines can do. However we believe with capacity we can help develop these links.

A survey of UK businesses, large and small, (see Figure 1.11) shows strong support for an expanded Heathrow from all over the UK²⁸:

- Yorkshire and the Humber:**
"As part of one of Europe's largest toy manufacturers, we would benefit significantly from the improved connectivity that an expanded Heathrow would provide."
 Richard Belford, Sales Director, Simba Smoby UK

1.4 Direct flights support economic growth

- **East of England:**
"Our business relies on Heathrow to gain access to its core market of Saudi Arabia and, as more countries look for a reliable and healthy source of protein, our business will need access to further markets in order to expand."
Nick Chandler, Managing Director, HiBreeds
- **London:**
"Octink heavily benefits from our proximity to Heathrow, with expansion of the airport presenting significant new opportunities for us to grow."
Mike Freely, Managing Director, Octink
- **South East:**
"As the BRIC markets continue to grow, our business will become increasingly reliant on the destinations that a hub airport supports."
Martin Corr, Managing Director, Sound Moves UK
- **South West:** *"The business is dependent on Heathrow to access overseas markets, with increased hub capacity presenting great opportunities to grow."*
Steve Cardew, Managing Director, Kawasaki Precision Machinery UK and Chair, Plymouth Manufacturing Group
- **East Midlands:**
"While based in Leicester, our clients are from all over the UK, with many of them relying on Heathrow for access to international markets."
Pete Miller, Partner, The Miller Partnership
- **North East:**
"The unpredictable nature of our future market means we require the extensive connections an expanded Heathrow could provide."
Alan Richardson, Contracts Manager, Hart Door Systems
- **North West:**
"The School relies on Heathrow to attract students from across the world, with new routes to China and the Far East vital for our future expansion."
Anna Goodband, Principal, Liverpool School of English
- **West Midlands:**
"Heathrow is Bureau Veritas' airport of choice for connecting our UK business to our global network. An expanded Heathrow would create significant benefits through improved connectivity which would ultimately improve our global offering."
Paul Barry, Chief Executive: North West Europe, Bureau Veritas
- **Northern Ireland:**
"Our business uses Heathrow on a daily basis to connect the Belfast office with the rest of the world. Expansion would create easier connections to emerging markets in the Gulf and Asia Pacific regions."
Kiara Seymour, Partner, Pinsent Masons
- **Wales:**
"While our business is based in North Wales, we would welcome the expansion of the UK's hub airport for the wider economic benefits it would bring to our region."
Tracy North, Managing Director, Outwrite
- **Scotland:**
"As a global business headquartered in Glasgow, we rely on the routes available from Heathrow to connect our worldwide business network."
Angus Cockburn, Chief Financial Officer, Aggreko plc

1.4 Direct flights support economic growth

Figure 1.11: UK Businesses²⁸



1.5 Britain as a competitive hub

1.5.1 Competition between hubs

Given the opportunity for growth described in the previous section, countries around the world are competing fiercely to host successful global hubs. The choice for Britain is who is best placed to represent us in a competitive race against France, Germany and Holland. Heathrow is our only global hub airport, and the only airport with the size and scale to compete.

1.5.1.1 Consolidation creates hub winners

The aviation industry has seen a trend to liberalise and consolidate which is likely to continue. Hub airports have seen a consequent trend to consolidate and compete over wider markets²⁹.

These increasingly larger hub operations create competitive advantage for both the hub airlines, the airport and the host country. For airlines, economies of scale and scope make them the most efficient and competitive way of connecting many different destinations. More destinations can be served directly, more frequently and at lower cost which in turn make it a better hub to transfer through.

For the airport, rising volumes can fund investment. For the host nation, connections through the hub drive the economy, making it a more important destination in its own right. For example, witness the rise of Dubai, Singapore or Incheon in recent decades. In essence, a large hub and connectivity are self-reinforcing.

Four trends in the aviation industry will continue to drive this evolution.

Firstly, continued growth of alliances will lead to larger alliances. The three alliances (oneworld, Star Alliance and SkyTeam) now cover nearly 60% of global capacity. They are increasingly supported by Joint Ventures (e.g. BA/AA or VS/Delta)³⁰, code shares and operational co-operation. Alliances continue to grow. Recent examples of alliance growth are Garuda joining SkyTeam (2014), and Avianca Brazil (2014) and Air India (2014) joining Star Alliance. Additionally, Malaysia (2013), Qatar (2013), Sri Lankan (2014) and TAM airlines (2014) either have joined or are scheduled to join Oneworld.

Secondly, there is business consolidation leading to fewer and larger network carriers. The larger carriers are concentrating their operations at fewer and larger intercontinental hubs. Lufthansa operates 65% of the slots at its home hub, Frankfurt. Air France / KLM have 59% at its hub in Paris and 58% at its hub in Amsterdam. British Airways has increased its share of slots at Heathrow from 37% in 2000³¹ to 51% today, and Iberia holds 50% of the slots at Madrid³².

Consolidation then leads to the decline of smaller hubs and concentration of airlines at larger ones. For example, the American Airlines merger with US Airways will lead to their downscaling hub operations, most likely in Cleveland and Phoenix, in favour of concentrating larger operations in Charlotte, Dallas and Philadelphia. In Europe, examples of concentration include the relative declines of Barcelona, Malpensa, Brussels, and Zurich.

Finally, this consolidation of airlines and airports will be particularly evident through the integration of EU carriers in the highly fragmented European space. EU carriers will likely approach consolidation levels seen in the USA. The top five US carriers hold 82% market share versus an EU share for the top five of 52%³³.

1.5.1.2 Britain's competitors are investing in the hub model

Competitor countries have realised the importance and value of hub airports. As a result, they are clearer on pursuing the strategy and much better prepared than the UK. European hub airports – Paris, Frankfurt, Madrid and Amsterdam – either already have or are committed to developing plans for enough runway capacity to serve an average of around 700,000 flights per year each. That is about 50% more than Heathrow³⁴ in current maximum. In Amsterdam and Paris, the governments are clear that the airport, and the connectivity it provides, is a critical part of growing their economy³⁵.

Dubai is just opening its new Dubai World Central airport, and though it will not become fully operational for some years, Dubai's leadership is clear the airport is designed as a globally competitive, integrated hub. Dubai Airport CEO Paul Griffiths asserts it is not intended for the new facility to compete with the existing airport: *"We might end up with a situation where two give you less capacity than if you concentrate all your operations on a single airport. If that turns out to be the case, clearly we won't be operating two."* (quoted by Bloomberg,

1.5 Britain as a competitive hub

September 2013). Home hub carrier Emirates will not split its operation over two airports, but will move its entire operation to the new airport sometime after 2020. Also in the Gulf, Qatar is opening a new Doha Airport to replace its predecessor and in Abu Dhabi, the existing airport is being expanded explicitly as a hub³⁶.

Istanbul's Ataturk hub airport has seen demand outstrip capacity in recent years as Turkish Airlines has emerged as a successful hub airline. Turkish has rapidly created new routes and connections with the support of the Turkish government. The city's second airport, Sabiha Gokcen, provides overspill but only for short-haul point-to-point services. The intention is to build a new hub airport with an initial capacity of 90 million passengers, rising ultimately to 150 million.

Fast growing airports are spending the most on their infrastructure. This growth is often driven by a strategic choice to pursue a 'hub model' airport, with attendant facilities and scale to attract network carriers and transfer passengers. For example, the Gulf countries are investing more than \$40 billion in airport development to help manage a surge in passenger traffic³⁷, driven by six major airlines. This includes the following spend on hubs over the next 5 years:

- \$11.1 billion supporting Doha's development³⁸
- \$8.1 billion to develop Dubai World Central (the new airport is estimated to cost \$33 billion by completion)³⁸
- \$7.6 billion supporting an extension to Dubai International³⁸
- \$6.8 billion for Abu Dhabi's development (including a new \$2.5 billion on a new terminal)³⁸
- €22 billion for a new airport in Istanbul, phased to open 2018³⁹

Mature hubs around the world, including Heathrow, Singapore, Amsterdam, Charles de Gaulle, are typically spending around \$1 billion per annum. These numbers illustrate that the scale of capital investment required to support hubs is typically far greater than point to point airports.

Investment in hubs around the world is making their proposition more favourable to transfer passengers and increases their connectivity. Unless Heathrow is allowed to expand the UK's connectivity will continue to diminish and the UK will be permanently cut off from global growth.

1.5.1.3 London continues to compete with the best hubs

Yet despite the growing importance of Asia and the Middle East, the UK can win in the face for global connections and growth. In 2014, Dubai International has overtaken Heathrow as the world's leading international airport. For the first time in 350 years, London has lost its position as having the world's leading port or international airport.

London is one of the world's premier cities. We have all the attributes required to win the global race for direct connectivity. These include:

- An excellent geographic location for global aviation flows
- A strong local base of international demand focused on a large, productive, affluent, metropolitan area
- The home base for some of the world's major network airlines and alliances³²

London's excellent geographic location offers unique competitive advantages. These include:

- The best location for Europe-Americas traffic flows, which will continue to be important in the 21st century global economy
- Shorter direct routes to the Far East for the UK. It is about 40% further to fly from London to Beijing via Dubai than it is to fly direct, as shown in Figure 1.12⁴⁰. Shorter flights imply better end-to-end travel times, air fares and emissions
- Greater convenience for Europe-Asian traffic flows, relative to other hubs. For example, it is 900 miles further to fly from Beijing to Zurich via Dubai than via Heathrow
- A location where the peak waves of traffic fall during the business day rather than at night as in the Gulf. London's advantage in this is similar to its timezone advantage in financial markets where it overlaps with both Asian, European and North American centres

London's attractive demand base features:

1.5 Britain as a competitive hub

- With a Gross Metropolitan Product (GMP) of €390 billion, London is one of the world's most productive cities – well ahead of Paris (€190 billion GMP) and Amsterdam (€70 billion GMP)²
- A well established and sophisticated aviation market. London and the South East is the world's largest direct long-haul aviation market. This strong base of local demand forms the backbone of the hub, supporting a range of destinations and frequencies. It enables Heathrow to be at one end of six of the world's ten busiest intercontinental routes⁴¹
- A strong services sector – a sector with a high propensity for international air travel
- Accessibility to much of the world's potential transfer and direct demand, even with shifts in the world economy

Heathrow is within a 12-hour flight of 96% of the world's highest household disposable incomes, compared to just 63% from Dubai⁴². Western Europe will continue to be an exceptionally attractive location for a global aviation hub.

Figure 1.12: The position of the Middle East relative to Europe-Asia traffic flows is often misunderstood



The UK's existing home base for network airlines, alliances and a successful hub airport are also major advantages:

- Heathrow serves 82 airlines, all three alliances and all of the top ten network carriers in the world. Competition between them benefits the whole of the aviation market
- Heathrow continues to be one of the world's most commercially successful hubs despite a decade of capacity constraint. We can still win market share and hold our own on long hauls such as Europe or South Asia to North America. If the UK did not have a historic hub airport it would be urgently seeking to acquire a base such as Heathrow to give it entry to the race for connections and growth.

1.5 Britain as a competitive hub

1.5.1.4 Heathrow has the scale to compete for the UK globally

Heathrow is our only globally recognised hub airport. As recognised in the Commission's remit, the issue is how to maintain the UK's global hub status as an aviation hub. The debate should be about who is best placed to represent Britain in a competitive race against the world, not Heathrow versus Gatwick.

Heathrow has the size and scale to compete with Frankfurt, Paris and Amsterdam, not to mention the Gulf and beyond. Airlines want to fly to Heathrow. It has a proven ability to deliver long-haul business flights and much of the infrastructure is already in place, including world-class terminals, and existing or committed road and rail connections. It is best placed to represent the UK in the race for jobs and growth.



Economies of scale and the flexibility to handle long haul network carriers are crucial to be a winning hub. Heathrow's current operations illustrate this point. Our terminals and airside areas accommodate large numbers of a range of aircraft types from both the largest in the world such as the A380, the most modern such as the B787 and short haul aircraft such as the A320 family. Our buildings and systems can handle millions of long haul and transfer travellers, bags and cargo. We can facilitate the needs of network carriers – from full service lounges to alliance co-location. With nearly 90 airlines and the world's three largest aviation alliances, Heathrow is constantly evolving to meet changes in the aviation sector. In our time zone all night operation, the capacity for cargo only flights, or over a million ATMs capacity are not required to win as a hub. But sufficient capacity to allow network carriers to grow and operate an efficient network is needed. Global hubs typically have around 700,000 to 750,000 ATMs – as do all our European competitors. Only a three-runway Heathrow can offer Britain this scale.

1.6 Heathrow is the best option

1.6.1 Heathrow is the best option

Our proposals will see benefits for passengers, airlines, business and freight. Passengers will have more choice of airlines and surface access options to travel to Heathrow. Airlines will benefit from greater opportunities to grow and a more resilient airport. Heathrow will deliver more jobs, trade and economic growth and our freight operators will benefit from a more extensive route network and lower prices.

1.6.1.1 Heathrow is the best option for passengers

Expansion at runway at Heathrow will:

- Provide more flights to long-haul destinations
- Offer a greater choice of airlines
- Offer a more convenient journey for travellers to or from the UK
- Deliver a world class airport experience for passengers
- Mean lower fares in future compared to a two runway Heathrow or expanding at Gatwick.

Heathrow is in the right place for most passengers, offering a better choice of onward transport than any other option. It also has new, modern terminals built to operate as a hub, such as Terminal 5 and the new Terminal 2, which opens in June.

Greater choice of destinations

A third runway will increase the range of direct and frequent long-haul destinations available to passengers. Aviation capacity and new routes can be delivered more quickly using Heathrow's existing network strengths including more long-haul business passengers, more transfer passengers and more network airlines than any other UK airport. We estimate 40 new direct long haul destinations and new UK and European destinations will be offered from an expanded Heathrow by 2030.

Greater choice of airlines

Many airlines want to access slots at Heathrow and would fly to the UK if they could. For example, China Southern would have flown to the UK sooner had slots been available at Heathrow. Instead they flow to cheaper European hubs. Those that cannot access Heathrow do not automatically fly to another UK airport instead. A survey of scheduled airlines found that if there were capacity at Heathrow, 53% of flights that were relocated abroad would come to the UK, and 86% of airlines would run more flights to the UK5.

Greater choice of flights and potentially shorter journey times from UK regions

Many passengers in the UK can no longer choose to fly via Heathrow because domestic flights have been squeezed out, as capacity has become constrained. Heathrow offers flights to seven UK airports, while Amsterdam Schiphol has routes to 24. For some UK regions, the only available option is to fly to Amsterdam. Spare capacity at Heathrow would increase competition, giving UK passengers more choice and leading to lower fares and better service. Connecting via Heathrow would also reduce travel times for domestic passengers, in particular to North American, South American and many African destinations.

Greater choice of ground transport

Passengers travelling to a three runway Heathrow will have a wide choice of transport options available. Heathrow Express, Crossrail, London Underground, mainline rail, HS2, Western rail, Southern rail and road transport will offer access to the airport with a range of fares and service levels.

Closer to passengers' homes or businesses

The UK origin-destination 'centre of gravity' for business passengers using Heathrow, Gatwick, Stansted and Luton is near Denham in Buckinghamshire – just 10 miles from Heathrow⁴³. Expansion of any airport other than Heathrow would result in greater journey times for the majority of passengers.

World-class terminals

Heathrow would build upon the experience gained from delivering two superlative terminals in the design and construction of the new terminal - thereby providing three world-class terminals. Each will feature outstanding way-finding, environmental performance, ambience, facilities and retail offerings. Each terminal would have the latest in terms of innovation, including the highest levels automation (e.g. self-service check-in and bag drop, automated

1.6 Heathrow is the best option

ticket presentation, automated boarding, etc), and deliver a single passenger journey (e.g. way finding apps, smart terminal design, an integrated airside tracked transit system, etc).

Simpler integrated Heathrow

Partly by introducing extra runway and terminal capacity into the system, a third runway will reduce delays and disruption and improve the airport's ability to respond to adverse weather or unforeseen events. An additional access road to the central terminal area will also improve resilience. A more operationally efficient airport will reduce disruption, ensure consistency, reduce travel times and deliver a better overall passenger experience.

Lower fares through increased competition

The capacity constraint at Heathrow is already affecting fares for passengers. The additional cost on airfares will continue to grow in future. Frontier Economics has determined that expanding Heathrow would allow competition to lower fares for all passengers in the London airport system. In turn, this will make the UK an even more desirable destination for foreign, domestic and transfer passengers. This would be a source of additional tourism for Britain and also create a more competitive hub, enabling larger transfer flows, connections to more destinations, more competition and even lower fares.

The research by Frontier Economics that finds that:

- Removing the capacity constraint on Heathrow will deliver net benefits for passengers, even after accounting for the higher cost of construction.
 - Ticket prices at Heathrow would be £95 per return ticket or 15% of average fares lower today if there were no constraint. This is compared to £14 (or 7% of average fares) at Gatwick where there is less constraint on capacity.
 - By 2030, the fares at Heathrow would be £320 lower in today's prices (or 38% of the average fare) because of the increasing impact of capacity constraint. This compares to circa £40 at Gatwick (or 18% of the average fare) from new capacity there
 - Reductions in fares outweigh the extra costs to passengers of new capacity – the £320 saving at Heathrow comparing to under £20 per return fare extra cost for a net £300 benefit
- Ticket prices will fall significantly more from expansion at Heathrow compared to the impact through expansion at a point-to-point airport – as excess demand is substantially higher at Heathrow. Expansion, especially at Heathrow, will increase competition and lead to lower prices across the London Airport system. The greatest completion benefits come from expanding at both Heathrow and elsewhere.
- Findings are robust even in different scenarios, including Gatwick emerging as a second hub. It is unlikely that a point-to-point airport could expand as a hub airport, because hub economics rely on maximum connectivity. Even if this scenario were to occur, the benefits to passengers in choice of destinations and fares would be substantially less from expanding at Gatwick only when compared to expanding Heathrow

1.6.1.2 Heathrow is the best option for airlines

Ultimately airports don't offer flights, airlines do. Airlines choose whether the UK is connected to new destinations, or if they will increase frequencies to existing destinations. Heathrow's role is to support airlines by creating an environment attractive to passengers that airlines can use as a platform for growth.

Our proposal to expand will offer opportunities for airlines currently at Heathrow and new entrants. Capacity will mean that they can optimise their schedules in a way they cannot do today. Scale and growth will create a virtuous cycle of demand. A competitive hub specialised to meet network airline needs will facilitate profitable airline growth. For example airlines will benefit from less disruption, greater punctuality, a stronger catchment, lower MCTs and more efficient airfield, cargo and terminal facilities. Currently, 82 airlines currently operate out of Heathrow. A good number of these would like to grow their operations today, adding frequencies or destinations. Dubai is served by over 150 airlines today⁴⁴, about 70 more than Heathrow. This also shows the potential for new operations to drive growth at an unconstrained hub.

Network airlines and their alliances have always been attracted to Heathrow. If given the choice, airlines have chosen Heathrow over other alternatives. Perhaps the most dramatic example followed the Open Skies Agreement in 2008. Given the freedom to choose, airlines serving North America rapidly consolidated to Heathrow. Many other long-haul carriers have sought slots at Heathrow. When those slots have not been available they have either

1.6 Heathrow is the best option

decided not to serve the UK or struggled to maintain services at airports such as Gatwick. Demand for Heathrow landing slots outstrips supply and airlines will pay in the region of £10m for a pair of slots in the secondary market, even though free slots are available elsewhere in London.

Airlines have continued to express their interest in more operating capacity at Heathrow:

- All three of the world's airline alliances, Oneworld, SkyTeam and Star Alliance have stated their support for an expanded Heathrow as the solution to the UK's aviation capacity⁴⁵
- Star Alliance has said, *"This will allow us to effectively compete with the other alliances in Heathrow and add to the quality of our services. We do not see any opportunity for us to make a change to another airport"*⁴⁵;
- SkyTeam commented, *"relocating to another London or UK airport is not an option for our members"*⁴⁵;
- IAG's multiple submissions to the Airports Commission all categorically support Heathrow expansion^{46, 47, 48};
- Virgin Atlantic's CEO, Craig Kreeger has backed expansion of Heathrow, as it is what *"customers prefer"*. Kreeger said, *"I do not like one or the other. It is not me who is voting, it is the customers. But they want to go to Heathrow. When we moved routes to Heathrow it was better, as customers prefer Heathrow."* Kreeger also said Virgin Atlantic has been gaining about one new slot per year at Heathrow and was 'perplexed' by the UK's attitude to aviation and why expansion had not been decided on before⁴⁹;
- Virgin Atlantic founder Richard Branson also declared his support for a third runway, warning that Britain is in danger of *"slipping into the dark ages"* without additional capacity at Heathrow⁵⁰;
- Tim Clark, CEO of Emirates, has stated that London is still an enormous draw for passengers around the world. He also believes the decades of political squabbling over airport expansion has cost the UK and the UK's flag carrier, British Airways dear. He said, *"I said to Howard Davies, if you unconstrained Heathrow today, in 2014, where would it be if you allowed it to grow with a third and fourth runway? I said you'd be at 130 million [passengers a year] now, not 60 million to 70 million"*⁵¹ ;
- In its letter to the Evening Standard, Singapore Airlines has supported expansion of Heathrow Airport as the right solution. *"London needs Heathrow and Heathrow needs more capacity,"* Mak Swee Wah, Singapore Airlines' executive vice president for commercial operations.⁵²

More recently, other airlines have come out in support of Heathrow's expansion:

- Delta also commented in the Evening Standard, calling for more runway capacity at Heathrow. Perry Cantarutti (VP for EMEA) was quoted as saying *"Gatwick serves a purpose for leisure travellers, it has a viable traffic base, and given the size and complexity of travelling across London, there are clearly some people who prefer to fly out of it,"* Cantarutti added. *"But it's Heathrow that needs extra capacity; the reality is that business travellers prefer to go via Heathrow."*⁵³
- Rafael Schwartzman, regional VP president Europe for the International Air Transport Association (IATA) backed the expansion of Heathrow. He added that while many businesses are located in the nearby Thames Valley, there was a strong case to develop the hub so the UK can compete in the 21st century.⁵⁴
- Michael O'Leary, CEO of Ryanair has stated that the market should decide where and how additional runways should be delivered. He supports Heathrow expansion given it is the only airport in the South East that is constrained and has not been able to deliver on what the market believes should be expanded first.⁵⁵
- easyJet has stated openly that it would consider flying from an expanded Heathrow. Carolyn McCall, the chief executive of easyJet, said *"We fly out of Charles de Gaulle, we fly out of [Rome] Fiumicino, which is Alitalia's hub, we are the number two airline out of Schiphol, which is a hub,"* Ms McCall said, *"If it was right for us to fly out of Heathrow... we would consider flying out of Heathrow"*⁵⁶.
- The CEO of Etihad stated that *"If the national carrier [BA] decides it's more efficient to operate its main long-haul hub out of Heathrow, and feed it via A320s and narrow bodies, then so be it."* He also stated that *"A hub brings corporate traffic, brings leisure, and has a catalytic effect on the economy."*⁵⁷

Expansion and investment will never be certain or without risk. Demand may fluctuate with business cycles. Affordability is an issue. We are confident we are best positioned to provide capacity at an affordable price with the lowest proportionate impact on charges.

1.6 Heathrow is the best option

Underlying this, the commercial business case is clear. Airlines can foresee the greatest opportunities at Heathrow. Heathrow is the best choice for airlines.

1.6.1.3 Heathrow is the best option for business

A third runway at Heathrow will deliver more jobs, more trade and more economic growth. It will also serve more business passengers and support more freight exports. The airport's location is better for most UK companies, including connections to the UK nations and regions. It will connect the UK to more fast-growing markets and support more inward investment. Heathrow's plans will cost taxpayers less generating new business tax revenue too.

An airport for business

Above we outlined the characteristics that already define Heathrow as the key UK airport for business. Because it is the hub it offers 80% of the direct long-haul services in the country³. Because it is the hub it provides the largest 'port' by value for exports and imports in the UK. Expansion will magnify those advantages for business. A stronger hub will directly connect British businesses to 70% of the world city GMP^{26, 27}. Over 20 new long haul destinations should rapidly open up. Cargo capacity will eventually double. Prices for business travel and freight will fall. The catalytic effects of expanding the hub are striking for British business. £100 billion (in present value terms) of economic value will be created of which £50 billion will be benefits to the wider economy. 123,000 new jobs will drive economic growth across the UK⁶⁴. APD tax revenue alone could increase by £1 billion per annum. London and the UK will be reinforced as the premier location for inward investment in Europe – a title recently lost to Germany. Expanding Heathrow is the best option for British business because a global hub delivers precisely the economic activity to support UK competitiveness in the 21st century.

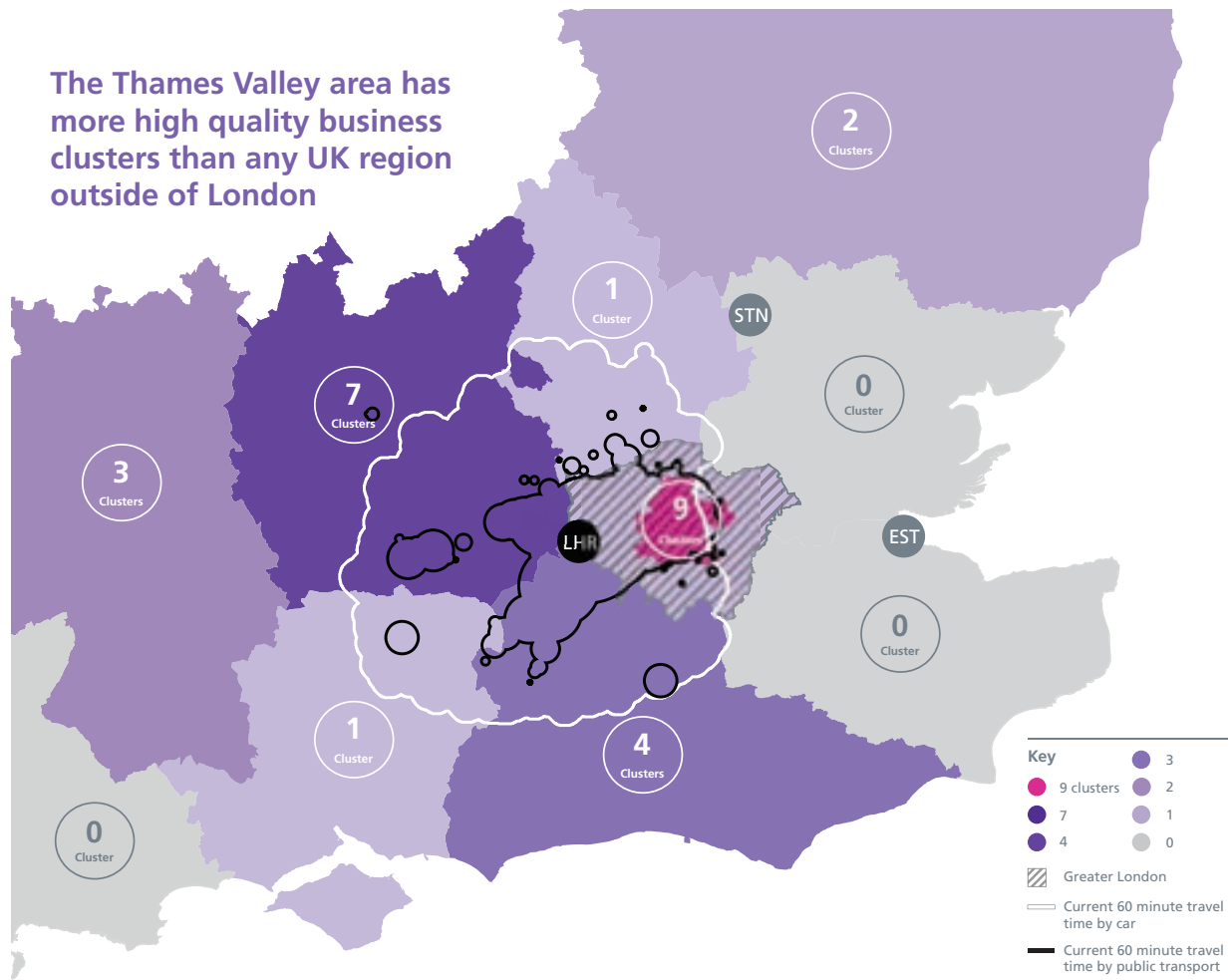
Best placed for the UK economy

An expanded hub at Heathrow will have the greater effect on UK business because of its location. Heathrow is ideally located for the largest economic clusters in our economy. In part this is because of the self-reinforcing effects of the hub's existence. Across the globe, countries are recognising the value for business of being close to the connections provided by large hub airports. Traditionally, airports were located at the edge of a city to serve the business activity that occurred in its centre. Today, the importance of international connectivity is such that businesses are even locating themselves at the airport itself rather than in the traditional city centre. The development of the 'airport city' has been recognised by places like Amsterdam, Frankfurt and Dubai. These cities are not just growing their airports, they are planning economic zones around the airport.

Although it has developed incrementally and organically, the area around Heathrow is Europe's foremost 'airport city'. Businesses have chosen to position themselves around the world's most successful international hub airport. These include geographic concentrations of inter-connected sectors, companies and institutions, known as clusters. Many of these are in industries identified as relying on air travel and exports, including business services, IT, research and development, and pharmaceuticals. These clusters are the engines of the Thames Valley and West London economies. London, Heathrow and these specialised clusters have grown together over the past 50 years.

1.6 Heathrow is the best option

Figure 1.13: The Thames Valley area has more high-quality business clusters than any UK region outside of London⁵⁸



Heathrow's location benefits businesses

The economy to the west of London is one of the most productive and dynamic economic zones in Europe. The analysis of the clusters around Heathrow shown in Figure 1.13 identifies those rated '2+ stars' by the European Clusters Observatory. These clusters are in the top 10% of European regions, both in terms of amount of employment in the sector and the level of industry concentration. As a result the area around Heathrow has 9% more jobs and 6% more management and professional jobs per person than the South East of England⁵⁹.

West London and the Thames Valley is world-class when compared against the criteria many global companies use to decide their business location. These include access to customers and markets, a skilled workforce, good transport connections and strong, research-led universities.

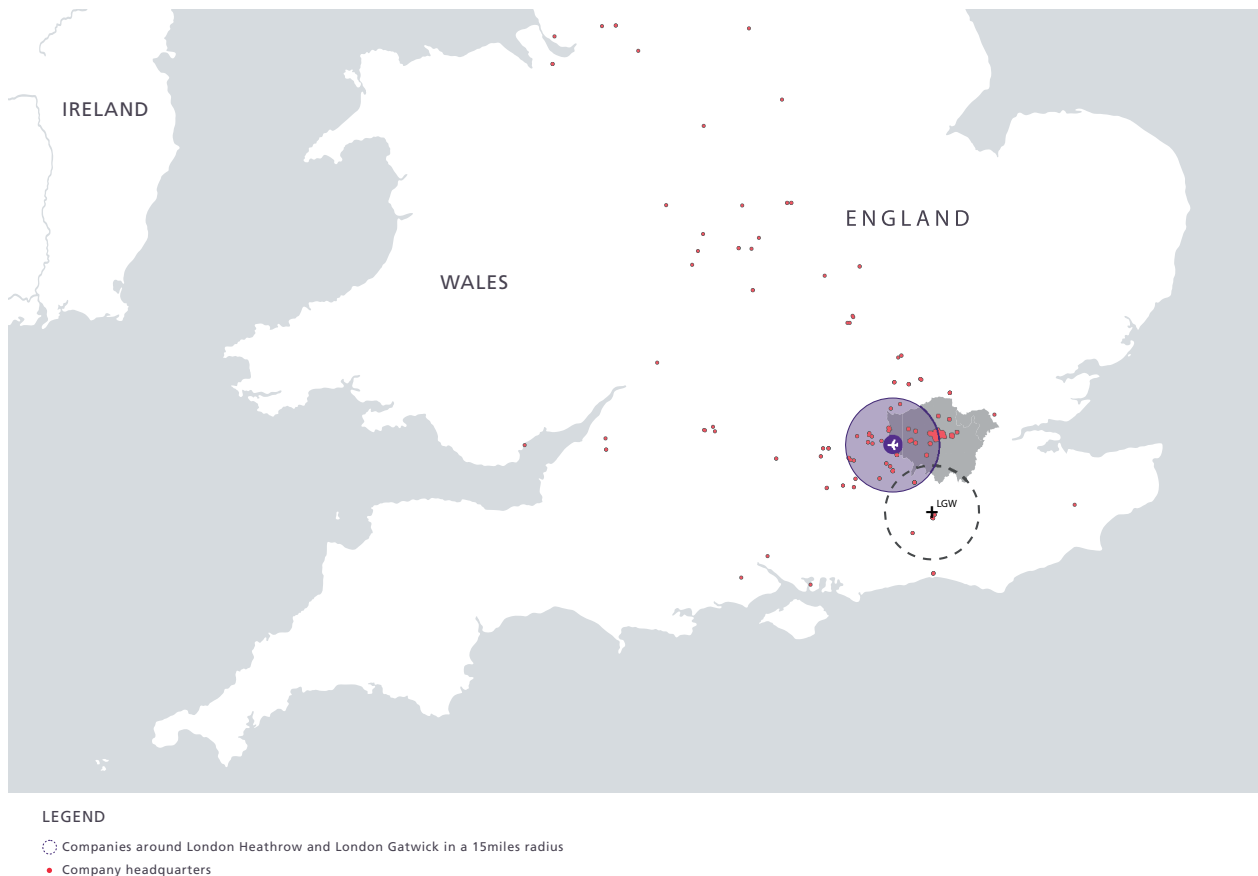
There are no guarantees that these business networks would go elsewhere in the UK if a new airport were built away from west London. It is very difficult to successfully move clusters. They are made up of many individual businesses. Other UK locations do not have the characteristics that companies typically look for. If we seek to strengthen these world beating clusters West London is precisely the place we should be strengthening international transport links.

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Heathrow is closer to UK businesses

More broadly Heathrow is well located for British Business. 120 of the top 300 companies in the UK are within a 15-mile radius of Heathrow⁶⁰. This compares to only 10 at Gatwick. In total, there are 60% more international companies in the area around Heathrow than in the rest of the UK⁶¹. This is because firms that rely on international long-haul flights have located themselves around Heathrow.

Figure 1.14: The UK's top 300 companies' (by turnover) HQ locations – 120 are within a 15-mile radius of Heathrow⁶⁰



Heathrow benefits the UK

A well-connected UK hub also supports jobs throughout the UK regions. 3.7 million people in the UK work for foreign-owned companies⁵⁸. Companies based in the US, Japan, Australia, Hong Kong, South Africa or Canada account for approximately half of these jobs and employ 600,000 people in regions outside of London and the South East⁵⁸. For example, we can identify 111 foreign-owned businesses with headquarters in the Thames Valley⁶¹, which own 149 companies elsewhere in the UK. Together they employ between 45,000 and 75,000 workers⁶¹.

Such is the economic geography of the UK that if we sought to place an international hub airport anywhere in the country Heathrow would be in the best place.

1.6.1.4 Heathrow is the best option for freight

Air Freight and the UK Economy

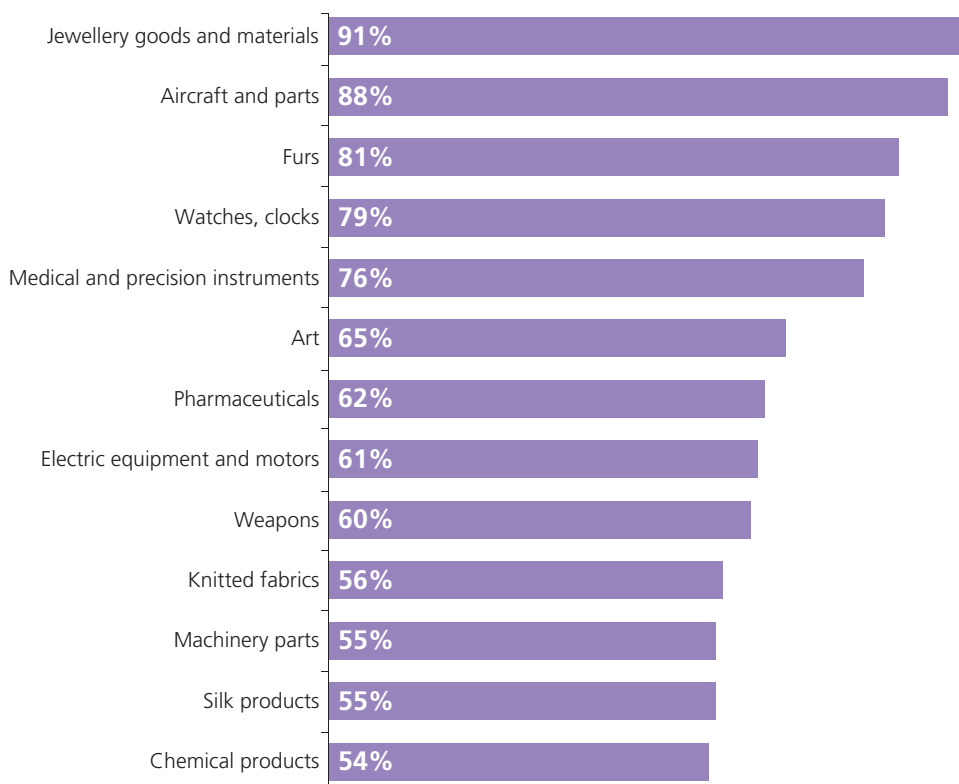
Trade in goods is critical for economic growth. Trade provides the raw materials for UK manufacturing and means UK companies can sell their products abroad. It allows the UK to compete through economies of scale and specialisation in high value industries. It supports R&D and gives us in the UK access to consumer products from all over the world. The UK will never produce everything it consumes. For example, it imports all its coffee needs, from places like Brazil.

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Air freight accounts for around 40% (~£280 billion) of the total value of UK imports and exports. Air freight particularly serves major export industries such as electronics and telecoms. Even service industries such as financial and business services rely on document shipments by airfreight. Air freight serves industries where time matters. Pharmaceutical, biotech and food producing industries are thus heavy users of air freight. UK manufacturing relies on air freight to import and export key components to keep factories working. Figure 1.15 shows the dependence on air freight by a selection of commodities in 2008.

Figure 1.15: Proportion by commodity carried by air freight (Percentage of total trade imports & exports)⁶²



Heathrow is central to UK air freight. In 2013, 66% of all international air freight tonnage in the UK came through Heathrow and 74% of all freight to non-EU countries⁹. This demonstrates how vitally important Heathrow is to the UK economy as a means of driving growth in both imports and exports. Figure 1.16 shows key air freight imports and Figure 1.17 shows key air freight exports via Heathrow⁹.

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Figure 1.16: Key air freight imports via Heathrow9

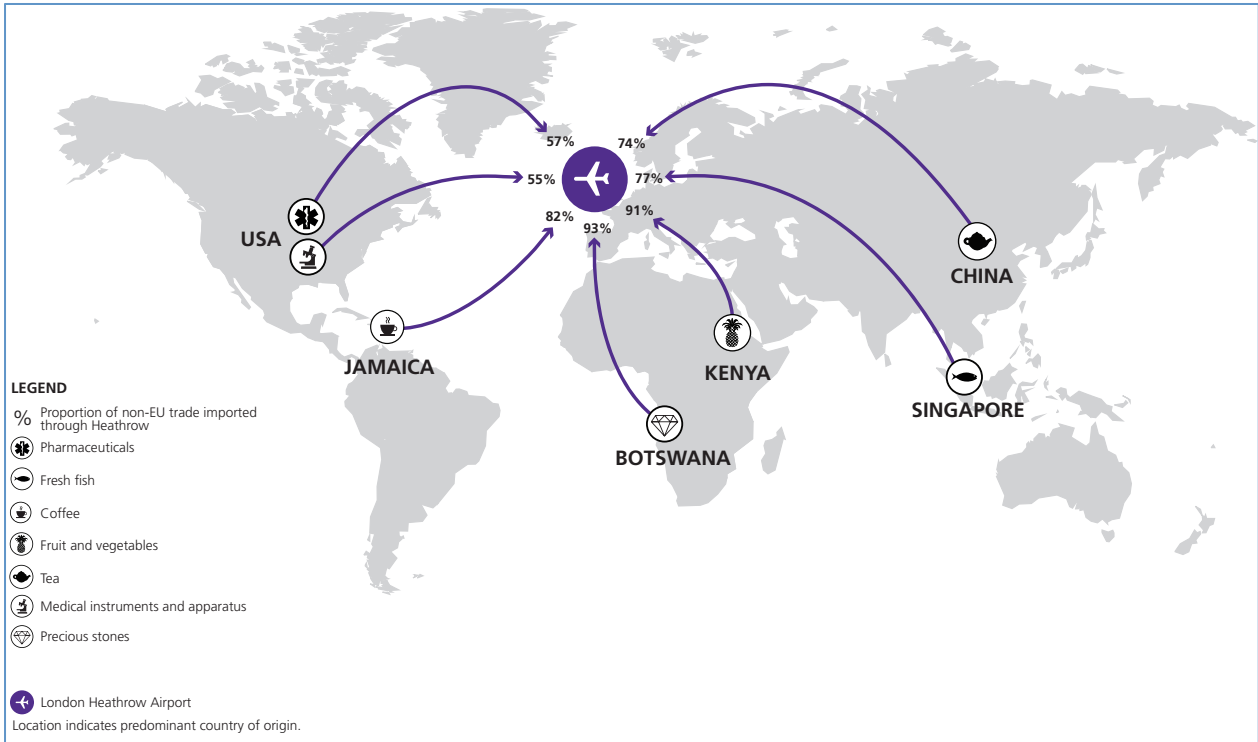
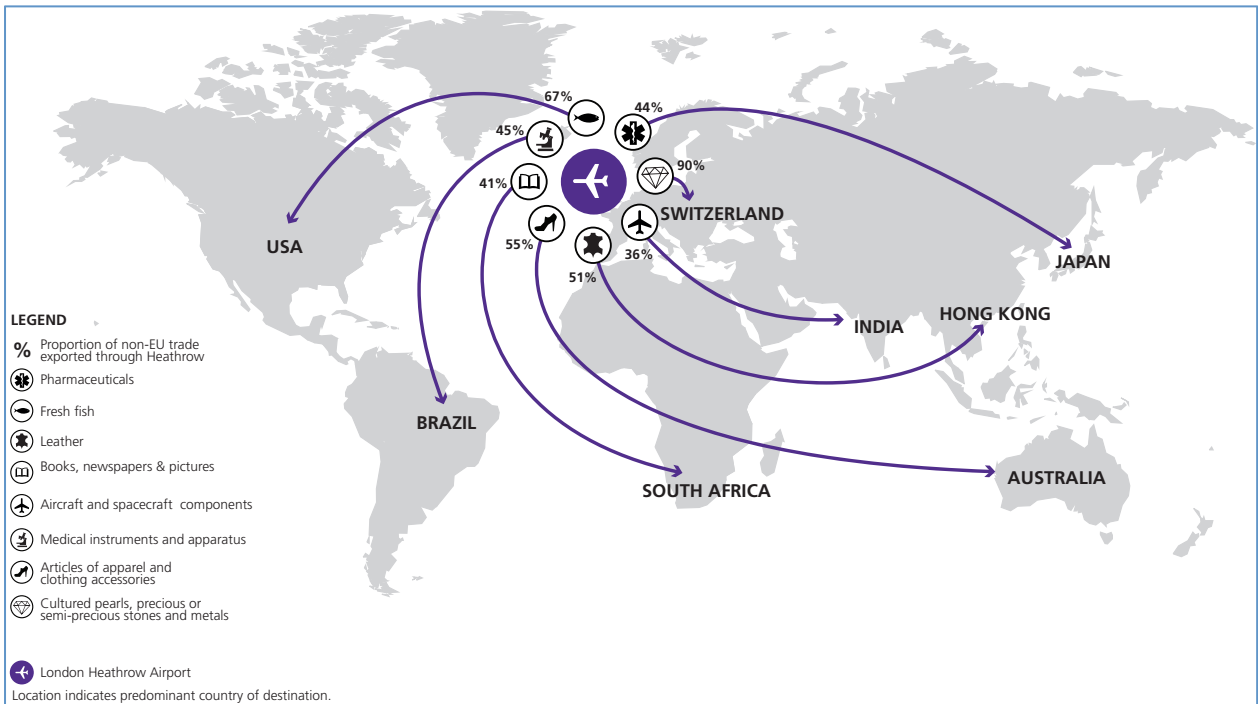


Figure 1.17: Key air freight exports via Heathrow9



Currently the majority of UK goods are exports to the EU. Over the next 20 years, this is likely to change for two reasons. Firstly, as more distant markets emerge, the weight in UK trade will grow in line with the new markets weight in the world economy and may exceed the share of EU air freight. Emerging markets share of air freight will

1.6 Heathrow is the best option

grow commensurably. Secondly, EU trading is more likely to be carried by surface transport – trucking in particular – as a viable substitute for air transport in many cases. Long distance shipping or road/rail is far less possible to substitute for air freight. As emerging markets become more sophisticated, long distance air freight will become yet more important for the UK economy.

Two air freight models

Air freight can be transported in the belly-hold of passenger aircraft or in dedicated freighter aircraft. In most cases, the end customer will not know or care which type of plane is used. However commercial models for shippers are distinct. The first is the integrator model whereby the entire service, from origin to destination, is provided by one company – for example DHL or UPS. Integrators have dedicated freighters. They also buy significant amounts of belly-hold capacity on passenger aircraft. The second model is the freight forwarder. The forwarder organises collection and delivery but the freight is transported by passenger or freight airlines. Both forwarders and integrators use a combination of belly-hold and dedicated cargo carriers in order to most efficiently transfer freight from origin to destination at the best value for money.

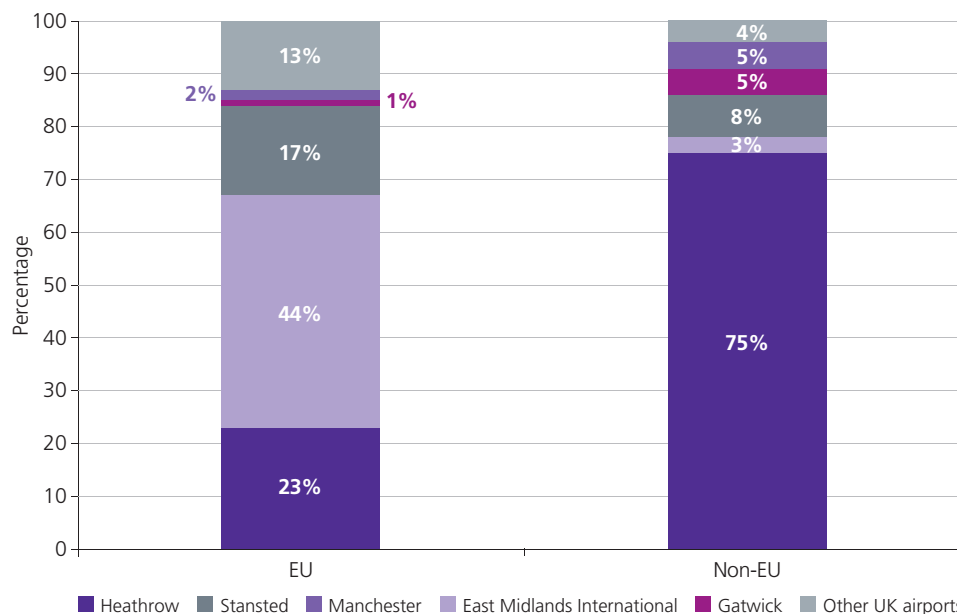
Whether a product is shipped by belly-hold or in a dedicated carrier depends on a number of factors:

- **The nature of the product.** Commodities that are low in volume and high value tend to be best suited for belly-hold shipping. Examples include jewellery, art, electronics, legal documents, bank notes, etc. Commodities that are too large to be carried on a passenger aircraft, or are not allowed on passenger aircraft because they are too dangerous are shipped by dedicated cargo aircraft.
- **Level of demand.** If the products are being shipped to a new, market where demand is not yet sufficient to justify the use of a dedicated aircraft, freight shippers will use belly-hold. Dedicated freight routes are usually only viable with large predictable flows of a similar type of cargo.

Belly-hold therefore tends to be used more for trade with non-EU countries. Dedicated carriers are preferred for trade with the EU or the very largest bulk flows to North America or the Far East (e.g. pre Christmas rush to import consumer goods from China). According to the CAA (2013), 84% of all non-EU air cargo travels belly-hold and 16% on dedicated freighters. The percentages are exactly reversed for intra-EU freight^{63, 3}.

This explains why forwarders and integrators transporting goods to non-EU countries that have the option of multiple airports in the UK to meet their need for capacity disproportionately choose to use Heathrow as their gateway to non-European markets. 95% of this traffic through Heathrow travels belly-hold³. As Figure 1.18 below shows, 74% of non-EU air freight (in terms of volume) in 2013 came through Heathrow. Gatwick by comparison is only 5%³. Heathrow’s network of routes is where the forwarders and integrators need to send it.

Figure 1.18: Split of air freight by airport in 2013



1.6 Heathrow is the best option

Heathrow and air freight

Heathrow plays an integral part in the development of UK air freight, in particular with non-EU countries. This is not a coincidence or just because Heathrow is a large airport. It reflects the importance of the network offered by Heathrow as the hub, unrivalled by any other airport in the UK.

Belly-hold cargo typically contributes 5-10% of revenues on long-haul passenger flights. Cargo thus makes a significant contribution to the fixed costs of a flight meaning cheaper passenger fares.

The UK's ability to increase trade with non-EU destinations is being hindered by the capacity constraint at Heathrow because it restricts passenger aircraft movements and our hub network. A third runway at Heathrow would enable the network to expand to include new destinations. Destinations such as Kolkata in India, or Osaka in Japan, cities of over 10 million, where there is a large appetite for trade but limited belly-hold capacity. Cargo capacity could increase on existing routes too, lowering prices with competition. The expanded network would have a catalytic impact on the economy. Additional business travel would generate business opportunities, which could be followed by trading goods via air freight. This effect is evident in economies such as Germany, which has built far greater trade flows with the emerging markets in Asia and elsewhere.

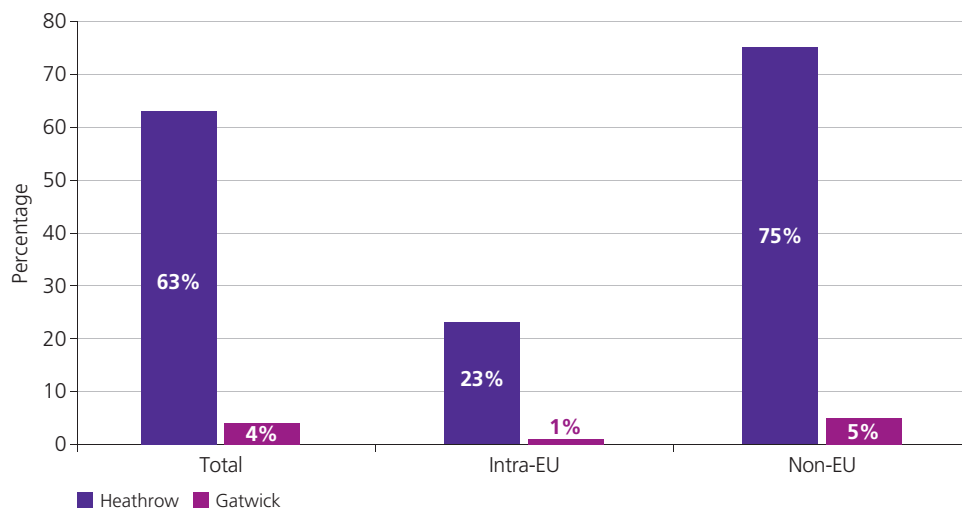
Shippers want direct flights to their markets. Direct flights give them speed, control over product, quality and security. Only by maintaining its hub status can Britain offer its businesses that advantage. Growing Heathrow's network brings two further future benefits for British traders:

- **A more extensive network of direct connections.** A third runway would open up new destinations that are important to business travellers, thereby increasing the number of markets that could be served reliably.
- **Lower prices.** Heathrow's current network makes it possibly the only option as a port into the UK for some users. However, the capacity constraint imposes a mark-up on the services offered. Oxford Economics found that the real value per kilogram of import and export (net of tax) flows through Heathrow has increased by 50% since 1996. The report suggests that the capacity constraint at Heathrow could have forced the cost of sending cargo up in order to clear the market. Given that only the most valuable goods would be flown via Heathrow, the real value per kilogram would increase. Adding a third runway would ease this constraint and thereby possibly lead to lower prices. This argument is consistent with the congestion premium for passenger fares as found by Frontier Economics¹⁰.

In total volume, Heathrow facilitates the transportation of more than 15 times as much cargo as Gatwick³, despite Gatwick having 54% the number of ATMs as Heathrow³. In value, Heathrow brings in 60 times as much cargo from outside the EU as Gatwick⁶².

As Figure 1.19 shows, in 2013 Heathrow accounted for over 60% of the total UK freight volumes (including domestic). On the other hand, less than 5% was transported through Gatwick. Heathrow plays an even bigger role in non-EU freight, accounting for about 74%.

Figure 1.19: Split of air freight by airport



1.6 Heathrow is the best option

There are three main reasons why Heathrow has this role for air freight and why it is likely to maintain this advantage in the future.

- **Air freight users are most interested in a business-oriented long-haul route network.** The route network Heathrow offers, as the hub, is much more relevant to forwarders and integrators for two main reasons. First, it is to long haul destinations. In contrast, over 66% of routes offered at Gatwick are intra-EU short-haul destinations. Air transport is not as essential for trade with short-haul destinations because ground transport is a competitive substitute.
- **Second, it's a hub network biased towards business destinations.** Almost 40% of passengers at Heathrow travel for business. By contrast, only 10% of Gatwick's passenger traffic is for business reasons³. For this reason Heathrow is much better positioned to sustain the 'passengers lead, freight follows' business model recognised by the Airports Commission in its Interim report.
- **Low Cost Carriers (LCCs) tend not to offer freight services.** The low cost business model is based on less time on the ground with fast ground handling operations. Less time on the ground, less equipment to load and offload cargo, and lack of dedicated staff to adequately secure cargo reduces the potential for freight facilitation of LCCs. In contrast, network carriers make cargo an important revenue stream. Heathrow and point-to-point London airports Gatwick are at opposite points of the spectrum in this regard. For example, Heathrow does not offer LCC flights, while easyJet alone – Gatwick's biggest airline – accounts for almost 40% of Gatwick's ATMs.
- **Charter flights do not offer the predictability required by forwarders and integrators.** Charter flights in 2013 accounted for over 13% of passenger volumes at Gatwick, compared to 0.13% at Heathrow³. Charter flights are able to carry cargo on an ad-hoc basis, but the freight industry strongly relies on predictability, which charter flights cannot offer. Therefore, charter flights cannot provide a sustainable platform, thus reducing Gatwick's potential in developing its freight facilitation role.

A report by the Freight Trade Association (FTA) highlights that both existing UK trade⁸, and attempts to grow it, rely on Heathrow keeping its position as the 'most prestigious freight hub in the world'.

Ian Veitch, President of the FTA, stated:

"It is imperative that we recognise the inherent advantages Heathrow has as a world-class, global air-freight hub and the unique benefits this brings, not just to the South East of England but to Britain as a whole, through enhanced connectivity to our key overseas markets."

At the individual business level this is understood as well. International logistics firm, Sound Moves, which supports touring artists such as U2 and Katy Perry, has 70 movements a week through Heathrow. Tour Principal, John Corr, said:

"Heathrow is essential to our business. It is no coincidence that suppliers to the music industry, as with other sectors such as motor sport, are clustered in the West London area. Heathrow's multiple daily departures for a huge number of international destinations are crucial to the company meeting the ever tightening time pressure on tour schedules."

That view is backed up by an unnamed pharmaceutical company also quoted in the report. Their strategic logistics manager said:

"We need Heathrow and we need it to be a primary hub. It is essential that it receives investment for a new runway because we will start to lose airlines and services to other countries where the hub airports are getting investment and slots are not under so much pressure. If we fail to invest, Heathrow will stop being a key hub for global aviation."

1.6 Heathrow is the best option

Heathrow's role in air freight is further cemented by the extensive existing infrastructure at the airport to support UK trade. Aviation infrastructure is critically important to the air freight industry. Cargo operators and their facilities have steadily grown around Heathrow for 60 years. Examples include:

- BA World Cargo Centre is the UK's largest cargo operation boasting flexible, world class facilities integrated with the airport operation.
- IAG Cargo also recently built a new constant climate centre at Heathrow, for shipping important pharmaceuticals transshipment route. This facility offers a precision temperature controlled environment for loose and intact cargo.
- dnata, one of the world's leading air service providers, based in Dubai, has recently completed its new off-airport cargo and logistics centre, which provides 206,000 sq ft of new world class cargo space;
- SEGRO's cargo facilities group multiple providers adjacent to the airport in dedicated infrastructure;
- Heathrow provides dedicated on-airport facilities such as large specialist cargo control posts.

The area immediately around Heathrow is the base for many of the UK's other leading freight forwarders and integrators (e.g. DHL UK, Schenker, etc) who have millions of pounds invested in dedicated facilities nearby. All of this is further reinforced by Heathrow's general location near the heart of the UK economy and linked to the strategic road network.

Future opportunities for freight

UK air freight can grow further – driving exports and growth. The market for air freight is especially cyclical, driven by demand and supply factors. On the demand side, freight demand is pro-cyclical and has tracked movements in trade for many decades. On the supply side, because air freight to non-EU countries is primarily transported via belly-hold, freight tonnage and passenger volumes are inextricably linked. This connection underlines the interdependence of passenger and freight services.

The only alternative to expanding direct air freight connections might be by dedicated freighters. These will add cost and inflexibility to UK shippers. For many routes, as noted above, they are not viable. Finally, because most of the capacity expansion of air freight through Heathrow is likely to come through belly-hold capacity, this will have a lower marginal impact on CO2 emissions than through running additional dedicated freighters.

1.7 Heathrow delivers the greatest socio-economic benefits

1.7.1 Heathrow delivers the greatest socio-economic benefits

Heathrow will drive the most growth for the UK of any of the capacity options. Most of this growth will occur across the wider economy. A major driver of the social benefits is employment. We have assessed the socio-economic benefits of Heathrow expansion through the lens of job creation. We have conducted detailed analysis of five factors:

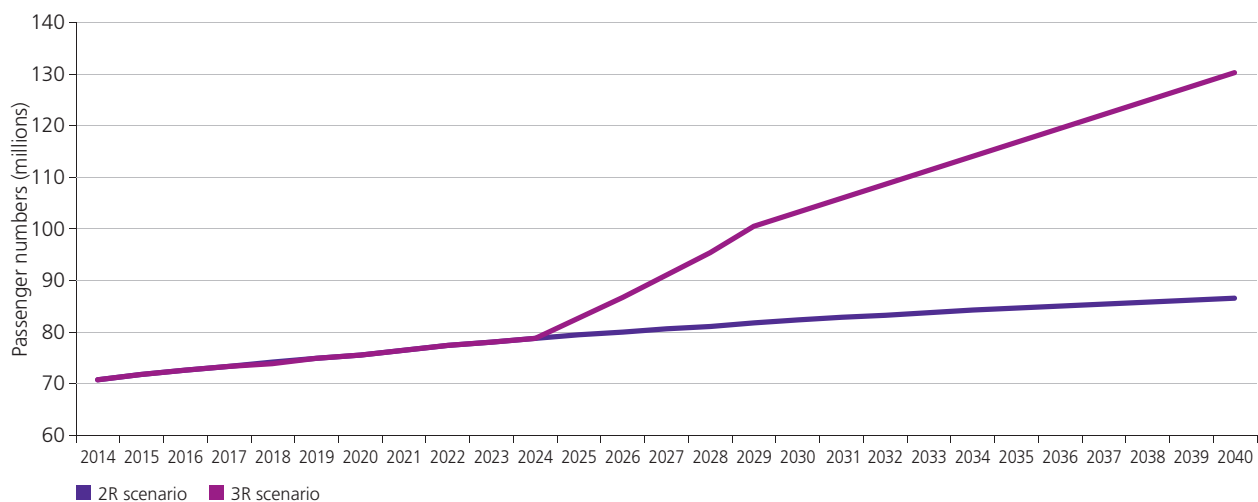
- Extent and nature of this employment growth;
- Spatial distribution of employment growth;
- Impact of the employment growth on the need for housing connected to the jobs growth;
- Context for growth in terms of local and wider strategies, and;
- How the employment growth can be accommodated and sustain growth objectives across London and the Thames Valley and more locally in the districts surrounding Heathrow.

1.7.1.1 Understanding the potential for growth

Increased employment is one of the key positive contributors to economic growth. It is therefore important to develop a robust estimate of the employment effects of expanding Heathrow. At the same time, when concentrated in a small geographic area, increases in employment can create local issues for public infrastructure – such as housing and transport. An accurate estimate of the employment effects of Heathrow is therefore also required to inform the assessment of local infrastructure needs.

Analysis has been undertaken for 2025, 2030 and 2040 and is based on considering the difference in traffic – including passengers, air traffic movements and freight – when moving from two to three runways. Figure 1.20 provides the differences in passenger volumes in the 2R and 3R scenarios that underpin the assessment. The new runway is assumed to open in 2025.

Figure 1.20: Passenger projections under 2R and 3R scenarios⁶⁴



The additional runway at Heathrow has an impact on employment as illustrated in Figures 1.21 and 1.22 and set out below across a range of employment types:

- **Direct** employment – i.e. generated at the airport itself. This would include security staff, check-in, ground handling, retail, parking, etc;
- **Indirect** employment – through airport-related services. For instance, this would include catering companies that supply airlines;
- **Induced** employment – the wages earned by direct and indirect employees that are then spent in the wider economy, which in turn generate more jobs;

1.7 Heathrow delivers the greatest socio-economic benefits

- Catalytic** employment – based on the benefits of air connectivity facilitated by the additional runway. Additional direct connections shorten the journey time of passengers, as they do not have to connect via a different hub airport. As a result of the change in journey time, there is an incremental increase in the number of passengers, including business travel. The increase in business travel facilitates an increase in trade and Foreign Direct Investment (FDI), which in turn has a positive impact on GDP as it improves productivity. The increase in GDP translates to an increase in employment in the UK economy. Similarly, the increase in leisure travel implies additional tourism spending, which also affects GDP and therefore employment.

The results show that a third runway at Heathrow will add 82,300 direct, indirect and induced jobs by 2040. Estimates also indicate it will add 41,200 catalytic jobs by 2040. Together, the additional 123,500 jobs added to the UK economy by the third runway by 2040 are equivalent to 5% of the current number of unemployed in the UK⁶⁴.

Direct, indirect and induced (DII) employment effects

The estimates of direct jobs are based on passenger and ATM forecasts and include assumptions on economies of scale and productivity improvements.

Figure 1.21 summarises the results of the additional employment created by a scenario with three runways ('3R scenario') as compared to two runways ('2R scenario'). It shows that the employment effects grow over time as the incremental passenger volumes between two and three runways increase. It also illustrates that the direct employment effect is the largest. This is to be expected, as it reflects the current situation at Heathrow.

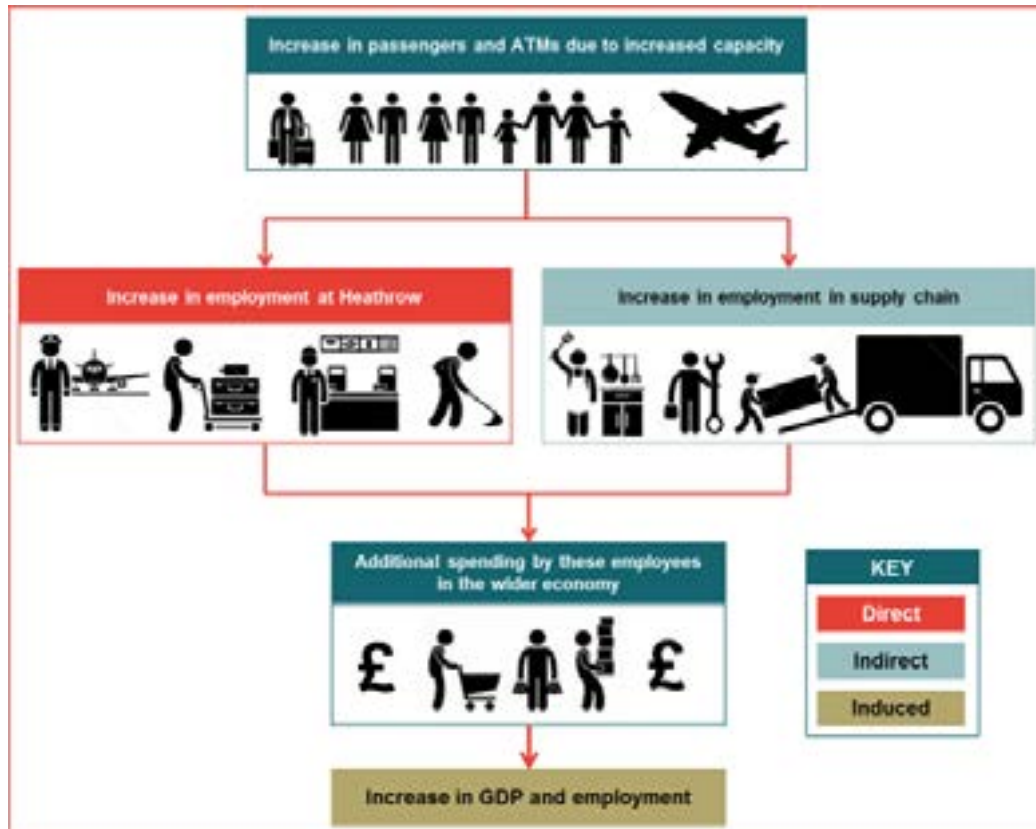
Figure 1.21: Summary of direct, indirect and induced employment effects – increments from third runway⁶⁴

Year	Direct employment (jobs)	Indirect employment (jobs)	Induced employment (jobs)	TOTAL (jobs)
2025	3,400	2,100	2,300	7,800
2030	17,900	11,300	12,100	41,300
2040	35,600	22,600	24,100	82,300

Figure 1.22 provides a simple illustration of the logic behind our methodology in estimating the DII impact of an additional runway at Heathrow.

1.7 Heathrow delivers the greatest socio-economic benefits

Figure 1.22: Direct, indirect and induced impact of an additional runway at Heathrow



Frontier Economics estimate that by 2040 the DII effects will contribute £14.7 billion to UK GDP⁶⁴. If this results in a net increase in economic activity (e.g. using more capacity or creating new capacity in the economy), it would represent over £200 billion in present value of GDP to 2080.

Catalytic employment effects

Catalytic effects from additional trade and FDI enhance the overall productivity of the economy based upon a greater level of integration with the global economy. We have selected appropriate parameters to quantify the impact of air connectivity on trade and FDI. These estimates are conservative, as the assumptions selected are at the bottom end of each range. It is important to note that we have assumed the additional direct flights to Europe from Heathrow would not have a catalytic impact. This suggests that the results for catalytic jobs are conservative.

Figure 1.23 gives a simplified outline of the logic underpinning our methodology to estimate the catalytic impact of an additional runway at Heathrow. The methodology captures how air passenger travel affects the movements of goods and capital. As a result, it does not take into account the volume and value of increased belly hold air cargo connectivity. Nor does it capture the impact of any reduced delays from the new runway. What it does show is that the effect grows over time as passenger volumes from the third runway increase, and that the employment related to trade and FDI is significantly larger than the tourism impact, which reflects changes in both inbound and outbound tourism.

1.7 Heathrow delivers the greatest socio-economic benefits

Figure 1.23: Catalytic impact of an additional runway at Heathrow

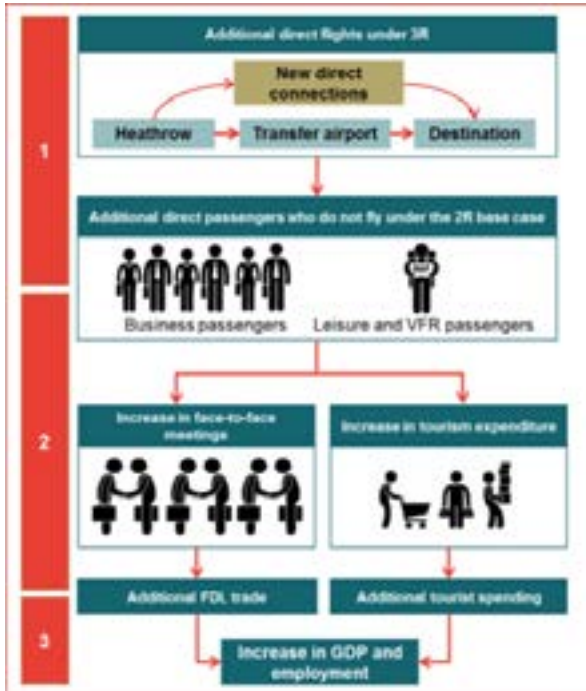


Figure 1.24: Summary of catalytic employment effects – increments from third runway⁶⁴

Year	Trade (jobs)	FDI (jobs)	Tourism (jobs)	TOTAL (jobs)
2025	5,100	6,600	75	12,000
2030	14,500	17,800	400	32,700
2040	17,500	23,000	720	41,200

The catalytic employment effects are based on the increased output associated with higher trade, FDI and tourism activity. Frontier Economics estimate that an expanded Heathrow will generate 41,200 jobs from this source. Figure 1.25 shows the volumes of trade, FDI and tourism spending and their impact on GDP that underpin the employment estimates. In total £2.4 billion would be added to GDP in 2030 in the 3R scenario, compared to the 2R scenario, which represents 0.12% of UK GDP in 2030. In particular, increased trade would add around £1 billion to the GDP. The impact from FDI has been estimated at £1.3 billion. This takes a long-term view on trade and FDI wherein both inward and outward FDI, and exports and imports, have a positive impact on the economy.

Figure 1.25: Summary of macroeconomic effects – increments from a third runway⁶⁴

Year	Trade (£m pa)		FDI (£m pa)		Tourism (£m pa)		GDP (£m pa)
	Imports	Exports	Inward	Outward	Inbound	Outbound	
2025	£501m	£330m	£453m	£850m	£16m	£11m	£765m
2030	£1.55b	£1.03b	£1.49b	£2.72b	£96m	£68m	£2.33b
2040	£2.28b	£1.53b	£2.29b	£4.1b	£214m	£3.59m	£3.59b

Frontier Economics estimate that by 2040 the catalytic effects will add £3.59 billion per annum to UK GDP⁶⁴. This will amount to over £50 billion in present value terms to 2080, slightly above the range of the Airports Commission’s estimate of £30 billion to £45 billion in its Interim Report⁶⁴.

As an input for the results, Frontier Economics estimated how many new direct connections a third runway at Heathrow could facilitate. In doing so, a continuation of the current market structure – with Heathrow as a hub and

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Gatwick as a point-to-point airport is assumed. It is important to check the robustness of our results with against the two additional potential market developments identified by the Airport Commission in their interim report:

- An increased adoption of lower-cost long-range aircrafts; and
- The development of Gatwick as a second hub for London.

In the first scenario, the catalytic employment effects we have estimated would be even higher. This is because an increased adoption of lower-cost long-range aircrafts would lower the passenger threshold used by airlines to assess the feasibility of a route. In turn, this would allow for a greater number of new direct connections, which would imply more additional direct passengers, increasing the catalytic impacts.

While we consider the second scenario unlikely, a new runway at Gatwick instead of Heathrow would result in much lower catalytic employment because a split hub system would be able to sustain fewer direct routes and less frequent direct connections, thus reducing the number of direct passengers.

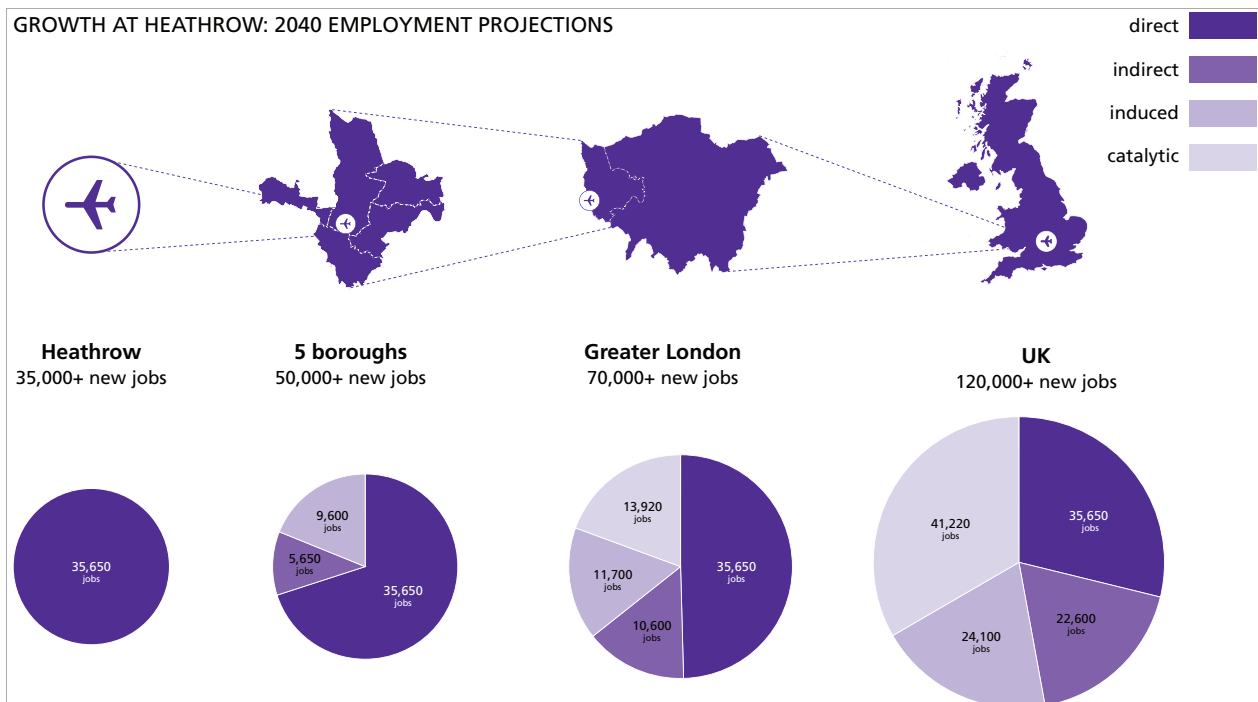
Overall economic impact

The catalytic effects are incremental to UK GDP (since they are generated by increases in the productivity of the economy). Additional expenditure from direct, indirect and induced economic activity relies on activating resources that are currently not contributing to economic activity to add real value. Making a conservative assumption that only a quarter of this demand feeds through to a net increase in economic output, the present value will still be a further £50 billion. Overall, we believe it is reasonable to conclude that the catalytic effects and DII effects will together result in an at least £100 billion of present value benefit up to 2080.

1.7.1.2 Spatial predictions

It is not possible to know the exact location of new jobs or where the people that will benefit from these opportunities live. It is possible to predict broad locations based on past trends. A summary of the spatial distribution of the 123,500 jobs we estimate will be generated from Heathrow’s expansion is illustrated below in Figure 1.26. This shows that the five boroughs adjacent to Heathrow alone could benefit from over 50,000 new jobs. Over 70,000 new jobs would be created in Greater London.

Figure 1.26: Employment projections at the local and wider scales



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The approach taken to estimate the distribution of jobs and employees arising from growth at Heathrow differs depending on the type of job, as set out below.

Direct employment

We have modelled the proportion of direct employment generated by an enlarged Heathrow that will be distributed in the 5 boroughs of Hillingdon, Hounslow, Ealing, Spelthorne and Slough based on three data sources:

- 2001 Census where 49% of Heathrow employees live within the five districts
- 2009 Heathrow Employee Survey where 47% live within the five districts
- 2014 Heathrow Employee Survey where 53% live within the five districts

Taking a conservative view, it is therefore assumed that 49% of those working directly for Heathrow will be within the five boroughs. The following table identifies the distribution of these 35,600 additional direct workers at Heathrow:

Figure 1.27: Breakdown of current and future (2040) employees by region

Location	Current (2001) residential distribution of workers in Heathrow Villages ward (Census)	Estimated additional Heathrow employees (2040)	Estimated total Heathrow employees (current and additional) (2040)
Five districts	49.1%	17,500	54,700
Rest of London	12.8%	4,450	14,050
UK	100%	35,600	111,400

Figure 1.28: Potential residential locations of additional Heathrow employees



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These additional jobs are expected to follow a broadly similar profile to current jobs at Heathrow. This suggests that growth is likely to produce a significant proportion of entry-level jobs with flexible working hours, particularly suitable for those looking to enter (or re-enter) the workforce. We have a good track record of recruiting and up-skilling local residents looking for work in these sectors (for example, through the Heathrow Academy).

The majority of the kind of jobs that would be created at Heathrow (e.g. retail, administration, customer service, support services, elementary and process roles) match the kind of jobs that currently unemployed residents are seeking in the five districts. Of the 19,000 residents registered for Job Seekers Allowance (JSA), over 15,000 are currently looking for work in these sectors (Department for Work and Pensions, Feb 2014).

The number of residents claiming JSA is just a subset of the total unemployed population. In addition, there are around 50,000 unemployed people in the area, and an additional 40,000 who are economically inactive but want a job.

At present the employment rate across these five districts is 71.6%. If the Government achieves its target of reaching a higher employment rate than any other G7 nation (currently Germany is highest at 73.5%), then that would require at least an additional 14,000 residents to be in work across the five boroughs.

There will also be a significant proportion of higher-value and higher-skilled jobs arising from growth at Heathrow in management, IT, flight operations and ATC among other roles. The latest available data showing the Standard Occupational Classifications at ward level (Census 2001, Heathrow Villages Ward that includes Heathrow Airport) states that 42% of jobs in the ward are classified as Skilled Trades, Technical, Associate Professional, Professional, Management or Senior Official roles. If the direct jobs created at Heathrow follow this split of occupational skill level, this could equate to approximately 15,000 skilled and higher skilled jobs at Heathrow, and would benefit residents from the local and wider area.

Indirect employment

Optimal Economics (2011) identify that operation of the airport supports indirect employment at three broad levels. These are locally (within the five districts), in London, and in the rest of the UK – through the purchases of goods and services by the companies providing direct employment.

Using the approach identified by Optimal to distribute indirect employment, the estimated distribution of jobs is set out in Figure 1.29. This is based on the extent to which businesses supply chains are located within these areas.

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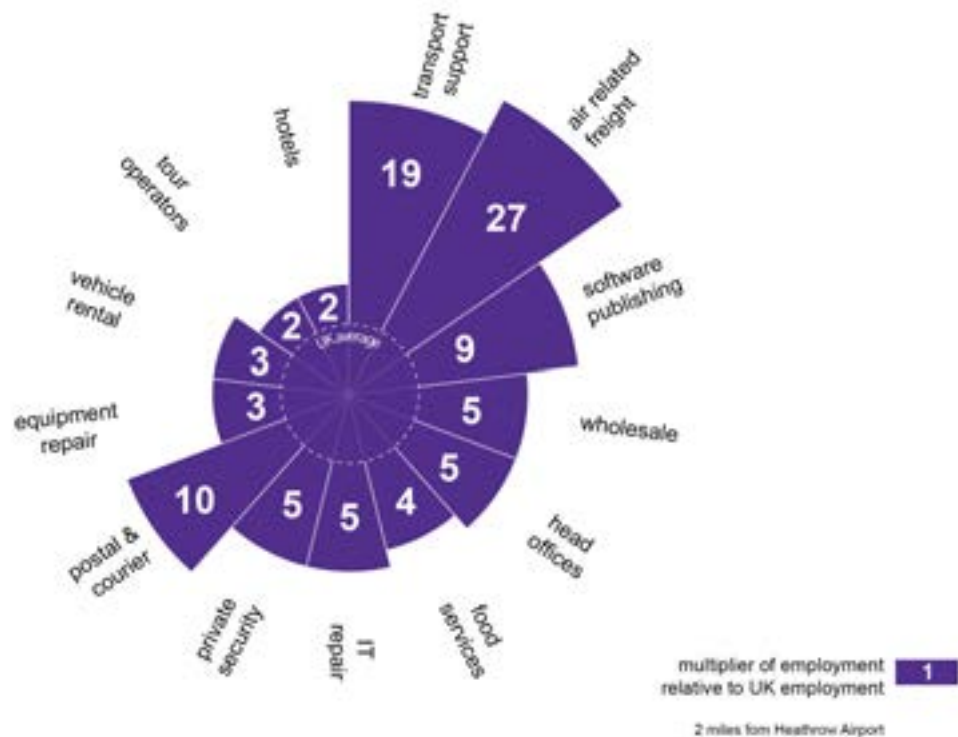
Figure 1.29: Estimated location of indirect jobs and employees by region

Indirect jobs	Five Districts	London	UK
Estimated location of jobs	5,650	10,600	22,600
Estimated location of employees	3,350 (59%)	8,600 (81%)	22,600

The five boroughs not surprisingly excel in airport-related industries. This strength, relative to the rest of London, becomes particularly evident as one comes closer to Heathrow itself. Strong clusters linked to aviation have emerged in close proximity to Heathrow and growth would help to strengthen these further. Figure 1.30 shows which sectors are particularly strong in the area, by identifying the locational quotients of jobs in each, set against the UK average. For this process, British Register of Employment (BRES) 2012 data for lower-level super output areas within two miles of the airport and within the five districts were used, and direct jobs subtracted. A value of '2' indicates there is double the proportion of jobs in a sector locally than nationally, and to a large extent it is logical to assume that these clusters exist due to proximity to Heathrow.

Figure 1.30: Degree of local employment specialisation

GROWTH AT HEATHROW: DEGREE OF LOCAL EMPLOYMENT SPECIALISATION



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Induced employment

Induced employment is supported by the expenditure patterns of the people whose jobs depend directly and indirectly on the operation of Heathrow. Therefore, it has been assumed that the spatial distribution of these jobs and its employees would track the direct and indirect jobs as set out in Figure 1.31 below, with 9,600 jobs estimated to be located within the five districts.

Figure 1.31: Estimated location of induced jobs and employees by region

Induced jobs	Five districts	London	UK
Estimated location of jobs	9,600 (40%)	11,700 (49%)	24,100
Estimated location of employees	5,650 (23%)	9,500 (39%)	24,100

Catalytic employment

The catalytic employment projections include jobs based on Foreign Direct Investment (FDI), trade and tourism. Frontier Economics estimate that an expanded Heathrow will generate 41,200 jobs from this source. By assessing public datasets it is possible to estimate the proportion of each of these jobs regionally in the UK, based on:

- Regional market share of FDI projects (Ernst+Young / FDI Markets, 2012)
- Regional share of value of overseas exports (HMRC UK Trade Info, 2014)
- ONS data (UKIPS) for regional share of international tourism expenditure (2009).

These jobs will have certain representations locally in current areas of high FDI and international business – such as new or emerging commercial districts within London and the Thames Valley, including areas in close proximity to Heathrow. Due to the nature of this type of employment, a significant boost to national economic growth is predicted, with around half of FDI jobs and two-thirds of trade jobs spread across the rest of the UK (outside of London and the South East). The data indicates a total of over 23,000 jobs from this type of employment growth alone. Figure 1.32 outlines the broad location of these jobs on a regional basis, using the methodology and data sources listed above.

Figure 1.32: Number of catalytic jobs by type

	FDI	Trade	Tourism	TOTAL
London	10,350	2,070	370	12,790 (31%)
South East	1,840	2,570	80	4,490 (11%)
Rest of UK	10,810	12,870	270	23,950 (58%)
TOTAL	23,000 (56%)	17,510 (42%)	720 (2%)	41,230 (100%)

1.7.1.3 The Heathrow Labour Market

The new jobs that will be created by growth at Heathrow will be accessible to and largely filled by existing residents.

The labour market that serves Heathrow is extensive, given that the area from which it can access Heathrow within 60 minutes covers most of London. This 60-minute market currently has a working-age population of 5.7 million people, and an employment rate of 63%. The working-age population within 60 minutes of the airport is forecast to grow by around 19% by 2031, increasing by over one million people.

This labour market is anticipated to account for 75% of the new workforce required by growth at Heathrow (based on the current journey times of direct on-site employees at the airport now). The new jobs can be accommodated within the 60-minute labour market through a combination of projected growth and 'slack', creating a significant spare labour pool.

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Projected growth and Increasing Economic Activity

By 2031, the total working age population of the 60-minute area will have increased substantially, increasing the overall size of the labour market. In addition, as more jobs are created, economic activity will increase to bring more of this increased population into the labour market as economically active and working residents. In summary:

- The working-age population in the 60-minute area is estimated to grow by around 19% over the next 20 years, creating a requirement for jobs
- The employment rate (63%) can be increased to take up ‘slack’ in the labour market, potentially to 80%
- As the number of jobs rises, including the new jobs created at Heathrow, the employment rate is expected to increase, as the population becomes more weighted towards working-age, economically active residents
- These higher employment rates would increase the potential labour force by the following amounts.

The following table (Figure 1.33) highlights the effect on the current and future labour force of increasing the employment rate from present levels to 75% and 80%, bringing substantially more people into the labour market.

Figure 1.33: Employment rates in 2013 and 2031

Employment rate (60 mins)	2013	2031
75%	667,000	794,000
80%	950,000	1,131,000

Unemployment is high within the future 60-minute labour market and currently stands at approximately 300,000 people. Within the five districts, those currently registered are seeking work in the sectors that will be enhanced by and serve the growth at Heathrow. There is an additional pool of potential employees – those who are economically inactive but would like to work, together with over 700,000⁶⁵ current students who will be looking to enter the labour market.

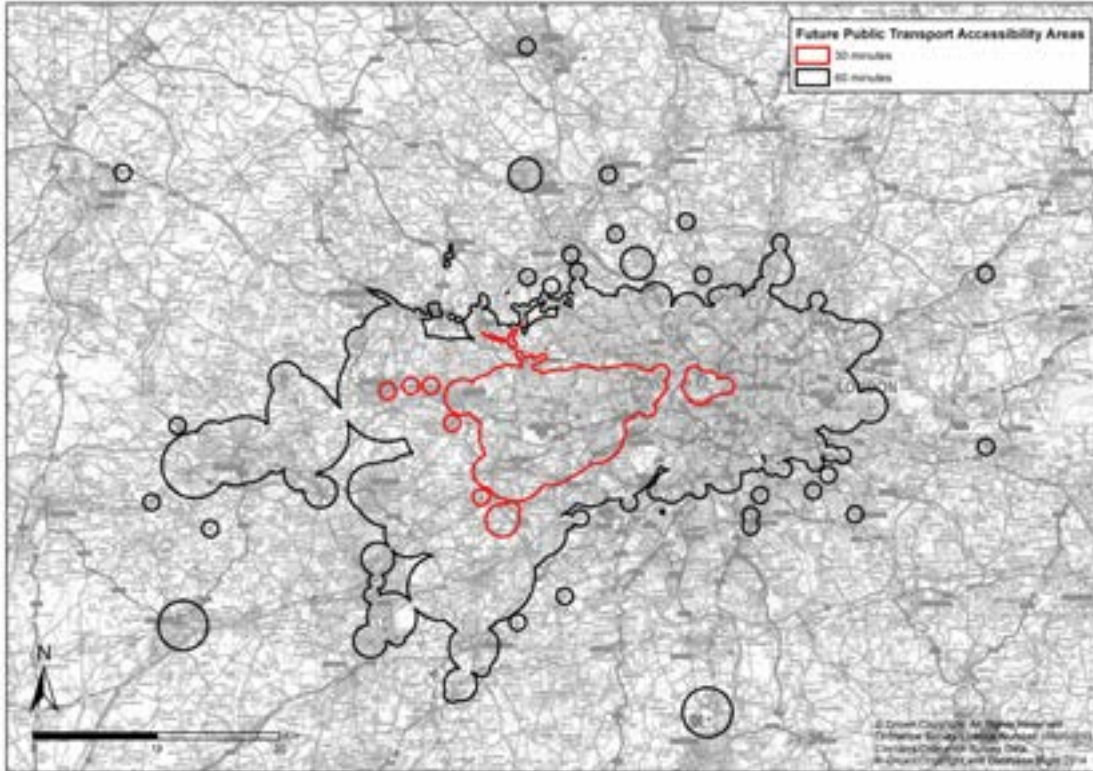
Heathrow will build on an established track record of local recruitment and training during the past 10-15 years. This includes the jobs and training brought on stream by Terminal 5 and Terminal 2. Heathrow-led programmes, tailored to the identified needs of the local boroughs with regard to the local labour supply, will create opportunities to reduce unemployment. It will ensure that the benefits of new jobs are available to those residents nearest the airport.

Local jobs mean more sustainable commuting. Out-commuting within the local boroughs to jobs further afield will reduce. This is considered a key issue within Hounslow for example, where those in highly skilled occupations commute to central London. Within the 30-minute catchment, 190,000 residents are currently out-commuting. There is significant potential for employment growth to assist in reversing out-commuting. This can reduce travel distances, improve quality of life, and further promote more induced jobs locally.

Given the size and scale of the labour market and the current employment rate, coupled with projected population growth, we can expect the new jobs created by an expanded Heathrow airport to be taken up by current and projected residents brought into the labour force. Given the capacity within the labour market, the analysis indicates that there will be no increase in the housing demand arising from the new jobs. This implies no requirement for net new house building to accommodate Heathrow’s growth.

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Figure 1.34: 30- and 60-minute isochrones



1.7.1.4 The regional context for growth

This section sets out current planning policy and economic aspirations at the local and wider scales. Growth at Heathrow will help to catalyse further growth and regeneration, and we have generated indicative proposals to show how the benefits of growth could be dispersed in response to the current trajectory for each area.

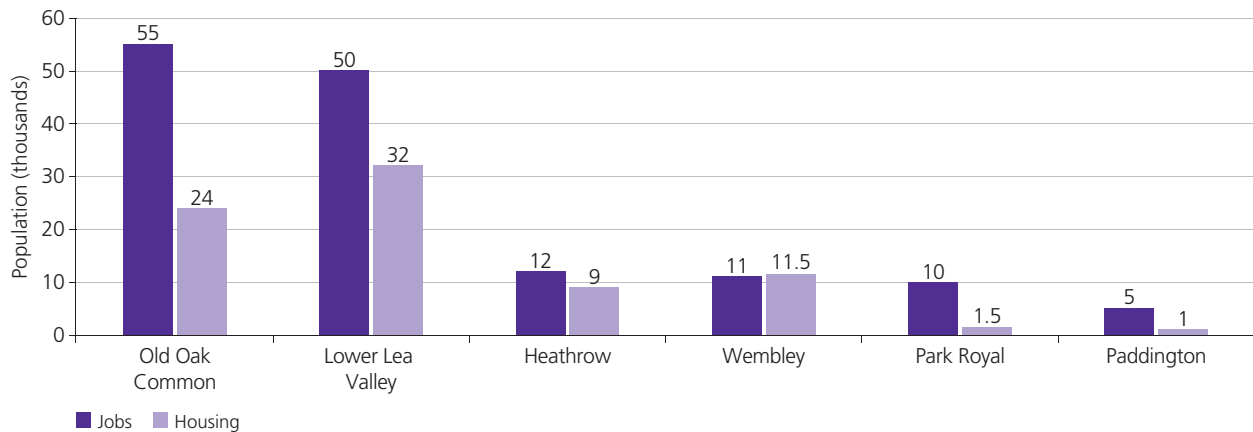
Greater London

The Mayor's London Plan sets out the strategic planning framework for Greater London. It recognises Heathrow's status as the UK's only hub and its critical importance to the London economy. It identifies the wider Heathrow area as one of London's Opportunity Areas, where economic objectives are driven by the strength of the airport. The Plan envisages 12,000 new jobs in the Heathrow Opportunity Area by 2036⁶⁶.

Growth at Heathrow will help to unlock the potential of this Opportunity Area, as set out later in this document. Furthermore, there are a significant number of key Opportunity Areas identified by the London Plan that will have excellent access to Heathrow and the economic benefits that growth will bring. These are set out in Figure 1.35 and include Old Oak Common and the Lower Lee Valley. Although the figure does not include a number of significant opportunity areas over 140,000 jobs are estimated across those set out below.

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Figure 1.35: Key opportunity areas highly accessible to Heathrow



Thames Valley and the ‘western wedge’

The western wedge area, defined by the recent London Heathrow Economic Impact Study⁶⁷ as the area including Heathrow and the economies that radiate out along the key transport corridors defined by their accessibility to the airport, is a strong, dynamic region. It generates £1 in every £10 of UK economic output and is home to over 2.4 million jobs. The overall economic output of the area calculated in terms of GVA totalled around £137 billion in 2011. This level is equivalent to 70% of the total GVA of the South East region, 30% of the South East and London combined, 12% of England’s total and 10% of total GVA across the UK (London Heathrow Economic Impact Study, 2013).

Heathrow is a major economic driver across the Thames Valley and western wedge. The area surrounding Heathrow is home to a large number of foreign-owned enterprises. These firms have clustered around the airport in order to take advantage of the connectivity benefits of close proximity to the international hub, which can efficiently connect them to their home country as well as other international locations. This is evident when comparing the distribution of foreign companies in the Thames Valley to the rest of the UK; there are 50% more European businesses, 100% more US businesses, and 260% more Japanese businesses located in the Thames Valley.

Within the local area this trend is particularly strong, with over 40% of Hillingdon, Slough and Spelthorne employment in foreign-owned enterprise, and 30-40% of employment in Hounslow. This compares to a London average of 17%⁶⁵.

A key aim of Thames Valley Berkshire Local Enterprise Partnership is to support economic growth in this dynamic part of the South East. It recognises the importance of ending the uncertainty around Heathrow’s expansion, as future investment by many firms will be dependent upon expansion at Heathrow.

Accommodating future regional and national growth

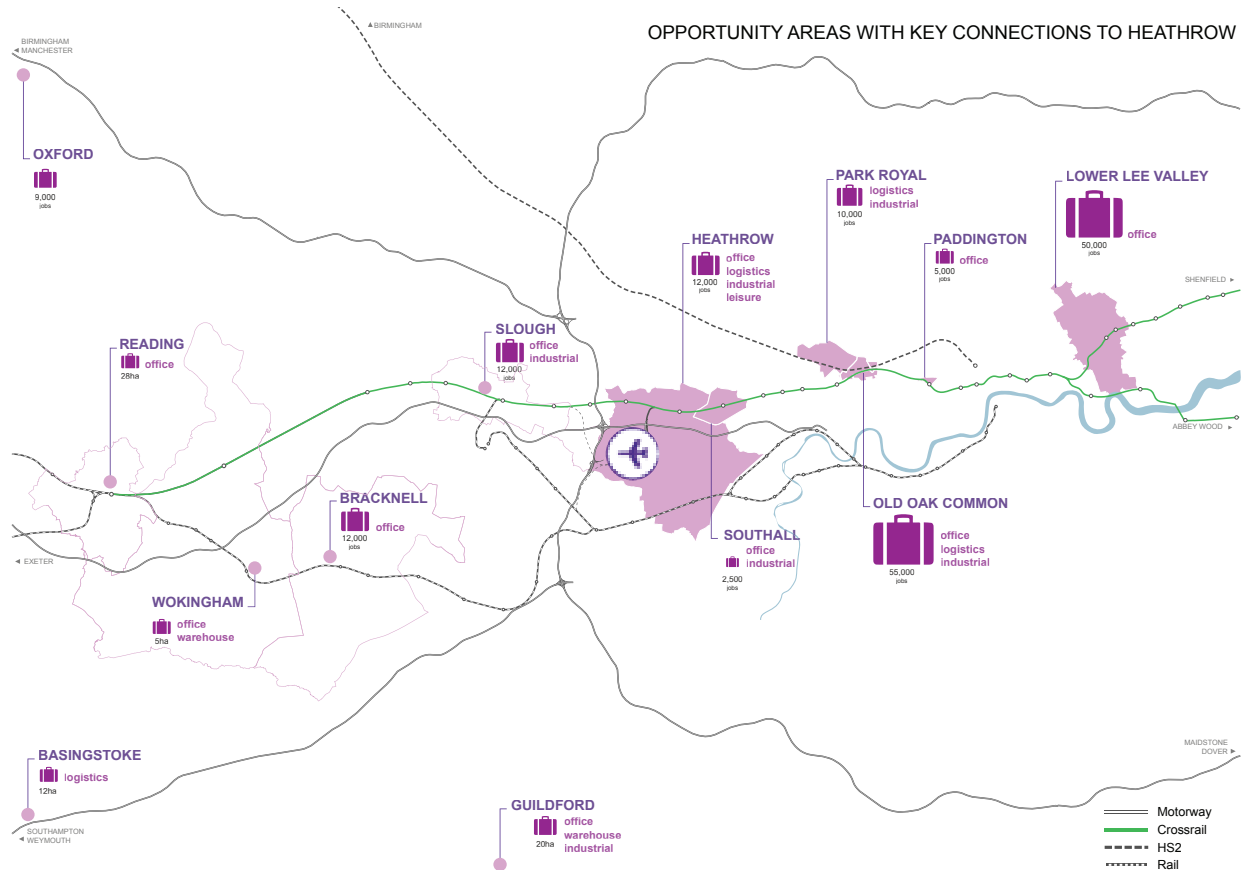
Growth at Heathrow will generate 123,520 jobs across the UK. Of these, over 70,000 jobs will be within London, with over 50,000 within the five boroughs adjoining the airport. Many of the 20,000 remaining jobs falling outside of the five boroughs will be spread across the Opportunity Areas. These offer significant combined capacity for employment and key freight and logistics linkages with Heathrow.

The considerable collective investment in the Opportunity Areas will bring new jobs, homes, retail facilities, education and research that are exceptionally well connected to Heathrow. Additional employment growth at Heathrow will help sustain and contribute to the Opportunity Areas as they play a significant role in maintaining London’s role as a World City. Town centres that are well connected to Heathrow will play a key role alongside the Opportunity Areas to accommodate significant employment growth.

Heathrow will be particularly well connected to Old Oak Common and Park Royal, which will be only 10 minutes from Heathrow. Major regeneration is planned around a new HS2 and Crossrail hub, including a large commercial quarter and the wider industrial and logistics zone of Park Royal, as well in the order of 25,000 new homes in these two areas alone.

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Figure 1.36: Opportunity areas with key connections to Heathrow



1.7.1.5 Local growth in context

We predict that growth at Heathrow would generate over 50,000 new jobs in the five districts of Hillingdon, Hounslow, Ealing, Spelthorne and Slough alone. These are in addition to the 72,000 new jobs that may be located elsewhere across London and the UK.

This will generate major benefits, helping to build on the strengths of individual areas and address current weaknesses. The current strengths, weaknesses and growth context of the five districts are considered below to highlight how the local areas can benefit from growth at Heathrow.

Hillingdon

Heathrow Airport is located in Hillingdon and its economy relies heavily on the employment and trade that the hub brings. 40% of jobs in the Borough are at the airport and one in 15 Hillingdon residents work for Heathrow.

The local economy is characterised by its strong knowledge industries, the presence of major national, and international corporate headquarters, and clear strength in the transport and communications sector, at over four times the London average.

However, the area suffers from high levels of youth unemployment, congested transport networks, significant out-commuting, below average qualifications, and high levels of deprivation south of the A40:

- Parts of West Drayton, Yeading and Townfield are among the top 20% most deprived areas of the UK
- 25% of those unemployed in Hillingdon are aged 16-24, compared with a national average of 14%
- 27% of residents are qualified to NVQ Level 4 compared with a London average of 37%⁶⁸.

Much of the southern part of the borough is identified by the Mayor of London as the Heathrow Opportunity Area, which envisages 12,000 new jobs by 2036⁶⁹. Much of this employment growth will be airport related, particularly in

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the transport, logistics, business, hotels and leisure/tourism sectors. Heathrow 'north' (including the A4 corridor) is seen as an important component of the Opportunity Area in accommodating this growth.

Other key areas of growth in Hillingdon are identified as:

- **Stockley Park** – with potential for a diverse range of additional offices including marketing and R&D, and for prestigious national and European headquarters
- **Uxbridge** – offering further potential for the bio-science and creative/media support sectors in the Uxbridge Business Park, and through redevelopment of the RAF Uxbridge site
- **Hayes-West Drayton corridor** – opening up additional possibilities for a range of uses including small business parks, logistics and mixed-uses
- **Hayes town centre** – bringing further options for SME workspaces and the creative/media sector
- **Feltham** – creating an opportunity to continue the rejuvenation of its town centre and make use of the area to develop Hounslow's strategically important industrial offer.

Hillingdon Council also recognises the potential for increased commercial activity at Heathrow, replicating the Heathrow Opportunity Area in its own planning policy and supporting an increase of 9,000 jobs by 2026 to boost the borough's competitiveness⁷⁰. Growth at Heathrow will help to unlock the potential of the Heathrow Opportunity Area.

Ealing

Ealing has the lowest employment rate of the five boroughs at 68% and offers significant potential for change in the coming decades. New public transport connectivity to Heathrow, the Thames Valley and Central London via five Crossrail stations should catalyse major investment in the area. At present, 4% of Ealing's residents work at Heathrow and it is the largest commercial borough in West London, with over 11,000 businesses.

Ealing is a major commercial centre ready for investment. The borough currently aspires to over 10,000 new jobs around east-west transport corridors by 2026⁷¹. Growth at Heathrow can help to secure Ealing's on-going economic success.

Currently around 18% of Heathrow employees live in Ealing. If this ratio remains constant, over 3,000 new jobs for existing residents could be brought to the borough, helping to address its low employment rate.

With major investment into the transport network also planned, it is plausible that a large number of the predicted high value, highly skilled jobs could be focused on Ealing in the coming decades. This would correlate with the borough's aspirations as an economic hub between the Thames Valley and metropolitan London, with up to 6,500 office jobs and 3,200 homes anticipated in a revitalised Ealing town centre⁷¹. Regeneration is also anticipated in Southall town centre to coincide with the arrival of Crossrail.

Hounslow

Approximately 15% of all businesses in Hounslow have a supply link to Heathrow. The airport's supply chain is estimated to account for up to 20% of the borough's economic base. Strong sectors in the borough reflect the importance of Heathrow to the local economy, with transport, communications, distribution, hotels and restaurants together employing over 40% of Hounslow's residents.

A key consideration for Hounslow is the need to ensure that there is increased use of the local labour supply to ensure residents access a wide range of local jobs. Hounslow residents are currently more likely to work in blue collar occupations. Growth at Heathrow can work in tandem with the borough's aspirations. Hounslow aims to support local employment and training initiatives, to facilitate more residents gaining higher skill levels to match employment opportunities that will be created by growth at Heathrow.

Hounslow town centre, Hounslow west and Brentford are the main focal points for regeneration and investment in the coming years, through housing and commercial growth. These areas will also benefit from connections and proximity to Crossrail and HS2 interchanges. The importance of North Feltham Trading Estate and Brentford for industrial use is recognised, and growth at Heathrow will help to sustain and enhance these areas⁷².

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Spelthorne

Spelthorne is a relatively small borough located to the south of Heathrow, characterised by flat, low-lying land that leaves large areas liable to flood. Unlike in many boroughs, job vacancies in Spelthorne exceed unemployment levels. The borough's workforce has more middle-ranking intermediate and supervisory roles compared with the national average, but fewer for both professional/managerial and unskilled workers. This is reflected in the educational qualifications of the workforce which show lower levels of educational attainment. Heathrow provides significant economic benefits to the borough and directly employs 10% of its workforce.

Stanwell is the closest major settlement to Heathrow within the borough – a relatively deprived area compared with much of Spelthorne. Growth at Heathrow can retain open land between Stanwell and the airport, and protect its economy.

The towns of Ashford and Staines are the main regeneration areas projected in Spelthorne's Local Plan, with large employment designations totalling approximately 50 hectares of land for a mix of office, industrial and warehousing uses. It is anticipated that these areas will be developed before growth at Heathrow occurs, but this provides a useful indication of the current spatial trend⁷³.

Slough

The development of Slough has been greatly influenced by its strategic transport links. Three stations on the Great Western Main Line provide access to Central London and Reading, with the M4 connecting Slough to Heathrow and beyond. Heathrow Airport lies just beyond the eastern boundary and the Poyle Industrial Estate is only 1 mile from Terminal 5.

Slough town centre is underperforming as both a retail and commercial centre. The future prosperity of some of the older industrial areas in the borough is also in doubt. This is largely due to gaps caused by structural changes to the local economy that are not currently being filled.

Once again the introduction of strategic transport links to major hubs will benefit Slough. Crossrail and the Western Rail Access will link directly into a growing Heathrow, unlocking the potential for major economic growth and boosting its declining centres. Some 10,000 new jobs and over 2,000 new homes are anticipated in Slough town centre in the borough's Core Strategy which highlights the aspiration to boost this part of Slough through growth⁷⁴.



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Figure 1.37: Planned growth areas in the five districts



Accommodating future local growth; 3 scenarios

The wide range of socio-economic and development strategies in the five boroughs show there is great strength to build on, and also significant weaknesses to be addressed, in the local area.

In addition to the 35,600 predicted jobs directly associated with the operation of the airport, we predict a further 15,000 new jobs located within the five boroughs, and over 36,000 across London as a whole. It is too early to say with any certainty where future policy and market forces may direct these jobs. None of the five boroughs have a Local Plan that will still be current by 2030.

Below, we set out three potential growth scenarios that are expected to work together to ensure that the benefits of employment growth within the five boroughs may be dispersed:

1. A new commercial quarter to the west of the expanded Heathrow;
2. Planned regeneration in the Heathrow Opportunity Area.
3. Clustered growth aligned to current borough aspirations;

Scenario 1: A new commercial quarter to the west of the expanded Heathrow

The development of a new commercial quarter at Heathrow could stimulate additional sustainable employment growth that may otherwise not be attracted to the UK. Heathrow will become one of the most accessible locations in the UK and could attract global companies that require exceptional connectivity. Since we can connect industry to the global marketplace like no other UK destination, we consider that there may be potential within the airport boundary (as identified in the Master Plan) to accommodate commercial growth. This will complement the vitality and viability of other nearby commercial centres.

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In addition the potential for development in this location will ensure that any airport related businesses displaced as a result of growth can have a new airport location that will allow their trade to flourish.

Due to the uncertain nature of future job demand, and the need to work closely with stakeholders on the proposal, the growth of a commercial quarter in this location is represented as an opportunity for debate. It may be the case that the Heathrow Opportunity Area continues to grow around the key areas discussed further below and in the London Plan – or that opportunities expressed in Local Plans take precedence, for example with jobs sought as part of the on-going revitalisation of Ealing town centre. As set out later, we are committed to working with the five local boroughs and other key agencies in effectively planning the economic, spatial and transport strategies that could support Heathrow's growth. We believe considerable benefit could be realised from a proactive, integrated and holistic approach, particularly with regard to maximising future economic growth.

Figure 1.38: Heathrow commercial quarter



Scenario 2: Planned regeneration in the Heathrow Opportunity Area

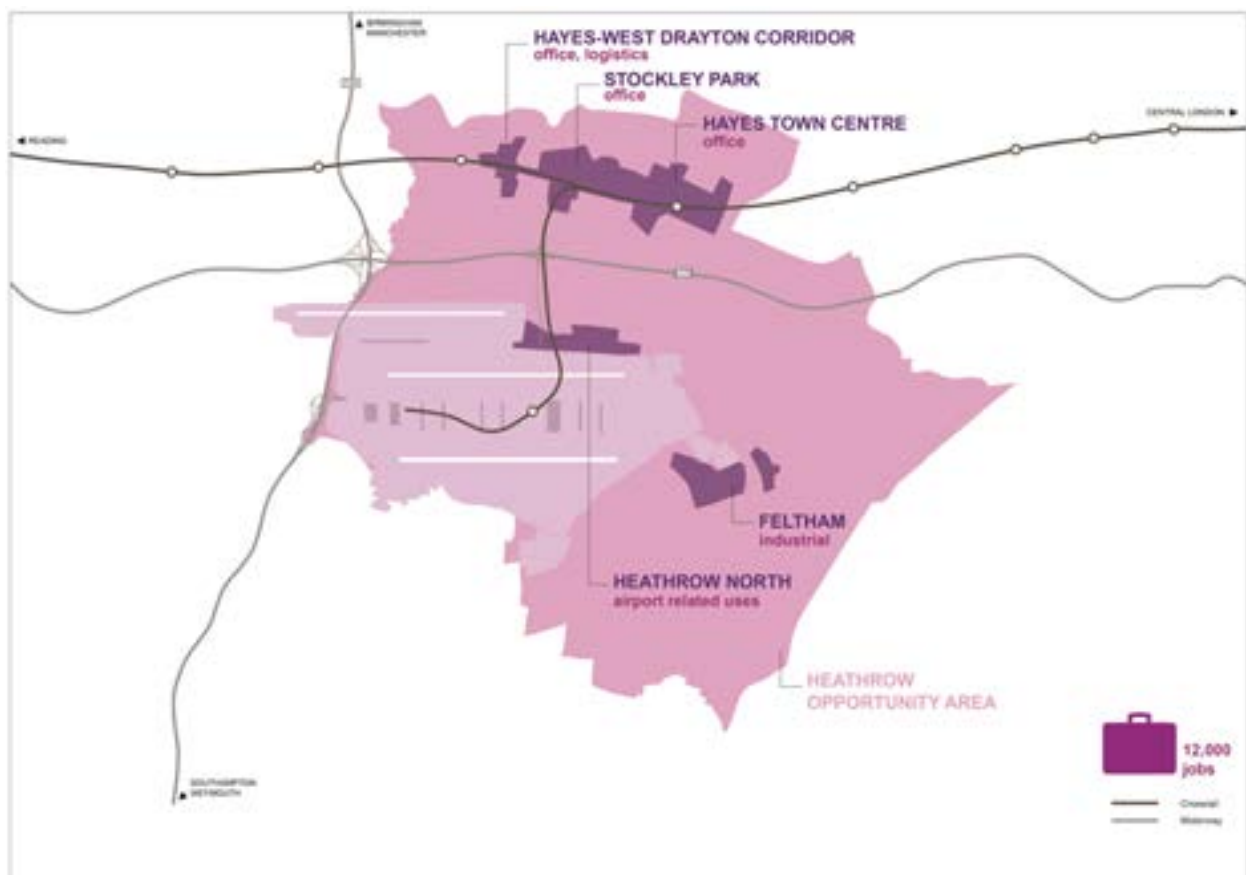
The London Plan allocates growth areas for the period to 2036. It considers that a significant proportion of economic growth created by Heathrow would be contained within the Heathrow Opportunity Area. This option conceptually explores at a strategic level the opportunities for continued growth in the local area in accordance with the on-going development of the Heathrow Opportunity Area beyond 2036. The Opportunity Area requires further definition but extends to in the order of 700 hectares. This will continue to support the industrial and commercial offer within the local area and link to priority town centre regeneration schemes such as those at Hounslow and Brentford. The London Plan provides indicative increases of up to 12,000 jobs and 9,000 new homes within the area.

The key development areas within the Heathrow Opportunity Area are shown in Figure 1.39. In Hillingdon, Heathrow 'north', (including the A4 corridor) will continue to benefit from airport related growth, particularly with regard to transport and logistics, business and hotels and leisure/tourism. Stockley Park has a significant draw for a

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diverse range of offices including marketing and R&D, and for prestigious national and International headquarters. The Hayes-West Drayton corridor contains redevelopment opportunities for a range of potential uses, including small business parks, logistics and mixed-uses. Hayes town centre offers considerable scope for the creative/media sector and for SME workspace. In Hounslow, there is capacity to continue the rejuvenation of Feltham as a town centre and to develop the borough's strategically important industrial offer⁷⁵.

Figure 1.39: Planned regeneration in the Heathrow Opportunity Area



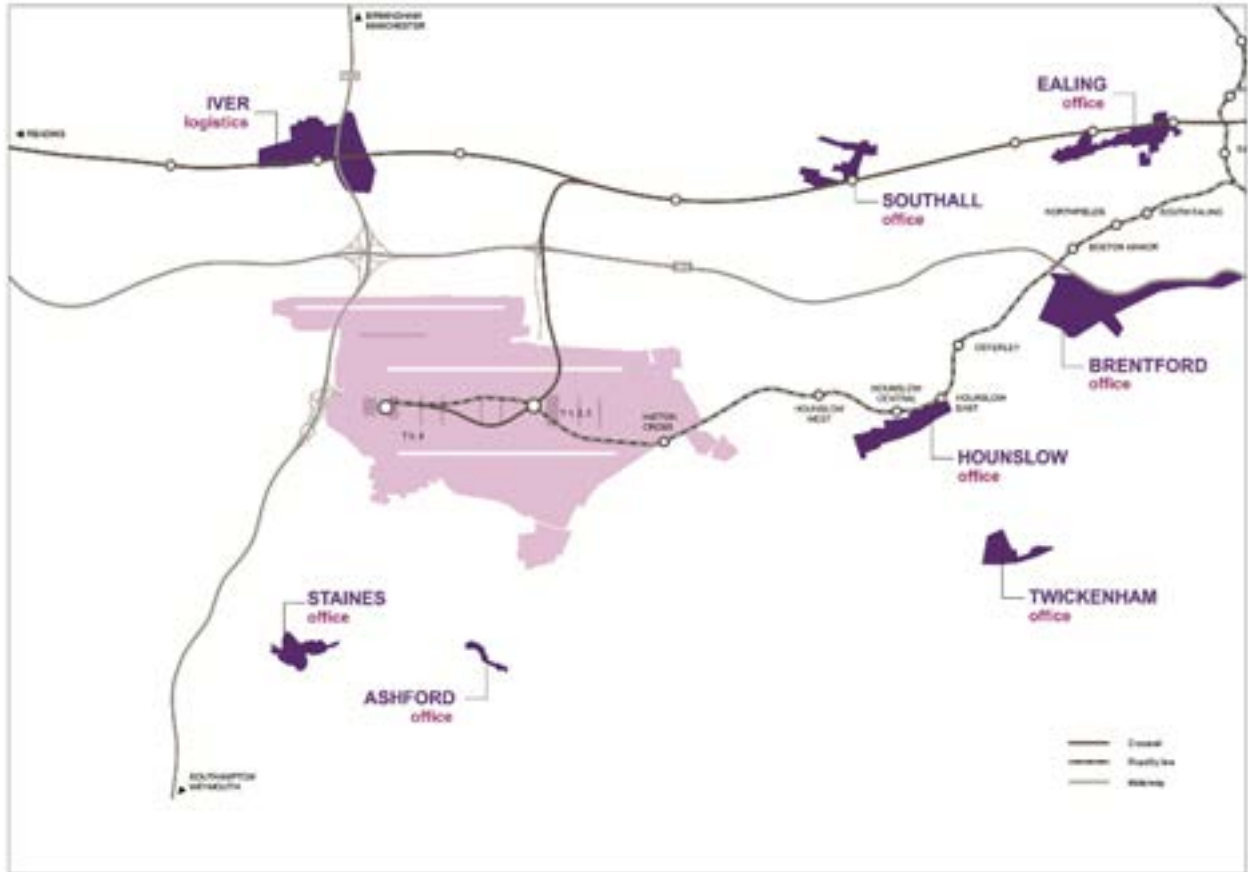
Scenario 3: Clustered growth aligned to current borough aspirations

Current growth locations are shown in Figure 1.40 are based on the development strategies of the five boroughs, which end before growth at Heathrow through expansion occurs. Revised plans are likely to be in place, which would respond to the employment opportunities created by additional growth at Heathrow. The local market has long benefited from airport related commerce and been able to accommodate it. The same will continue into the future.

It is often the case that development trends continue through an on-going process of regeneration, contiguous development and intensification in similar areas. Therefore there is potential for continuing growth in these locations to harness and perpetuate the inward investment activities promoted, as set out in Figure 1.40. For example, the LB Ealing adopted development strategy uses its strategic location between Central London and Heathrow, as well as the arrival of Crossrail, to direct and inform the planned growth of both Southall and Ealing urban centres⁷⁶. Similarly, in Hounslow's Local Plan Proposed Submission (setting out growth strategies for Brentford and Hounslow centres), Heathrow is recognised as having a major role in the local economy, employing more than 11,000 of the borough's workforce and the reason for the significant concentration of airport-related business based in the borough, including logistics services and industrial estate and business parks⁷⁷.

1.7 Heathrow delivers the greatest socio-economic benefits

Figure 1.40: Current growth locations



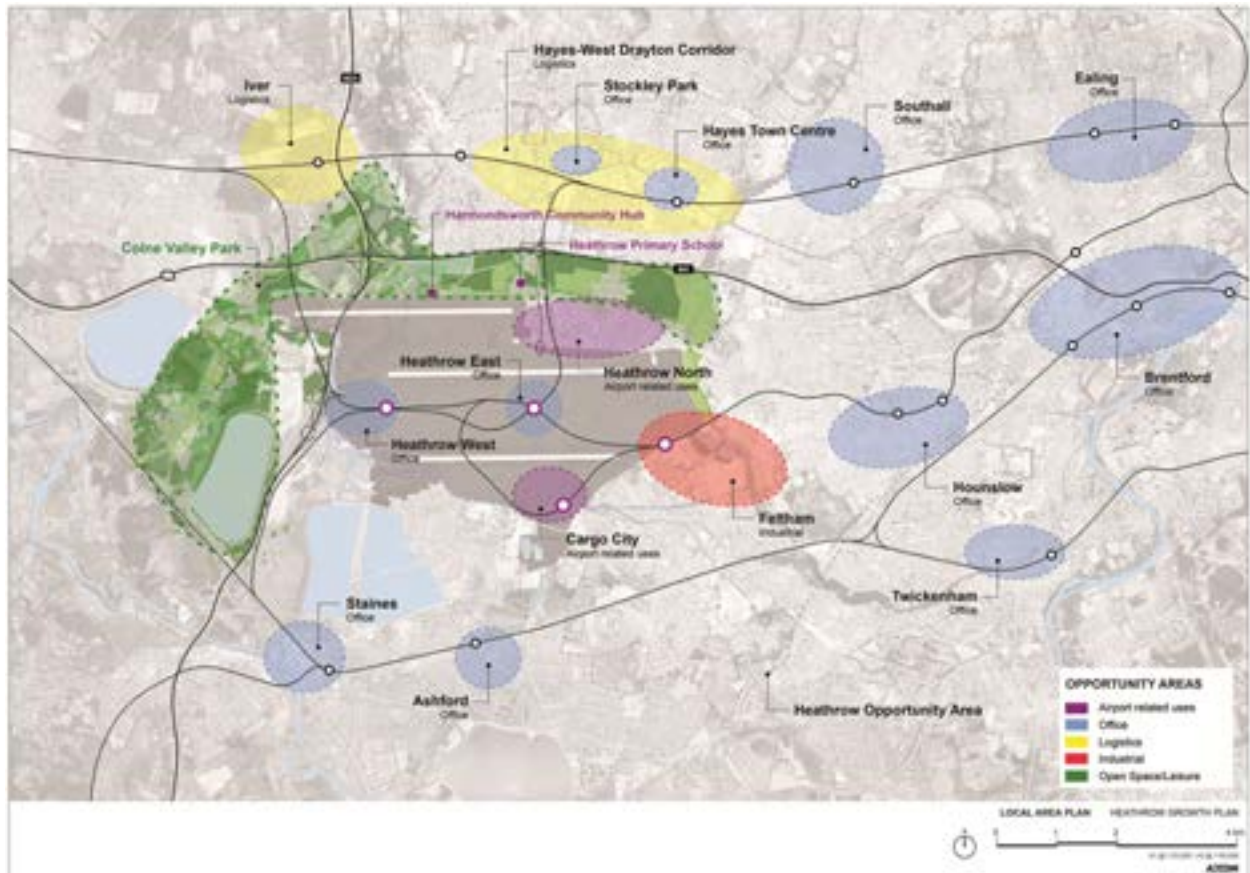
1.7.1.6 A robust context for Growth at Heathrow

Working together, the planned growth set out above demonstrates how Growth at Heathrow can continue to connect with and simulate growth and regeneration in the local area. Figure 1.41 shows the key growth areas that provide a robust context for growth within and out with the airport boundary. The plan also reflects the objective to promote and significantly improve strategic green infrastructure surrounding the airport including the Colne Valley Park.

This established network of town centres and commercial areas offer a range of conditions to accommodate growth across sectors related to the employment drivers for Heathrow. Together they form a positive context for continued investment and employment growth working alongside the concentrated growth targeted for the Heathrow Opportunity Area itself.

1.7 Heathrow delivers the greatest socio-economic benefits

Figure 1.41: Illustrative local area plan



1.7.1.7 Summary

Heathrow's expansion will stimulate economic growth, boost UK competitiveness and create a significant number of jobs in the local area, throughout London and across the wider UK. Analysis by Frontier Economics predicts 123,500 new jobs by 2040.

Given the size, scale and nature of the labour market, we expect the new jobs created by an expanded Heathrow to be accommodated by current and projected residents entering the labour force.

Employment will span a broad range of sectors and cater for a wide variety of skills targeted for improvement by the local boroughs. The sectors and skills addressed by the new jobs will match local employment area specialisations created and sustained by Heathrow.

Due to the nature of the labour market, employment growth will not require net additional housing, as residents are expected to fill the new jobs. Consequently there is no need for urbanisation to support the new workforce.

Heathrow is well placed to contribute to and sustain planned economic growth within opportunity and growth areas that are well connected to Heathrow. What's more, it can do so in a way that closely corresponds with stakeholder aspirations.

1.8 Meeting the Commission's objectives

1.8.1 Heathrow's proposal delivers on all of the Commission's objectives

The Airports Commission's terms of reference are to examine the requirement for additional capacity to maintain the UK's position as Europe's most important aviation hub. They seek to maintain a UK-wide perspective and take into account their economic, social and environmental costs and benefits, and operational deliverability. In the interim report the Commission found that there was a clear case for one net additional runway in the South East to provide 200,000 or more annual aircraft movements. Based on this finding the Appraisal Framework lays out eight high level commission objectives.

Heathrow's proposal to expand meets the overall finding of a need for capacity to maintain the UK's position as Europe's most important aviation hub. It does this by providing over 200,000 ATMs per year of hub capacity. It also directly addresses each of the Appraisal Framework strategic objectives. Heathrow will take Britain further than alternatives. Only Heathrow connects the whole of the UK to growth.

We detail how we meet many of these objectives in the following Parts 2-6. An overview of our case for meeting these objectives is as follows, with a detailed reference in part 8:

1.8.1.1 Strategic fit

Expanding Heathrow will ensure Britain retains one of the world's leading, best connected hubs to win the global race for growth. A three-runway Heathrow will have a capacity of 740,000 flights per year – and increase of 260,000 air traffic movements (ATMs) from the current cap of 480,000 ATMs. Expansion at Heathrow will deliver connections, particularly to long haul destinations like no other option. Regardless of future developments in aviation the UK will be assured of a winning hub proposition in the 2030s and beyond. Competition across UK aviation will benefit. We will offer a world class airport, and can integrate it with local, regional and national development.

1.8.1.2 Economy

Heathrow will deliver greater economic benefits to the UK than any other option. It will create jobs, facilitate trade and tourism, boost spending in the wider economy and improve public finances. We have estimated the benefits to the UK from expanding Heathrow at £100bn (present value). Within this total trade, FDI and tourism alone would bring a present value of £50bn over the coming years. Expanding Heathrow would protect the existing 110,000 local jobs that depend on the airport and create 123,000 new jobs across the UK. Heathrow is ideally placed to ingrate into the key clusters of the UK economy as well as regional development plans. Economic benefits will spread across the entire UK, connecting 90% of the UK population within 3 hours to 90% of country GDP and 70% of world city GMP.

1.8.1.3 Surface Access

Heathrow is already the best served airport in the UK for surface access. With our plans it will become a truly integrated hub at the heart of the UK transport network. 70% of the UK will be within 3 hours of Heathrow on public transport alone. 50% of passenger will travel on public transport and sustainable employee travel will rise. ... Better rail connections will include Crossrail, the Piccadilly Line upgrade; Western Rail Access; Southern Rail Access; and HS2. Heathrow's rail capacity will treble from 5,000 to nearly 15,000 seats per hour or from 18 to 40 trains per hour. Passengers boarding a train at Sheffield or Manchester could be checking in for their flight at Heathrow 90 minutes later. Heathrow is well placed on the strategic road network already. Capacity will expand on the M25. No new airport traffic will burden local roads. We will work with airlines and government to deliver better air links between UK regions and Heathrow. How we meet the objectives are outlined.

1.8.1.4 Environment

Our proposals address the objective to reduce or mitigate environmental impacts. A third runway at Heathrow should not go ahead at any cost. People have legitimate concerns about the environmental impact. Our proposals will fit within strict limits on noise, local air quality and within the UK's climate change targets. Our proposals for a third runway at Heathrow will see noise reductions continue. Even with a third runway, we estimate that in

1.8 Meeting the Commission's objectives

2030 there will be at least 30% fewer people within Heathrow's noise footprint than today. This would deliver the lowest noise levels around Heathrow since the 1960s. Air Quality will be within EU limits, helped by cleaner aircraft, vehicle and no increase in airport related traffic. Each of the specific Environmental objectives is addressed in detail in Part 5.

1.8.1.5 People

Our proposals limit impacts on people and communities. Since we published our initial options last July and were shortlisted by the Commission in December we have engaged widely. In our refreshed scheme, we have located the runway further south helping to minimise impacts on local people. This reduces noise impacts and protects more homes and important heritage sites. The number of properties requiring compulsory purchase has been reduced by 200. The revised scheme also avoids the need to redevelop the M4/M25 junction. Our proposals will add real new benefits for local people such as high quality new green spaces and flood protection.

1.8.1.6 Cost

The benefits of Heathrow growth far outweigh the costs. Total costs are estimated at £15.6 billion, of which £11.1 billion is airport infrastructure, £0.8 billion is surface access, and £3.7 billion is community compensation and environmental mitigation. These costs can be privately funded with the appropriate framework.

1.8.1.7 Delivery

Heathrow offers the fastest, most cost effective and most practical route to delivering new hub capacity. A third runway is deliverable, politically and practically. Many local people support Heathrow expansion. There is a strong underlying business case and clear airline demand for Heathrow. And with an asset base of more than £13 billion and an investment grade credit rating, Heathrow is uniquely well positioned to fund a new runway. If Government takes a clear policy decision after the Commission reports then planning consent can be delivered by 2019, with the first flights using a third runway in 2025.

1.8.1.8 Operational Viability

Our vision is for Heathrow to be a globally competitive transport hub that wins the global race for the UK. Our airport masterplan will deliver a world-class hub in terms of: safety, resilience and reliability, passenger experience. It will be flexible and allow adaptation to any future changes in the aviation industry.

References

- ¹ Winning the \$30 trillion decathlon - going for gold in emerging markets, McKinsey Global Institute, August 2012
- ² Frontier Economics, 'Connecting for Growth', September 2011 & Eurostat 2013
- ³ Heathrow analysis of CAA passenger survey data
- ⁴ Airports Commission - Discussion Paper 04: Airport Operational Models, May 2013
- ⁵ Board of Airline Representatives in the UK (BAR UK), April 2012
- ⁶ Knight Frank and Citi Private Bank – The Wealth Report, 2012
- ⁷ Civil Aviation Authority – Heathrow: Market Power Assessment Non-confidential Version, February 2012
- ⁸ Freight Trade Association – Sky-high value, March 2014
- ⁹ HMRC database on UK trade info: www.uktradeinfo.com
- ¹⁰ Frontier Economics - Impact of airport expansion options on competition and choice, April 2014
- ¹¹ Theoretical city pairs = $n \times [n-1]$; where n is the number of destinations served. The number of city pairs connected across the hub is directional: the transfer from origin A to destination B across the hub is a separate city pair to the transfer from origin B to destination A across the hub. This reflects the reality that city pairs are constrained by the schedule of the hub.
- ¹² IATA Airport IS Database, OAG Airline Schedules Database, 2011 (ODs [Origin-Destinations] are counted bidirectional; number of ODs and level of global demand considers all services, passengers per OD and routes operated consider only ODs with 1000+ passengers [which represents 99% of global demand])
- ¹³ Heathrow analysis of IATA Data (Airport IS) and OAG Data, 2011 (regular long-haul services – at least 3 flights per week, >2200NM). Note CAA passenger survey data is more comprehensive and accurate compared to Airport IS - including, for example, self-connecting passengers. As CAA passenger survey data is only available for the main UK airports it has been used for Heathrow and Gatwick's transfer rate while international benchmarking draws on Airport IS.
- ¹⁴ Heathrow analysis of IATA Data (Airport IS), 2012 (city pairs calculated by adding the combination of cities connected through a route when hubbing at both ends of the route is allowed)
- ¹⁵ Heathrow Analysis of OAG Data, 2003-2012 (over this period long-haul destinations endured for 30% longer at Heathrow compared to Gatwick whose long-haul services were also twice as likely to experience a break in service)
- ¹⁶ Airport Capacity Expansion Strategies in the era of Airline Multi-hub Networks, OECD, February 2013
- ¹⁷ easyJet website, www.easyJet.com, June 2013
- ¹⁸ Heathrow analysis of OAG Data, 2012 (European market, frequencies for British Airways at Heathrow)
- ¹⁹ CAPA, www.centreforaviation.com, June 2013
- ²⁰ Heathrow Analysis of Boeing (www.boeing.com) and Airbus (www.airbus.com) websites, July 2013
- ²¹ Heathrow analysis of Boeing, www.boeing.com, Flight global www.flightglobal.com and world city population data (world bank)
- ²² Willie Walsh evidence at the Airports Commission Public Evidence Session, July 2013
- ²³ HSBC Transport Equity Research, February 2014
- ²⁴ Heathrow analysis of IATA Data (Airport IS), OAG Data 2011 and CAA Passenger Survey 2012 (for Heathrow and Gatwick) (regular defined as at least 3 departures per week; long-haul defined as >2200NM, forecast based on current market growth trends; worldwide OD passenger traffic to and from all highlighted airports was scaled to 2030 using IATA and Boeing/Airbus growth rates and the existing transfer ratio. The threshold for long-haul route viability in 2012 was obtained by calibrating the existing long-haul routes served across airports using current traffic and applied to 2030. The change in transfer passengers was estimated based on historic trends and expected competitive movements by 2030. Growth in regular long-haul routes at Paris CDG and Amsterdam Schiphol was averaged to account for the bilateral agreement between these airports. Growth at New York JFK reflects constraints on the number of aircraft movements. The figure is designed to provide an indicative view of Heathrow and its peers likely future 'position' without being categorical. It is based on today's view of the world.)
- ²⁵ Frontier Economics - Impact of airport expansion options on competition and choice, April 2014
- ²⁶ CityScope 2.0 Global Database, 2011
- ²⁷ Cities with a GMP greater than £100 million were considered for this analysis
- ²⁸ Heathrow: A national asset, April 2014
- ²⁹ For example, the review of foreign ownership restrictions on airlines in the United States and the European Union's Common Aviation Area initiative (<http://ec.europa.eu/transport/>)
- ³⁰ Virgin Atlantic, A new strategic alliance between Delta Air Lines and Virgin Atlantic, www.virgin-atlantic.com, June 2013
- ³¹ Heathrow Internal Database – BOSS, 2000
- ³² Heathrow Analysis of OAG Data, 2012 (regular services – at least 3 departures per week, long-haul>2200NM, we view this minimum threshold of regularity to be representative of a business passengers' view of a direct connection, enabling a 2 day business trip. We note table 4.1 of the Commission's Airport Operational Models paper which considers 1 departure a week and non-European destinations; half of LGW's 50 Rest of World destinations are served <3 a week)
- ³³ Airports Commission – Discussion Paper 04: Airport Operational Models, May 2013
- ³⁴ More detail provided in "One hub or none", Heathrow, www.heathrow.com, November 2012

References

- ³⁵ More detail provided in Heathrow's submission to the Airports Commission - Discussion Paper 02: Aviation Connectivity and the Economy, April 2013
- ³⁶ JLS Consulting – Analysis of Global Hub Airports – Why no city supports more than one hub, October 2013
- ³⁷ IATA quote
- ³⁸ ConstructionWeekOnline.COM – Top 10 airports under construction in the GCC
- ³⁹ Reuters - Turkish firms win 22 billion euro Istanbul airport tender, May 2013
- ⁴⁰ More detail provided in Heathrow's submission to the Airports Commission - Discussion Paper 01: Aviation Demand Forecasting, March 2013
- ⁴¹ Heathrow analysis of IATA Data (Airport IS), OAG Data 2011 and CAA Passenger Survey 2012 (for Heathrow and Gatwick) (regular defined as at least 3 departures per week; long-haul defined as >2200NM, forecast based on current market growth trends; worldwide OD passenger traffic to and from all highlighted airports was scaled to 2030 using IATA and Boeing/Airbus growth rates and the existing transfer ratio. The threshold for long-haul route viability in 2012 was obtained by calibrating the existing long-haul routes served across airports using current traffic and applied to 2030. The change in transfer passengers was estimated based on historic trends and expected competitive movements by 2030. Growth in regular long-haul routes at Paris CDG and Amsterdam Schiphol was averaged to account for the bilateral agreement between these airports. Growth at New York JFK reflects constraints on the number of aircraft movements. The figure is designed to provide an indicative view of Heathrow and its peers likely future 'position' without being categorical. It is based on today's view of the world.)
- ⁴² Heathrow analysis of Boeing, www.boeing.com, Flight global www.flightglobal.com and world city population data (world bank)
- ⁴³ Analysis of existing Heathrow, Gatwick, Stansted and Luton passengers (CAA Survey 2011)
- ⁴⁴ Oxford Economics – Explaining Dubai's Aviation Model, June 2011
- ⁴⁵ Financial Times - Big air alliances rule out move from Heathrow, August 2013
- ⁴⁶ British Airways submission to the Airport Commission - Discussion Paper 02: Aviation Connectivity and the Economy, April 2013
- ⁴⁷ British Airways submission to the Airport Commission - Discussion Paper 01: Aviation Demand Forecasting, March 2013
- ⁴⁸ British Airways submission to the Airport Commission - Airport Operational Models, July 2013
- ⁴⁹ Routesnews - LHR is what 'passengers prefer', says Virgin Atlantic boss, January 2014
- ⁵⁰ Reuters - Virgin Atlantic's Little Red needs new runway for expansion –Branson, March 2014
- ⁵¹ The Telegraph - Why Dubai is taking business away from London, March 2014
- ⁵² London Evening Standard – Singapore Airlines adds its voice to call for Heathrow expansion, January 2014
- ⁵³ London Evening Standard – Delta boss says Heathrow must be expanded or London will lose, April 2014
- ⁵⁴ CAPA - <http://centreforaviation.com/news/iata-notes-business-case-for-heathrow-300424>
- ⁵⁵ The Telegraph - Michael O'Leary: let the market decide where to build airport runways, December 2013
- ⁵⁶ The Telegraph - easyJet debunks Gatwick's Heathrow myth, March 2014
- ⁵⁷ The Telegraph - Sunday Interview: Etihad CEO James Hogan, March 2013
- ⁵⁸ More details are provided in "Best Placed for Britain", Heathrow, www.heathrow.com, June 2013
- ⁵⁹ ONS, 2012, Annual Population Survey Workplace Analysis.
- ⁶⁰ Analysis of FAME database by a leading management consultancy for Heathrow. Turnover is according to the last listed accounts — generally 31/12/2011, but occasionally 31/03/12
- ⁶¹ Analysis of Companies House data by a leading management consultancy for Heathrow. Note: Thames Valley includes Berkshire, Buckinghamshire, and Oxfordshire
- ⁶² Steer Davies Gleave – Air Freight: Economic and Environmental Drivers and Impacts, March 2010
- ⁶³ Furthermore, these figures may overstate the true importance of intra-EU air freight because in many cases truck services operating airport-to-airport are operated under the airline's flight number, following IATA rules. The extent of this mode is demonstrated in a report by Steer Davies Gleave which found that trucked air freight achieved a compound annual growth Rate of 24% between 2002 and 2007. Over the same period, freight carried in the belly-hold of passenger aircraft bound for Europe declined by 10%.
- ⁶⁴ Frontier Economics – Employment impacts from growth at Heathrow, April 2014
- ⁶⁵ Office of National Statistics 2011 Census
- ⁶⁶ Further Alterations to the London Plan, January 2014
- ⁶⁷ London Heathrow Economic Impact Study, Regeneris Consulting, Sept 2013. The report was commissioned by Thames Valley Berkshire LEP, Oxfordshire LEP, Buckinghamshire Thames Valley LEP, Enterprise M3 LEP and West London Business
- ⁶⁸ Hillingdon's Local Economic Assessment, 2011
- ⁶⁹ Further Alterations to the London Plan, January 2014
- ⁷⁰ Hillingdon Local Plan: Part 1 – Strategic Policies (adopted November 2012)
- ⁷¹ Ealing Adopted Core Strategy, April 2012
- ⁷² Hounslow Local Plan Proposed Submission (2015 – 2030)
- ⁷³ Spelthorne Adopted Core Strategy, February 2009

References

⁷⁴ Slough Core Strategy 2006 - 2026

⁷⁵ Further Alterations to the London Plan, January 2014

⁷⁶ Ealing Adopted Core Strategy, April 2012

⁷⁷ Hounslow Local Plan Proposed Submission Draft consultation document, March 2014

Part 2

**What our
stakeholders
say**



2.1 What our stakeholders say

We have shared our proposals widely. Inevitably some people will never believe expansion of Heathrow is the right choice. But at least as many support a new runway. We are clear that any proposal we make needs to be significantly different from that which was previously withdrawn in 2010. We have listened to many – local residents, the wider public, businesses, passengers, airport users, statutory consultees and elected representatives – about what they would want to see in any revised proposal.

We are committed to further consultation. We believe it is important to listen at each stage and we look forward to receiving further feedback on our refreshed design. We will start by working with local people to consult on proposals for noise and blight consultation in the summer of 2014, with further formal opportunities in the NPS and planning process to work with all interested parties to improve our plans.

This section describes how we have engaged with our stakeholders and what we have heard so far. We point to where our plans have changed, which is described in more detail in further sections. We also outline how we propose to continue the conversation.

2.2 What our local communities say

2.2.1 What our local communities say

Heathrow recognises the importance of good community relations. Following the reaction to our previous proposals for a new runway at Heathrow we have undertaken extensive and ongoing consultation with our local communities. We have sought to understand their issues, debate the tradeoffs and priorities with them and use this engagement to genuinely shape our proposals.

Since the Airports Commission Interim Report we have held a wide-ranging formal public consultation. The feedback from this has allowed us to improve our plans. We think it is important that the process allows time for engagement to shape the plans, rather than be too quick to define every detail. The public's views are reflected in our revised scheme design. Our plans will continue to be refined as we develop further detail and obtain more community feedback.

2.2.1.1 Heathrow's on-going engagement programme

Over the past few years, Heathrow has established a comprehensive and on-going engagement programme involving local political stakeholders, local authorities, interest and residents groups, businesses, and individual residents. Conversation encompassing a range of airport-related issues is encouraged through a variety of mechanisms. At a formal level, these include the fora listed in Figure 2.1:

Figure 2.1: Heathrow's engagement fora

Forum	Purpose
Heathrow Airport Consultative Committee (HACC)	The HACC is an independent committee which meets six times a year and includes representatives of airport users, local authorities, airlines, NATS, DfT, trade unions and other bodies concerned with the airport and local area. Heathrow has recently instigated an independent review of the committee to support the Government's Aviation Policy Framework's objective that Airport Consultative Committees play an effective role.
Local Focus Forum (LFF)	The Local Focus Forum is chaired by Heathrow's Director of Policy and Political Relations and is held quarterly for resident association representatives and Councillors from the villages and wards bordering Heathrow. The forum discusses a range of local and Heathrow-related issues and reports from the meetings are made available on the Heathrow website.
Heathrow Noise Forum	The Heathrow Noise Forum was established in January 2014 and brings together representatives from DfT, CAA, NATS, IATA, British Airways, Heathrow, noise pressure group HACAN and local authorities. The forum seeks to foster collaboration in noise management at Heathrow from a range of stakeholders and was set up following a successful partnership between HACAN, NATS, Heathrow and British Airways which facilitated the early morning arrivals trial that ran in 2013.
Local Authority bi-laterals/briefings	Heathrow holds regular meetings on a number of airport related matters with the local authorities around Heathrow, ranging from annual meetings between Council/Heathrow CEOs to quarterly bi-laterals that involve a number of senior Council and Heathrow representatives.
MP briefings	Heathrow has a programme of engagement with the MPs whose constituencies are close to Heathrow to ensure they are kept up to date with policy and operational issues that impact their constituents.
Residents groups	On-going dialogue has been established with a number of residents groups around the airport. For example, since Heathrow's previous proposal for a third runway was cancelled, Heathrow has held bi-annual meetings with the residents in Sipson and Harmondsworth and meet on a regular basis with action group CLAD (Cherry Lane Against Development).

At an informal level, Heathrow responds positively to requests to attend meetings and make presentations to communities on matters of interest. During recent operational trials at Heathrow, we took the opportunity to speak at public meetings organised by MPs, councils and interest groups. On-going engagement has enabled Heathrow to successfully build genuine partnerships with many local councils and resident groups. We take feedback seriously and where appropriate will use it to shape our policies and management of key issues.

2.2 What our local communities say

Our continuing work with airlines, NATS and the CAA to explore and employ smarter aircraft operating procedures has been driven by feedback from our residents and our shared objective to reduce the noise impact of the airport. Our position on mixed mode is another example of how policy is informed by stakeholder engagement. This confirmed that runway alternation is highly valued by local people, and as a consequence we do not support mixed mode. Similarly, following feedback from local residents, Heathrow no longer supports increases in night flights.

In last year's report 'A Quieter Heathrow', Heathrow acknowledged the importance of engaging openly and constructively with local communities to understand their concerns. This is essential to tackle problems by helping residents to better understand the challenges of aircraft noise and what is being done to address it, giving them the opportunity to actively shape policies and procedures. The creation of the Heathrow Noise Forum reflects the partnerships that have been forged with key stakeholders involved with this issue.

The views of local residents regarding aircraft noise were used to develop the runway proposals that were submitted to the Airports Commission in July 2013. Two of the three options involved moving the third runway to the west to help reduce noise over the more densely populated areas of west London. All three options recommended the construction of a parallel runway so that the principle of runway alternation could be maintained, providing periods of respite from noise for all communities around Heathrow.

2.2.1.2 Undertaking public consultation on the north west Runway

Following the publication of the Airports Commission's Interim Report in December 2013 we decided to undertake a major, wide-ranging public consultation on the proposal for a new runway to the north west of the airport. We saw this as a continuation of our on-going engagement with local stakeholders.

The public consultation was designed to increase levels of local awareness and engagement around our proposal. Our consultation also let us measure and assess local sentiment towards the proposal and issues associated with Heathrow expansion. Feedback from the consultation has formed an integral part of planning a refreshed scheme design for the Airports Commission.

Timing and scope of the consultation were important to our programme. In the limited time available before submitting a refreshed scheme we felt it was critical that we allowed sufficient time to both hear local communities' views and incorporate them into our scheme in a material way. This meant consulting early and on plans that were still evolving.

Similarly, our consultation needed to allow people a say on big strategic design questions not only technical detail. This was particularly so in the context of the many future opportunities for further consultation on detailed aspects of the scheme. In the past, we, in common with many other developers, have sometimes tended to announce proposals fully formed, leaving consultation to at best drive minor adjustments. By viewing consultation as a sequential process over many years we plan to ensure the public's views will meaningfully shape the outcome at each stage.

2.2.1.3 Overview of consultation findings

Clear trends emerged regarding the issues and factors local residents believe are most important in planning for a proposed new runway at Heathrow. The four major areas of feedback were on:

Aircraft noise

- Noise was clearly identified as the most important factor for consideration
- A significant number of consultation survey respondents (38%) told us that aircraft noise is the most important factor in planning for a new north west runway
- When asked how proposals for a new runway could be improved, respondents most often raised issues associated with existing and potential noise from Heathrow. These included alternation patterns, night flights, the impact of new flight paths and noise mitigation measures.

2.2 What our local communities say

Aircraft noise and patterns of relief

- Respondents used the consultation survey to tell us that they overwhelmingly support priority being given to reducing the number of residents living underneath flight paths. 62% of all respondents agree with the statement that “*providing periods of significant noise relief for all communities is more important than limiting the number of communities living beneath flight paths*”.

Air pollution and Aircraft safety/risk

- *Aircraft safety/risk* (11% of responses) and *air pollution* (9% of responses) ranked second and third as factors respondents believe should be considered most important when planning a new runway at Heathrow.

Jobs and the economy

- The public consultation survey revealed that, locally, there is strong recognition of the economic and employment benefits provided by Heathrow
- Of the 14 factors respondents were asked to rank in terms of importance when planning a new runway at Heathrow, the impact on *jobs/local employment* (8% of responses) and *National economic benefits* (5%) ranked as the fourth and fifth most important
- The importance of local employment provided by Heathrow is particularly important to those respondents living closest to Heathrow
- 11% of those who completed the consultation survey said that either they or a member of their household worked at Heathrow.

2.2.1.4 Consultation Programme

Approach

The programme of public consultation was designed as a continuation of Heathrow’s on-going engagement work with the local community. We consulted on the runway proposals, the airport’s wider role in the local area and its participation in the Airports Commission process.

In the context of the Airports Commission process and the shortlisting of one option proposed by Heathrow, the consultation was designed to encourage engagement with our shortlisted proposal for a new runway and to measure sentiment towards associated factors and potential impacts.

The consultation programme ran for six weeks. 13, 479 residents and business responded to our survey. Over a thousand local residents attended a series of public exhibition events, 13 in total, held across the wider Heathrow area from Putney and Brentford in the east to Windsor and Slough in the west.

Consultation period

The formal consultation period ran for six weeks, commencing on Monday 3 February 2014 and concluding on Sunday 16 March 2014. The timing and length of the consultation programme was established to ensure multiple opportunities for engagement with the maximum number of local residents across a range of platforms. This also allowed enough time post-consultation for meaningful analysis of the results. In turn this meant time was available to consider consultation feedback and reflect it in changes to the refreshed scheme design.

Consultation area

The consultation was targeted at communities identified as potentially being directly impacted by the proposal for a new runway. We covered all homes and businesses within the standard 57 dB Leq noise contour, the annoyance level threshold as set by the UK Government. However, the public consultation was open to all across the UK and promoted beyond this immediate area in the media and online.

2.2.1.5 Channels of response

A consultation survey and information booklet were the primary feedback tools used throughout the public consultation. The booklet contained:

- Information regarding the Airports Commission process, including timelines of previous and future activity
- Information regarding the public consultation process
- Detailed information and explanations regarding the questions contained within the consultation survey

2.2 What our local communities say

- Illustrated maps of the original north west runway proposal (as submitted to the Airports Commission in July 2013) and an indicative 'variation' proposal to move the proposed new north west runway further to the south
- Indicative graphics demonstrating the current patterns of runway alternation as used by Heathrow
- Details regarding all consultation response channels, promotion of public exhibition events and information regarding language and accessibility options.

A range of consultation response channels were made available to residents in order to lower barriers for participation and engagement.

Direct mail to residents

143,175 local homes and businesses within the primary consultation area were contacted directly during the first week of the consultation period. They were sent the consultation information booklet and a sealable, freepost return consultation survey form via direct postal mail.

Survey hotline

We received 223 enquiries via a dedicated telephone response line, which operated 24 hours a day for the duration of the consultation period. This included 11 requests from local residents for language translations of consultation materials and a request for the provision of large print and braille formats.

Survey website

A dedicated website was established as a 'one stop shop' for respondents from the targeted consultation area and beyond, providing access to all consultation materials and an easy to complete online response form. The website was promoted in all materials (including posters, paid media and media releases) during the consultation period.

Figure 2.2 Consultation responses by channels

Consultation channel	Number of responses (% of total)
Direct mail response	8,829 (65.5%)
Online	3,720 (27.6%)
Standard postal response	725 (5.4%)
Public exhibition response	204 (1.5%)
Phone interview	1 (0%)
Total	13,479 (100%)

2.2.1.6 Public exhibitions

A key element of the public consultation programme was the hosting of 13 public exhibition events across the local area during the consultation period. In total 1,162 residents attended.

The exhibition sessions offered local residents an opportunity to meet with members of Heathrow's team to discuss the proposals and provide feedback on issues around airport expansion. A series of exhibition boards featured information on the proposals, the consultation and the Airports Commission process. Collateral materials and full scale maps of our plans were available for viewing by residents. Visitors were also able to complete and return consultation forms during the exhibition sessions.

Following requests by local authorities additional events were added in Stanwell Moor, Putney, Ealing and Hammersmith. At the request of the local MP, the session in Putney was also extended to close at 9pm to allow an extra hour for attendance by local residents. The first exhibition session, held in Longford, hosted a pre-opening session to which councillors from the London Borough of Hillingdon were invited to attend. Figure 2.3 lists the public exhibition sessions held.

2.2 What our local communities say

Figure 2.3 – Public exhibition sessions

Date	Location	Venue	Times
Mon 10 February	Longford	Thistle Hotel	12pm – 8pm
Weds 12 February	Harmondsworth	St Mary's Church Hall	12pm – 8pm
Thurs 13 February	Colnbrook	Colnbrook Village Hall	12pm – 8pm
Tues 25 February	Stanwell Moor	Stanwell Moor Village Hall	12pm – 8pm
Weds 26 February	Harlington	Harlington Baptist Church Hall	12pm – 8pm
Thurs 27 February	Richings Park	Richings Park Sports Hall	12pm – 8pm
Sat 1 March	Windsor	Macdonald Windsor Hotel	9.30am – 4.30pm
Mon 3 March	Putney	The Putney Pantry	12pm – 9pm
Weds 5 March	Richmond	Duke Street Church	12pm – 8pm
Thurs 6 March	Brentford	Holiday Inn	12pm – 8pm
Sat 8 March	Hounslow	Civic Centre	9.30am – 4.30pm
Mon 10 March	Ealing	Doubletree by Hilton Hotel	12pm – 8pm
Weds 12 March	Hammersmith	Hammersmith Town Hall	12pm – 8pm

2.2.1.7 Promotion

Engagement and participation in the consultation was promoted using a diverse range of channels.

Media work

Although the consultation was targeted at those most likely to be impacted and those within the 57 dB Leq noise contour, London-wide media releases and paid media advertising promoted the consultation beyond the primary consultation area. These included:

- A half page colour advert placed in the Evening Standard on 3 February, the consultation launch date
- Work with local and London-wide media to promote the beginning of the consultation process
- Localised promotional advertising in newspapers throughout the consultation period promoting the programme of public exhibition events
- Published letters from the Heathrow Chief Executive in local newspapers in the last week of the consultation period notifying residents of the forthcoming close of the formal consultation and encouraging participation.

Third party promotion

All media and advertising contained information on channels of response and directed visitors to the dedicated online consultation site at www.heathrow.com/localcommunity. We also worked with established community and resident groups to promote participation in the consultation, the exhibition sessions and to ensure as wide a reach as possible to local residents.

2.2.1.8 Consultation survey and results

The response form that constituted the main platform for feedback during the consultation process was designed to be quick and easy to complete. The survey sought to focus on sentiment regarding the specific proposal for a new runway at Heathrow and not on general attitudes to Heathrow expansion. The response form was split into two sections:

- A three question survey measuring sentiment towards issues and factors associated with the proposed new north west runway at Heathrow
- An 'About you' section for respondent identification.

In order to ensure the robustness of the questions posed in the consultation response form, we asked polling and research consultancy ComRes to provide independent feedback on the methodology and the language used. We adopted recommendations made by ComRes around question language and response options in drafting the final response form and the final consultation materials.

2.2 What our local communities say

Profile of Respondents

Postcode analysis identified respondents by location, broken down into local authority area. The majority of identifiable responses came from residents of the London Borough of Hounslow and the London Borough of Richmond. Identifiable responses from these two boroughs totalled 7,839, 58% of all responses.

Significant numbers of responses were identified as having come from addresses in the Royal Borough of Windsor and Maidenhead and the London Borough of Hillingdon, each of which returned over a thousand responses.

1,504 (11%) responses were identified as being on behalf of individuals who had a household member working at Heathrow. 1,955(14%) individual respondents had a member of their household working in a job dependent on Heathrow. 1,272 (9%) individual responses identified with both these descriptions.

Figure 2.4: Responses by location

Response location (by local authority)	Number of identifiable responses
London Borough of Ealing	668
London Borough of Hammersmith and Fulham	77
London Borough of Hillingdon	1,194
London Borough of Hounslow	4,423
London Borough of Richmond Upon Thames	3,596
Slough Borough Council	650
South Bucks District Council	158
Spelthorne Borough Council	560
London Borough of Wandsworth	31
The Royal Borough of Windsor and Maidenhead	1499
Other London	192
Outside London	368
Not known	243
Total	13,479

Questions on Heathrow's north west runway proposal

As described above the survey asked three questions. The highlights of responses for each were as follows.

Q1. What factors do you think are most important when planning a new runway?

The first question asked respondents to rank their top five factors from a list of 14 in order of importance. Factor options included:

Air pollution	Aircraft noise	Aircraft safety/risk
Construction impact	Flooding	Historic buildings
Jobs/local employment	Loss of homes and businesses	National economic benefits
Public transport	Range of national/international flight destinations	Road-traffic congestion
Viability of local economies	Wildlife/ecology	

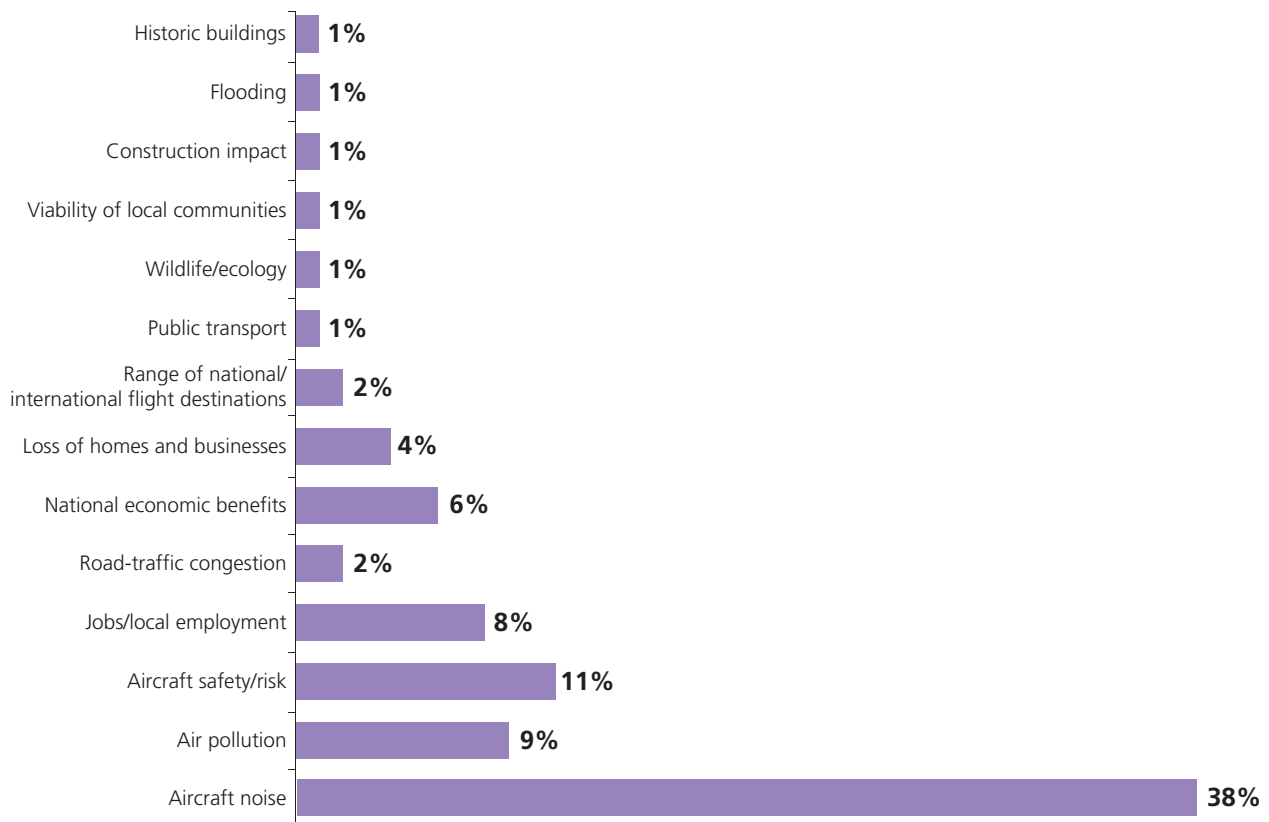
Key findings:

- By a significant margin, *Aircraft noise* was ranked as the most important factor for consideration; 38% of all responses ranked it so. This pattern was consistent across the consultation area.
- *Aircraft safety/risk* was ranked by respondents as the second most important factor for consideration whilst *Air pollution* ranked third.

2.2 What our local communities say

- *Jobs/local employment* and *National economic benefits* ranked fourth and fifth respectively amongst factors respondents believed should be prioritised.
- The prioritisation of jobs and local employment increase significantly amongst those residents living closest to Heathrow. Identifiable respondents from the London Borough of Hillingdon ranked Jobs/local employment as the most important factor for consideration,
- A significant number of respondents (15%) either did not complete this section or spoilt their response form.

Figure 2.5 Factors ranked as important - Proportion of respondents



Percentage rankings for each factor as selected as ranked 'most important' in Question 1 (above). Rankings are based as a percentage of all responses. 15% of respondents did not complete Question 1.

Q2. Which of the following statements best matches your attitude to noise relief from aircraft and the number of communities living beneath flight paths?

Explanatory text within the consultation booklet indicated that this question had been designed to assess the balance between delivering noise relief and the overflying of new communities. This text explained the potential impact of Heathrow expansion on current patterns of alternation, likely changes to the impact of flight paths, and asked respondents to choose between three statements:

- (A) Providing periods of significant noise relief for all communities is more important than limiting the number of communities living beneath flight paths
- (B) Limiting the number of communities living beneath flight paths is more important than providing periods of significant noise relief for all communities
- (C) Don't know

2.2 What our local communities say

Key findings:

The responses to this question produced a clear preference. 62% of all respondents selected the statement “Providing periods of significant noise relief for all communities is more important than limiting the number of communities living beneath flight paths”

Figure 2.6

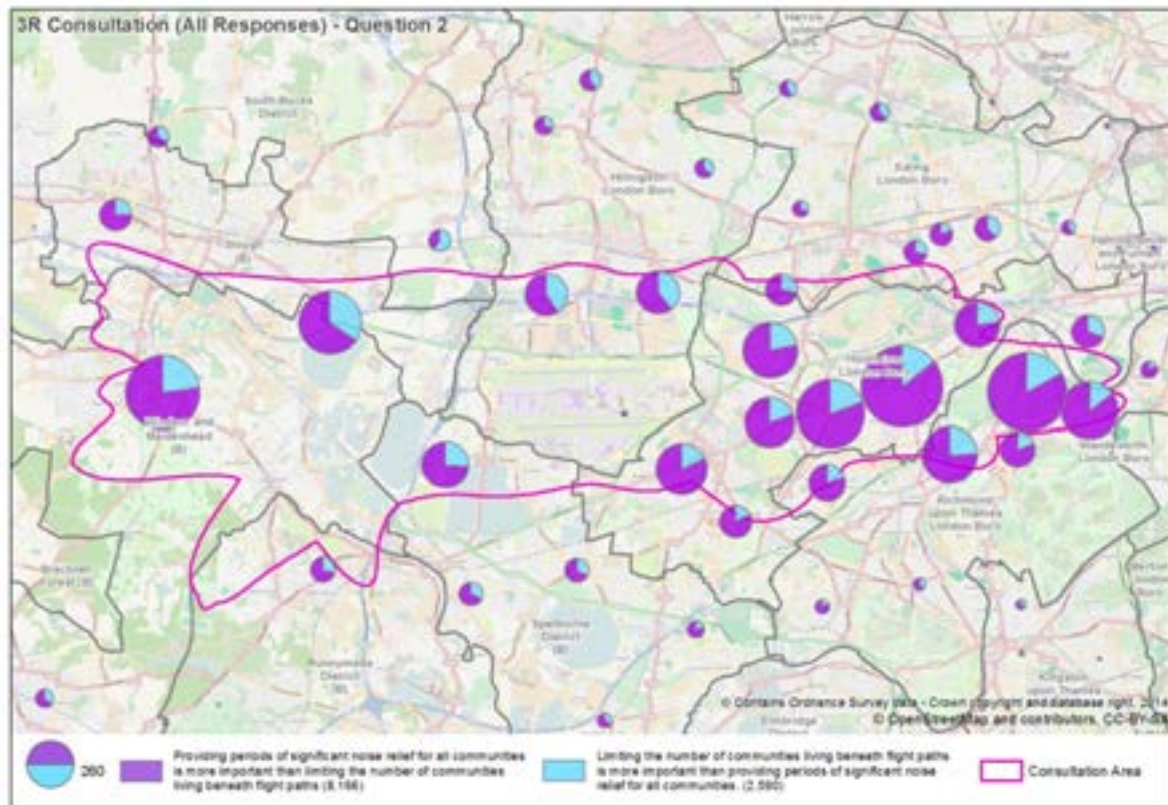
Which of the following statements best matches your attitude to noise relief from aircraft and the number of communities living beneath flight paths?	Number of responses (% of total responses)
Providing periods of significant noise relief for all communities is more important than limiting the number of communities living beneath flight paths.	8,384 (62%)
Limiting the number of communities living beneath flight paths is more important than providing periods of significant noise relief for all communities.	2,667 (20%)
Don't know	871 (6%)
Not completed	1,557 (12%)
Total	13,479

Responses to Question 2 (above)

This pattern was repeated across the geographic area, with groups of responses from each local authority area supporting Option A. However, postcode analysis shows a greater margin of support expressed for Option A in those communities living under existing flight paths, compared with those most likely to be bought under new flight paths resulting from a new north west runway at Heathrow.

2.2 What our local communities say

Figure 2.7



Q3. How can we improve our proposal for a new runway?

The final question, which was presented as an open comment box, asked respondents to provide suggestions for improvement to the outline proposal for a new runway ahead of the design of the updated proposal. A key word analysis was undertaken to identify response themes and sentiment towards Heathrow expansion.

Key findings

Question 3 was designed to solicit engaged and substantive proposals from respondents to influence the drafting of an updated proposal for the proposed runway.

To ensure such responses were considered as part of the process behind the refreshed scheme design, data from Question 3 was provided to the Heathrow planning team in three managed stages during the consultation period; after 5,000 responses, after 10,000 responses and on the completion of all data analysis (13,479 responses).

Some trends emerging from Question 3 were useful in terms of the measurement of specific aspects of sentiment towards the runway:

- Using keyword analysis, nearly one in five responses to Question 3 were categorised as having clearly raised issues associated with aircraft noise. This included responses which mentioned night flights, frequency of flights, and the measurement of noise or noise from aircraft.
- In line with the findings from Question 1 and the prioritisation of issues associated with noise at Heathrow, of the responses to Question 3 that mentioned a specific impact or factor associated with the proposal, noise was by far the most popular.
- In line with the findings of Question 1, issues associated with environmental impacts were prevalent in Question 3 responses. Of nearly a thousand responses which were categorised in this way using the keyword analysis, two thirds were categorised as having clearly mentioned issues regarding pollution in association with Heathrow operations.

2.2 What our local communities say

- The most notable difference between the factors ranked as most important under Question 1 and the trends emerging from Question 3 was the relatively small number of responses which used Question 3 to mention issues associated with aircraft or airport safety. Of the responses which did mention this issue, the most notable trend was broad opposition to flights over residential or built up areas.
- Over a thousand respondents used Question 3 to raise a variety of issues categorised within the transport impacts or transport improvements keywords. This included issues around road improvements, rail links and general public transport improvements.
- There were clear geographic trends with regards to the themes raised in Question 3 responses. Respondents who raised issues regarding land-take, for example, and the physical footprint of proposed expansion at Heathrow were disproportionately from those areas likely to be most impacted by physical expansion, such as those households within the UB7 postcode, including Longford and Harmondsworth.
- No restrictions or guidelines were placed on Question 3 responses and, as such, many respondents used the Question to make broad statements of opposition or support for Heathrow expansion.
- Over a third of respondents (35%) did not provide a response to Question 3.

Analysis of the questions was supported by independent analysis of the results by polling and research company ComRes. Heathrow asked ComRes to undertake this review in order to ensure the robustness of the analysis and the conclusions drawn from the data.

2.2.1.9 How we changed our plans

The public consultation programme was consistent with Heathrow's commitment to involving local residents, businesses and stakeholders in the shaping of a refreshed scheme design for a new north west runway.

In undertaking this work with local residents, we appreciate the importance of reporting key findings from the consultation responses and identifying, through analysis of the results, trends and patterns in sentiment towards the proposal. Most importantly, we understand the importance of being seen to act on these findings as we updated our proposal. As a result of the feedback from the public consultation, we arrived at the following conclusions:

Noise is the most important factor

The response to the consultation survey's first question overwhelmingly demonstrates most local residents believe that noise from aircraft is the factor that should be considered most important when planning a new runway at Heathrow.

Therefore, Heathrow has sought to position the proposed new runway so that as few people as possible are within a new 57 dB Leq noise contour around the expanded airport.

The exact position of the proposed new runway at Heathrow is the most effective tool we have with regards to reducing the number of local people impacted by any expansion. We have reviewed runway location closely as a result. Other work to reduce noise impact on our neighbours, including action to reduce aircraft noise and to offer residents periods of noise relief through alternation, will also continue to be significant areas of focus.

Local residents want Heathrow to continue to be able to provide noise relief

Question 2 of the consultation survey sought to understand local sentiment towards the continuation of noise mitigation measures and the extent to which residents value current noise relief patterns.

The results of Question 2 overwhelmingly demonstrated that local residents, by a margin of 3:1, want Heathrow to continue to prioritise the provision of periods of significant noise relief for all communities over limiting the number of communities living beneath flight paths.

The extent to which local residents placed aircraft noise as the issue for greatest prioritisation, both in the formal response to the consultation and through informal feedback at exhibition events across the local area, allows us to be confident in the findings taken from Question 2 and the levels of engagement from local residents around our noise mitigation measures.

The key to delivering capacity while preserving respite is independent runway operation. Our plans therefore guarantee this feature on the airfield.

2.2 What our local communities say

The proposed north west runway should be positioned further south

Moving the proposed north west runway further south enables Heathrow to remove an additional 8% of households from the new 57 dB Leq noise contour.

It also allows Heathrow to act on some of the recommendations from residents most likely to be affected by the proposed new runway. Moving the runway further south could preserve areas of Harmondsworth, to the north of the proposed new runway, including the historic church and the Great Barn. Adopting the alternative option to the south will, therefore, also allow us to reduce levels of property loss.

In line with the strong sentiment expressed by residents living to the north of Heathrow and in communities such as Richings Park, the alternative option also avoids the need for major restructuring work on the M25/M4 junction.

Amongst the most engaged responses was a clear desire for the adoption of the alternative option with the runway moved to the south, a sentiment supported in conversations with residents at public exhibition events.

Our full consultation report is included in Appendix 4.

2.2.1.10 Next steps

We understand that the issue of compensation and mitigation measures, and the need for certainty around the future of properties and businesses in the area, are crucial - particularly for those residents most likely to feel the impact of physical expansion of Heathrow through a new north west runway.

However, we do not believe a broad brush approach to compensation and mitigation, taken without consultation with local residents, is the best option. Therefore, with the updated proposal for a new runway now submitted to the Airports Commission, we will commence a separate and wide ranging consultation exercise with local residents and businesses regarding compensation schemes and mitigation measures for all residents who could potentially be impacted by Heathrow expansion.

The first step will be to use the contacts we have made with residents and businesses through this process, who wish to be engaged in these discussions, to help shape the consultation and our next steps.



2.3 What our local businesses say

Heathrow is at the heart of the local economy and supports many local businesses. It is important that we listen to the voice of local business. Through the Heathrow Business Summit and other forums we have built partnerships with our local business community. We have developed our proposals embedding their priorities.

2.3.1 What our local businesses say

Heathrow has shaped the business landscape in West London, Surrey and the Thames Valley. Businesses locate themselves close to Heathrow for its global connectivity and for trading connections with the airport itself. This has resulted in the emergence of business clusters. Clusters are either directly linked to the airport, such as logistics and cargo companies located in Hounslow or come about because of easy access to flights, such as IT and technology in the Thames Valley. Clusters develop as the infrastructure - transport, supply chains and talent - reflect their needs.

We launched the Heathrow Business Summit in 1997 in recognition of the central role that the airport plays in connecting small and medium sized enterprises (SMEs) with new business opportunities. Together with our partnership with UK Trade and Investment (UKTI), we have connected SMEs to each other, our own supply chain and globally. We are using our position to drive the local economy by supporting business to grow. An estimated £90 million worth of new business has been won by local businesses that have been given the opportunity to meet and trade with large companies based in and around the airport.

We provide a fact based approach to our engagement which has helped local business be more aware of the issues of the expansion debate. They have formed their own opinions. We have informed business but we have also listened and we have learnt how the current capacity constraints and the indecision about aviation capacity are affecting local businesses today; how they are impacting on inward investment and companies looking to locate near Heathrow, how they are creating uncertainty of tenancy renewals; and how they are affecting business growth plans.

2.3.1.1 Local business groups

Business Groups

We have identified a range of key business groups to engage with in the local area. We support their objectives of providing a voice for business and encouraging their members to grow. Figure 2.8 provides a list of business groups with which we have engaged and how we have supported them.

2.3 What our local businesses say

Figure 2.8

Business Group	Activity
<p>West London Business</p> <p>A chamber of commerce and economic development agency, representing over 800 businesses in six Boroughs of West London (Brent, Ealing, Harrow, Hammersmith and Fulham, Hillingdon and Hounslow), providing them with services and lobbying programmes.</p>	<p>Membership of West London Business</p> <p>Board Member of West London Business</p> <p>Sponsored and attended seminars</p>
<p>Ealing Chamber of Commerce</p> <p>Local business membership organisation with over 2,500 members, who are able to access a range of membership services and products designed to support business.</p>	<p>Heathrow Business Summit Partner</p>
<p>Hillingdon Chamber of Commerce</p> <p>Provides the voice of business in Hillingdon and works with businesses to help them by offering members a range of services including: access to business advice, networking events, training opportunities, local business news updates, and offers between members. HCoC have conducted a members' survey on the aviation debate.</p>	<p>Membership of Hillingdon Chamber</p> <p>Sponsored and attended MPs' Breakfast</p> <p>Attended member events</p> <p>Heathrow Business Summit Partner</p>
<p>Hounslow Chamber of Commerce</p> <p>Supports existing firms, assisting them to grow and create new jobs, while at the same time encouraging new start-ups that innovate and fill the demands of the market place. They are the voice for business in Hounslow. They have conducted a members' survey on the aviation debate.</p>	<p>Membership of Hounslow Chamber</p> <p>Board Member of Hounslow Chamber</p> <p>Attended member events</p> <p>Heathrow Business Summit Partner</p>
<p>Thames Valley Chamber of Commerce</p> <p>Works with businesses across Berkshire, Buckinghamshire, Oxfordshire and Swindon to help them achieve their full business potential. They do this by offering members a range of services including business advice, networking events, training and international trade support.</p>	<p>Membership of Thames Chamber of Commerce</p> <p>Sponsored inward investment programme</p> <p>Attended member events</p> <p>Heathrow Business Summit Partner</p>
<p>Surrey Chamber of Commerce</p> <p>A membership representing every sector of the workforce, works hard to ensure that the continued growth of the area takes into account the needs of business, as well as providing a range of high quality services to help businesses grow and meet new potential customers.</p>	<p>Membership of Surrey Chamber of Commerce</p> <p>Attended member events</p> <p>Heathrow Business Summit Partner</p>
<p>Thames Valley Local Economic Partnership</p> <p>Brings together business, unitary authorities, education and the community sector to drive the local economy to new levels of growth.</p>	<p>Membership of steering groups</p> <p>Attended stakeholder events</p> <p>Heathrow Academy Partner</p>
<p>Enterprise M3 Local Economic Partnership</p> <p>A public/private partnership set up to support and sustain economic growth at a local level.</p>	<p>Membership of steering groups</p> <p>Attended stakeholder events</p> <p>Heathrow Academy Partner</p>
<p>Place West London</p> <p>Focused on economic development & regeneration in West London. It aims to help West London shape its future, and ensure continued economic growth and prosperity.</p>	<p>Sponsored and attended regeneration conference</p> <p>Presented at stakeholder seminars</p>

2.3 What our local businesses say

Individual Businesses

We meet regularly with individual businesses that may be affected by the future of Heathrow – all of whom consistently state that their location is chosen for proximity to Heathrow.

Below is a selection of their statements:

Chris Parker, Senior Director, Law and Corporate Affairs, Microsoft –

“Heathrow is the reason we are where we are, along with the rest of the high-tech industry in the Thames Valley. If you think about all the companies in the IT industry between west London and Bristol there is one reason for their location. Of the 2,000 people who are based in our Thames Valley HQ, only about half of them work in the UK business. The other 50% do jobs which are not UK specific, they have roles which involve them in activities across Europe, and sometimes globally. One of the main reasons they are here is that they do need to travel more and they are in close proximity to the hub airport.”

Albert de Beer, Director of Facilities, EMEA, BlackBerry –

“Our location close to Heathrow enables us to be close to our carriers including O2, Orange and Vodafone. If the UK’s hub airport moved from its current location in West London this would have a significant impact on BlackBerry and our business travel”

Ken Davey, Managing Director, SVP EMEA, FM Global –

“We are located in Windsor because it is only a 20 minute drive from Heathrow Airport. Our business is dependent on being able to meet with clients across the world quickly and efficiently to provide our services. As an international hub, Heathrow is absolutely crucial because it is a truly international airport. If you go to Heathrow, you can fly anywhere in the world. The idea of having to go somewhere else would be a huge inconvenience to us. The presence of Heathrow was the defining factor in choosing our location when we merged our offices. We wanted to move away from central London and there were a variety of different areas we could have chosen to relocate to. In the end, we chose to relocate to the west of London primarily because of its close proximity to Heathrow.”

Dr Malcolm Parry, Managing Director, Surrey Research Park –

“25% of our companies on the Park are actually international companies that have come here to do business because of the presence of Heathrow. We also have a lot of Foreign Direct Investment. For example, US company Electronic Arts bought the UK computer games company Bullfrog Productions because it’s a good business, but also because it’s accessible. When the executives turn up it’s easy for them to get to us.”

2.3.1.2 Back Heathrow

Back Heathrow is a group of people, businesses and organisations who have come together to defend the jobs that rely on Heathrow and to campaign for its secure future. This independent campaign was initially launched with funding from Heathrow in response to polling that showed more local people support expansion of the airport than oppose it. Since then, it has received support from many different sources.

In just six months up until February 2014, over 20,000 local residents signed up through surveys both online and by post to support Heathrow expansion.

2.3 What our local businesses say

Back Heathrow's website (www.backheathrow.org) illustrates the different ways local businesses and unions help Back Heathrow. Local groups such as Hounslow Chamber of Commerce, West London Business, Slough Business Community Partnership, Heathrow Hoteliers Association and GMB support the campaign by communicating to their membership networks. Individual companies contribute in various ways. For example Mixed Freight Services, a company with 70 employees decided to support Back Heathrow by dedicating two sides of an 18 metre lorry to advertising the campaign.



2.3.1.3 Local business studies

Three independent studies have been commissioned by local authorities and business groups to identify the economic impact of Heathrow on the communities located near to the airport.

- **Aviation Capacity and the Surrey Economy** - Commissioned by [Surrey County Council](#)
Surrey's study concluded that one of the key drivers of the Surrey economy is Heathrow, facilitating up to 3 % of the jobs in Surrey. Furthermore, the study found the current location of many Surrey based firms is a result of their relative proximity to Heathrow. These are household name companies and many express concerns about the mid to long-term implications to their operations should the status of Heathrow radically change in future. If Heathrow were to close, the potential scale of job losses for Surrey residents would represent an enormous economic challenge to policy makers. Conversely the opportunities with growth are equally significant.
- **Heathrow Employment Impact Study** - Commissioned by [London Borough of Ealing](#), [London Borough of Hounslow](#) and [Slough Borough Council](#)
The study found that up to 70,000 jobs across the three boroughs neighbouring Heathrow would vanish, with devastating economic consequences, if the airport were to close in favour of a new hub airport elsewhere. The 'catalytic' impacts (employment from attraction, retention or economic activity attributable to Heathrow's international connectivity) could amount to as many as 250,000 jobs across a swathe of south west London, west London and surrounding areas, and are a crucial consideration in the debate about the future of Heathrow.
- **London Heathrow Economic Impact Study** - Commissioned by [Buckinghamshire Local Economic Partnership](#), [Thames Valley Local Economic Partnership](#), [Enterprise M3](#), [Oxfordshire Local Economic Partnership](#) and [West London Business](#).
The study explored three main scenarios: constructing a new hub airport to the east of London with the closure of Heathrow; an expanded Heathrow; and a "do-nothing" option. The study reveals that the closure of Heathrow could, by 2030, lead to the loss of over 100,000 jobs and £8bn in economic output. The study found that currently Heathrow supports 120,000 jobs and £6bn in economic output across the "Western Wedge" economy; a further 170,000 to 230,000 jobs are dependent on the good air connections offered by Heathrow. With Heathrow expansion, the better air connections could deliver business productivity benefits of £230m to £300m pa from reduced delays and more frequent services, with around 50 additional long and short haul services offered. The expansion of Heathrow would help secure the many jobs in international firms clustered around the airport.

2.3 What our local businesses say

Steve Lamb, Chair for Thames Valley Berkshire LEPS,

“The findings reinforce the critical importance of the airport on the regional economy. The proximity to a hub airport at Heathrow is of critical importance to Thames Valley businesses. The airport acts as a gateway to new and emerging markets of the world. The ‘western wedge’ area to the west of London is a fiercely competitive global market and the need to facilitate more and better aviation links from an expanded Heathrow is absolutely crucial for keeping us well-connected, as well as ensuring that we secure reductions in the operational impact of Heathrow now, and for the foreseeable future.”

Geoff French, Chair for Enterprise M3 LEP,

“The findings of this study confirm what businesses in the Enterprise M3 area have been telling us – that maintaining and developing Heathrow’s position as an international hub airport is vital to the economic success of our area. Many of these important businesses are based along the M3 corridor because of its proximity to Heathrow and there is a genuine concern that if Heathrow wasn’t the location for the UK’s hub airport, then these big businesses would not only relocate out of our area but out of the UK completely. It is therefore vital that the Davies Commission, and Government, take the findings of this study seriously and take this opportunity to safeguard Heathrow’s future as an international hub airport.”

Alex Pratt OBE, Chair of the Buckinghamshire Thames Valley LEP,

“We are all in a global economic race and need to focus hard now on our international competitiveness. By this time we should have been agonising about runway 4 at Heathrow, not runway 3. Our competitors are stealing a march on us and our children will have to pay the costs of our pontification.”

Frank Wingate, Chief Executive for West London Business,

“This important piece of research, covering the greater Heathrow economy, demonstrates just how devastating the closure of Heathrow would be to an area dynamically contributing ten percent of the UK economy. It’s impossible to imagine how tens of thousands of jobs and billions of pounds of GVA could ever be replaced in West London and the Thames Valley and to damage this UK powerhouse would be folly.”

Nigel Tipple, Chief Executive, Oxfordshire LEP,

“Heathrow plays a critical role in the local and regional economy as this study makes clear. Not only does it support thousands of businesses and livelihoods but is also the hub around which many major companies are based – thanks to its unrivalled access to the global economy. Safeguarding and developing Heathrow is therefore vital for the growth of the region and for maintaining its competitive advantage. It is also the gateway to new emerging markets, to new business opportunities and to the creation of jobs in the years ahead.”

2.3 What our local businesses say

2.3.1.4 How we have changed our plan

We know how important it is for our local businesses to benefit from being close to Heathrow. Local businesses regularly tell us that having easy access to Heathrow is important to them so our plans have been designed to minimise congestion on our local road network and take the opportunity to improve traffic flows on a key section of the M25 around Heathrow.

We invest in our local businesses through our Business Summit – which seeks to connect local businesses with each other and to develop links with the airport. We have developed our plans in relation to commercial spaces, cargo and local connectivity to maximize business opportunities for our region. We will look to further develop ideas to create local growth for businesses of all sizes if growth at Heathrow is supported.

2.4 What the regions say

Business and regional leaders from across the UK support expansion at Heathrow. In recent months, we have visited 25 Chambers of Commerce representing thousands of businesses across the UK. Feedback from our meetings with UK regional business leaders indicates the need for increased connectivity to Heathrow from all over the UK, and to long haul markets, with clear support for Heathrow expansion over other options.



2.4.1 What the regions say

Why the UK's nations and regions are important to Heathrow & why Heathrow is important to them

Direct flight connections to overseas markets are critical to the trade that drives UK economic growth. We know for example that UK businesses trade 20 times more with emerging markets that have daily flights than those with less frequent or no direct service. Air freight accounts for about 40% of UK imports and exports by value and 65% of UK international air freight goes through Heathrow.

Trade and exports are especially crucial for UK regions as a catalyst for growth. Exports are key to rebalancing the UK economy and building sustainable economies across the country. A recent UKTI survey found that 85% of its clients believed that exports led to a level of growth not otherwise possible.

We understand the importance of a hub airport to the UK's nations and regions in supporting growth and attracting inward investment. That is why we have met with a diverse range of British businesses from around the country to discuss our plans for the airport's expansion and how we can best continue to serve our regional partners, either directly or by complementing the UK's thriving regional airports.

We have used the Airports Commission process as an opportunity to meet with the Confederation of British Industry (CBI), British Chambers of Commerce (BCC), Institute of Directors (IOD), London First, Federation of Small Businesses (FSB), local chambers of commerce and a range of Local Enterprise Partnerships (LEPs) from across the country.

2.4 What the regions say

As a result of these discussions regional business representatives asked us to use our refreshed design scheme submission to:

- Commit to safeguarding routes to the UK's nations and regions;
- Place a greater emphasis on the importance of freight for importers and exporters;
- Go further in communicating the benefits of a third runway at Heathrow for greater UK connectivity.

Businesses routinely ask about safeguarding routes to their regional airports such is the importance of access to Heathrow. We understand that the reason for this is the unique value that Heathrow provides, and the increased benefits Heathrow could provide with more runway capacity. Unfortunately, many regional routes cannot operate into Heathrow because of the lack of capacity at the airport.

We know that regional airports play an important role in the areas they serve. An expanded Heathrow is not designed to compete with such airports but will complement the services they offer. Many of the regions have expressed a strong desire to use Heathrow to connect to the rest of the world.

2.4.1.1 Regional Roadshows

Visiting all corners of the UK

Since January 2013, senior Directors from Heathrow have visited regions across the UK to try to understand their needs and their objectives for UK connectivity. From Inverness to Plymouth and Swansea to Norwich, we have taken the opportunity to listen to businesses across the breadth of the UK. Our thinking has evolved as a result of the feedback we have received and informed our updated proposal to ensure that a third runway at Heathrow connects to and benefits the whole country.

We have organised a national programme of events to hear the views of businesses on the aviation capacity debate and to explain our new approach to expansion at Heathrow. This has allowed regional businesses to put their questions to executive representatives from Heathrow and to share their opinion with us on how the lack of hub capacity affects them.

The table below shows the areas and the Chambers of Commerce that we have visited.

Figure 2.9

Region	Business Groups	Who we've met
Scotland	Edinburgh Chamber of Commerce SCDI Fife Chamber of Commerce North East Committee of the Scottish Council for Development and Industry Glasgow Chamber of Commerce CBI Scotland Ayrshire Chamber of Commerce Inverness Chamber of Commerce Aberdeen City Council	Representatives from Heathrow have visited Scotland on seven occasions throughout 2013 and 2014 so far. This includes visits to Edinburgh, Glasgow, Ayrshire and Fife where we have met with a broad cross-section of Scottish businesses. During these visits, we have met with Edinburgh Chamber of Commerce, Scottish Council for Development and Industry, Fife Chamber of Commerce, North East Committee of the SCDI, Glasgow Chamber of Commerce, CBI Scotland and Ayrshire Chamber of Commerce. Most recently, in April 2014 we presented to the Inverness Chamber of Commerce.
North East	North East Chamber of Commerce	In December 2013, we held an event with the North East Chamber of Commerce in partnership with Newcastle International Airport. The North East Chamber is the largest Chamber of Commerce in the UK.
North west	East Lancashire Chamber of Commerce Liverpool Chamber of Commerce East Lancashire Chamber of Commerce (July 2014)	We visited the North West in April 2013, presenting to the East Lancashire Chamber of Commerce and Liverpool Chamber of Commerce at two separate events. We then re-visited Liverpool Chamber in May 2014. At the East Lancashire event in Accrington, an audience of 15 owners of small and medium sized businesses reiterated the importance of a hub airport at Heathrow to complement the routes available from Manchester Airport.

2.4 What the regions say

Yorkshire & Humber	<p>Doncaster Chamber of Commerce</p> <p>Barnsley and Rotherham Chamber of Commerce</p> <p>Barnsley Economy and Culture Board</p> <p>Leeds Chamber of Commerce (June 2014)</p> <p>Sheffield Chamber of Commerce and Industry (September 2014)</p> <p>Doncaster Chamber (October 2014)</p>	<p>In May 2013 in partnership with both the Barnsley and Rotherham Chamber and Doncaster Chamber we presented to an audience of local businesses at an event. During our visit, we also met with the Barnsley Economy and Culture Board.</p> <p>We have plans to return to a number of areas within this region later in the year.</p>
East Midlands	<p>Leicestershire Chamber of Commerce</p>	<p>In June 2013, we presenting to an audience of local businesses at an event in partnership with the Leicestershire Chamber of Commerce.</p>
West Midlands	<p>Coventry Chamber of Commerce</p> <p>Staffordshire Chamber of Commerce</p> <p>Herefordshire & Worcestershire Chamber of Commerce (June 2014)</p>	<p>We have made two visits to the West Midlands over the past 6 months, presenting to Coventry Chamber of Commerce in November 2013 and Staffordshire Chamber of Commerce in April 2014. We have plans to visit again in June this year.</p> <p>In Staffordshire, we presented to an audience of 15 businesses at an event in Stoke and also met with representatives from Stoke-on-Trent Council and the Local Enterprise Partnership.</p> <p>In Coventry, we presented to an audience of 20 local businesses at an event in partnership with the Coventry Chamber of Commerce.</p>
East of England	<p>Norfolk Chamber of Commerce</p> <p>Hertfordshire Chamber of Commerce</p>	<p>We held two breakfast events in June 2013, with the Norfolk Chamber of Commerce and the Hertfordshire Chambers of Commerce.</p>
London	<p>London Chamber of Commerce & Industry</p> <p>London First</p>	<p>Given Heathrow's strategic importance to London businesses, we are constantly engaged with London's business groups ranging from London First and London Chamber of Commerce & Industry (LCCI) as well as local borough chambers.</p> <p>We have exhibited and spoken at events organised by a number of business organisations.</p>
South East	<p>IOD Oxford</p> <p>Surrey Chamber of Commerce</p> <p>Thames Valley Chamber of Commerce</p>	<p>In the South East, we have run events with IoD Oxford, Surrey Chamber of Commerce and Thames Valley Chamber of Commerce in separate events in 2013.</p>
South West	<p>Plymouth Chamber of Commerce</p> <p>Cornwall Chamber of Commerce</p> <p>Cornwall and Scilly Isles LEP</p> <p>Cornwall County Council</p> <p>Dorset Chamber of Commerce & Industry (September 2014)</p>	<p>During the course of 2013 and early 2014, we held events in partnership with Plymouth Chamber of Commerce and Cornwall Chamber of Commerce. Later this year we will return to the region to speak at an event with Dorset in September.</p>
Northern Ireland	<p>Northern Ireland Chamber of Commerce (June 2014)</p>	<p>We have a good working relationship with the Northern Ireland Chamber of Commerce who recently provided a quote for our <i>Heathrow: a national asset</i> publication.</p> <p>The Chamber and the businesses it represents understand the importance of direct flights between George Best Belfast City Airport and Heathrow to provide Northern Irish businesses to access to global markets.</p>
Wales	<p>South Wales Chamber of Commerce</p> <p>Swansea Council</p> <p>West Cheshire & North Wales Chamber of Commerce (June 2014)</p>	<p>In March 2014, we held an event in partnership with South Wales Chamber of Commerce just outside Cardiff. A future event with West Cheshire and North Wales Chamber is planned for June 2014.</p>

2.4 What the regions say

2.4.1.2 Regional Feedback

North East

- Local businesses recognised the benefits of an expanded Heathrow to the local economy by working in tandem with a successful regional airport at Newcastle and expressed concern over the lack of a regional voice in the hub capacity debate. While Newcastle International Airport provides many of the European routes that businesses require, it was widely recognised that Heathrow complements such routes with access to emerging markets around the world.
- To support these local businesses, we have forged a strong working relationship with Newcastle International Airport, a thriving regional airport that while ambitious to develop their own route network are keen to see the UK's hub airport grow to provide its customers with a wider range of destinations.
- David Laws, Chief Executive of Newcastle International Airport welcomed our visit to the region, saying *"It is great to see Colin in the North East working with the business community in this way. For us at the airport it can be frustrating that Heathrow is often viewed narrowly by politicians and as an issue that only impacts people near Heathrow. Access to Heathrow is hugely important to us as the North East's biggest airport."*
- Furthermore, we continue to work with local businesses through the North East Chamber, with their Policy and Research Manager Mark Stephenson recently saying that *"Only an expanded Heathrow can provide the hub capacity required to connect North East businesses to fast growing emerging markets."*

North West

- The Liverpool Chamber and local businesses have been consistently supportive of the need for a strong UK hub to complement services from their regional airports. They have strongly welcomed our commitment to continue to improve both surface and air access to the regions – the Local Enterprise Partnership (LEP) in particular believes the lack of an air link to Heathrow is holding back regeneration in the city. They have been clear that the regions need to take a more active role in the aviation capacity debate.
- The Chief Executive of East Lancashire Chamber of Commerce, Michael Damms, recognised the importance of the UK hub and the need to protect it for the benefit of the regions. Local businesses expressed frustration over the slow progress on addressing the UK's hub capacity constraints
- Following our most recent event in Liverpool, the Chamber of Commerce has taken a prominent role in supporting expansion of Heathrow on behalf of their local businesses. In a press release accompanying our visit in May, Jenny Stewart, CEO of Liverpool Chamber said, *"An expanded Heathrow with improved rail links would bring huge benefits to Liverpool, offering speedier journey times to the airport and driving trade, jobs and growth through improved access to overseas' markets" stating "The proposals launched by Heathrow today offer substantially better access to international markets for businesses in Liverpool than alternative proposals being submitted to the Airports Commission."*



2.4 What the regions say

Yorkshire and the Humber

- The Barnsley and Rotherham Chamber, Doncaster Chamber and local businesses were very supportive of a strong UK hub for the benefits it provides for the region and believed Heathrow should be allowed to expand.
- In particular, the Chamber and businesses welcomed the fact it might become possible to begin a direct air link between Heathrow and the region via Robin Hood Doncaster Sheffield Airport if capacity was increased.
- Freight is a vitally important sector in the Yorkshire and Humber region, with a number of freight businesses from the region expressing concern that their interests were not properly recognised in the capacity debate. The businesses were concerned that Heathrow's status as a major international freight hub is under threat as a result of capacity constraints and that politicians failed to fully understand this.
- In our recent *Heathrow: a national asset* publication, Labour MP for Leeds North East, Fabian Hamilton was quoted on both the political and business support in the region: *"Firms in Yorkshire already benefit from a flight three times a day direct from Leeds Bradford Airport to the UK's hub, Heathrow. A bigger Heathrow would increase the range of growth markets that firms from my constituency, and across Leeds and West Yorkshire, can access throughout the world, boosting jobs and growth."*
- On hearing the announcement that a direct link between Heathrow and Leeds-Bradford was to be restored in 2012 following an 18-month interval, Mark Goldstone from Leeds Chamber of Commerce summed up the importance of the connection with Heathrow when he said, *"This is a real issue for the Leeds city region as we have dozens of members that trade with or aspire to do business with the likes of Brazil, India and China. To support trade and the city region's economy, it is vital for our firms to be able to make connections to these emerging markets."*

East Midlands

- While the region benefits from East Midlands Airport, businesses were supportive of Heathrow for the complementary benefits it provides. In particular, the business recognised that while East Midlands Airport serves a growing range of European destinations, there would never be sufficient local demand to support the routes to the emerging markets available at Heathrow.
- Furthermore, representatives from the National Space Centre, a major local tourist attraction made clear that while local people use East Midlands Airport for holidays, many of their overseas visitors travel via Heathrow.
- Local businesses also expressed concerns about the relocation of UK's hub airport to the Thames Estuary given the poor surface access from the region. They contrasted this with the improvement in access between the East Midlands and Heathrow that will be achieved through the High Speed Two rail line.

West Midlands

- In Coventry, a number of the businesses were supportive of expansion of the UK's hub airport at Heathrow to complement their regional airports at Coventry and Birmingham. They also expressed concern about the relocation of the hub airport to either Gatwick or the Thames Estuary given the poor surface access between these locations and the region. Many contrasted this with the improved connectivity to Heathrow that will result from the building of the High Speed Two rail line.
- In Staffordshire, our presentation helped the Chamber and local businesses understand how successful regional airports are complemented by a strong hub airport.
- Indeed, following our visit, the Stoke-on-Trent and Staffordshire Local Enterprise Partnership have revised their aviation strategy to include a paragraph on the need for a strong hub airport with Heathrow expansion being the preferred option. The LEP's aviation strategy now reads:
"Whilst the Stoke on Trent and Staffordshire LEP believe that the immediate, and part of the long term, future of air freight and air passenger transport should be to increase the long haul capacity of airports across the country (particularly Birmingham and Manchester) there is also a recognition that we have a leading hub airport at Heathrow. Our strategy therefore supports the development of Heathrow in order to maintain the top ranking of this airport and will lobby for HS2 links to Heathrow and to Stoke on Trent to provide a travel time of less than an hour. Heathrow is crucial to exporting as it is still the main hub for long haul flights to the emerging markets. However, we want more long haul slots for other airports to encourage and support the rise in exporting."

2.4 What the regions say

East of England

- In Norwich, the Chamber and local businesses were broadly supportive of expansion at Heathrow with no support expressed for the Thames Estuary option despite the potential for quicker surface access times to the region.
- In our recent *Heathrow: a national asset* publication, Caroline Williams, Chief Executive of Norfolk Chamber of Commerce provided the following quote : *'An expanded Heathrow would create new growth opportunities for HiBreeds (local business featured in the report) and other businesses in Norfolk through better connections to emerging markets.'*
- A long standing concern of businesses in the East of England is the quality of road and rail access to London with hope that an expanded Heathrow would boost the case for improvements to journey times to the capital. Furthermore, while businesses were strongly supportive of Norwich Airport, they understood it would be unable to offer the range of destinations available from a hub airport.
- In Hertfordshire, the Chamber and businesses present were strongly supportive of expansion with businesses strongly welcoming the opportunity to engage directly with Heathrow and ensure their perspective was understood.

London

- Businesses in London are broadly united in support for expansion at Heathrow given the economic geography of the capital and the investment in surface access including Crossrail.
- The LCCI has been consistent in its support of Heathrow expansion. Following the publication of the Transport Select Committee's report on Aviation Strategy in 2013, the LCCI's Chief Executive, Colin Stanbridge, said, *"We strongly agree with the Committee that aviation should be permitted to grow and that a third runway at Heathrow is needed to meet future demand. As the Committee has concluded, Heathrow is an important pillar of the London economy and a strategic asset to the wider UK - connecting our island nation to the world. Over recent decades, London's economy has greatly benefitted from Heathrow giving business travellers what they need - daily, direct and frequent flights to key and emerging markets."*

South East

- Business groups across the South East are strongly supportive of expansion at Heathrow with the overriding concern in Surrey and the Thames Valley being the continued delay in making decisions on UK airport capacity. More information on this engagement is highlighted in the local business engagement overview (Chapter 2) above.
- In addition, businesses were excited by the prospect of the proposed development of Western Rail Access to Heathrow (WRAtH) alongside the extension of the Crossrail line to Reading. Thames Valley Chamber believes WRAtH alone will generate more than £220m in economic benefits to the Greater Thames Valley, the South West and Wales along with 40,000 new jobs.
- In Oxford, local business leaders expressed concern at the year-on-year growth of other EU hub airports while the UK remained constrained. They recognise the benefits that their close proximity to Heathrow provides including easier access to global markets

South West

- In Plymouth, we heard from businesses about their concern over connectivity to the region. It was recognised that a third runway at Heathrow would significantly increase the amount of new slots and result in improved connectivity to the South West.
- In Cornwall, we heard similar comments, with businesses concerned over the lack of a direct air link. They were encouraged by the potential for improved connectivity in the event of permission for a new runway.
- In our recent *Heathrow: a national asset* publication, Leader of Plymouth City Council, Cllr Tudor Evans said, *"As the largest city on the UK's south coast and the economic driver for the South West peninsula, Plymouth needs access to international markets. We can see the wider benefits of an expanded Heathrow, especially if it means direct rail access from Reading which will improve direct rail*

2.4 What the regions say

connectivity to the South West. It will also increase the opportunity to increase potential regional flights in the longer term from the South West using Heathrow as a hub airport."

Scotland

- Businesses in Scotland understand the need for a strong hub airport with many businesses relying on the services to Heathrow from Glasgow, Edinburgh and Aberdeen to access overseas markets. While all three are successful airports, there is recognition that they are unable to offer the wider range of destinations available at Heathrow.
- The importance of a direct connection is demonstrated by the survey conducted by SCDI, Inverness Chamber of Commerce and the Federation of Small Businesses following the loss of the direct service between Inverness Airport and Heathrow. The survey found that more than 50,000 passengers a year are lost from the Inverness Airport to other Scottish airports, in spite of the fact the Inverness maintains a direct link with Gatwick.
- Following our presentation to the Inverness Chamber of Commerce, one local business leader quoted in the local press as saying *"the lack of direct flights to Heathrow is tying the hands of the region's economy..."*

Wales

- At the event with the South Wales Chamber of Commerce we received strong support from businesses for Heathrow expansion. This support is particularly fulsome in light of the proposed Western Rail Access to the airport which will significantly reduce journey times between Heathrow and Wales.
- The Chamber is particularly supportive of Heathrow expansion due to the impact on regional businesses, the convenience for Welsh residents to travel on vacation or business, and how Heathrow currently supports Wales by acting as an entry point to international visitors and tourists. They believe proposals to expand Gatwick or to build a new airport in the Thames Estuary will have a significantly negative impact on Wales.
- Following our recent visit, Graham Morgan, Chief Executive of South Wales Chamber of Commerce, commented: *"With direct rail connections from South Wales to Heathrow, the UK's hub airport, passengers will be able to turn left out of Heathrow to Wales, instead of right towards London. An expanded Heathrow would increase the number and range of direct flights to emerging markets, to the benefit of South Wales."*

Northern Ireland

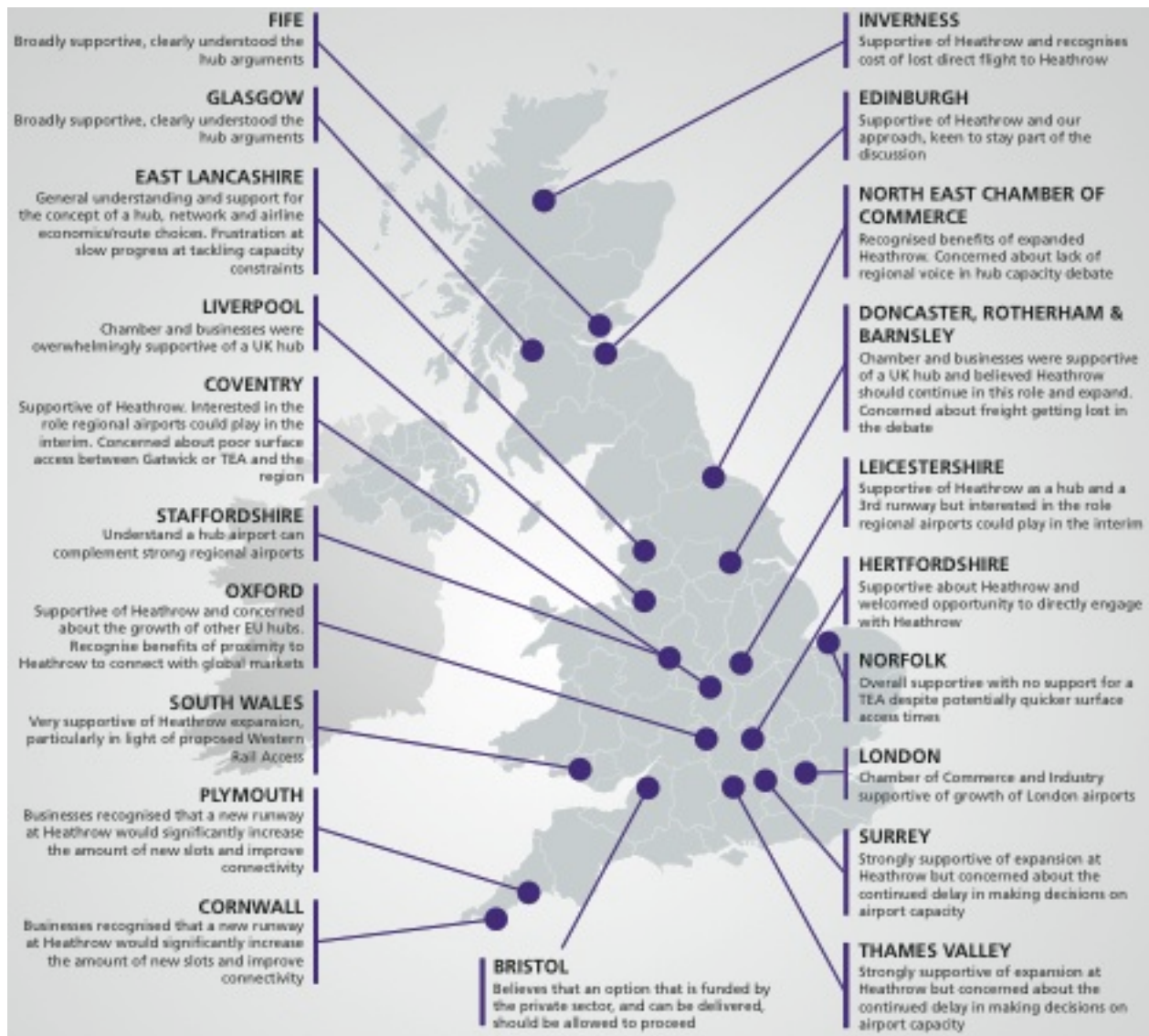
- We have a good working relationship with the Northern Ireland Chamber of Commerce who recently provided a quote for *Heathrow: a national asset* publication. The Chamber and the businesses it represents understand the importance of direct flights between George Best Belfast City Airport and Heathrow to provide Northern Irish businesses to access to global markets.
- In the *Heathrow: a national asset* publication, Chief Executive of Northern Ireland Chamber Ann McGregor said, *"The route between Belfast and Heathrow is vital for the local economy, with Oxford Economics estimating these flights currently generate 900 jobs in Northern Ireland. An expanded Heathrow with improved connectivity to growth markets would further improve the attractiveness of Northern Ireland to global investors."*



2.4 What the regions say

2.4.1.3 Regional map

Figure 2.10 Regional Roadshows



2.4 What the regions say

2.4.1.4 How we have changed our plan

We know how important it is to connect the UK's nations and regions. Our plans have been designed to help take Britain further by helping businesses across the country realise their ambitions to grow.

That is why Heathrow has committed to ensure the whole of the UK shares the benefit. As part of our submission to the Airports Commission in July 2013, titled *A New Approach*, one of the ten commitments we made if the government supported a third runway at Heathrow is to connect UK nations and regions to global markets by working with airlines and government to deliver better air and rail links between UK regions and Heathrow.

Our recently published report, *Heathrow: a national asset*, puts a handful of successful businesses from across the UK at the heart of the aviation debate by highlighting what Heathrow means to their businesses and how expansion would benefit them.

Our masterplan places surface connections to the UK at the heart of our design. We are also proposing a Regional Connectivity Taskforce to look at ways to foster direct air links to the hub if expansion goes ahead.

2.4.1.5 Next steps

Senior representatives from Heathrow will continue to meet with businesses from around the UK so that businesses can learn more about our plans to take Britain further and tell us their comments. Details of events that are scheduled for the rest of 2014 are included in Fig 2.9.

2.5 What our passengers say

Passenger experience has been transformed over the last six years with the proportion of passengers rating their journey as good or excellent increasing from 50% in 2008 to 80% today¹. In June 2013, Heathrow jointly won the ACI Europe Award for Best Airport over 25m passengers. In 2014, we won the Skytrax Best Terminal in the World award for T5 for the third year in a row. We are the only UK airport ranked in the top 10 best airports worldwide by millions of Skytrax passengers. As this progress demonstrates, our detailed insight and analysis programme helps us to understand passenger needs. A clear understanding of what is important to our passengers has enabled Heathrow to develop guiding principles to ensure all our developments meet those needs.

2.5.1 What our passengers say

Heathrow receives constant passenger feedback in many forms. We track their views, compare ourselves against the world and analyse how to deliver a better airport. We have distilled these insights into passenger service propositions. These propositions are reflected in our plans.



2.5.1.1 Passenger Experience at Heathrow

Passenger Satisfaction at Heathrow

Heathrow has witnessed a significant improvement in passenger satisfaction. This transformation is a reflection of our unwavering commitment to improving the passenger journey at Heathrow, which is sustained by a robust research and insight programme.

The following charts illustrate the marked change in passenger experience at Heathrow, for departing, arriving and connecting passengers, using our customer satisfaction survey, Quality of Service Monitor² (QSM).

2.5 What our passengers say

Figure 2.11 – QSM scores for departures and arrivals (MAA)

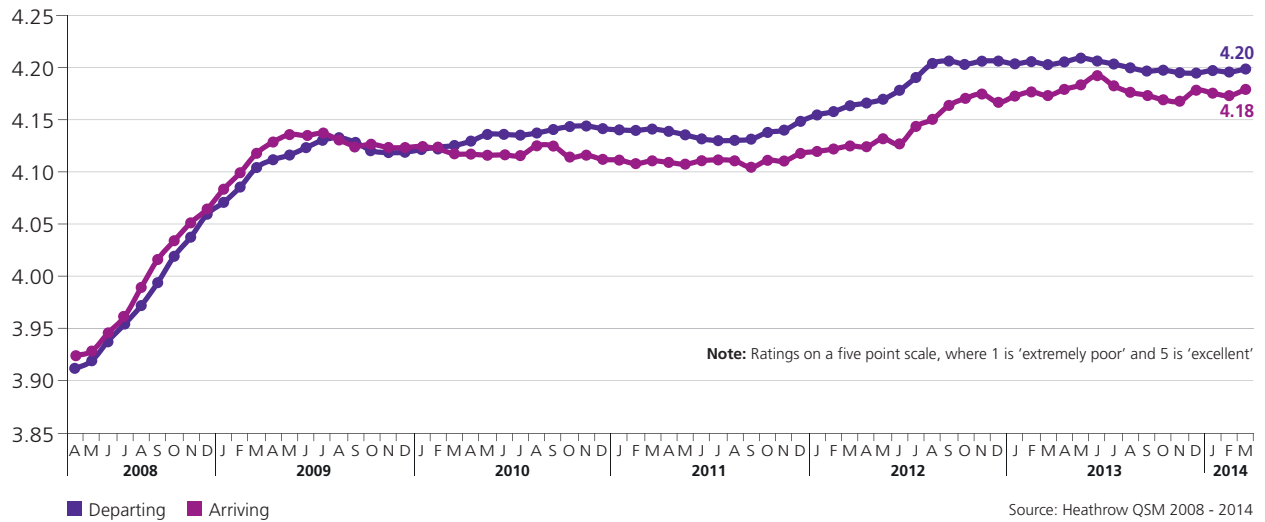
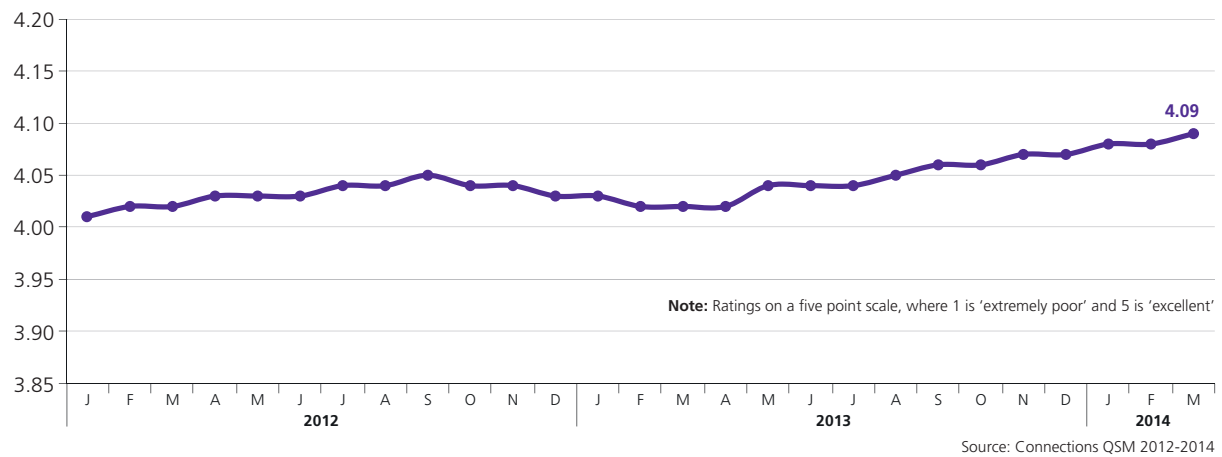


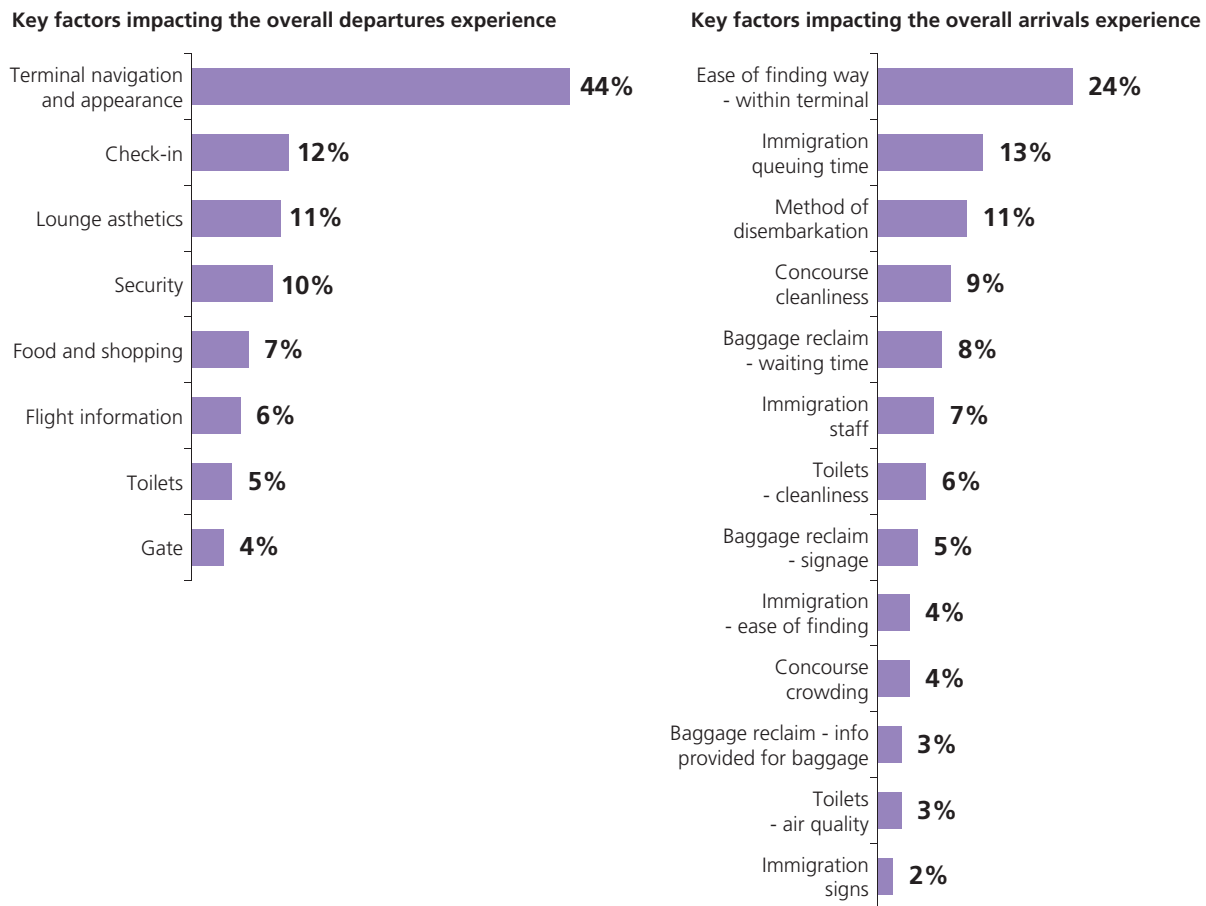
Figure 2.12 – QSM scores for connecting passengers (MAA)



We have achieved this through a detailed understanding of passenger priorities. Key driver analysis enables us to identify those aspects of the Heathrow experience that have the maximum benefit for the passenger. The findings below (see Fig 2.13) indicate that overall satisfaction is indeed driven by a few vitally important basics.

2.5 What our passengers say

Figure 2.13: Key drivers analysis for departing and arriving passengers



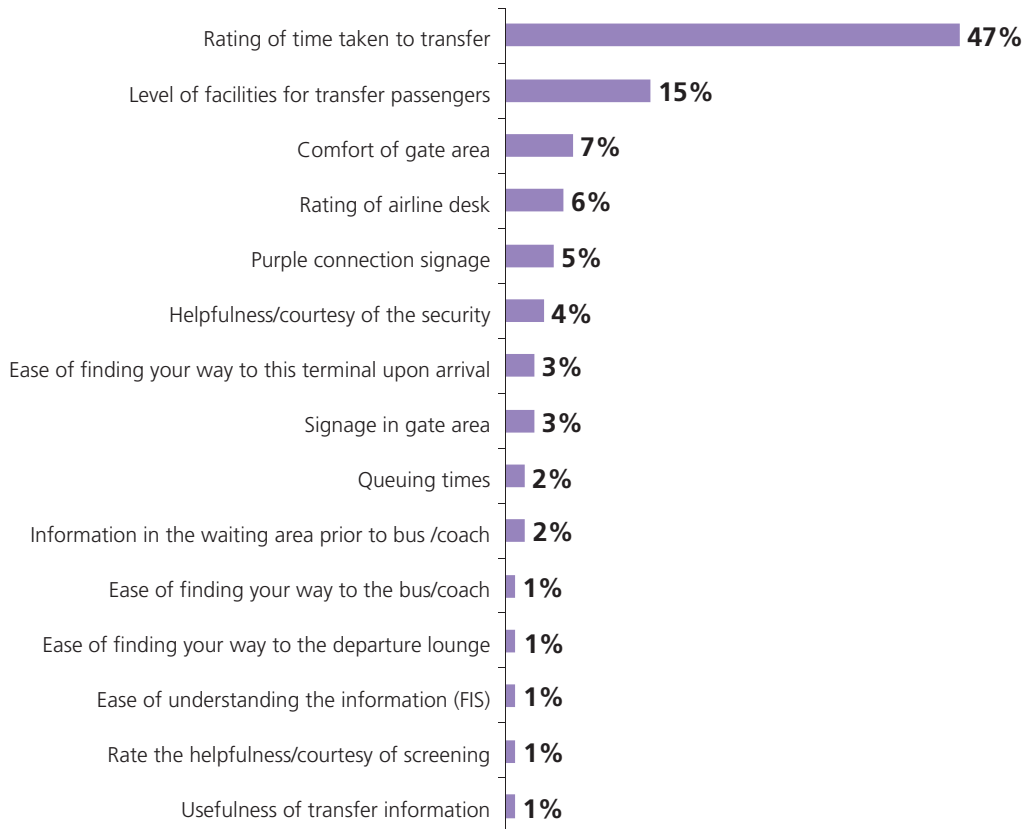
Source: Key Driver Analysis, Heathrow QSM 2012 data

Since 2007, this type of detailed analysis has been instrumental in driving key improvement programmes across all of Heathrow, focusing on security, wayfinding, cleanliness and connections. This analysis is updated periodically allowing us to keep abreast of changing passenger concerns. For example, ‘immigration waiting time’ increased from the fifth to the second most important driver between 2010 and 2012. Subsequently, we have sought to address this through continued dialogue with UK Border Force, emphasising to them the importance of this factor to our passengers. Similarly, in the last few years Wi-fi access has become more important, so we introduced a free wifi period for passengers, comparable with the offering at leading European airports.

We also undertake this type of analysis among connecting passengers to refine our understanding of their needs, see Figure 2.14, and this is discussed in further detail in section 2.5.1.2 Heathrow Service Proposition.

2.5 What our passengers say

Figure 2.14: Key driver analysis for connecting passengers: key factors impacting the overall connecting experience

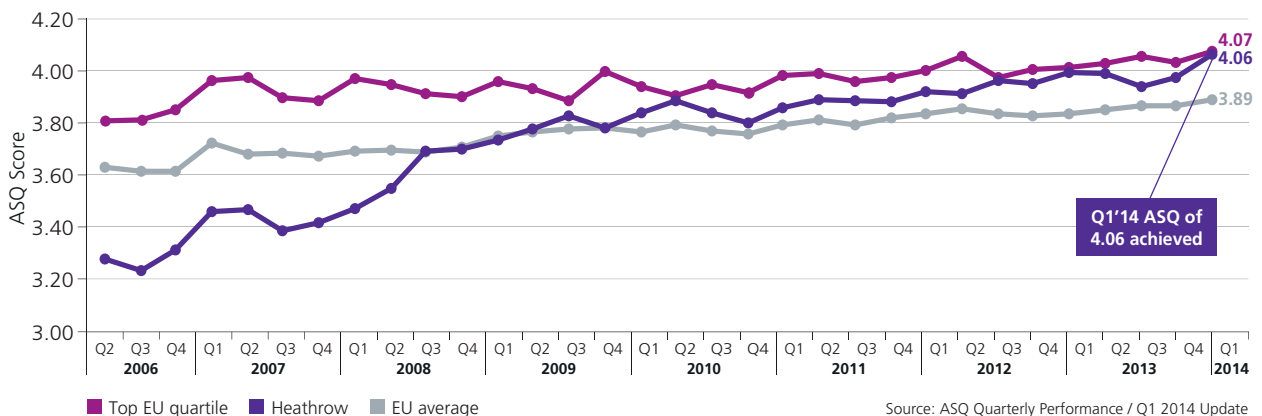


Source: Key Driver Analysis, Heathrow Connections QSM, 2012 data

Heathrow's Experience compared

The transformation seen in Heathrow's passenger experience is clearly evident from international comparisons. The Airport Service Quality (ASQ) survey confirms there has been a turnaround in passenger satisfaction levels at Heathrow. Carefully targeted investment has contributed to the overall improvement in satisfaction at Heathrow bringing us consistently above the European average. Heathrow has just achieved its highest ever satisfaction rating, scoring 4.06 out of 5 in Q1 2014 (results released April 2014). Figure 2.15 confirms that Heathrow is just behind the top quartile of European airports. (All terminals have had their best performance to date with Terminals 4 and 5 in this top quartile).

Figure: 2.15 ASQ Q2 2006 to Q1 2014... LHR vs EU Average vs Top EU Quartile

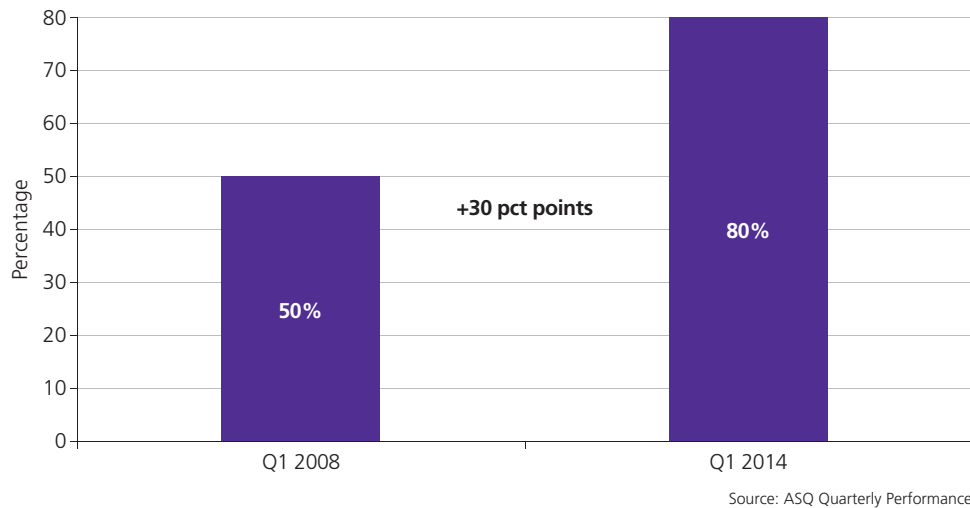


Source: ASQ Quarterly Performance / Q1 2014 Update

2.5 What our passengers say

More specifically, the proportion of passengers rating their journey as 'very good' or 'excellent' has increased from 50% in 2008 to 80% today.

Figure 2.16: ASQ Q1 2008 vs Q1 2014... Proportion of passengers rating their overall journey at Heathrow positively



Heathrow's efforts have been recognised by our passengers; T5 was recently voted by passengers as the 'World's Best Airport Terminal' for the third year in a row. In 2013 we were presented with a Mumsnet Family Friendly Award. Heathrow has received plaudits for passenger groups as disparate as business travellers and families. These included Best International Airport, awarded by Executive Travel, Best Airport Business Shopping, awarded by Business Traveller and Best European Airport for Families, awarded by SkyScanner.

Our focus on continuous improvement is also recognised by the aviation industry. In June 2013, Heathrow jointly won the ACI Europe Award for Airports with over 25m passengers, with Schiphol. A common point mentioned by all judges was that both airports delivered excellent services and facilities. Global perception of Heathrow, amongst passengers and the aviation community, is fundamental when reviewing the case for expansion. We are confident that we understand the needs of the world's passengers.



2.5 What our passengers say

Understanding the world's passengers

Heathrow is distinct in terms of size and scale in the UK. This is inherent in us being a global hub. Our 72 million arriving, departing and connecting passengers are incredibly diverse. We work hard to understand this diversity and to provide a positive experience of Britain on the world stage.

Heathrow's current mix of passengers comprise of (taken from the CAA Passenger Survey, provisional 2013 data):

- 37% Connecting through Heathrow
- 61% are Non-UK residents
 - 20% are EU residents and 41% are Non-EU residents
 - Residents from over 190 countries fly through Heathrow.
- 30% travelling on business
- 2.7% are passengers with restricted mobility.³

Over a third (36%) of passengers are visiting friends and relatives worldwide, underlining the importance of Heathrow's extensive choice of destinations, which enables people to connect across the world.

We fully support the special challenges such diversity brings. For example, we have Passenger Service Ambassadors in the terminals to assist passengers at key stages of the journey. They are trained to provide support and reassurance to passengers, enabling them to move easily through the airport. Between its members, the Passenger Service Team speak 49 languages, providing vital translation services to international or vulnerable passengers.

Heathrow is uniquely placed within the UK to understand and meet the varied passenger needs that arise from creating a world-class hub airport.

2.5.1.2 Heathrow Service Proposition

Using Passenger Principles to support our Service Proposition

Heathrow has developed enduring passenger principles based on this clear understanding of what is important to our passengers, as shown in Figure 2.17. We have collaborated with the wider Heathrow community in defining these principles. These serve as guiding principles to ensure all further development activity meets the combined needs of passengers and operations.

Figure 2.17 Passenger principles

Principle	How we live up to it
Consistent basics	Consistently delivering the basics every time; safety, security, cleanliness and ease of wayfinding
Reliable and predictable	Enabling airlines to deliver a punctual, reliable, comfortable, efficient and predictable service at every stage of the passenger journey through the airport and Heathrow airspace
Easier journeys	Work with others to continually improve the overall Heathrow experience, for all departing, arriving and connecting passengers
Show we care	Caring for each of our passengers' journeys through the commitment, helpfulness, knowledge, courtesy and appearance of everyone who works at Heathrow
Delight	Delighting passengers by improving the products, services, facilities and atmosphere in each terminal on a planned and agreed basis.
Affordable	A passenger experience for which airlines and passengers are willing to pay
Value for money	Providing competitive solutions for passengers and airlines

As an example of these propositions in action, **Terminal 2 | The Queen's Terminal** has been entirely designed on principles which drive passenger satisfaction:

- At a general terminal level, the design has encompassed factors that positively impact the passenger journey (in order of the key driver analysis attributes, departures, arrivals and connections):

2.5 What our passengers say

Figure 2.18 Terminal 2 Passenger design principles

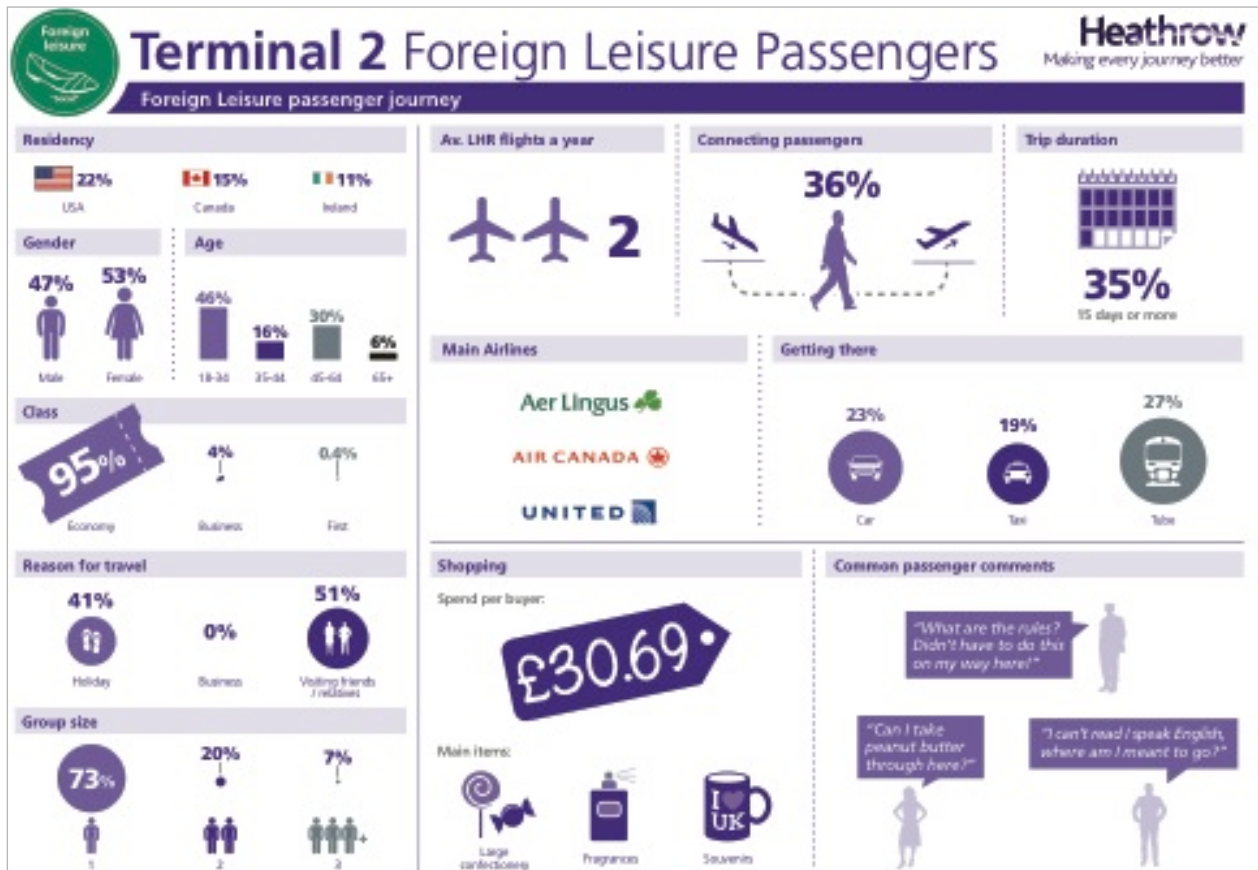
	Departures	Connections	Arrivals
1	Straightforward flow and clear sightlines assist wayfinding		
2	Largest security hall in Europe speeding the security process up	-	Immigration waiting times are being addressed with the availability of new generation e-passport gates
3	Non-airline specific check-in provides flexibility and a seamless journey for the passenger	Dedicated re-check-in facilities	-
4	Departure Lounge is designed to be aesthetically pleasing with a unique ambience		-
5	Gates are open, in line with passenger preferences	-	-
6	Substantial choice of shopping and food & beverage outlets		-

- The entire premise of Terminal 2 | The Queen’s Terminal has been built around the connecting passenger (which is critical given that it is home to an airline alliance) for whom the key driver of satisfaction is ‘time taken to transfer’. Intra-terminal transfers not only reduce time but simplify wayfinding (essential for passengers who may not speak English and maybe disorientated due to jetlag). It also enables us to put in specific services for connecting passengers, and consequently, Heathrow have provided a separate check-in, security and a rest & relaxation area, comprising showers, sleep pods and quiet areas.
- Our commitment to providing passengers with excellent service is evident in the operational readiness programme for Terminal 2 | The Queen’s Terminal. The extensive proving trials and staff training are based on a comprehensive understanding of the key passenger groups that will be using the terminal. Given Heathrow’s complex passenger mix, it is essential staff have a thorough understanding of passengers’ needs to enable them to provide a more responsive and sensitive service. The success of this initiative has resulted in this process being rolled out to the other terminals to ensure that smaller, though equally significant, passenger groups’ needs are met. Figure 2.19 is an example of a key passenger segment in terms of description and likely needs, taken from staff training documents:



2.5 What our passengers say

Figure 2.19: Example slide from Terminal 2 staff training pack



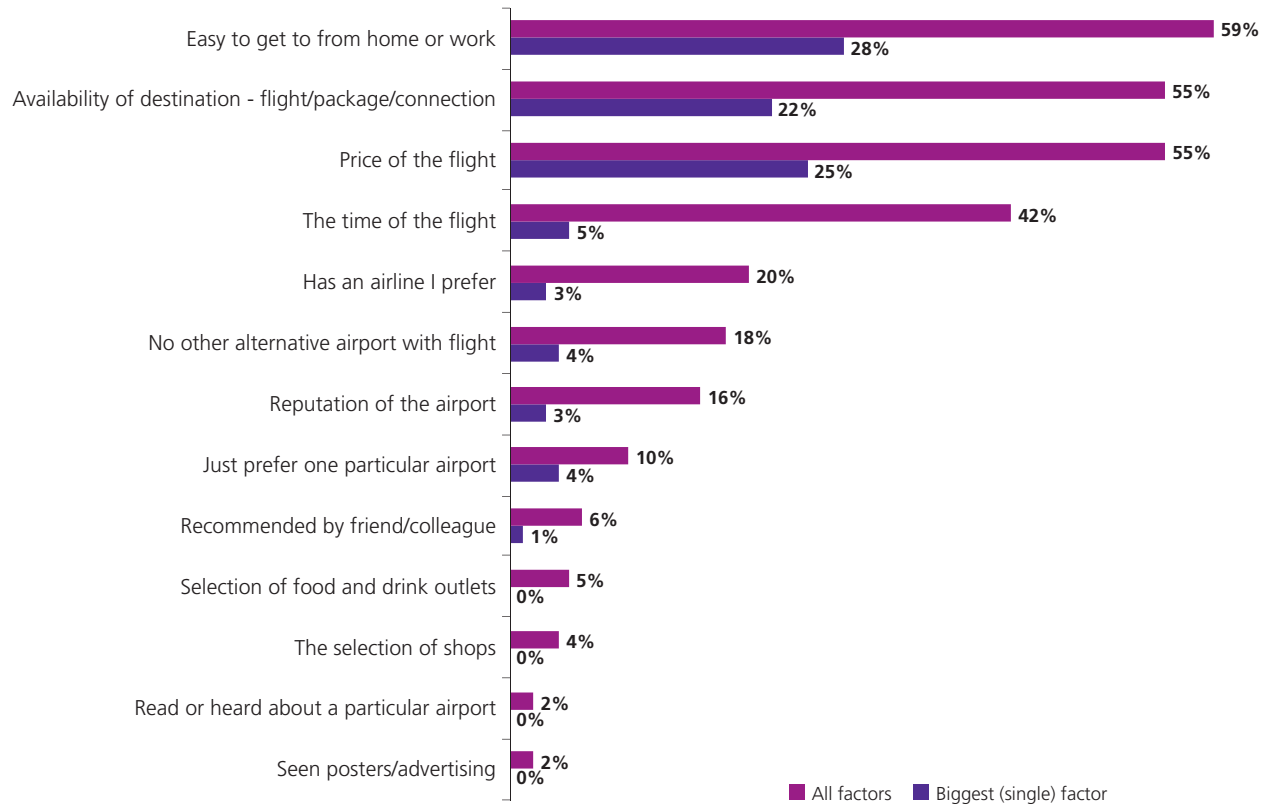
This insight-driven approach demonstrates the importance Heathrow places on ensuring passenger needs are met. All future developments at Heathrow will be substantiated with similar vision, ensuring all expansion plans place passenger needs at the forefront.

Role of Surface Access within our Service Proposition

We understand the importance of ensuring passengers have an excellent experience at Heathrow. We also know passengers have wider considerations when choosing which airport to fly from and these outweigh some of the earlier specific airport attributes mentioned. The most recent of our passenger research (see Figure 2.20) amongst UK residents confirms ease of access, price of flight and destination of flights as the key drivers of airport choice.

2.5 What our passengers say

Figure 2.20: Influences of Airport Choice



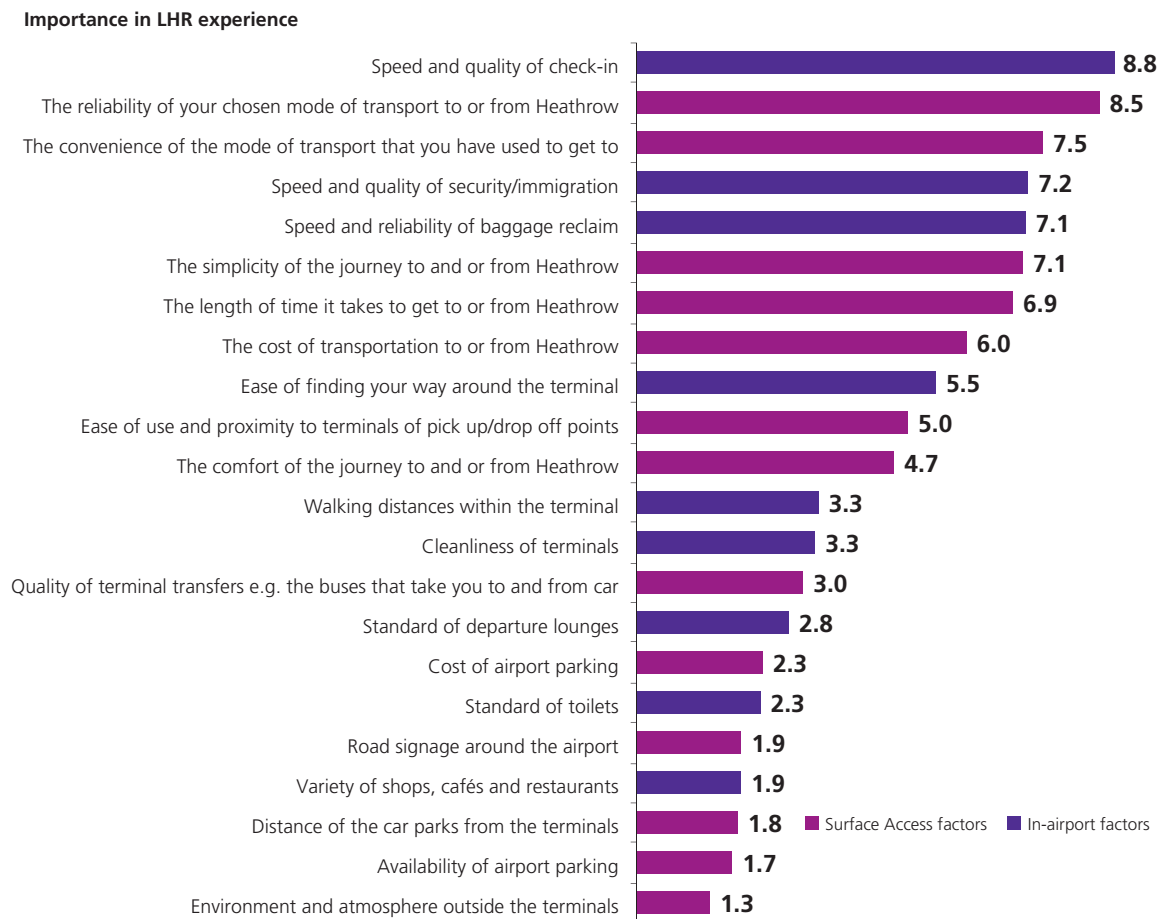
**Q: When flying, which of the following influence you decision as to which airport to use?
And which is the one biggest influence on your decision on which to use?**

Source: 'Making every journey better' research, April 2014

The role of 'ease of access' within the passengers decision-making criteria is broken down within bespoke analysis of journeys to Heathrow by surface transport which enables us to understand what drives passenger satisfaction. This remains essential given the high correlation between surface access experience and satisfaction with a passenger's Heathrow experience⁴. This is why we focus on working effectively with transport providers to improve transport links to Heathrow.

2.5 What our passengers say

Figure 2.21 Role of surface access factors in overall airport experience



Relative importance of factors in satisfaction with Heathrow experience. Scores sum to 100

Source: KAE Surface Access Analysis, Nov 2011.
 D2MaxDiff – Please select the most and least important factors in your satisfaction with the whole Heathrow experience N=1,687

It is therefore rewarding to note that at least nine out of ten passengers find their overall surface access experience ‘good/ excellent’ (92%)⁵.

2.5.1.3 How we have changed our plans

Our refreshed scheme design has allowed us to start to detail some of the ways an expanded Heathrow might operate. For example we have worked to reduce taxi times, cut time from the plane to the platform or kerb and simplified the passenger journey through the terminals. Our proposal would see on-going development of the airport over decades to the mid-2030s. At times public discussion of passenger experience at airports can focus on particular new technologies, service offers or changes in a fairly haphazard way. As we know from the rapid change in consumer needs and projects like the launch of Terminal 2: The Queen’s Terminal, we will not be able to specify the detailed technologies or layouts for some parts of an expanded Heathrow for years to come. Yet the core needs of passengers are remarkably constant. Our track record demonstrates over the last few years that consistent application of guiding principles and a focus on the passenger in all aspects of design best meets passengers’ needs. This approach underpins our plans for expansion.

2.5 What our passengers say

2.5.1.4 Next steps

Passenger research is a constant effort at Heathrow. At each stage of the planning and subsequent development phase, we will inform our proposals with the latest insights and data. At appropriate points we will qualitatively test proposals, or trial them with passengers or prospective passengers. The passenger aspects of our plans will also be an important aspect of discussion with airlines as part of the wider consultation with them.



2.6 What our airlines say

We have a longstanding history of working with our airline partners to jointly transform Heathrow and improve how we operate together. Since the publication of the Interim Report, we have met with the airline community in a number of different fora to share with them our proposals and understand their views. Airlines remain concerned about affordability and slot allocation.

2.6.1 What our airlines say

We have a longstanding history of consultation with our airline community. In relation to proposals for expansion this goes back to the original 3R masterplan proposals in 2008-10. It has continued through the subsequent development of our 2R masterplan and the constructive engagement that has taken place as part of our latest Q6 regulatory cycle. The engagement has been used to inform our masterplan layout, airport priorities, and assumptions. All of the thinking and principles previously identified through this long-term development underpin our masterplan and wider proposal.

Overall airline industry views in support of more capacity at Heathrow based on public statements are outlined in the Connecting for Growth section. It is clear that a wide range of airlines see the case for demand at Heathrow. Many are interested in serving that demand, subject to commercial terms. Many are keen for the Government to take a clear decision that works with the realities of the international airline business.

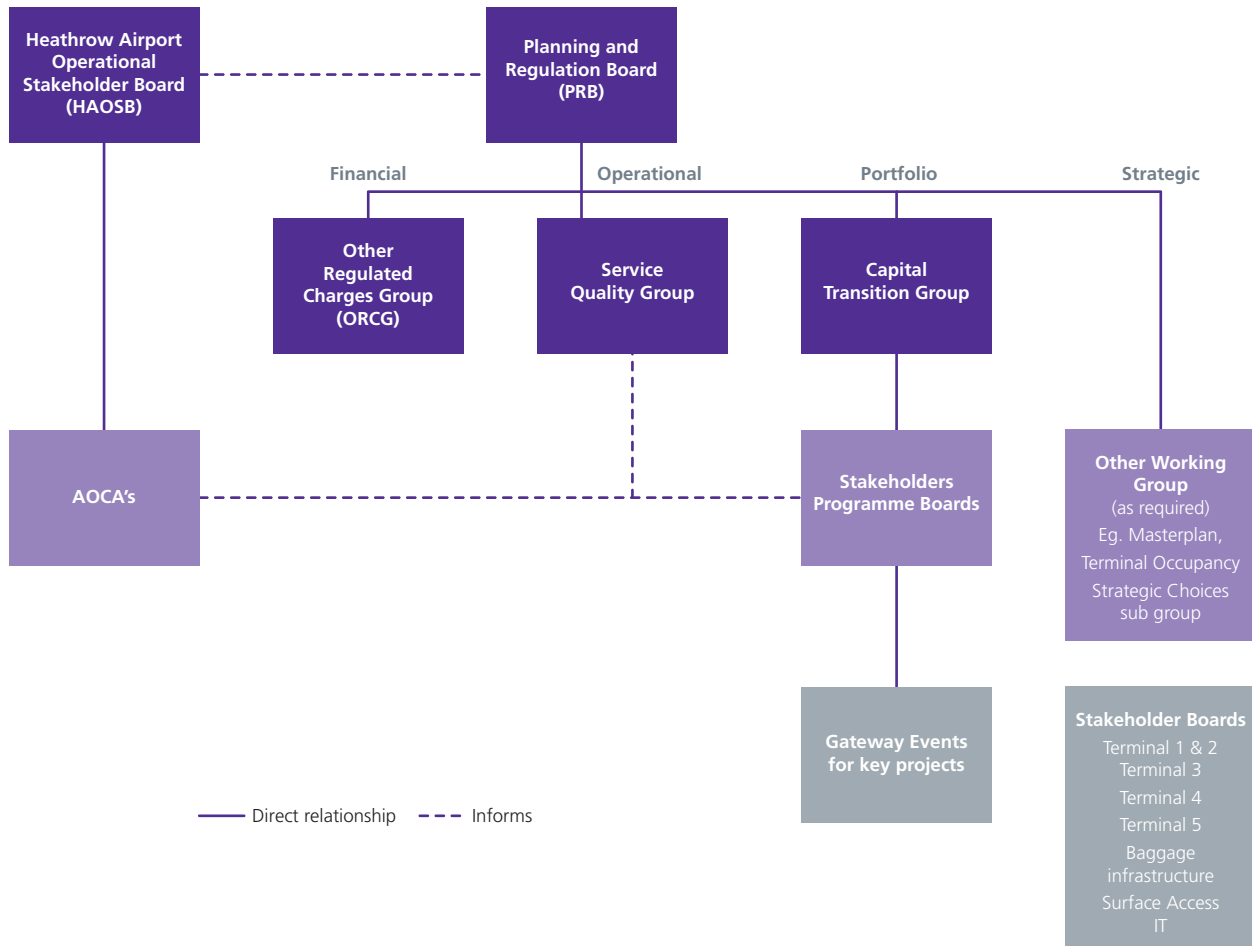
Beyond this general support for capacity we have begun to consult with airlines on the details of our plans. Heathrow regularly consults with airport users on a wide range of topics. The CAA requires us to consult effectively to ensure we do not impose decisions without dialogue and input from users. This dialogue is best served through effective consultation where users' views are sought and considered before any final decision is reached. We regularly consult on topics beyond what are mandated by regulation. It is important for us to consult effectively on a consistent basis and to ensure we understand what good consultation looks like.

Consultation with airlines on our plans, which could affect their businesses for years to come, will be an on-going, multi-year process. Effective consultation with our airport partners and other stakeholders is critical to ensuring that their views and needs are taken into account, our proposals and plans are fully understood by users and that our decision making process is robust. Therefore we have made a start on formal consultation using the structures that already exist for the airport community of airlines. Outlined below is our airport stakeholder engagement structure.

Outlined in Figure 2.22 on the next page is our airport stakeholder engagement structure.

2.6 What our airlines say

Figure 2.22 Stakeholder Engagement Structure



Following publication of the Draft Appraisal Framework, the engagement with our airline community was discussed at the Heathrow Planning & Regulation Board (PRB) on 6 January 2014. The PRB is the principal airport and airline engagement forum and is jointly chaired by the Heathrow Director of Regulation, Strategy and Planning and the Chairman of the London Airports Consultative Committee (LACC).

The PRB meets monthly to oversee and discuss Portfolio, Operations, Financial and Strategic key issues. The PRB approved the principle of engagement via a Working Group the following month on 3 February. Invitations were sent to the principal airlines operating at Heathrow, the major airline alliances plus representatives from IATA and the AOC. The first meeting was held on 25 February agreeing Terms of Reference and setting out the Airport Commission process and timescales. We also briefed the airline community on the emerging feedback from our Community Consultation exercise that was launched on 3 February 2014. The airline community raised issues of affordability and slot allocation as their primary concerns at this stage.

The second meeting held on 25 March provided the opportunity to take the airlines through our masterplan in more detail. We explained to them our proposed principles of runway operation, terminal configuration, track transit proposals and the transport interchange at Heathrow West amongst other detail. Our sharing of information was welcomed. At the high level discussed, no fundamental issues were raised regarding the need for future hub capacity in south east England but recognised that much more discussion would be necessary over the coming months and years.

The third meeting took place on 30 April. The airlines were provided with a briefing of our submission to the Commission to ensure that they would not be surprised once it was published. At this meeting the Heathrow

2.6 What our airlines say

Airline Community again outlined their concerns regarding the key issues with any new runway proposal. These include affordability, financing in line with established ICAO policies (including the avoidance of pre-funding), no airline funding for surface access, slot release mechanisms, CAA's regulatory policy and framework and the retention of night flights. Whilst the airline community recognises the future hub capacity shortage in the South East, given airlines and their passengers will ultimately fund any new capacity, they believe that these are the issues that need to be addressed by any capacity proposal.

Alongside these Working Group meetings, we have also held bilateral discussions with several airlines - both those currently at Heathrow and others which do not operate at Heathrow. These discussions have reinforced our view that there is a clear demand for expansion at Heathrow. Airlines repeated their concerns some of the commercial considerations such as affordability, cargo and slot allocation.

Additionally we have presented our proposals to a number of airline governance fora including the Full LACC (19 March), the LACC Executive (3 April) and the IATA European Leadership Team (9 April).

The LACC has outlined the key issues to be addressed in the coming months but as the LACC comprises a range of airlines with a range of views, it has left it to individual airlines or airline groupings to work with us as appropriate. Some airlines are content to engage but others have chosen to comment directly to the Airports Commission.

2.6.1.1 How we have changed our plans

Key elements of our masterplan are based upon the principles designed over the last few years from consulting with airlines. For example, the preference for fewer, larger "front doors" for the airport or the need for resilient, efficient taxiways based upon the 'toast rack' concept. In our refreshed scheme we have confirmed basic design parameters such as the runway length, mix of stands and overall surface access strategy through airline conversations. We note the need for us to look at commercial and regulatory structures that will support a fair and affordable way to finance expansion at Heathrow.

2.6.1.2 Next Steps

Following any guidance from the Airports Commission, we will look to engage more deeply on the operation of our airport masterplan with our airline partners and in particular explore further the potential funding models that may exist to help inform the work being undertaken by the CAA which is considering the regulatory approach and financing that relate to airport expansion.

2.7 What our statutory stakeholders say

We have strong links with statutory authorities and have met with many organisations to share our proposals. We have listened to their views and, wherever possible at this stage of our scheme development, we have incorporated their feedback into our proposals.

2.7.1 What our statutory stakeholders say

We have talked to a range of statutory stakeholders, especially with regards to surface access and the environment.

2.7.1.1 Surface Access

We have a strong relationship with Network Rail and have been consulting with them to develop a credible and deliverable service pattern that will deliver a step change in rail connectivity to the airport. The rail elements of our surface access strategy has been developed in collaboration with Network Rail taking into account their wider long term planning process which is currently on-going.

We have developed outline proposals for the M25 and M25/M4 junction in consultation with the Highways Agency and the Agency has provided further information on background traffic forecasts. We will continue working closely together to develop the scheme as the Commission process continues.

Initial engagement with local authorities has begun with individual meetings and a presentation of our strategy to the West London Panel meeting in March 2014. The West London Panel is a regional transport group, attended by TfL and key London boroughs.

We have met with TfL separately to obtain their views on impacts of Heathrow expansion on the Piccadilly Line, Crossrail and TfL's road network.

2.7.1.2 Environmental Stakeholders

We have undertaken regular consultation with key statutory stakeholders including Natural England, the Environment Agency and English Heritage. This began when our original submission to the Airports Commission was being prepared and has continued throughout the period of the refinement of our masterplan. Specifically the consultation was undertaken to allow us to gain input from them to inform the development of our mitigation, compensation and enhancement strategies. In doing this we have shared and tested with them our evolving proposals. For example Natural England indicated their main concern is the potential adverse effects on the South West London Waterbodies SPA/RAMSAR site. Natural England has welcomed this early engagement and has welcomed the opportunity to have further inputs as we develop our strategy further. In certain cases, stakeholders they have been able to provide to us key data that has helped inform our understanding of the local environment. Further details of our mitigation strategies are included in Part 5.

2.7.1.3 Next steps

We will continue to work with these stakeholders and other stakeholders such as Thames Water to share with them more detailed plans and understand their aims and objectives concerning our proposals for Heathrow expansion. We will also work closely with them to develop more detailed strategies and schedules to deliver the next phase of the project should Heathrow be recommended by the Airports Commission.

2.8 What elected representatives say

Political consensus will be required to drive a successful resolution of the UK's capacity crisis. In 2010, political support was withdrawn for the previous plan for a third runway at Heathrow. Since then, we have engaged with politicians from all parties to understand their views which have helped us to develop our new approach to Heathrow expansion.

2.8.1 What elected representatives say

Achieving a degree of political consensus on the future capacity needs of UK aviation is critical to the delivery of the Airports Commission's recommendations in 2015. Heathrow has developed an active and constructive engagement programme with political stakeholders from all parties to build understanding and support, gain visibility of key political and policy challenges and identify areas where further development is required. Our commitment has been to listen and engage with the widest range of political interests so that we can understand and respond to national, regional and local priorities.

Politicians across the country play a vital role in promoting their constituency and region. We believe growth at Heathrow can drive the success of regional economies through connecting to the global marketplace, supporting the attractiveness of the UK for inward investment, tourism and trade. As our recent publication, *Heathrow: a national asset* demonstrated, successful businesses from across the UK attribute some of their potential future growth to better connections into and from Heathrow. Politicians from many of these regions have welcomed our engagement. While not all agree with a new runway in the South East, a growing number recognise that the choice between strong regional airports and a strong global hub is not a binary one.

2.8.1.1 Political deliverability

Populus has conducted research among local residents on behalf of Heathrow since autumn 2011. In that time, they have conducted more than 28,000 structured telephone interviews with local residents as part of seven separate projects. Demographic quotas and weighting were used to ensure that each survey was representative of the adult population in that area.

Throughout all seven waves of research residents were asked a range of questions, including how positive they felt towards Heathrow Airport on a scale of 0-10, where 0 meant very negative, 10 very positive and 5 was neutral. In each wave more than half of local residents were positive towards the airport (ranging from 53% to 60%).

Throughout the first four waves residents were also asked about the perceived balance between the benefits and disadvantages of Heathrow. In all four waves more than three-in-five local residents agreed that the benefits of Heathrow outweighed the disadvantages for them and their family. Similarly, more than two-thirds agreed the benefits outweighed the disadvantages for their local community, and three-quarters agreed that the benefits outweighed the disadvantages for the country as a whole.

In the three most recent waves of research conducted in local constituencies and boroughs, residents were asked whether they support or oppose expanding Heathrow. In these waves, just under half of residents supported Heathrow expansion. Further details of the results of these surveys are included in Part 6.

2.8.1.2 National and regional engagement

We engage with MPs from all parties and across the UK to discuss the importance of Heathrow to their region and constituents. This includes engagement with Parliamentarians at Westminster, including members of the Transport Select Committee and All Party Parliamentary Groups, as well as a concerted effort to mirror our engagement with regional businesses by engaging a range of political Parties around the country.

Heathrow has taken the opportunity to listen to a large number of activists and party members at political party conferences across the country autumn or spring party conferences of Conservative, Labour, Liberal Democrats, SNP, Plaid Cymru, and UKIP to get feedback on our July 2013 options.

2.8 What elected representatives say

By following up on conversations and meetings at party conferences and other events, we have been able subsequently to meet with politicians, their advisers and researchers to provide further information, update them on our plans and address their concerns.

2.8.1.3 Local engagement and priorities

As outlined in earlier, our local political and community engagement ranges from regular fora such as the HACC and Local Focus Forum to regular meetings with MPs whose constituencies are close to Heathrow, relevant local authorities and local enterprise partnerships. These relationships have been key to developing both our initial proposals in July 2013 and this submission. Our approach has been closely aligned to local priorities, which have been consistently focused on: going further in reducing aircraft noise and installing noise insulation; providing more generous compensation schemes than in the past; and supporting economic growth and jobs for the region.

2.8.1.4 Conclusion

We have demonstrated extensive and wide ranging consultation. Since 2010, we have continuously engaged with a broad spectrum of stakeholders and listened to their valued feedback. At each opportunity we have sought to incorporate this feedback into our plans, continually refining our proposals at each stage of the process. Our engagement will continue and in many areas intensify should we be recommended by the Airports Commission.

References

¹ Source: Airport Service Quality report, Q1 2014 (using quarterly data). This is an international survey monitoring airport performance

² Quality of Service Monitor, our own passenger satisfaction survey, hereafter referred to as QSM

³ Source: Heathrow, refers to departing passengers only

⁴ The correlation between Surface Access Experience and Satisfaction with the Heathrow experience is 0.62. The consultancy undertaking this analysis states that in Consumer Research, correlations between 0.4-0.6 are strong. Source: KAE Surface Access research, November 2011)

⁵ Insitas Surface Access QSM quarterly report, Q4 2013

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An aerial photograph of a university campus, showing a mix of green spaces, roads, and buildings. A prominent purple rectangular box is overlaid on the right side of the image, containing white text. The campus layout includes a central road with several roundabouts and green islands, and various academic and administrative buildings scattered throughout. The overall scene is a well-planned urban environment.

Part 3

**Our vision
for a world
class hub**

3.1 Our vision for a world-class hub airport

Our refined masterplan for a north-west runway will transform Heathrow into a globally competitive hub airport while minimising impacts on our communities. The masterplan strikes the best balance of a number of objectives. Our design builds upon existing facilities, developing the airport along principles that have proved successful already in improving Heathrow for passengers, airlines and other users.

We have listened to the public's priorities as well as the needs of other stakeholders to improve our masterplan, which incorporates feedback from our public consultation in early 2014.

We have put the passenger at the heart of our design, offering easy, quick, reliable journeys through a simpler, integrated airport campus. A transformed Heathrow will also provide an operationally and commercially attractive airport for airlines. For transfer passengers at our hub airport, the plan sets out a high-quality transfer experience in the layout. For direct passengers, we will create an integrated transport interchange between multiple rail, bus, road and air routes putting Heathrow at the heart of Britain's transport network.

Our scheme provides a 3,500 metre third runway capable of providing 740,000 annual ATM – and capacity for forecast demand until at least the 2040s. It will accommodate all aircraft types and will deliver connectivity to at least 40 new, long-haul destinations. Heathrow will be more resilient, reducing delays and eliminating routine stacking of aircraft over London. World-class cargo and commercial facilities will maximise the opportunities across the British economy, doubling UK airfreight capacity by the 2030s.

Drawing on feedback from our public consultation, our masterplan prioritises noise respite for communities. It significantly reduces noise, land take and impacts on local heritage and transport compared with our July 2013 proposal. High-quality green space will be created around the airport boundary for the benefit of local people.

This plan can adapt to changes in the aviation industry with options for future development. A transformed Heathrow will be competitive with hubs across Europe and the world. It will become a national asset of which Britain can be justly proud.



3.1 Our vision for a world-class hub airport

3.1.1 Our vision for a world-class hub airport

3.1.1.1 Connecting the UK for growth

An expanded Heathrow has potential as a global hub airport, providing opportunities for the UK. Our masterplan will ensure that Heathrow is competitive to at least 2040. For centuries the UK has prospered through connections to the rest of the world. In the 21st century economy air connections are required, most especially to the increasingly important economic centres that can only be reached by long-haul flights. The best model to provide globally competitive long-haul connectivity is through a hub airport.

Hub airports must compete across Europe and the globe for network airlines, and the transfer passengers and cargo that support their business. Our masterplan is designed to maximise our competitiveness as the UK's hub – by providing the capacity to compete. It will also continue the transformation of Heathrow into a first class airport for passengers, airlines and other users.

Figure 3.1: Our vision for an expanded Heathrow



To achieve this we will deliver:

- A rationalised airfield delivering a safe, efficient and resilient operation
- A redesigned airspace that eliminates routine aircraft stacking and provides real opportunities to minimise the impact of aircraft noise on local communities
- A single integrated airport campus where passenger movement is intuitive, rapid and seamless
- A transfer product for passengers and their bags that rivals the best in the world
- An integrated public transport hub with seamless connections between bus, coach, rail, tube and aircraft
- A high value commercial development zone with hotels, conference centre and office suites
- An enlarged cargo facility that is well connected to the heart of the airport and the motorway network
- A local plan that combines newly accessible green space with necessary river diversions and natural flood protection to produce a sustainable legacy resource for local communities.

3.1 Our vision for a world-class hub airport

3.1.1.2 Characteristics of a competitive hub

A competitive hub has distinctive characteristics that need to be incorporated into the airport design.

Like all airports, it must be safe. Given the high demands on airspace and airfield by a wide range of large jet aircraft, the safety case must be beyond doubt, without compromising on operational capacity.

For passengers and airlines the terminal facilities, stands and ancillary airfield facilities must be modern and built to handle large volumes. The layout of the airfield and airport facilities should be simple, maximising both capacity and passenger experience.

The end-to-end passenger experience must be a good one, both for people travelling to or from the UK and for those transferring in London. Otherwise, passengers will choose to fly elsewhere. As a hub, minimum connection times need to be short for passengers, of course, but importantly for bags and freight too. For those passengers not transferring between flights, taking only a few minutes to connect from surface transport to the terminal door is equally important.

Unlike some point-to-point airports, a hub must also provide a wide range of aircraft stands. Heathrow will need to be able to flexibly handle future generations of wide body and narrow body planes. Resilience is also critical for a competitive hub. Only a very resilient airport can provide the efficient, punctual operation required by a complex network.

A hub therefore needs a diverse airfield layout, multiple taxiways, and key facilities such as de-icing or maintenance capabilities. An integrated operation, with consistent processes and linked systems across the airfield, is increasingly important for a successful hub. For example, locating an airline's or an airline alliance's operations together delivers faster, more reliable connections.

Also unlike many point-to-point airports, long-haul network airlines require significant commercial facilities at a hub. Critical to this are large-scale air cargo operations. Increasingly around the world, hubs are seeing the development of 'airport cities' with hotels, convention centres, offices and other commercial developments near to the runways.

Above all, a competitive hub must be designed to be flexible to accommodate future shifts in demand given that airlines may grow, shrink, change their fleets or enter new partnerships. Simplicity is key to this flexibility. Complex infrastructure to support a hub operation is expensive to deliver and hard to rebuild. Airline demand in a simply laid out, integrated airport can be reallocated to adjust to future changes more easily than changing infrastructure.

3.1.1.3 Building on our world-class facilities

Not having to build a hub airport from scratch is a strength of Heathrow's scheme. Instead, we start with one of the world's most successful airports, particularly given its transformation over the last ten years during which we have spent £11 billion in upgrading our facilities¹. Terminal 5 has been voted the world's best terminal by passengers for three years in a row. Terminals 3 and 4 have been extensively refurbished. Passengers have noticed this, as over three quarters now rate their Heathrow experience as either 'Very good' or 'Excellent'². Terminal 1 will close in the next two years and in June 2014 our brand new £2.5 billion Terminal 2 will open. This new terminal aims to improve on the Terminal 5 passenger experience. The extensive investment at Heathrow provides a strong foundation for building additional aviation capacity for the UK.

Many of the facilities that support the hub operation are less visible to the travelling public. We have installed some of the world's most sophisticated automated baggage systems in Terminal 5 and are expanding them to Terminal 3. Baggage tunnels now connect the western campus. As the baggage network expands, it is increasingly possible to deliver bags automatically to aircraft stands across the airport.

As a result of these and other improvements, connection times and baggage reliability have become amongst the best in Europe. The new control tower oversees an efficient operation using many of the world's most sophisticated airfield management process and systems. Heathrow already has more than 150 aircraft stands in a wide range of configurations designed to handle the complex fleets of network airlines.

Our cargo area handles more air freight than all other UK airports combined. Cargo and other airline operations are supported by a cluster of aviation businesses, both on the airport or adjacent to it, from freight forwarders to specialist suppliers. Heathrow also has two major maintenance bases, representing technical capabilities found in few other places in Europe.

3.1 Our vision for a world-class hub airport

A core principle of Heathrow's transformation over the last 10 years has been to simplify the airfield and terminals. Doing so reduces airfield delays, increases resilience and creates an airport that is more navigable and understandable for passengers. This is achieved through a 'toast rack' configuration of a few main terminals, with satellites aligned north-south along the main spine of the airport between the runways.

Our masterplan deliberately builds on Heathrow's existing facilities. The plan completes the creation of modern terminals laid out in a 'toast rack' formation along the east-west spine as the core of the airfield layout. Existing baggage, airfield and surface transport links will be fully used through to 2050. Maintenance and cargo areas are developed facilities already at Heathrow. The fully independent operation of the two existing runways is preserved, maximising the capacity increase provided by a new runway.

Figure 3.2: Terminal 5



Figure 3.3: Terminal 2



3.3.1.4 Designing for passengers

Passengers are at the centre of our masterplan design for our international hub that will serve diverse passengers who come from many countries and cultures. Large numbers travel on business, yet many are visiting family or friends or travelling to long-haul destinations often only served via a hub.

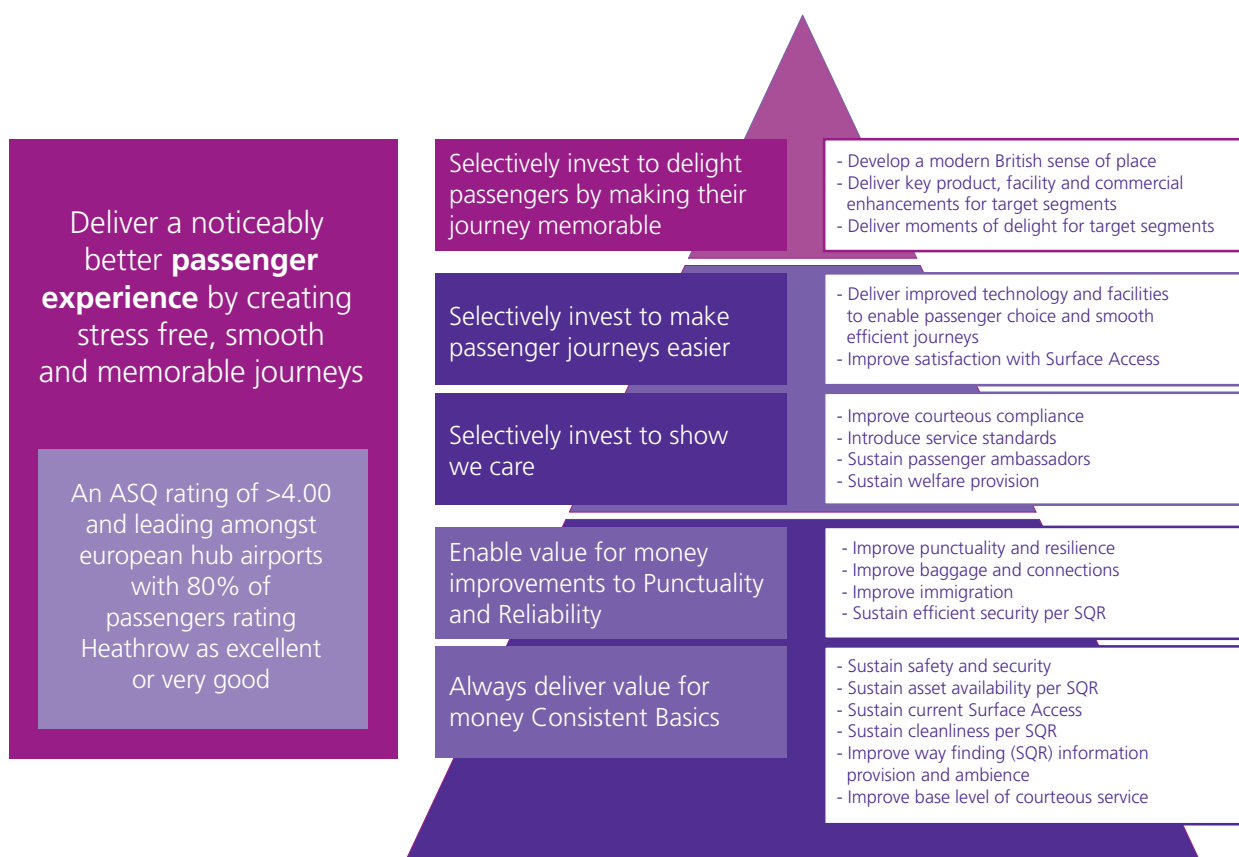
Heathrow undertakes regular, extensive research into passenger satisfaction and compares findings to other international airports. We seek out best practice in global aviation, as well as in other industries.

Based on this we know that passengers' core needs are remarkably consistent, despite their diversity. These 'basics' account for 80% of what a passenger seeks in an airport. They need to feel safe. Their journey must be reliable. They wish to avoid excessive queues, whether at check-in, security, immigration or when waiting for a bus or train. Facilities must be clean and functioning. An airport is often a confusing place, so navigating easily into, out of and around the airport is important.

Over and above the basics, the best airports offer more – a sense of care and ease. This includes additional services and courteous people to help with the journey. First class retail offers are also increasingly expected. Technology lets the passenger choose how and when to complete airport processes and automation helps speed them through. There are staff to help if things go wrong with travel. Above and beyond this, passengers seek a sense of delight in the airport experience. A global hub in London has the opportunity to provide a sense of the UK's global city to travellers by showcasing all that we have to offer.

3.1 Our vision for a world-class hub airport

Figure 3.4: Passenger service pyramid



Some of the more nuanced aspects of passenger experience are hard to define at the level of a masterplan for an airport that will not be constructed until the 2020s. However, delivering brilliant basics are embedded within our scheme design. Furthermore, Heathrow has developed a strong track record of improving passenger service. In the last ten years, the number of passengers rating their Heathrow experience as ‘Good’ or ‘Excellent’ has increased from under half to over three quarters .

Heathrow has therefore moved from the bottom to near the top of major European airport rankings in terms of passenger satisfaction². This has been largely driven by infrastructure investment, information technology and continuous improvements in service and airport operations, from cleaning to wayfinding information.

We are increasingly delivering world-beating passenger products. In addition to the ‘World’s best terminal’³, Heathrow has been awarded the ‘World’s best retail offer’ for five years running⁴. Our airport contains two award-winning premium lounges and the only two Michelin-starred chef airport restaurants in the world. ‘Ready to Fly’ and positive boarding are world first technologies that have improved punctuality for all passengers.

Heathrow leads the world in adopting automated check-in and common check-in across airlines. We are proud of our world firsts in the use of biometrics for immigration, boarding and security that help to speed passengers on their way. With the best free Wi-Fi offer in Europe, the most downloaded airport app and the largest online following of any airport worldwide, we are already deeply engaged with the networked, digital consumer.

Skytrax now positions Heathrow in the top ten global airports, based on the world’s largest passenger feedback survey. With a transformed and expanded Heathrow, it is our ambition to become a world-class hub airport.

3.1 Our vision for a world-class hub airport

3.3.1.5 Meeting airlines' needs

A competitive hub masterplan must provide an operationally and commercially attractive airport for airlines. Passengers are only served if the airport is designed to support airlines flying from it. Similarly, the economic benefits of connectivity are only delivered for the UK if the needs of airlines are met.

Resilient, reliable capacity is an important basic need, as is being able to fuel, service and load and unload planes efficiently and flexibly. Airlines seek to avoid long or overly complex taxiing on the ground and having to cross live runways. For long-haul network carriers, access to cargo facilities is critical. Airlines also need a large local destination catchment area.

At a hub, airlines also rely upon transfer passengers. The ability to fly flexible waves throughout the day, with a swing in arrivals or departure rates if possible, enhances transfer economics. So too does having a consolidated operation, ideally next to alliance partners at the airport. A consolidated operation reduces airlines' operating costs. Airlines also need an airport layout that is as flexible as possible to allow for future changes in their business models.

We have worked closely and in consultation with our airline partners throughout the last few years to understand their requirements for a better two-runway airport and an expanded Heathrow. This has encompassed the four stages set out below in the process of planning for the future, which have informed our proposal. We will continue this detailed engagement process as we further develop our current masterplan.



Our previous third runway design process

We undertook extensive work to implement the policy for a new runway set out in the Air Transport White Paper 2003. As part of this process a series of workshops and briefing sessions was used to compile a vision and intents statement defining what a future airport masterplan should deliver and how it should perform. This vision, supported by a detailed requirements document, shaped our original third runway proposal within the boundaries set by the government policy statement and the white paper that existed at the time.

Examples of the requirements to support airline business success included:

- Facilitating airline alliance co-location within terminals and campuses to optimise passenger transfers and enable efficiencies through facility sharing
- Targets of 45 and 60 minutes for intra- and inter-terminal minimum connection times respectively
- Target of 20 minutes from arriving aircraft chocks-on to the first bag being delivered to the baggage hall
- Maximising the commercial development potential of the airport to support lower aeronautical charges
- Minimum connection times from the cargo hub to the primary road network.

3.1 Our vision for a world-class hub airport

This proposal was halted by government policy reversal in 2010, but the increase in understanding of hub airport needs remains valid. The central tenets of the briefing document that was produced and the engagement with the airlines through a series of managed gateway events were carried forward into a process for developing a 'better not bigger' two-runway plan for Heathrow. We have drawn on many of the requirements of the briefing document to shape our current third runway proposals.

A two-runway masterplan

In late 2010 work started on preparing a two-runway masterplan, and concluded in June 2012. Many of the same principles were carried forward from the third runway consultation work, for example co-location of alliances or a preference for a masterplan with fewer bigger terminals. A similar process of engagement via managed gateways was used to arrive at an agreed solution for a two-runway airport that had airline support. The plan was subsequently refreshed in 2013 to respond to airline business change, principally the acquisition of bmi by British Airways.

The Q6 definition process

Since June 2011 we have been consulting with our airlines to maximise the opportunity presented by the sixth quinquennial (Q6) regulatory review to improve passenger experience. The Heathrow Airport community has followed a process of Constructive Engagement (CE), intended to inform the Civil Aviation Authority's (CAA) thinking on the Q6 settlement. This process followed the direction set out within the CAA's Mandate for CE, and concluded in December 2012.

We have drawn extensively on the debate with our airline community in developing the Full Business Plan for Q6.¹ Our business plan has passenger interests as its primary objective – an objective that is enshrined in the regulatory regime and is also consistent with Heathrow's management philosophy and commercial interests.

Early work to support the Airports Commission process

Our early work to support the Airports Commission process leading up to July 2013 was necessarily wide-ranging in the options that we considered for capacity at Heathrow. Given the relatively short time period between the Commission's call for evidence in February 2013 and the submission date of 19th July 2013, there was limited opportunity to enter into a detailed consultation process. However, the principles captured in the previous third runway definition process, the modifications suggested in the two-runway process, and the greater insights into airline business models afforded by the Q6 Business Plan definition process all helped to shape our thinking in responding to the Airports Commission. The feedback we received from airlines on the proposals presented has further refined our scheme.

3.2 Planning for growth

Heathrow’s masterplan can deliver the necessary hub capacity going forward to at least the 2040s. Our growth forecasts are aligned with the Airports Commission’s Interim Report. They form the basis for our design and inform our delivery plan.

3.2.1 Planning for growth

3.2.1.1 Heathrow’s econometric model

We have developed an econometric model to forecast long-term passenger demand. This model forecasts change in demand as a result of changes in income (GDP and consumer expenditure) and changes in fares (driven by oil price, taxes, charges and efficiency gains). It explicitly takes into account the extent to which Heathrow is at capacity through demand elasticities. It is therefore capable of forecasting passenger demand in both the current constrained scenario and if additional capacity were created by a third runway.

The econometric model uses the following independent sources for forecasts for the input variables:

- GDP / Consumer expenditure – Consensus Economics⁵
- Oil Price – US Energy Information Administration Annual Energy Outlook⁶
- Airline passenger duty – HMRC⁷
- Efficiency gains – DfT⁸

To account for uncertainty, a ‘Monte Carlo’ method is used by which input variables are ranged using a truncated normal distribution to produce a ranged forecast output. This model is also used for our long-term business planning, including our regulatory settlement process with the CAA.

3.2.1.2 Long-term traffic forecast

The long-term traffic forecasts for the current constrained two runway (constrained) scenario and the proposed three runway scenario (unconstrained) are presented in Figure 3.5.

Figure 3.5: Long-term traffic forecast for baseline and expansion scenarios

Year	Constrained Passenger Forecast	3 runway Passenger Forecast
2015	72.8	72.8
2020	75.9	75.9
2025	79.5	82.6
2030	82.5	103.6
2035	84.9	117.6
2040	86.8	130.3
2045	88.5	132.7
2050	89.9	134.6

Figure 3.6 illustrates this forecast traffic growth over the next 25 years in comparison to the unconstrained growth forecast supplied by the Airports Commission⁹. The blue line shows how we predict that passenger demand will move from a constrained growth path towards this unconstrained growth path. Our modelling arrives at a very similar mid-2030s demand level to the Interim Report.

In practice, these assumptions on growth represent a central case. The actual path is dependent on many factors, one of which will be the strategy for releasing airport capacity. This will be determined through working in conjunction with ACL, NATS and the airlines. For example, we may choose to release additional slot capacity at a

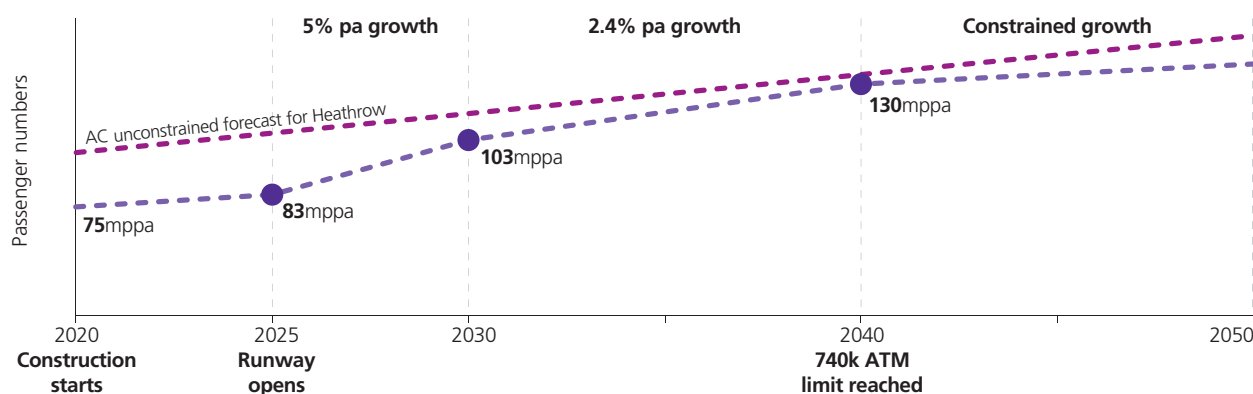
3.2 Planning for growth

steady rate over time rather than making all the theoretical capacity available on day one. Alternatively, a faster rate of release may drive faster growth depending on airline economics.

Environmental factors and the planning application process are also likely to play a significant part in defining how slot growth is released. This could be through potential environmental impact limits, which would have to be adhered to when determining how aircraft movements would grow over time.

There is risk in both directions on the growth path assumptions. The central case has been used to develop the strategic test schedules by which airport facilities have been sized. It has been used for the environmental impact assessments. A first operation date for the third runway of 2025 has been assumed. 2030 and 2040 have been selected as design years to represent an early phase operation and a mature operation respectively. Test schedules have been developed for these years.

Figure 3.6: Central case assumptions on passenger growth at Heathrow with a third runway



3.2.1.3 Two-runway/three-runway strategic test schedules

Example schedules for a busy day's flights allow us to test a masterplan for actual operating capacity. Test schedules for this purpose are far more precise than annual aggregate passenger numbers. Heathrow has developed baseline two-runway strategic test 'busy day' schedules for 2025, 2030 and 2040. For our expanded masterplan, we have developed two, three-runway 'busy day' scenario schedules: a 2030 schedule equivalent to 570,000 annual movements and a 2040 740,000 annual movement schedule.

The schedules are based on a Friday in July to test the most extreme case, therefore using the summer schedule as a base. In the case of the three-runway schedules, additional arrival-departure flight pairs are added according to the market growth rates from the econometric model. This is necessarily a simplifying assumption. While accurate for testing capacity, it will not necessarily predict the actual mix of destinations or aircraft on a given day in 2030 or 2040.

Base passenger numbers are assigned to each flight by applying load factors from given hours and arrival/departures splits using average historic load factors. Market growth rates from the econometric model are applied to the base passengers to produce a flight level passenger demand for each schedule. Aircraft type changes are carried out on the basis of fleet plans supplied by carriers or known aircraft orders, and, where appropriate, if forecast demand exceeds capacity. The flight level passenger forecast is then calculated using 95th percentile load factors on an hourly, market and arrival/departure basis. We have used this methodology at Heathrow for defining capacity for the last three years.

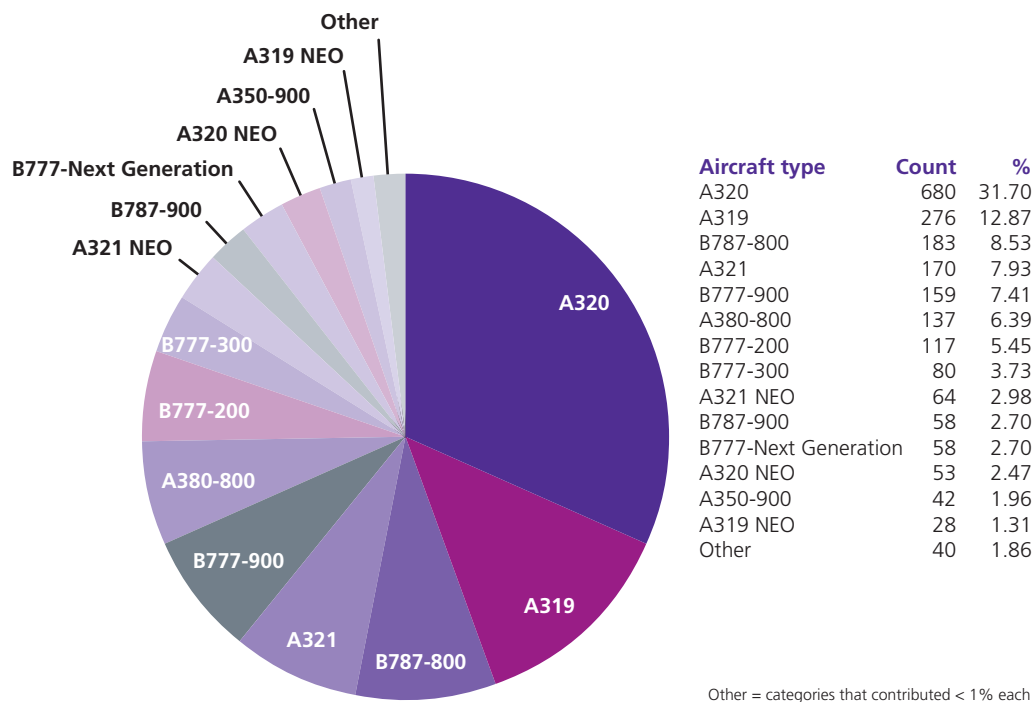
3.2 Planning for growth

3.2.1.4 Detailed fleet assumptions

The type of aircraft flown is an important factor in understanding capacity. This is especially true for estimating stand capacity, where the size of aircraft will dictate the gauge of stand required. Heathrow is committed to encouraging our airline partners to use the latest and quietest aircraft. Currently more than 98% of aircraft are operating to the latest, quietest standard – ICAO Chapter 4. We believe Heathrow can continue to attract the most modern and quietest aircraft.

We have therefore adopted an approach for the future fleet that illustrates this advance in technology. Our categorisation of aircraft is based on the terminology used by Sustainable Aviation – current, imminent (also referred to as next generation or generation 1) and future generation (or also referred to as generation 2). Aircraft are also grouped by stand size from the smallest in use at Heathrow, Code C, to the largest, Code F.

Figure 3.7: Assumptions on future aircraft fleet mix¹⁰



In 2030 we believe that around 85-90% of operating aircraft will be next generation aircraft types – for example, the A320 NEO and the A350. There will still be approximately 10% of the current aircraft types – for example, the current A320 family. There will be no future generation aircraft operating by 2030. We believe that future generation aircraft technology will start operating in around 2035 and account for approximately 20% of operating aircraft in 2040.

Our approach is marginally more optimistic than the latest DfT 2030 forecast for a two-runway Heathrow. These amendments have been made to reflect what airlines have told us about their orders for aircraft and their future fleet plans. For example, the DfT forecasts that approximately 80% of the A320 (single aisle, short-haul) would be next generation. We have assumed around 85-90% of these aircraft would be next generation in 2030. We have applied similar assumptions to our two-runway 2030 forecast as to our three-runway forecast.

3.2.1.5 Modelling capacity with schedules

Once busy day schedules are defined, the next step is to test the capacity of key airport assets, such as stands, terminals and roads. We again test the extreme case by defining a peak hour in the test day. The peak hour schedules have been reviewed by ACL and checked against the proposed runway scheduling limits for the three-runway operation. They have been smoothed where necessary to optimise the runway throughput.

3.2 Planning for growth

Runway capacity for flights is a key assumption. This is defined as the 'scheduling limit'. The proposed three-runway operation is to use one runway solely for departures, one for landings and one for a mix of both. The proposed total peak hourly annual movement rate is 128 aircraft per hour, comprising 42 departure runway movements, 38 landing runway movements and 48 mixed mode runway movements (with a maximum of 28 departures or 28 landings). The runway scheduling limits have been reduced from today in order to build in additional resilience.

Factors for the allocation of flights to the terminals and aprons include:

- Seeking to co-locate airlines or alliances
- Balancing the terminal and apron occupancy so that both are fully used.

The output from this analysis is a peak hour demand for two parameters – stand frontage in metres and passenger flow in 1,000s per hour. A number of occupancy iterations are then explored. It should be noted that this schedule is one view of the world produced for 25 years' time and there are many other ways that it could be formed, as well as allocated. The purpose of producing the schedule is to gain a broad understanding of how a representative traffic pattern for a three-runway airport might operate.

The terminal allocation in the test schedule has also been used to assess the surface access flows to the airport. We assume that origin destination passengers – i.e. passengers starting or ending their journey at Heathrow – represent an average of 65% of total passengers, and that transfer passengers represent an average of 35%. We also assume a public transport mode share in excess of 50%. The rationale for this assumption is explained in more detail in Part 4.

3.2.1.6 Freight forecasting assumptions

Heathrow is the UK's largest cargo airport. Over the last ten years cargo has grown slightly faster than passenger numbers – by about 0.2% pa. The vast majority of cargo is carried in the belly hold of passenger flights. Generally larger planes and long distance flights carry both more passengers and more cargo. The growth in cargo is thus partly driven by the shift toward long-haul, larger aircraft. We expect this trend to continue.

From a base of 69.4 million passengers in 2011, under Heathrow expansion we forecast passenger growth of 49% to 2030, and 88% to 2040. Allowing for the continued trend in intensification of cargo, we forecast a 55% growth to 2030, and a 99% growth to 2040.

3.2.1.7 Staff forecasting assumptions

Increased employment is critical for economic growth. We have undertaken analysis to assess the impact that expanding Heathrow will have on jobs generated by the airport itself – including security and ground handling staff, for example. Expansion of Heathrow would result in an increase in direct jobs by 3,400 in 2025, 17,900 in 2030 and 35,600 by 2040. These estimates are based on passengers and ATM forecasts, and include assumptions on economies of scale and productivity improvements. Additional details can be found in Part 1.

3.3 How our scheme has changed

3.3.1 How our scheme has changed

3.3.3.1 Our refreshed plan (May 2014)

Our refreshed plan has moved on from the July 2013 proposal but is also a radically different design from the proposals in 2007-9 (see Figures 3.8 and 3.9). The new design responds to feedback from stakeholder consultation of all kinds to improve our plan in all areas. Our design approach has avoided some of the impacts of the previous scheme altogether and minimised many others.

Figure 3.8: Our refreshed plan



Better for communities

- 1 Runway located further west to reduce noise
- 2 Runway length allows for periods of relief from noise
- 3 Aircraft touch down further along runways to reduce noise
- 4 New green spaces and flood protection for communities
- 5 More generous compensation for home owners
- 6 Better noise insulation schemes – £250m allocated
- 7 Steeper landing flight paths to reduce noise

Better for passengers

- 8 Two main passenger terminal and public transport areas
- 9 M25 redeveloped to improve traffic flow
- 10 Underground passenger transit makes for easy transfers
- 11 Western Rail link
- 12 Fast connection to HS2

Better for business

- 13 Doubling the capacity of freight facilities
- 2 Full length runway allows every aircraft type to take off
- 2 Total capacity for more flights than previous proposal
- 14 New space for commercial development

3.3 How our scheme has changed

Figure 3.9 compares the key metrics between our refreshed plan, our previous July 2013 submission and our 2007¹¹ third runway proposal. Not only is our refreshed plan a considerable step forward from our July 2013 plan, it is clearly a radically better proposal than the 2007 plan.

The 2007 plan was for a compromised length runway. This would have had significant impacts on the economic benefit to the UK (it was much less than for our current proposal) principally because of the poor connectivity delivered by the runway. It would have had significant impacts on the local communities too, since the new runway had to be operated constantly in simultaneous arrival and departure mode. This meant that periods of noise relief would not have been available for those living under the flight path to the new runway.

Our refreshed plan will deliver the connections to emerging markets that the UK requires and increased financial benefits to the UK economy. It will do this with less noise impact, less impact on the motorway network, less airport related traffic on the roads, less impact on the most important heritage buildings and with less than 50 additional residential properties affected than the 2007 proposal.

Figure 3.9: Comparison metrics for our refreshed scheme

	2007 Third Runway	July 2013 Submission	May 2014 Refreshed plan
Runway length	2,200m	3,500m	3,500m
Able to take all known aircraft	B767/A320 size only	Yes	Yes
Annual aircraft movements	702,000	740,000	740,000
Annual passenger throughput	122 million	130 million	130 million
Destinations reachable	Europe & Near East only	All destinations	All destinations
UK economic benefit	£5bn	£40 - 100bn	£40 - 100bn
Noise relief periods supported	No	Yes	Yes
People most exposed to noise	15% less than today	15% less than today	30-35% less than today
Single airfield / airport campus	No	Potentially	Yes
Public transport mode share	39 - 42%	>50%	>50%
Airport related cars on road	More than today	Same as today in 2030	Same as today in 2040
Residential properties lost	>700	950	747
Grade I & II* listed buildings impacted	1	2	0
Local green space	Less than today	Not defined	Enhanced
Land needed for expansion	330ha	520ha	460ha
Length of motorway affected	3.5km	7km	1.2km

3.3 How our scheme has changed

Figure 3.10: Our July 2013 submission to the Airports Commission

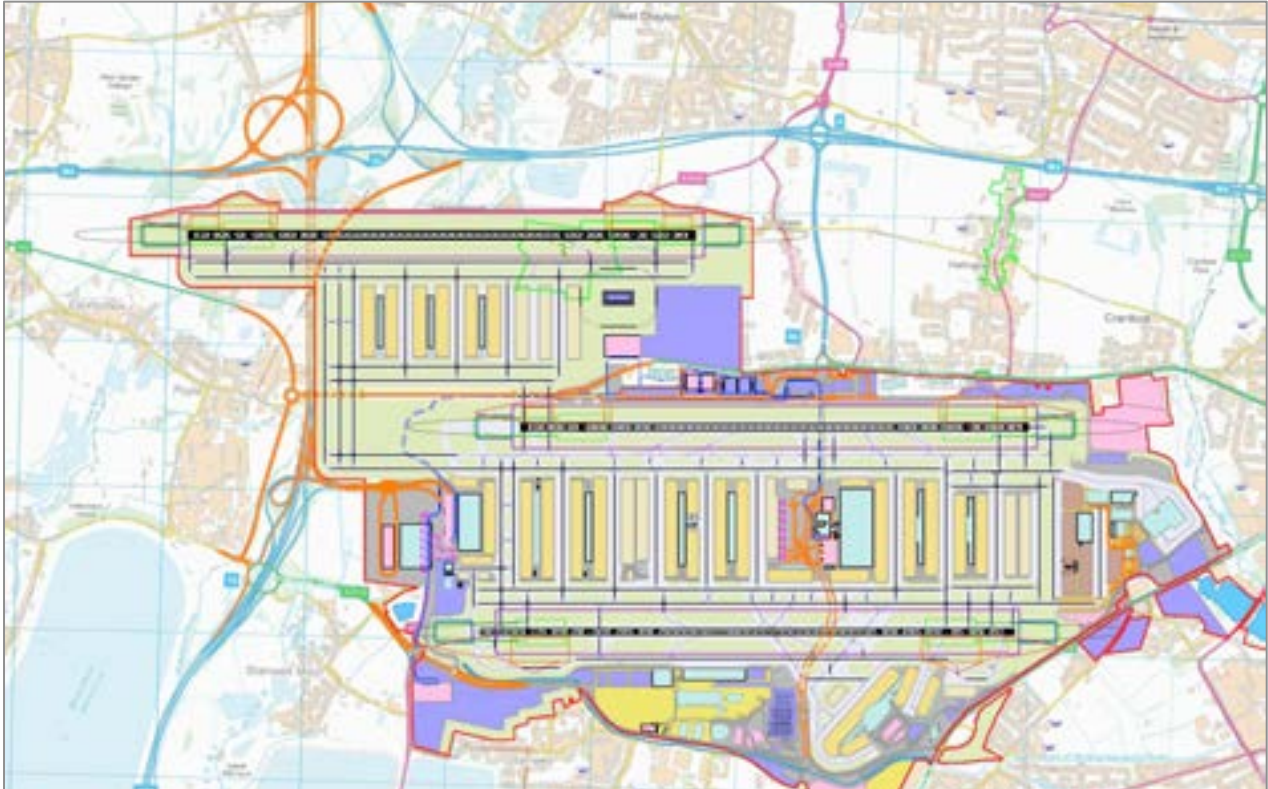
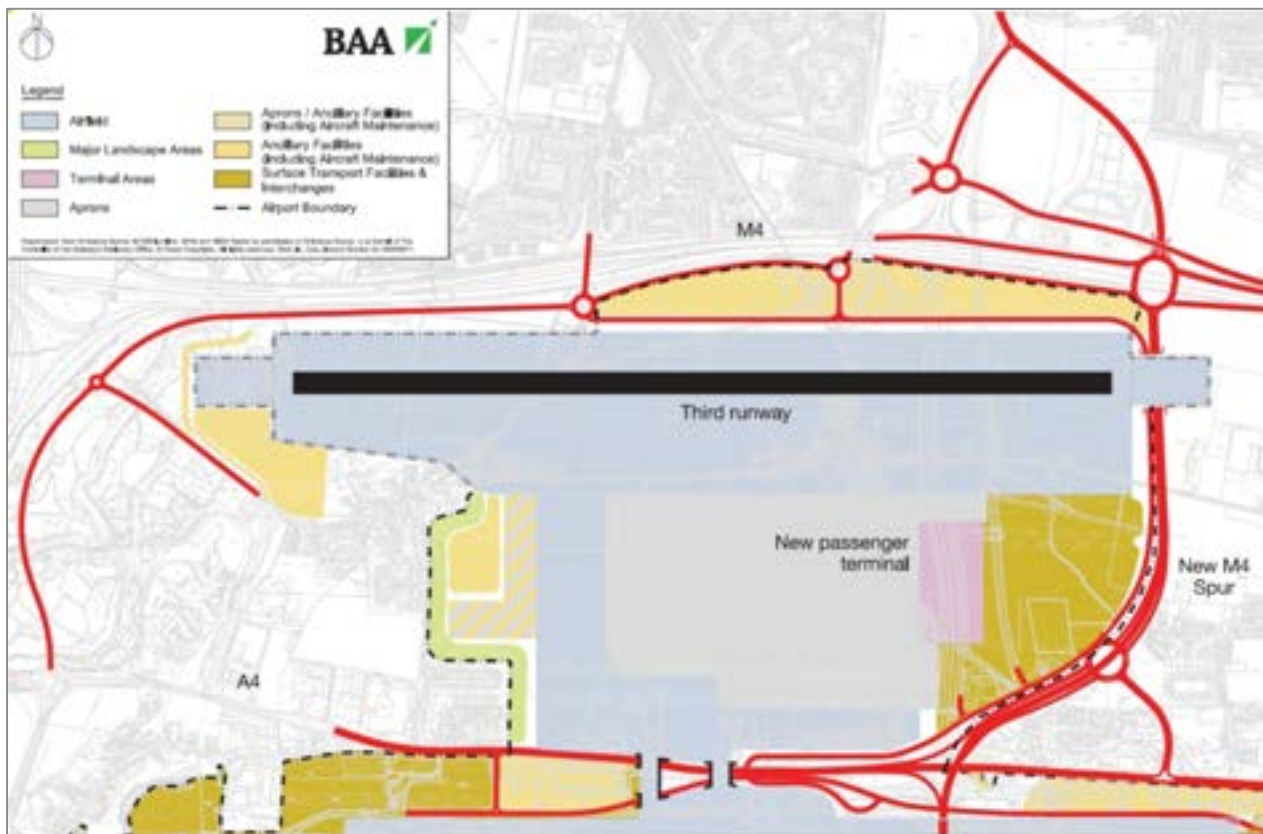


Figure 3.11: Our 2007 plan for a third runway



3.3 How our scheme has changed

3.3.2 Refreshing our plans based on stakeholder feedback

In Part 2 we discussed how we have engaged with stakeholders, particularly the local community, but also the airlines and key statutory stakeholders. This engagement has led us to develop and improve our plan since our submission in July 2013. We believe that these changes have helped to shape a plan that is more responsive to all our stakeholders' needs.

3.3.2.1 Responding to the needs of our local communities

Our plan addresses the priorities of local people – and improves on them:

- People believe that it is important for us to be able to continue to deliver significant periods of relief from aircraft noise for all communities through placement of the third runway. They prefer this to a placement that minimises the number of new people having aircraft flying over them
 - Noise from aircraft is the biggest concern of local residents and minimising this as far as possible when developing our plan is most important to them
 - People are also concerned about aircraft safety risk increasing, with an increasing number of planes serving Heathrow
 - They value local jobs and the employment that comes from the airport and also recognise the wider national economic benefits resulting from increased connectivity
 - People are concerned about road traffic congestion around the airport caused by increased numbers of car and HGV movements.

We have changed our plan to respond to each of these factors:

Responding to consultation feedback on noise relief periods

We discuss in the airspace section how our guiding principle in siting a third runway has been the need to continue to deliver significant periods of noise relief to all local communities – in particular those communities most affected by noise (i.e. within five miles of the ends of the runways and under the arrivals flight paths). We deliberately rejected, earlier in this process, those options that could not deliver this. These included extensions to one or both of our existing runways.

Responding to concerns about the impact of aircraft noise

The general placement of the runway in the north-west quadrant delivers relief periods from aircraft over flight. We have considered how to further minimise the impacts of noise when looking at the precise location of the runway for the refreshed plan.

Providing the new runway is at least 1035 metres north of the existing northern runway, ICAO rules allow independent arrival and departure movements on adjacent runways¹². In other words, an aircraft may land on one at the same time as an aircraft is taking off on the other. This independence preserves our ability to deliver runway alternation. We have therefore investigated various options for the runway placement with this as a constraining factor. We have picked what we consider to be the best answer given the result of the local consultation – i.e. we have sought to minimise the number of people affected by aircraft noise.

To do this we have moved the new runway 300 metres further south. This places more of the flight paths to the new runway over the M4 corridor. This removes 12,000 people from the area most significantly affected by aircraft noise (the 57 dB L_{eq} contour) compared to our July 2013 proposal. It reduces the number of people in this contour in 2030 by up to 35% when compared to today.

The number of people in the 69-72 dB L_{eq} contour is increased by this move from 400 to 1,100. This has been considered justifiable given the benefit to many more people in the 57 dB contour. In practice, although the details of any noise compensation and mitigation scheme are still to be consulted upon, we would fund sound insulation for all homes in the 69-72 dB contour and support any resident who wanted to move away with a relocation assistance package.

3.3 How our scheme has changed

Responding to aircraft safety risk concerns

Our refreshed plan proposes the use of inset runway thresholds on all three runways, existing as well as new. These will be inset by 700 metres, so aircraft will now be landing 700 metres further inside the airport boundary than they do today.

There are two risk areas used by the DfT in defining aircraft incident risk in relation to runway design – the Public Safety Zones (PSZs) and the high risk contour area. These define the level of individual third party risk of being killed as a result of an aircraft accident within the zone as 1 in 10,000 per year (10^{-4}) for the high risk areas or 1 in 100,000 (10^{-5}) for the PSZs.

The effect of inseting the thresholds is to shrink the extent of the 10^{-5} PSZs on the current runways significantly, bringing marked improvements in the number of residential properties within them. Figure 3.12 demonstrates this principle of how this change applies in practice.

Figure 3.12: Example of change to 10^{-5} public safety zones (PSZs)



The thin outline is the current 10^{-5} PSZ and the shaded blue triangle is the new 10^{-5} PSZ with the inset thresholds. We detail later in this section the overall PSZ changes and the relative number of properties involved. However, based on current information from NATS, we expect there to be fewer people living in the 10^{-5} PSZs with three runways than there are today. This will be a significant contribution to reducing public risk.

We are committed to working with local authorities to look at potential beneficial changes of designation and use in the public safety zones beyond the airport boundary. Since many of the properties in these zones will also be in the 69-72 dB Leq noise contours, opportunities for this type of re-zoning may present themselves as our strategy for noise compensation becomes clear after our consultation this summer.

Inseting the thresholds also plays a key role as part of a group of measures to reduce the number people affected by aircraft noise, raising the height at which arriving aircraft pass over the most densely populated areas of West London and Windsor.

Responding to consultation feedback on local employment

We believe that delivering the potential for the greatest possible number of aircraft movements from a three-runway airport to maximise local employment and national economic benefits is also an important aim, as identified by the consultation response. We have ensured that our runway positioning allows the maximum throughput potential for a three-runway airport.

Responding to air quality and traffic congestion concerns

We have previously committed to a surface access strategy that was designed to ensure that there would be no more airport related cars on the road in 2030. Because of the importance of this issue to local people, we have now looked at how we can extend this commitment to 2040 when the full capacity added by the third runway will be in use. In Part 4 we detail how this can happen through the control of staff parking and the introduction of an airport congestion charge zone.

3.3 How our scheme has changed

Our access road strategy will reduce airport traffic on the M4 by building a southern road tunnel access to the East Terminal area (Terminal 2). This shifts the major access to the south side of the airport, relieving pressure on the M4.

Responding to concerns about the impact on local property

Figure 3.13 : New airport boundary relationship to Harmondsworth



Moving the runway south could help to potentially retain Harmondsworth's most significant heritage buildings – the Great Barn and St. Mary's church and cemetery – in situ, along with the buildings around the village green and on the High Street. Figure 3.13 illustrates the new airport boundary in relation to the historic centre of the village. 12 out of the 16 Grade II listed buildings in the village are now retained.

The new plan with our amended airport boundary enables us to preserve 200 more local homes than our previous proposal, mostly in the Harmondsworth area.

The detail of the impacts on Harmondsworth and the exact nature of the final location and use of the most valuable historic buildings are dealt with in more detail in the mitigation section of this report. All of the options would need to be the subject of detailed consultation with all stakeholders during a future Development Consent Order planning process.

Responding to quality of life concerns

We have understood that the quality of life for local residents is a major concern for them. We are looking at a range of interventions that Heathrow could instigate or support to bring benefit in this area. Access to green space is one of the key drivers of quality of life. As part of the changes to our plan, we are proposing new publicly accessible green space in the Colne Valley Park. This takes advantage of the changes necessary to divert the six rivers in this area and creates public recreation facilities in the newly landscaped areas.

3.3 How our scheme has changed

3.3.2.2 Responding to the needs of our passengers

Our long history of conducting passenger satisfaction surveys has given us a wealth of information on what passengers value. Seeing passenger satisfaction scores improve in response to our infrastructure improvements has given us insight into how best to deliver that and has informed changes in our plan in several areas:

- We have created a single Western terminal complex by building a new terminal building in close proximity to the existing Terminal 5. The two buildings will be linked via an expanded public transport interchange between the two terminals
- Passengers will have a simpler journey in and out of the airport with two main 'front doors' to choose from – one in the West and one in the East (Terminal 2)
- Once the plan is complete, more than 90% of our passengers will be travelling through modern terminal facilities that are less than 30 years old. In 2007, less than 20% were doing so
- We have incorporated aircraft stands on the new Terminal 6 building allowing short-haul flights to be very close to the main passenger processor and enabling very short passenger journeys from plane to train and vice versa
- We have adapted our airside passenger transfer system concept to deliver one single journey from any concourse on the airport to any other concourse on the airport. The solution will be delivered by an underground tracked transit system running across the whole airport.

Figure 3.14 Reservists and Passenger ambassadors



3.3 How our scheme has changed

3.3.2.3 Responding to the needs of our airlines

Our airlines tell us they want the following core principles from a hub airport:

- A resilient and reliable airfield operation that supports airline punctuality targets
- A flexible plan able to adapt to changes in airline business models e.g. airline fleets and airline products, airline alliance changes, joint venture arrangements
- Appropriate cargo facilities to support the airline economic model
- A plan that maximises additional sources of airport revenue by creating appropriate commercial development opportunities on airport land
- A plan that delivers a great transfer product for passengers
- The ability to house all airline alliance partners under one roof.

We have changed our plan to respond to this:

- The last two points above are identical to the passenger requirements for a hub airport. They are supported by our change to adopt the two large terminals concept and our improved transfer infrastructure proposals
- We have enabled a site for the development of high value commercial space to the west of the Western entrance to Heathrow. This recognises the need not just for revenue streams to support airport funding, but also the need to replace local office space that will be removed to facilitate the airport expansion
- We have shown additional space for development in the current cargo area, mainly through the removal of non-operational aircraft parking stands and rationalising available space. This will allow cargo throughput to be doubled.
- We have planned direct underground airside roads from the new apron areas to this expanded cargo facility to ensure that time sensitive cargo (which accounts for a large proportion of all our cargo) can be delivered as quickly as possible.

3.3.2.4 Responding to our statutory stakeholders

As set out in Part 2, we have consulted with statutory stakeholders about their views on our proposals. Preliminary feedback has been useful in shaping our refreshed plan, particularly around the motorway network and its interface with the airport, to offer the following improvements:

Avoiding the need to move the M25/M4 junction

As one of the busiest on the whole of the UK's motorway network, completely rebuilding this junction without causing extensive disruption would be challenging. It is also seen as a key piece of the Highways Agency infrastructure, designed to cope with traffic volumes into the foreseeable future. The refreshed scheme requires far more modest changes to lower the southern road approaches in order to meet the connection level to the tunnel below the runway

Refining the airport layout to minimise the impact on the M25

Although we cannot avoid having to tunnel the M25, we have designed a solution that minimises the impact as far as possible and creates the shortest tunnel length that we can. A system of collector/distributor roads separate through traffic on the M25 from traffic leaving or joining the motorway and coming into or out of the airport, into separate tunnels. This means that no weaving will take place in the tunnel section, increasing average speed and improving safety.

3.3 How our scheme has changed

Figure 3.15 Motorway impacts of our original scheme



Motorway impacts of the refreshed scheme



The tunnel created will be 600m long. This is the same length as the Holmesdale tunnel in the Hertfordshire section of the M25 and half the length of the Hatfield tunnel on the A1M. Initial design work suggests that the tunnel can be constructed off the current alignment of the M25 (see figure 3.16 below). This will allow the new section to be completed prior to closing the existing carriageway. This makes the proposals easier to construct, while maintaining traffic flow on the existing motorway. Only short tie-in sections would need to be built on the existing carriageway, which could be delivered through appropriate temporary traffic management. This will form part of the early work required to deliver the third runway, along with the crucial river diversions and flood defence measures.

3.3 How our scheme has changed

Figure 3.16: M25 tunnel section alignment



Enabling additional capacity on the M25

Our current masterplan allows for additional lanes to be provided on the M25, should this be required. In addition, the separation of through traffic by the use of collector/distributor roads will also have the effect of providing an increase in the effective capacity of the through section of the M25 due to the reduction of weaving and merging occurring in this area which is one of the busiest sections on the entire motorway network.

Our proposal would therefore permit an increase in the carrying capacity of this section of the motorway. We have adjusted the airport boundary inward to allow the collector distributor roads to be positioned alongside the main M25 through route. Our current assumption is that there would be at least three collector/distributor lanes and four through lanes in either direction between Junction 15 and Junction 14.

We have designed the motorway access from the M25 to the West terminal area (Terminals 5 and 6) to be simple and to reduce the impact of the number of junctions on the M25 on traffic flows. The solution proposed is a one-way system with traffic for the West terminal area, entering at an upgraded Junction 14 and joining using the existing on-slip at Junction 14A.

The A4 has been shown routed to the north rather than tunnelled under the airport. Where our previous scheme showed the alignment of the A4 largely retained and placed in a short tunnel beneath the taxiway crossings, this solution is no longer practical with the runway moved further south. To avoid a very long section of tunnel (around 1.5 miles) we have shown the A4 re-routed to the north of the airport, but have also avoided the local villages. The exact route would need to be the subject of detailed future consultation and further traffic analysis. The current route shown is therefore indicative, but in principle we have sought to provide a like-for-like replacement, ensuring that through-traffic would not make use of local roads. The alternative of tunnelling the A4 below the airport, while more costly and potentially less attractive, is still possible in engineering terms.

3.3 How our scheme has changed

3.3.3 A better plan

In shaping our refreshed plan for Heathrow expansion we have listened to our stakeholders and worked hard to ensure that every area of our new proposal will represent an improvement over our July 2013 submission to the Airports Commission.

We have sought to sensitively balance the needs of the UK in providing a world-class hub airport capable of truly competing with other global players to 2040 and beyond, with the needs of our local communities and stakeholders. We believe that our new proposal represents a good platform to retain, and in some areas enhance, the quality of life locally.

This is still an early stage in the scheme development process and there is more work to do in continuing to define the next levels of detail that would be required to support a Development Consent Order application process. We are committed to carrying out all the necessary early survey works in 2014 and 2015 that will be required to facilitate a meaningful start to this process.

This will ensure that, in the event that Heathrow is selected, we will have prepared the necessary work to submit an application as soon as possible after the Airports Commission report is published and the government has reached the appropriate point in the process of designating a National Aviation Policy Statement based on their findings.

The government's ability to act quickly in this regard will be critical to delivering aviation capacity expansion in a timely manner. However Heathrow is ready to play its part in supporting an ambitious yet credible schedule that would see development commence before 2020 and the new runway open in June 2025.

Continued consultation with all parties will be critical to produce a commercially successful, responsibly delivered and politically supportable scheme. We are committed to continuing this process that we have already begun.

Figure 3.17 A local public consultation event in 2014



3.4 Airfield

3.4.1 Our vision for the airport

3.4.1.1 A safe, resilient and efficient airfield operation

Putting safety first

Safety is always our foremost concern. We have long experience of running one of the world's safest airports and will continue to do so by ensuring our design for an expansion of Heathrow puts safety first.

Public fear about the risk from overhead aircraft was highlighted by the local consultation we conducted. However, flying is an extremely safe form of travel and the threat from aircraft overflight is largely a theoretical one.

Nevertheless, our design will prioritise taking every measure within our control to make the airport and surrounding areas as safe as possible. The following factors improve safety and reduce risk:

- **Insetting the runway thresholds reduces the number of homes in Public Safety Zones (PSZs)**

Insetting the thresholds moves the 10^{-5} contour which is used to determine the shape and size of PSZs in the UK. These are areas at either end of the runways of heightened risk of aircraft incident. Development is controlled in these areas to ensure that only appropriate uses are added in these areas. These zones stretch into residential areas around the airport. With a 700m inset the existing PSZs will shrink whilst the zones from the new runway will fall in largely uninhabited areas.

Figure 3.18: Future public safety zones at Heathrow



This means that fewer homes will be in these zones in the future than there are today. This represents a significant net improvement in public safety around the airport. We estimate the number of residential properties within the PSZ will reduce from 454 today to 178, a reduction of over 60%. This means there will be around 660 fewer people living in these areas with an expanded Heathrow.

3.4 Airfield

- **Reducing the number of communities overflown**

The flight path from the new north-west runway will, in those areas closest to the airport boundary, be largely over the M4 corridor. This reduces the number of people overflown and improves not just the number of people affected by noise, but also the theoretical aircraft safety risk.

- **Eliminating routine aircraft stacking**

This will cut the time aircraft spend flying over London dramatically compared to today, further reducing aircraft risk to populated areas.

Another important safety question is runway crossings. These are a normal part of everyday operations at the Heathrow, with around 17,000 per year in today's operation. But an operation with fewer crossings is always to be preferred to one with more. Our plans for expansion will include the need for fewer runway crossings than today, due to:

- **Taxiway changes**

We will realign a number of runway crossing points to reduce taxiing times. Crossings for all aircraft types, including the A380, will be introduced behind the displaced thresholds for the southern runway, reducing inefficiency. The central runway will have multiple exits to the south and the north – ensuring that vacating aircraft can access the correct aprons

- **Rotation of runway operating modes**

Wherever possible, departures from and arrivals to Terminal 4 will use the southernmost runway. This will be possible approximately half the time as the runway will be operating in a mixed mode operation (for both landings and departures), meaning no runway crossings will be necessary. When the runway is being used for landing aircraft, all departures from Terminal 4 will have to cross the runway. Similarly, when it is in use as a departure runway, all arriving aircraft will have to cross the southern runway to reach their stand. NATS is comfortable that these crossings can be conducted safely and without affecting the flow of the operation

- **Introduction of Around the End Taxiways (ATETs)**

ATETs have been introduced on the route to access the new runway and aprons in the north-west of the airport. This process avoids runway crossings on the central runway. Like at Atlanta airport, the route will be a high-energy ATET, where other planes are taking off toward or arriving over the top of the taxiing aircraft. In a similar way to Atlanta, some form of light-weight screen is likely to be used to ensure that pilots on the runway are aware that a taxiing aircraft is not a runway incursion

- **Introduction of aircraft de-icing pads**

These will be introduced at key locations, reducing the need to cross the runway to reach de-icing facilities in winter weather conditions.

The final safety concern we have considered is the risk of bird strike to aircraft. Our approach to bird hazard management in a future airport plan would remain the same as it is for today's airport, with the work scaled up to manage the additional land that would need to be monitored. Heathrow adheres to performance standards to ensure that all reasonable steps are taken to mitigate the risk that birds present to aircraft. Periodic audits by the Health Safety and Security Executive (HSSE), CAA, Food and Environment Research Authority (FERA) and Heathrow all verify that the performance standards are met. With a third runway, a formal study by ornithological consultants would need to be undertaken to understand the impact of land works on environment/habitat pertaining to birds. Our expectation is that bird activity with a three-runway Heathrow would be similar to that for a two-runway airport.

3.4 Airfield

A resilient and reliable airport

Heathrow today is close to its maximum capacity, with inevitable and well-known consequences for the resilience of the operation. A three-runway Heathrow will be a much more resilient airport, with far fewer days where operational disruption affects passengers. We will have a much greater ability to recover from any adverse events that do disrupt the operation and believe that the following features will contribute to a more resilient airport:

- **Introduction of an Enhanced Instrument Landing System (EILS) and a Ground Based Augmentation System (GBAS)**

From 2014-19, we will introduce these systems as part of our Airport Resilience Programme. Over the past 15 years Heathrow has experienced an average of 16 days per year with low-visibility operations. With the introduction of these new technologies – and the right level of aircraft equipment – Heathrow predicts it will eradicate effects to landing aids associated with low-visibility procedures by 2040

- **New rapid exit taxiways**

These will minimise runway occupancy times by ensuring aircraft vacate the runway as early as it is safe to do so. This protects runway capacity from the increasing numbers of very large aircraft (e.g. Airbus A380s) in use at Heathrow. This is critical in today's two-runway operation, and will continue to be so in the peak demand hours of an early-stage three-runway operation. These measures will be vital to preserving airport capacity as demand grows to near 2040 levels and beyond.

Ground movement simulation modelling has been undertaken by NATS to prove the taxiway design concept for our plan. They have tested the airport in both easterly and westerly operation. One challenging condition revealed by the tests is an easterly operation where the central runway is being used for departures, and aircraft are joining the hold area immediately to the north of Terminal 5. For this reason, the refreshed plan has introduced taxiways to the west side of the new West terminal complex (T5 and T6). This addition has two advantages – it avoids congestion at the point outlined above and it facilitates stands for short-haul aircraft directly on the new terminal building. This will add short-haul capacity where it is most useful and deliver very short aircraft-to-onward transport times for arriving passengers on short hop flights.

Figure 3.19: Example of ground interaction modelling output to determine taxiway flows



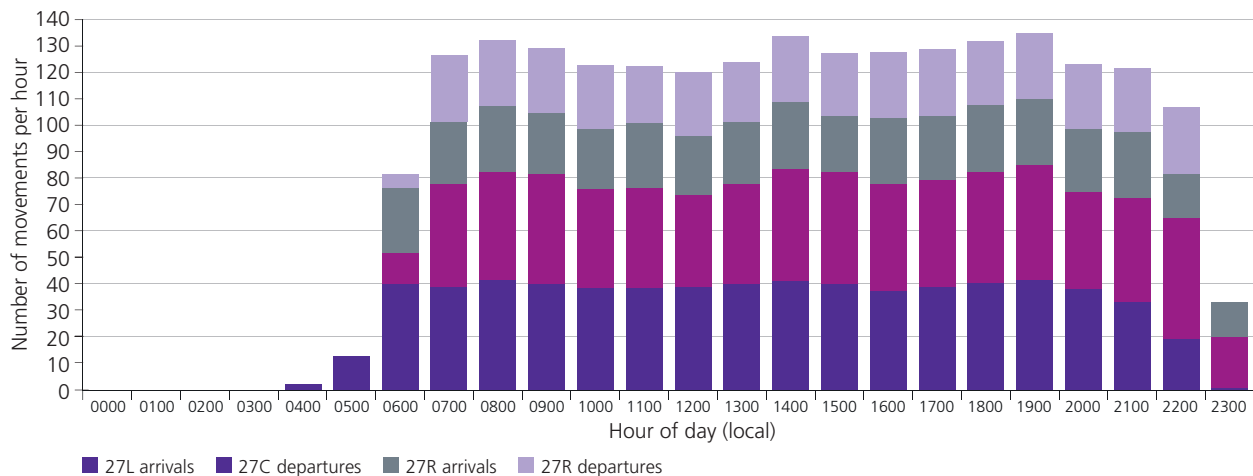
A further measure to introduced additional resilience is the reduction of runway scheduling limits. The proposed three-runway operation is to use one runway solely for departures, one for landings and one for a mix of departures and landings. The proposed total peak hourly annual movement rate is 128 aircraft – made up of 42

3.4 Airfield

departure runway movements, 38 landing runway movements and 48 departures/landing runway movements (with a maximum of 28 departures or 28 landings in any one hour). These rates compare to today's peak hourly rates of 46 departures and 44 landings.

The modelling has confirmed the achievable peak runway rates, as shown in figure 3.20 below. This demonstrates that our planning assumptions on runway rates are robust and that 740,000 movements per annum is achievable.

Figure 3.20: Modelling outputs confirming runway throughput by hour



The modelling provides early indications that taxi times will be broadly comparable to today. NATS have also investigated the level of runway delay which could occur during peak operations on the busiest day when the airport has reached its 740,000 ATM limit as being similar to today's operation although in the years before this limit is reached these levels will be considerably less.

In contingency periods of operational recovery, it may be possible to use all three runways simultaneously for arrivals or departures to relieve a back-log of aircraft either in the air or on the ground. Such procedures would need careful design of the safety case and contingency departure routes, but could add significantly to the airport's ability to recover from low-visibility procedures or unexpected events. This plan would allow us to remove a departure backlog – possibly caused by a temporary runway closure – quickly, or mitigate the effect of severe actual or forecast arrival delay.

In situations where a runway is not available for use, for example due to an emergency landing, a three-runway airport is inherently more resilient than Heathrow is today. For instance, with the loss of one runway, up to three quarters of the schedule can still be flown from the remaining two runways through the use of tactical mixed-mode operations.

3.4 Airfield

An efficient airport

The new runway is 3,500 metres long, which is sufficient for departing to our key markets all aircraft types both in use today and currently envisaged by aircraft manufacturers. The improvement in engine technology in recent years means that the distance required for take-off is less than ever before. For example, the new generation of Airbus A380 aircraft requires a shorter take-off distance than a Boeing 747 from the previous generation – even though it is a larger plane. The full-length runway makes the airport completely flexible in its operation. Our plan avoids placing constraints on the operation due to runway choices forced by a shorter runway.

By 2040 Heathrow will be the most efficient airport in the world. A land area of 1,650 hectares will support a throughput of 130 million passengers per year from 740,000 air traffic movements from its three runways. This is more flights than Paris Charles de Gaulle handles (514,000 flights¹³) from four runways set over 3,200 hectares¹⁴, and more than Frankfurt handles (487,000 flights¹³) from four runways set over 2,600 hectares¹⁵.

Congestion for arriving and departing aircraft on the ground will be eliminated, shortening passenger journey times. This will come from the combination of Airport Collaborative Decision Making (ACDM), the rationalised aprons and piers, through taxiways rather than cul-de-sacs (the 'toast rack') and the new taxiway design, which allows access to the third runway and its associated apron and piers. This plan will reduce aircraft emissions on the ground – improving local air quality and reducing airline fuel bills. This change will be important for all passengers, but will be critical for short-haul operations where the ground and air time at Heathrow can currently represent a disproportionately large part of the journey.

The new aircraft stands provided are predominantly Code F sized – as are the taxiways – to ensure future flexibility for airline fleets. Many of these stands will also be Multi Aircraft Ramp System (MARS) stands, which provide facilities that allow two Code C aircraft to park and be boarded within the same area as one Code F stand. Pier buildings will be designed to allow independent access to both aircraft on a MARS stand. This concept gives the greatest operational flexibility possible, and has already been delivered in the Terminal 2B pier and in Terminal 3, Pier 6.

Aircraft de-icing pads will be located at both ends of each runway, allowing efficient de-icing of aircraft within the critical time window before take-off. Using these pads, rather than the general aircraft stands, will assist with the recovery and recycling of the glycol used in de-icing. This saves money on de-icing fluid and reduces contaminated surface water run-off in winter months.



3.5 Airspace

3.5.1 Designing airspace for expansion

3.5.1.1 An opportunity to transform the airspace

The current route structure has been in place for over 50 years, with very few changes. When originally developed, the design was focused around reducing the population overflow within the constraints of the navigation and aircraft technology performance of the time. Now, better technology means that we can create and fly routes that will reduce noise impact on local communities. Expansion allows us to exploit these opportunities.

Heathrow has led the world in improving ways to ensure that aircraft follow the existing routes much more consistently. Modern aviation navigation technology uses GPS. This is very accurate and the results of various trials at Heathrow and other UK airports indicate a high degree of flight path consistency is achievable for well-designed routes. This consistency will lead to a greater degree of predictability about aircraft movement than we see today. There will be less spread on departing aircraft tracks and less random daily variation in flight paths. Trials indicate that a total spread of less than 300 metres in an aircraft track width is likely with GPS-based route design and navigation¹⁶.

The response to our consultation made it very clear that our local communities consider noise to be the most important consideration when designing the airport expansion. A third runway at Heathrow presents an opportunity to work further with our local communities and our industry partners to transform the airspace. This will maximise efficiency and resilience for airport users while minimising impacts on local people.

3.5.1.2 Runway operating procedures

The design of the airspace around Heathrow is as equally important to the future operation and efficiency of the airport as the design of the airfield. With the assistance of NATS Heathrow, we have designed solutions for the airspace for a third runway. However, our plan for the airspace design cannot be definitive at this stage. This is because the choices between the many possible ways of shaping aircraft routes must necessarily be the subject of extensive future consultation with all interested parties. Chief of these will be consultation with local communities affected by the flight paths chosen.

We have therefore selected three different policy objectives to shape three different approaches to route design. We detail these later. The impact of these approaches on the number of people affected by aircraft noise and the degree to which they are affected is discussed in Part 5.

At this stage of the scheme development process we have designed the airspace around a key operating principle for a three-runway system. This design conforms to ICAO and CAA¹² safety rules, and balances a high runway throughput with the continued ability to deliver alternation. The principle consists of the use of four separate operating modes used in a rotating pattern.

In order to balance the number of arriving aircraft with the number of departing aircraft in a three-runway airport, one runway must be dedicated to landing aircraft (L), one to departing aircraft (D) and the third must be used for both landing and departing aircraft simultaneously (DL). In effect, on the DL runway each departure movement is followed by a landing movement and then by another departure movement. By rotating these three uses around the three runways, we can establish four different operating modes. The diagram in Figure 3.21 shows how this works.

Figure 3.21: Rotating runway use to produce alternative operating modes

Assumption	Mode 1	Mode 2	Mode 3	Mode 4
Northern runway	DL	DL	L	D
Centre runway	L	D	D	L
Southern runway	D	L	DL	DL

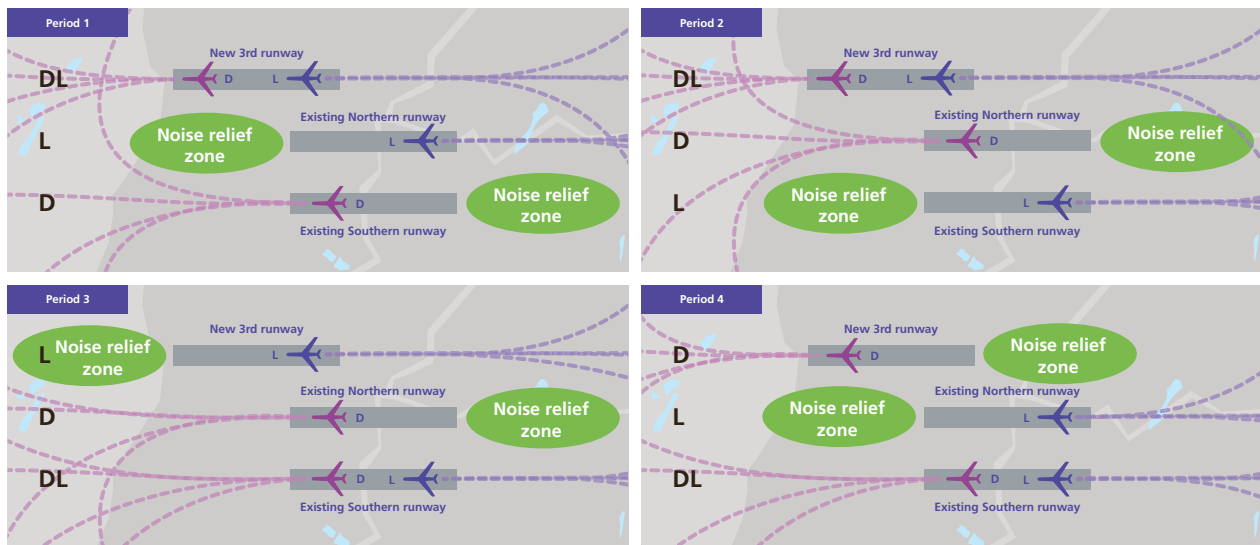
D = Departing, L = Landing, DL = Departing and Landing

3.5 Airspace

Using DL on the central runway is not included due to the need to allow missed approach procedures and to de-conflict traffic operating on the other runways that could have a detrimental effect on runway throughput.

The use of Modes 1-4 can be rotated/alternated to spread noise relief. Each runway has at least one Departure and one Landing mode of operation when reading horizontally across the patterns, which ensures both arrivals and departures respite under the flight path for the runway. See Figure 3.22 for the series of diagrams that explain how this works.

Figure 3.22: Effect on noise relief of rotating the four operating modes (shown for westerly operations)



Through the combined use of these four operating modes, we can deliver relief from overflight to those communities closest to the airport. The effect is more pronounced under arrivals flight paths, because for the last four nautical miles the aircraft have to be lined up with the runway. On departures, the aircraft flight paths diverge between one and two nautical miles after take-off.

The diagrams above illustrate the principle for westerly operations. For easterly operations the same principle applies, but the arrivals relief is felt in the communities on the west side of the airport.

3.5.1.3 Airspace design principles

NATS is confident that the London Terminal Manoeuvring Area (TMA) airspace will support a three-runway Heathrow. Route designs and operational modes will not constrain the resilience or operational capacity of the expanded airport. NATS also believes that no other airports will be adversely affected by Heathrow's expansion.

All aircraft will operate using Precision Based Navigation (PBN). This system gives a high degree of accuracy to aircraft routing and positioning that enables shorter distances between aircraft on the same route.

We have assumed a principle of Terminal Arrivals and Compass Departures to allocate the schedule to runways. Compass Departures mean that aircraft depart from the runway most suited to their flight direction – i.e. northbound flights depart from the northernmost departure runway. This avoids departure routes crossing each other and also supports the principle of providing periods of relief for communities close to the runway ends. The alternative, Terminal Departures, means aircraft departing from the runway closest to the terminal at which they are parked. If a Terminal Departures approach were used, sometimes a northbound departure would depart from the south runway, and a southbound departure from the north runway. In this case, the departure rate would fall significantly to allow aircraft to cross in the air safely after take-off.

Terminal Arrivals means that aircraft land on the runway closest to their parking location, which gives the shortest possible taxi times. This sometimes results in aircraft intending to land on the northern runway when arriving from the south having to cross with an arriving aircraft intending to land on the southern runway when arriving from the

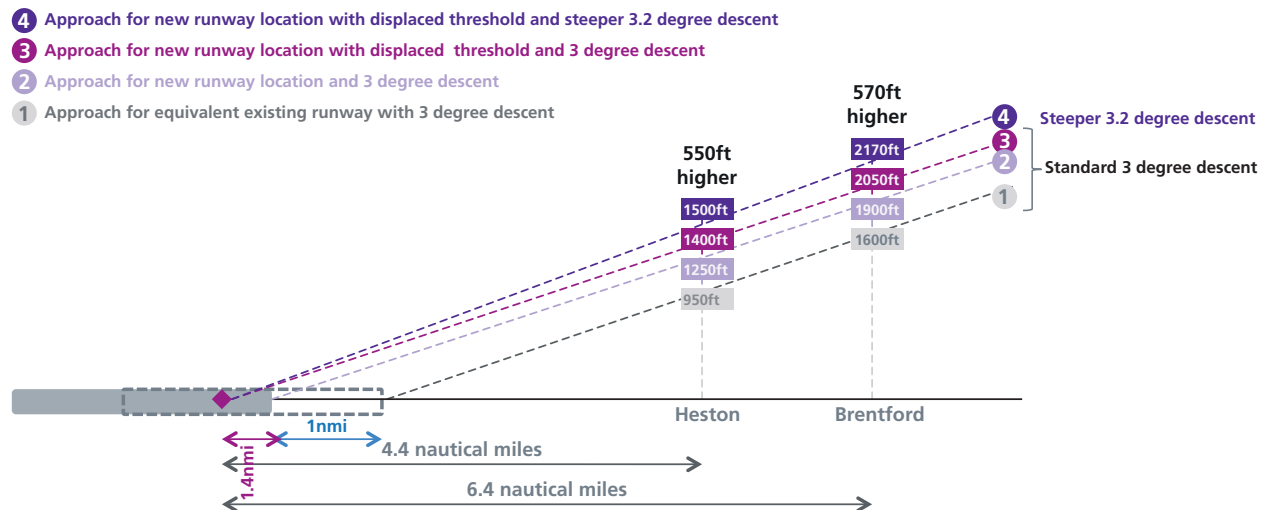
3.5 Airspace

north. However, the crossover can be achieved either on intermediate approach, or at a greater distance from touchdown using flight planning to a certain runway.

We have assumed the following when designing the approach flight paths:

- Continuous descent approaches are conducted to all runways**
 Independent parallel final approaches can be conducted to any two runways and all approaches will be steeper than today at 3.2 degrees in 2030 and 3.5 degrees in 2040. See Figure 3.23
- GBAS technologies will be in place to allow precision approaches from 2030**
 This will be the primary navigational aid for landing, with the current ILS retained for resilience purposes and all-weather operating capability
- Aircraft are established and stabilised on the straight run in to the runway or ‘final approach’**
 This is at a height of 1,000 feet (approx. 3 nautical miles (nmi) from the threshold on a 3.2 degree approach)
- Long-distance turns are possible to give ‘curved approaches’**
 These enable aircraft to turn onto the final approach closer in than today’s 8-mile joining point. This joining from a curved approach has a minimum turn radius of 2 nmi and must intercept the final approach no closer than 4 nmi from the threshold, as stabilisation on any straight section requires approximately 1.5 nmi. These curved approaches are able to deliver the same capacity as a ‘straight in’ approach. The angle of intersection from a curved approach to any straight-line segment can be no more than 30 degrees.

Figure 3.23: Using steeper approach angles reduces noise over surrounding areas



We have assumed the following when designing the take-off flight paths:

- Continuous climb departures can be conducted from all runways, independent parallel departures can be conducted from any two runways and routes from different runways in use at the same time must diverge
- Required Navigational Performance (RNAV) Standard Instrument Departures (SIDs) exist with any pair of diverging routes, permitting one minute departure separations for non wake vortex separated pairs of aircraft
- All aircraft fly straight ahead to 1 nmi from the end of the runway. In order to maintain an efficient operation and allow for aircraft separation requirements, there must be a split of routes at or as close as possible to the 1 nmi point. These splits are not required from a runway being used in Departures and Landing mode (DL), as the assumption is that any two departures will be separated by an arrival.
- Turns in departure routes have a radius of not less than 2 nmi to allow for Code F size aircraft
- Routes allow northbound aircraft to depart from the southernmost runway (and vice versa), using either wrap around or long way round SIDs. These SIDs exist to permit compass departures where a northbound/southbound imbalance exists: for example, a Dover (DVR) North SID, which allows DVR departures

3.5 Airspace

to depart from the northernmost departure runway. This will permit 'Compass Departures' to be maintained despite a departure route imbalance

- Where SID tracks from different runways cross, vertical separation of 1,000 feet exists at the crossing point, maintaining the SIDs independence of each other
- To ensure maximum flexibility and resilience of operation, each runway in each mode of operation has the same set of departures routes. It is assumed that aircraft will continue to be directed along a set of specific routes in a similar manner to today and not be dispersed. There are a similar number of routes as today and each is available from every runway.

3.5.1.4 Three options for airspace design

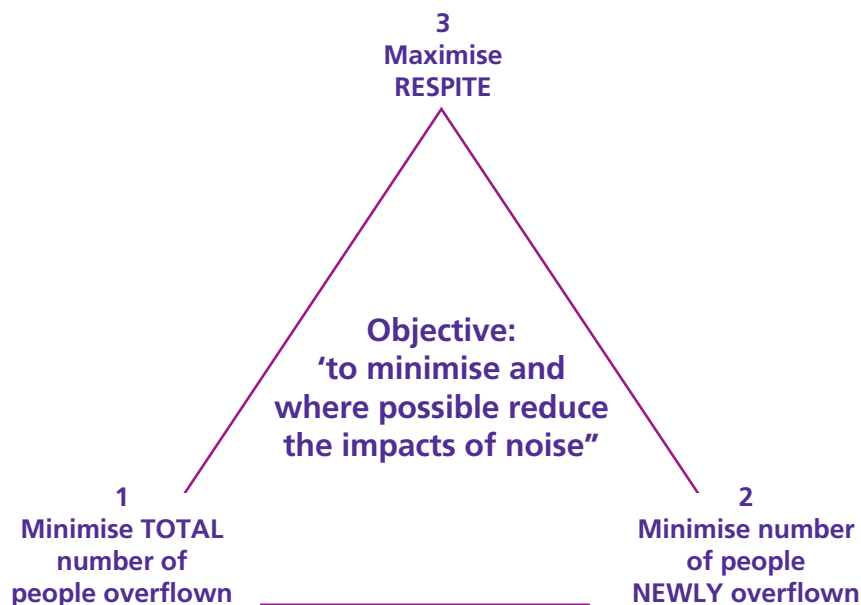
For our third runway proposals we have developed three distinct airspace designs that will each achieve different objectives. These objectives could all be said to meet the current Government policy objective set out in the Aviation Policy Framework (APF), which is to "limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise".

The three differing objectives are:

- To minimise the *total* number of people overflown (which is a refinement of our proposals in 2013)
- To minimise the number of *new* people overflown
- To maximise *respite* through the use of alternating routes.

It is not possible to fulfil all three objectives simultaneously. The three approaches are in tension with each other as described in Figure 3.24.

Figure 3.24: Different ways in which the objective of 'minimising noise' can be interpreted



There are advantages and disadvantages to each of these options relating to the number of people overflown, the number of people exposed to noise, the number of new people overflown and the amount of respite that can be provided. The noise impact of each of these approaches is discussed in Part 5.

It is important to note that decisions on airspace principles are for government policy to determine. However we recognise the importance that residents place on the provision of relief from over flight, which was further illustrated in the response to our recent consultation and that an airspace option that maximises respite therefore

3.5 Airspace

offers advantages. At this stage we have developed flight path designs for all three options. We would consult with and be guided by our local communities on their preferences for any of these options before making any recommendations.

3.5.1.5 Option 1: Minimise the *total* number of people overflown

This option minimises the total number of people overflown by landing and departing aircraft. We have used the core structure of today's routes as the starting point and then optimised this to further reduce the number of people overflown.

For example, the route known as Dover (DVR), which during westerly operations currently tracks directly over Staines and Egham, has been combined with a route known as Midhurst (MID) that has also been slightly revised. Together they now fly over and affect fewer people than the two routes individually. In addition, the routes that track to the north-west between Slough and Maidenhead have been changed to reduce the number of people in Slough that are overflown.

The arrival paths to each runway have been modified to form 'curved' or 'staggered' approaches. This helps to avoid the most densely populated areas of London. As a result, significant areas of central, east and west London would no longer be overflown. Many areas would have noticeably fewer aircraft overhead. However, other areas that are overflown today, only in a more infrequent and unpredictable fashion, would become more consistently overflown. This would be a noticeable change for people living there.

Focussing on minimising the population overflown means that some open spaces will experience greater over flight than today (see Part 5 for a more detailed explanation)

3.5.1.6 Option 2: Minimise the number of *new* people overflown

An additional runway inevitably results in new people being overflown. This option seeks to minimise the number of *new* people resident in areas overflown by aircraft¹⁷.

The core structure of the Option 1 routes has been used. In this case, too, there are a number of variations developed using typical current flight track data to indicate communities that would routinely be overflown today. In summary, these are approach routes to the new northern runway (used only when the centre runway is not being used) that follow a path with the same ground track as that to the centre runway. Aircraft switch to the final approach to the northern runway to intercept at 4 nautical miles. This occurs for easterly and westerly operations. It means that aircraft on approach to the northern runway do not fly over new areas of north-west London.

As with Option 1, noise relief is provided through alternation of the modes. A discussion on the impact to relief offered by this option is provided in Part 5.

3.5.1.7 Option 3: Maximise respite

Our consultation showed that 62% of all respondents felt that providing periods of relief from aircraft was more important than minimising the number of communities overflown.

Our basic design delivers relief through alternation using different runway modes. Although this works well for communities close to the airport, this relief is mainly from arriving aircraft. In the previous two options, departures from different runways can share routes. There will therefore be a number of houses that would have no respite from departures traffic.

Our third option therefore creates two distinct departures alternatives for each route for each operating mode. This takes full advantage of the improved precision of GPS-based navigation. Flights can then alternate between these routes, maximising our ability to deliver relief for all communities. It also adopts the same solution for arriving flights while they are further out than the 4 nmi final approach. It provides two alternative routes for each arrival path to each runway, joining them together at the final approach start point.

There are numerous ways in which these alternative routes can be employed. One would be to adopt a similar pattern to that used for current runway alternation and apply it to the routes.

3.6 Single airport campus

3.6.1 Creating a single airport campus

Figure 3.25 A single airport campus



3.6.1.1 A single airport campus with two front doors

Our long-term vision for Heathrow is a single airport campus with two main front doors (West and East) giving access to two terminal areas. This will provide a very simple airport diagram that passengers find easy to navigate. The rationalised landside campus will complement the rationalised airfield layout and turn Heathrow into a truly world class airport.

For a long time Heathrow has been constrained by the legacy of old airport infrastructure. The hexagonal runway layout of the original military airfield imposed its pattern on the airport buildings developed first during the 1950's and later in the decades following. With the levels of traffic being handled and the size of aircraft in use at the time, the plan for the airport served well. However, as traffic and aircraft sizes grew, the limitations of the hexagonally based masterplan became apparent.

Terminal 5 was the first step in the process of moving to a new masterplan concept. This introduced, at the west side of the airport, a rationalised terminal and airfield layout set at right angles to the runways. This has been continued in the design of Terminal 2 at the east side of the airport.

The Central Terminal Area (CTA) is where the legacy of the old airport is still most clearly seen. The three terminals and their approaches have grown organically over time and now present a complex and potentially confusing environment for passengers to navigate, whether they arrive by car or public transport. This complexity is not just the result of a legacy planning grid but is also a function of how many terminal buildings the airport has. Even when our new Terminal 2 building has opened and the existing Terminal 1 has been closed to passengers, Heathrow will still effectively have four front doors to four terminal buildings. Figure 3.26 illustrates this, the numbers associated with each terminal giving a nominal annual passenger throughput.

This is confusing for passengers who need to know which terminal they are leaving from. This is often compounded by the issue of code-share flights; airlines selling tickets which are actually operated by an alliance partner. In today's Heathrow, airline alliance partners are not always in the same terminal, meaning that codeshare flights can operate from a terminal that the passenger has not anticipated.

3.6 Single airport campus

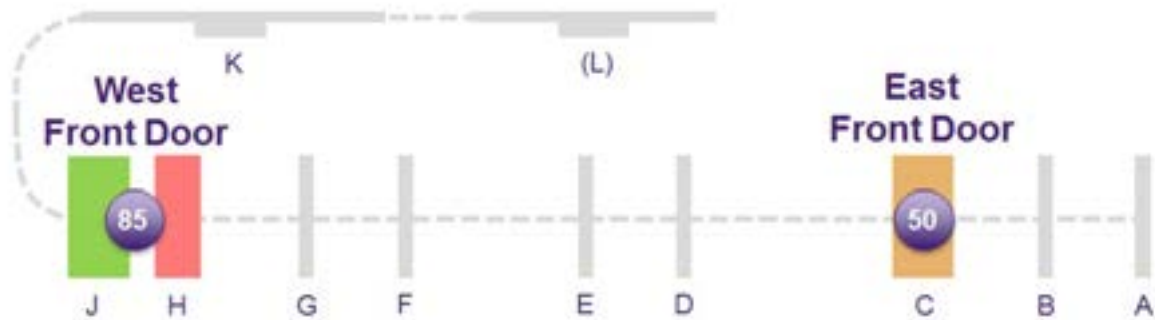
Figure 3.26: Current front doors to Heathrow



Numbers indicate nominal annual passenger throughput

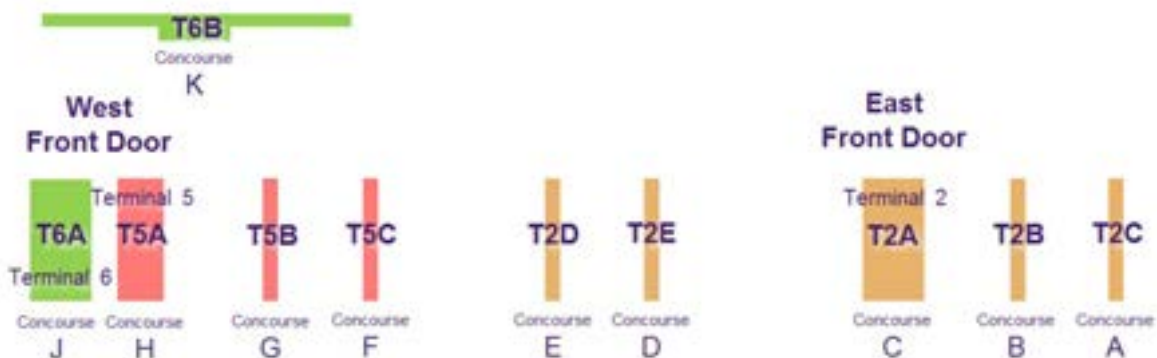
Our future airport strategy (see Figure 3.27) will radically simplify this. When our long term plan is complete there will be two front doors giving access to two large terminal areas.

Figure 3.27: Front door strategy in our refreshed plan



Terminal 4 is assumed to be replaced towards the end of the masterplan development

For the purposes of avoiding confusion in this document, Figure 3.30 lists both the existing terminal naming system in use today which is based around numbers for terminal buildings and letters to indicate their associated piers, and a new Concourse based lettering system, all on one diagram. This will allow the reader to be clear to which part of the airport various passages of text are referring.



3.6 Single airport campus

3.6.1.2 A better plan for Heathrow

This plan will have the following benefits:

Better for passengers

Passenger experience is better served by fewer, larger terminals – having two main terminals in the airport is less confusing than having five, since the passenger can more reliably find their way to the correct one. The ability to have buildings large enough to accommodate all the members of an airline alliance grouping within one terminal also overcomes the issue of code-share flights - a common source of passenger confusion today at Heathrow - where the passenger does not realise that the airline providing the service is not the airline from whom they bought the ticket and presents themselves at the wrong terminal.

The most efficient theoretical model is always all traffic passing through one single terminal, allowing the steady runway utilisation to be reflected in steady throughput through the terminal capacity. In practice a single terminal of 130 million passenger throughput would be too large to work. It would produce very long internal walking distances. The limitations of the model are apparent already in Schiphol at around 50 million passengers per annum. We have therefore chosen to have two main front doors giving access to two main terminal complexes as the most practical solution for the passenger.

The use of a single palette of materials and finishes, again prototyped in Terminal 5, together with common branding and wayfinding will produce continuity across the airport. This will reinforce the passenger perception of Heathrow as a single airport campus with a single quality of service.

Better for airlines

Airline business models are subject to constant change as individual airlines change destinations, services and products and airline alliances change shape and membership. The future of airline alliances and airline joint ventures is not predictable in detail but it is likely that further consolidation will take place over time. Given these changing needs, larger terminal buildings are more easily able to accommodate this change without the need for costly infrastructure interventions

Producing uniformity of passenger experience and facilities will do much to create a level playing field for competing airlines at Heathrow. This was a key principle of the airline requirements of a three runway plan from our work in 2009 and will continue to be so. Common access to public transport facilities is a major factor influencing how airlines perceive this equality of product.

Better access to public transport

Placing our new terminal capacity directly on the existing major public transport infrastructure spine is crucial to delivering a better public transport mode share. Our plan will ensure that all future terminal capacity has equal access from Heathrow Express, London Underground and the future Crossrail extension.

Placing the terminals anywhere other than this would potentially involve the passenger in changing transport modes to reach their terminal with the attendant loss in public transport mode share that this would produce. (The alternative solution of diverting these three services northward to also serve a terminal elsewhere is not considered practical given the need for two of them to continue on a through route to other destinations).

Both Heathrow East and West front doors will have excellent public transport access. Rail and roads will also provide good landside connections between the two terminal zones. Heathrow Express, Crossrail and London Underground trains will all be available at both nodes and give passengers and staff a choice of modes when moving between the two landside locations.

Better for efficient capital planning

Consolidating terminal capacity in two large terminal complexes will reduce the amount of future capital spend required to accommodate day to day change in airline business products and models. The basic airport infrastructure can remain as a constant, with business change continuing to be accommodated within it. This will reduce the impact on aeronautical charges for future years after the plan is in place.

3.6 Single airport campus

3.6.1.3 A flexible plan

Our plans need to be flexible as airline businesses evolve. Airlines may grow, consolidate, merge, join different alliances or fly different aircraft. Again our integrated airport approach supports long-term flexibility.

The majority of aircraft 'contact' stands will be located on piers attached to terminal (including satellite terminal) buildings. All the terminal buildings will be accessible via the single-track transit and baggage systems. This will allow stand areas to be reallocated incrementally as required. Thus, a growing airline might take up stands on the next satellite along the 'toast rack'. On a larger scale, major airlines could, if ever deemed necessary, be moved from one end of the integrated airport to the other.

For passengers this flexibility would be largely unnoticed. They would continue to come through one of the two main 'front doors' or, if transferring, make their way airside. Departing passengers would continue to be directed towards the nearest 'front door'. Thus a passenger departing from the current T5C would check in at Heathrow West (in the current Terminal 5 building).

In future it is possible passengers or airlines may seek to check-in flexibly from any terminal for any flight. This could potentially be done with integrated baggage and a single-track transit. It might also become more attractive if common check-in among alliances, as pioneered by Heathrow with Star Alliance in Terminal 2, spreads in future. However, if every flight were operated this way it would strain the capacity of the systems by increasing the volumes carried long distances. It would also increase travelling times for passengers and complicate wayfinding. Our concept therefore remains based on co-location of airlines and alliances, each with a home in either the East or West.



3.7 Transfers

3.7.1 Quicker and easier transfers will enable Heathrow to compete on the world stage

No airport can function as a hub airport and compete on the world stage without a great transfer product that draws passengers to use it because of its ease, quality and reliability. Heathrow will offer a service that can achieve Minimum Connect Times (MCTs) of between 45 and 60 minutes in a simple, intuitive, stress-free system that uses innovative technology to speed transfers and assist passenger wayfinding.

The transfer product that Heathrow is able to offer in the future will be a key determinant of how successful the airport can become. We are already in fierce competition with other global hubs to attract a finite number of transfer passengers, who are needed to sustain the hub airport model and enable marginal routes to emerging markets. In reality there are too many hub airports already in northern Europe, and this competition is now being intensified by the focus of Middle Eastern airports becoming global hubs too, in particular Dubai.

To survive and succeed in this competitive world, the UK's hub airport must be able to match or beat the offer from the global competition. In practice, this offer consists of a number of factors, which will include:

- Convenience in terms of least nautical miles and flying time added to both legs of the overall journey
- The price of the ticket
- The ease, convenience and reliability of the transfer process itself.

The speed of the overall transfer will be a determining factor – but only within certain limits – and for all but a very small number of passengers this will not be the only factor being considered. Speed of connection is important when airlines or travel agents are calculating how many onward flights are available to be connected to from any given arrival. However, this calculation is always subject to the reliability test, with airlines being unwilling to advertise those they know are not consistently realistic. The product must therefore be reliable to be marketable – and as short as possible within the constraints of reliability to open up as many connectivity options as possible.

Provided the transfer time that can be offered is within a few minutes of the best available, other factors are likely to be just as important. The biggest of these is how easy and stress-free the experience is for the passenger. Connection experiences that are sold as advantageously short, but due to poor or confusing wayfinding involve running for long distances through unfamiliar environments, with a real prospect of not making the onward connection, are not likely to be commercially viable for very long.

Heathrow's ambition is to provide a seamless and stress-free experience for the passenger and a reliable solution to deliver bags to connecting planes on the same timescale as the passenger. Making an onward connection to find your bag has not made the same flight is not only a frustrating experience for passengers, it is also expensive for the airlines. Our systems will ensure it is a rare occurrence.

3.7.1.1 Moving bags

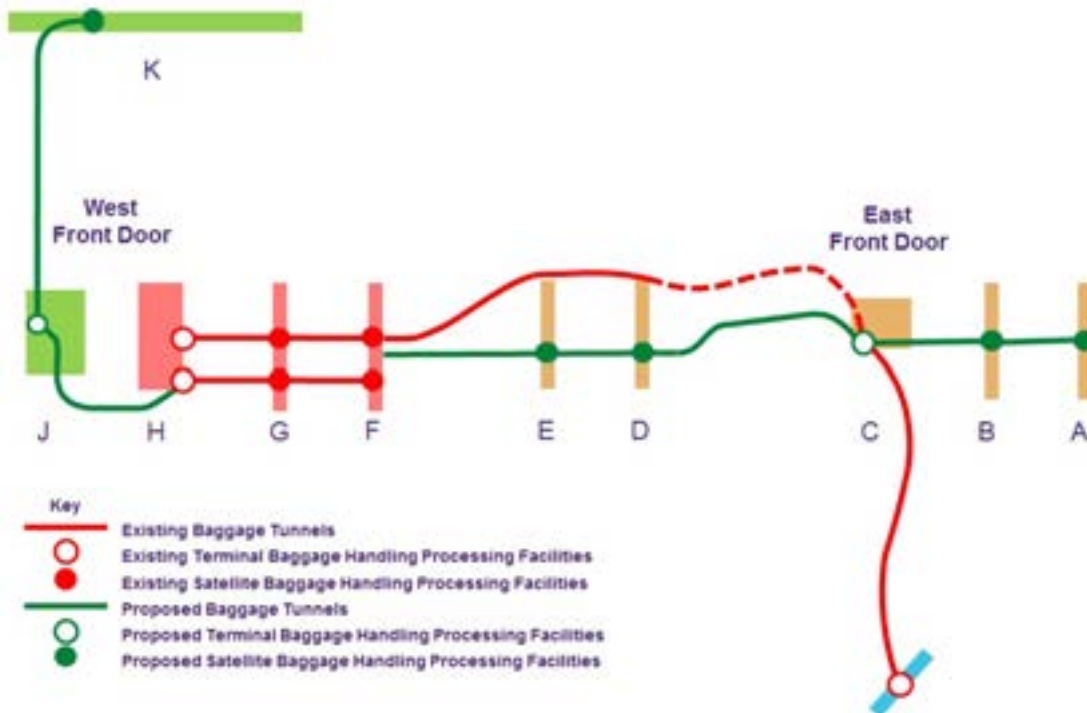
We have already invested heavily in an extensive automated baggage system at Heathrow. The system will soon connect all terminals together and allow the timely delivery of transfer bags to the terminal of departure.

We will continue this principle of one connected airport in delivering the new terminal and pier buildings envisaged by the masterplan. This investment will ensure that bag MCTs can keep pace with passenger MCTs. The overall system diagram is illustrated in Figure 3.28. It shows how the East and West sides of the airport are already connected via a tunnel for an automated baggage system. It also shows how the new buildings in the west and north will be integrated.

We have assumed that all transfer bags will be moved across the airport using an automated high speed Destination Coded Vehicle (DCV) or Tote system. These are small, self-propelled carts, each carrying an individual bag and running on rails. In Terminal 5, originating and destinating bags are currently made up and broken down in T5A, with tug and dolly being used to move bags between make-up and stand. The exception is late departure (expedite) bags, which use an automated, DCV based, head of stand delivery baggage system.

3.7 Transfers

Figure 3.28: Baggage system schematic diagram



In Terminal 2 it is proposed that O&D bags will eventually be screened in the main terminal (T2A currently uses the Terminal 1 baggage handling system). They will then be transferred out to the concourse of departure using a Tote/DCV system and made-up in the pier at basement level in T2B and apron level in T2C.

Arriving transfer bags will be selected and put into an automated Tote/DCV system close to the aircraft. Arriving bags for passengers coming to London will either be transferred back to the main terminal building in containers by tug and dolly, or they will be unloaded from the containers at the pier and put into the automated Tote/DCV system as individual bags. The choice between these two systems for dealing with arrivals baggage will be a balance between capital investment, on-going operating cost, contingency operation feasibility and system reliability.

The same operating concept has been assumed for the Terminal 6 building on West Terminal and the same choice of arrivals process is open. Reverting to a tug and dolly based system, as in Terminal 5, would offer the potential to save considerable capital cost. However, the longer travel distance between the main terminal building and the pier at Terminal 6 points to an automated system as the more likely to be preferred option. These approaches would be developed in detailed consultation with airlines and other airport users.

3.7.1.2 Moving people

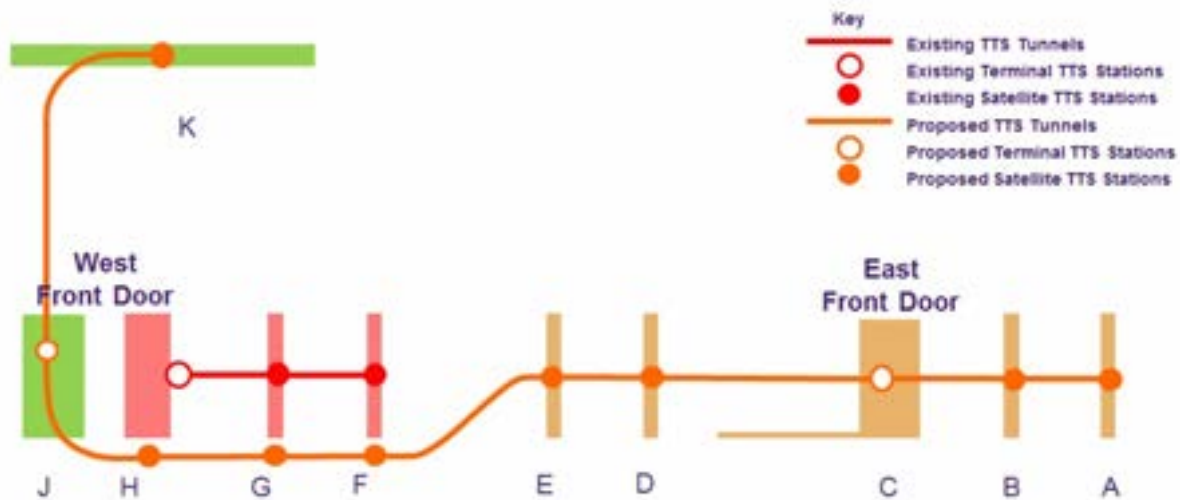
We want passengers to experience a single, integrated airport. For them to do so, the masterplan envisages an airside tracked transit system similar to that currently employed in Terminal 5. The transit system will be configured in a single end-to-end system that passes through each terminal and pier building.

Ideally, the existing Terminal 5 system would form part of this new overall system. However, there are two reasons why this has been considered unworkable. Firstly, the platforms in T5B and T5C piers are only four cars long, which offer insufficient capacity for the numbers forecast. Secondly, there is no available through route at T5A terminal building where a major structural core blocks the onward route. The former reason may be able to be re-engineered and a more detailed study is required to assess this. However, the latter issue cannot be overcome without compromising Terminal 5's ability to operate or committing a very large capital spend to achieve it.

3.7 Transfers

For this reason the layout below has been planned, with a single end-to-end system supplemented with additional capacity from the existing T5 system:

Figure 3.29: Airside passenger movement system



The advantages of this approach are:

- **One single line for every transfer passenger in the airport**
This makes the journey intuitive and easily understood, as the passenger only has to know at which stop to get off
- **Concourse-to-concourse travel without the need to stop at main terminal buildings**
This will deliver very competitive MCTs.

The system runs from one end of the airport to the other and interfaces with all buildings on the campus. The connection with the existing Terminal 5 is created by new stations at the southern end of the three buildings. Most transfer passengers to and from current Terminal 5 will be able to travel to other parts of the system. The existing Terminal 5 system will continue to deliver most arriving and departing passengers to and from the main terminal, without the need to disrupt it during construction of the new system.

Transit trains will be five cars long to provide the required capacity. Transfer passengers will be segregated into separate cars by means of the station design. Transfer passengers will be screened in their concourse of departure in dedicated security zones with a five-minute maximum queue time. For full details and assumptions on the operation please refer to Appendix 12.

Both direct and transfer passengers will need a simple naming system for concourses in this integrated airport. The existing 'Terminal X' approach appears too confusing – so we propose changing this to letters A-K. Transit stops and gates would share the lettering, a system that will ensure passengers experience the airport as a user friendly, integrated whole.

3.7 Transfers

3.7.1.3 Innovative technology

This approach to passenger movement relies upon some not yet deployed innovation. It has been assumed that the current manual security sweeping operation of transit cars that have carried unscreened passengers before they can be used for carrying screened passengers, can be automated. This would happen as the train moves between loading and unloading platforms. This system does not yet exist. It would also need to be certified by the DfT. Given technology currently available, it is credible to suppose that, by 2025, further development will make this possible. This assumption allows the headways between trains to be reduced to two minutes. In turn, this increases the carrying capacity of the system, the number of cars per train can be kept to five, and the physical capacity of the track supported.

Innovation also has a potential role to play in making this type of system easy for passengers to navigate. Passengers' mobile phones when they reach the right station can thus be alerted and provided with push visual system maps and information about their onward flight status and the facilities available in their concourse of departure.

In both these ways, the use of innovative technology will have a key role to play in making this a fast, easy and intuitive system for passengers to use. Most passengers already carry smartphones.

Figure 3.30: Heathrow's current TTS system at Terminal 5



3.7.1.4 Minimum Connection Times (MCTs)

The minimum time to connect between two flights is a long metric for transfer passengers. A MCT is measured for people and bags. While few passengers naturally connect at the minimum time, it indicates the ease and reliability of the transfer. As such it is an important comparison point for hubs.

We have modelled MCTs for the new airport, considering Intra-terminal (within one terminal) and Inter-terminal (between terminals) flows as two separate cases. We target 45 minutes for Intra and 60 minutes for Inter-terminal MCTs. A worst-case series of assumptions has been made as follows:

- The walking distance used is from the furthest stand possible on the arrivals concourse to the furthest stand possible on the departures concourse
- The walking speed of passengers is 1m/s – a conservative estimate that represents an overall average of the walking speeds of differing types of passenger
- TTS waiting time is assumed as the maximum – 120 seconds. This equates to the service interval between trains
- The queue time at security search is assumed to be the target maximum of five minutes

3.7 Transfers

- The figures also include a five-minute buffer between aircraft doors closing and scheduled departure time
- Bags are off-loaded and taken to an injection point by tug and dolly
- Bags remain in automated bag sort system and are delivered to head of stand of the departing aircraft
- Bags are then manually loaded onto the aircraft ready for departure.

Terminal 4 has been excluded from the Inter terminal analysis as it is not and will not be connected to the other terminals via a TTS system; the provision of such a system would be too expensive to be justifiable given the low numbers of passengers expected to make inter-terminal connections involving T4.

Figure 3.31: Passenger and Baggage Intra –Terminal Maximum Transfer Times

Transfer	Maximum Transfer Time	
	Passenger	Baggage
Concourse A - Concourse E	44 minutes	41 minutes
T4 – T4	42 minutes	41 minutes
Concourse H - Concourse F	40 minutes	39 minutes
Concourse K - Concourse J	45 minutes	41 minutes

Figure 3.32: Passenger and Baggage Inter –Terminal Maximum Transfer Times

Transfer	Maximum Transfer Time	
	Passenger	Baggage
Concourse A - Concourse H	52 minutes	43 minutes
Concourse A - Concourse K	60 minutes	47 minutes
Concourse F - Concourse K	55 minutes	43 minutes

Intra Terminal MCTs are all within the 45 minute target time and Inter Terminal MCTs are all within the 60 minute target time. As these are worst case figures, this indicates that these connection times can be reliably delivered in daily use.

When compared to our competitor European hub airports, these transfer time figures will be amongst the best. See figure 3.33 below for a comparison table.

Figure 3.33: Passenger and Baggage Inter –Terminal Maximum Transfer Times^{18, 19, 20}

	Intra-terminal	Inter-terminal
Heathrow (today)	70 minutes	90 minutes*
Heathrow (2032)	45 minutes	60 minutes*
Paris	60 minutes	75-90 minutes
Frankfurt	45 minutes	45 minutes
Amsterdam	40 minutes**	50 minutes***

* not including Terminal 4

** connecting to EU flight

*** connecting to inter-continental flight

3.8 Integrated transport

3.8.1 Integrated transport

We place our terminal infrastructure on a consolidated public transport 'spine'. This means Heathrow can offer true integrated transport. People will be able to reach the platform or kerbside in five minutes from the terminal, as well as change easily between one form of surface transport and another.

Our masterplan is designed to allow fast and frequent public transport access to the two key passenger nodes or 'front doors' in the east and west. This will provide direct public transport access to the terminal for most passengers and allows more trains to access Heathrow than the current operation permits. The two nodes will be connected by frequent free landside rail services, at least every five minutes. The majority of bus, coach and rail services will stop at both ends of the airport.

Interchange facilities at both ends of the spine have been designed around the needs of airport passengers to reduce walking distances, minimise level changes and provide fast access from platform to check-in (or arrivals to platform). Integrated landside connections will provide free access to key employment locations across the airport to make public transport the easiest and fastest choice for the workforce.

Figure 3.34: Our western public transport interchange



3.8.1.1 Heathrow West

The western transport node will welcome 65-70 million passengers per year in 2040. It will form a new rail interchange with Heathrow Express, Crossrail, Western and Southern Rail services. These services will have a five-minute walk to check-in concourses. Bus and coach services would operate at ground level allowing a fast interchange with rail services for airport passengers and local residents.

The existing rail and London Underground stations will be adapted to serve both sides of the new west node. They will have direct access from the platform to the departures level via existing and new vertical circulation. There will be easy interchange between rail services to enable a truly integrated transport experience for airport and rail passengers.

Our proposals include a shared short stay car park, expanded to deliver 6,000 spaces. There will be a larger forecourt shared between the existing Terminal 5 building and a new building to the west, providing sufficient

3.8 Integrated transport

capacity for passenger numbers. For passengers, the entire complex will function as one area. There will be pedestrian connections via link bridges from the two sides of the Terminal that will aid safe passenger and staff movement. Similarly, we will provide airside tunnel connections for those people already screened by security.

A passenger movement system (potentially a form of Personal Rapid Transit system, such as the current 'pods') will join the west T5 transport hub to the Airport Commercial Zone, Business Parking, Valet Parking, a consolidated car rental centre and Long Stay parking to the south.

This unrivalled connectivity and integrated approach will drive a high public transport mode share. It will also make associated, high-value commercial development sustainable from a transport perspective.

3.8.1.2 Heathrow East

The eastern node will cater for 50-55 million passengers per annum in 2040. The existing central transport interchange will undergo a major redevelopment, including the building of a modern and expanded bus and coach station. There is already easy access from London Underground to Terminal 2 using existing pedestrian walkways. A new mid-platform vertical circulation core will connect Heathrow Express, Crossrail, Western and Southern rail services to the Terminal 2 building, which will be easier to navigate intuitively. This means shorter walking distances for passengers. It will bring them into a newly designed interchange above ground. The existing platform end circulation will be quicker for passengers at the 'London End' of the platform and will provide direct access into the northern end of Terminal 2.

The new elevated passenger transport interchange zone will provide a spacious and modern environment. There will be convenient interchange between all modes and new waiting facilities for passengers. In addition, there will be capacity to cater for growth in bus and coach services, providing a facility capable of expanding hub operations for National Express.

3.8.1.3 Local road network

The key principle for the development of the local road network has been to retain existing connectivity. We seek to avoid cutting off roads and to expand carrying capacity if possible. For example, where the existing A3044 is removed, the proposals include a new connection from the A4 to Poyle to avoid inappropriate local re-routing. Further work will be required as proposals develop to assess the impact on the local road network and identify suitable improvements with local authorities and TfL.

The existing Western Perimeter Road and part of the Northern Perimeter Road will be removed to accommodate the new runway and associated airfield infrastructure. To facilitate this, a new Southern Road Tunnel will be constructed to provide access to Heathrow East and be the main landside road link between the two terminals. Circulation between these two nodes will now effectively be via the south of the airport, rather than the north as it is today (see Figure 3.35 below). Delivery of this element of infrastructure will be required early in the works to deliver the third runway and allow the Western Perimeter Road removal.

Existing junctions on the southern access roads will be upgraded to accommodate the increase in traffic flows. The roundabout junction where Airport Way meets the Southern Perimeter Road will be grade separated to allow dedicated access to Heathrow West and segregate through movements on the Southern Perimeter Road. There would also be a new and improved junction on the Southern Perimeter Road to facilitate access to the Southern Road Tunnel. The remainder of the airport road network remains unchanged.

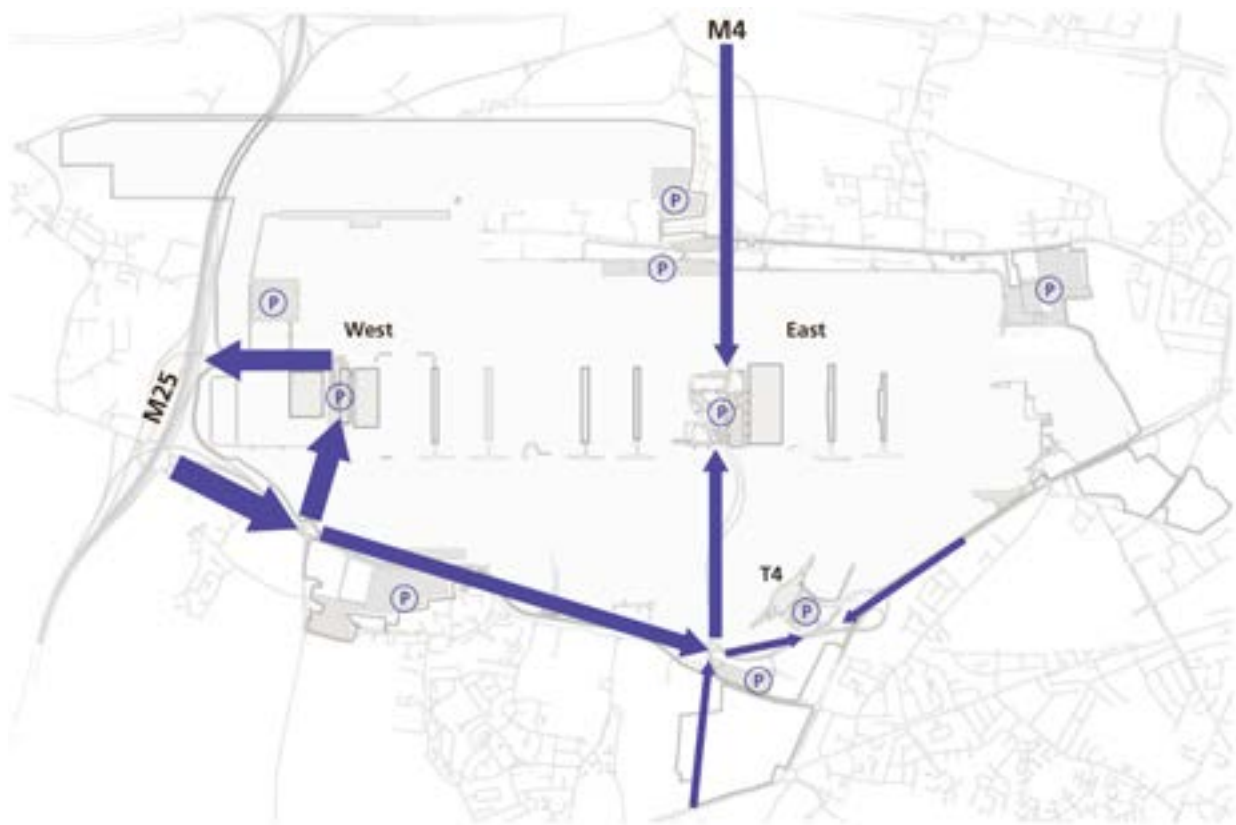
The Southern Road Tunnel will also serve to reduce travel distances for those approaching Heathrow East from the south side of the airport, reducing airport traffic using the M4 for this purpose and providing much needed resilience for vehicular access to the terminal. Having an alternative route to Heathrow East, should the existing northern tunnel be compromised for some reason, is a key resilience issue for the airport.

Delivery of this element of infrastructure will be required early in the works to deliver the third runway in order to allow the Western Perimeter Road removal.

As the proposals are developed further, we would seek to undertake more detailed traffic impact assessments to identify where localised improvements to capacity might be required. We would work with local authorities to identify where improvements might have wider benefits, such as to resolve existing bottlenecks and ease traffic flow, as well as improve journeys for local buses and cyclists.

3.8 Integrated transport

Figure 3.35: Vehicle access to Heathrow will shift to be southern biased



3.8.1.4 Car parking

Our future strategy for car parking will be built around three principles:

- Continuing to offer passengers a choice of parking products
- Moving all passenger car parking as close as practically possible to its associated terminal
- Connecting all passenger parking as sustainably and conveniently to the terminal areas as possible.

In practice this means continuing to offer as much parking directly outside the terminal front doors in multi-storey car parks as is viable. This provides the smoothest and most seamless passenger experience through direct walking connections to the terminals, and is consistent with the current proposition at many other leading European airports. West Terminal will be served by enlarging the current Terminal 5 car park to approximately 6,000 spaces. East Terminal will be served by increasing the size of the new Terminal 2 multi-storey car park, giving around 4,000 spaces in total, when the current Terminal 3 car park is included.

Other passenger parking products will be provided further from the terminal buildings. These locations will be connected to the terminals using some form of automated people movement system. This will ensure a rapid and convenient transfer for the passenger and their baggage to the terminal and back again. Vehicle movement of passengers on car park buses will be eliminated, taking vehicles off the roads and improving air quality. There are a number of options, including a personal rapid transit system (PRT) similar in concept to that operating at Terminal 5 today.

Our sustainable staff travel initiatives have already done much to reduce the number of staff parking cars. Through the development of a parking control partnership with airport tenants, we would propose to manage the total of Heathrow and tenant staff parking downwards over time, using the normal turnover of staff to deliver change. This would be enabled through greater subsidies for staff using public transport.

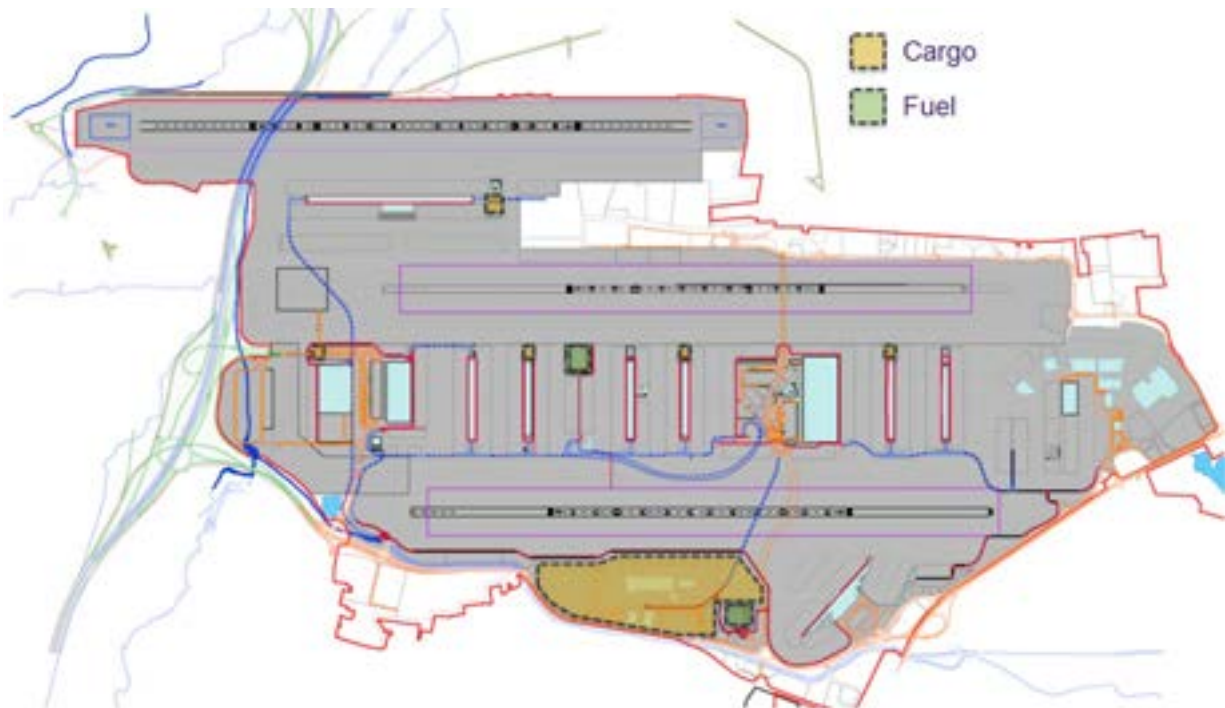
3.9 Land use planning

3.9.1 Land use planning

3.9.1.1 Growing cargo

Heathrow's ability to continue to be the cargo hub for the UK will be critical to the airport's success, airline business models and the UK economy. Our plans will double cargo capacity at Heathrow.

Figure 3.36: Cargo and fuel strategy



Our plan for the redevelopment of Heathrow's airfield allows for the complete overhaul of its cargo facilities. The strategy has three parts:

- Keeping the cargo operation in its current location to the south of the airport but re-planning and modestly expanding the available site. This ensures that the current links with freight forwarding operations located in the Feltham and Bedfont area continue to operate on a time-critical basis. It also acknowledges the scale of investment made in the British Airways facilities in this zone
- Providing excellent airside road links from the new apron areas to the cargo zone in order to ensure that time-critical movements are not impacted by the distance between the two areas, with underground access roads carrying all non-hazardous freight
- Identifying zones for on-apron cargo transshipment facilities to enable the efficient turnaround of transit freight at the aircraft location. This avoids having to drive the freight to the cargo zone and back again to conform with customs processes. This strategy will remove a large number of vehicle movements from our airside roads and significantly improve the freight transit times.

3.9 Land use planning

The current cargo zone is controlled by three parties – British Airways World Cargo (BAWC), SEGRO and Scottish Widows, with the first two accounting for the majority of the current cargo throughput. The BAWC cargo handling building is a modern, automated facility. The SEGRO facility is largely composed of older, now life-expired buildings in need of redevelopment.

We will work with all parties to develop a masterplan for the cargo zone that enables the efficient redevelopment of older facilities. This masterplan is likely to involve a degree of land swap to produce ideal development areas. We estimate the total additional land available for all cargo uses in the zone as 13.3 ha – an increase of more than 30% on today's figure. This growth in area, together with the efficiencies possible from rationalised facilities, will enable the doubling of cargo throughput for this area from 1.5 million tonnes per year today to meet the forecast demand of 3 million tonnes per year in 2040. This compares with current freight throughput at Frankfurt airport for example of 2 million tonnes in 2014.

There are also opportunities in this re-masterplanning of the cargo zone to consider the relationship of the cargo sheds to the airside restricted zone. With this rezoning, the need to take cargo from the sheds through a control post to reach the aircraft could be removed, vastly speeding up the efficiency and reliability of cargo loading and unloading.

Figure 3.37: Cargo zone planning assumptions



Existing 41.7 ha

Potential 55.0 ha

Faster, more efficient cargo at Heathrow will improve the UK's export competitiveness and maximise the UK's economic benefit.

3.9.1.2 A resilient fuel strategy

We have been working with airlines to develop a strategy to ensure a resilient fuel operation in a two-runway airport plan.

Fuel storage capacity in a three-runway plan will need a different approach to deliver sufficient fuel capacity to the northern half of the airfield, as the airport centre of gravity moves north-west. Ideally, the first steps of both a three-runway and two-runway strategy should be identical to allow the two-runway scheme to be implemented in a timely manner.

The three-runway fuel strategy proposes to expand the existing Perry Oaks fuel farm site to the east of T5C and add a new site to the south between Terminal 4 and Cargo on Grass Area 17. The former, expanding the Perry Oaks facility, is not appropriate in a two-runway plan as aircraft stands in that area are at a premium. However, the additional land available with an expanded airport makes this less critical.

In total, the existing Perry Oaks site has been expanded from six tanks to twelve. This site will serve the Western apron and the new apron area to the north-west using pipeline lengths that are within the acceptable range. A new nine-fuel tank operation has been planned on Grass Area 17 to the south, which would serve Terminal 4 plus the Eastern Apron. This is congruent with the two-runway plan that envisages a new fuel farm in this area.

3.9 Land use planning

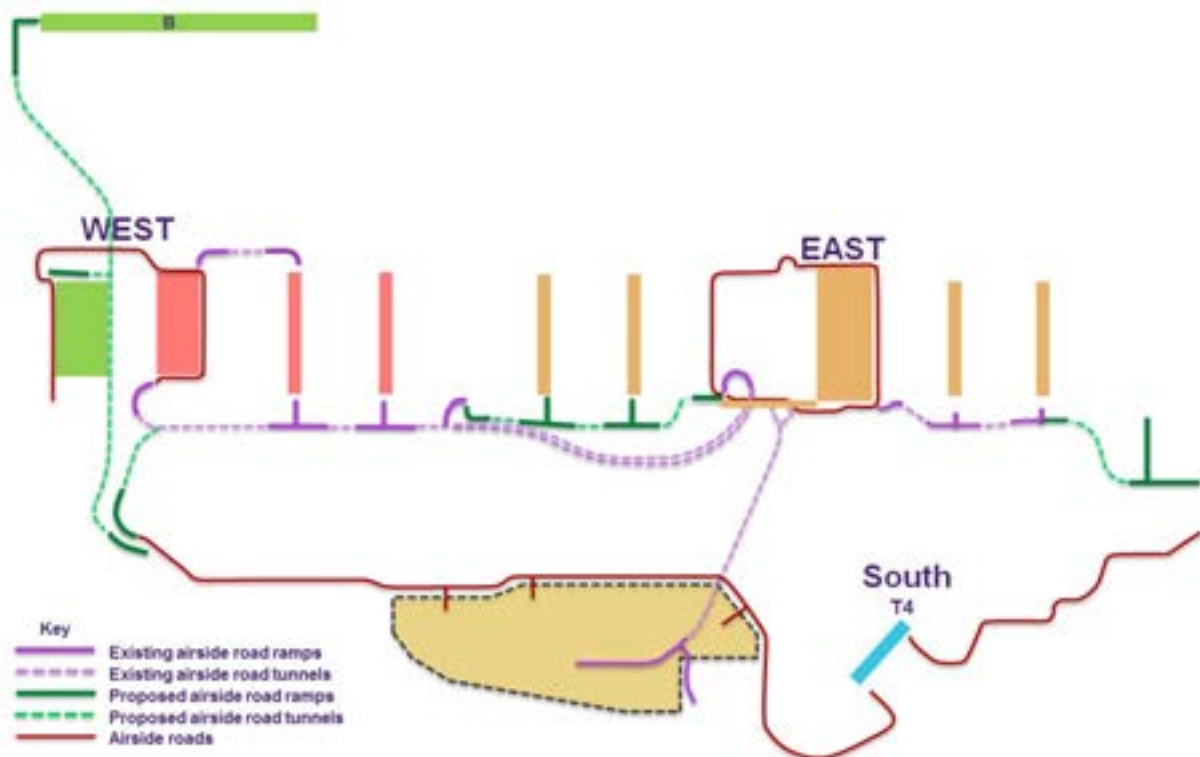
In addition to providing additional fuel tanks for a three-runway operation, the long-term fuel strategy will increase the amount of on-airport storage to approximately three days of supply. This will help to increase the resilience of the airport to external events, such as the Buncfield fire of 2005.

3.9.1.3 Airside roads

We have designed extensions to our airside road network to accommodate the future terminals and piers. These use tunnels to cross under taxiways to minimise the delays inherent in crossing taxiways at grade level, particularly in low visibility conditions.

The principal challenge is to ensure fast road connections between the new northern apron and the rest of the airport, in particular the cargo area. To do this we have designed new, direct routes at the western end of the airport to connect to the cargo zone. These pass under the new southern taxiways that access the new apron. Estimated journey times from an aircraft unloading point at the far end of the new apron to the cargo sheds will be 11 minutes.

Figure 3.38: Airside road strategy



3.9.1.4 Aircraft Maintenance

Aircraft maintenance at Heathrow is undertaken at the eastern end of the airport, between the existing runways. Maintenance is predominantly carried out by British Airways (BA), who has a long term lease on a significant portion of the maintenance base zone. Virgin Atlantic also has a maintenance hangar within the zone. The area of the total maintenance zone today is in the order of 87 ha (see Figure 3.39), of which around 26 ha is used for long layover aircraft parking. This means that around 61 ha is available for maintenance uses, including aircraft hangars, offices, motor transport facilities and staff parking.

In our refreshed plan it is envisaged that the maintenance function will remain in its current location. The development of the second pier to the east of the East terminal area will result in the need to reconfigure the western portion of the maintenance base. This is because the taxiways displace the existing “Cathedral” hangar

3.9 Land use planning

which will need to be replaced elsewhere on the base. We have been working with BA to develop concepts for how this might be done as part of our two runway masterplan development process.

The outcomes of these discussions are reflected in the current refreshed plan. This shows the potential for development of additional maintenance hangar facilities to replace the Cathedral Hangar, in order to meet demand for a future masterplan. Through rationalisation of the existing site to increase efficiency, it is envisaged that the total maintenance zone area will largely remain the same as today with approximately 68 ha dedicated to maintenance and 23 ha for remote aircraft parking. See Figure 3.40.

Figure 3.39: Current maintenance zone layout



Figure 3.40: Proposed maintenance zone layout



3.9.1.5 Commercial opportunities

Our competitor airports have developed zones for high value on-airport commercial development, sometimes referred to as 'airport cities'. We believe that the opportunity exists for Heathrow to balance airport charges through enabling similar appropriate commercial development. While actual opportunities for 'airport cities' are often less than claimed, there are important market segments that seek proximity to a hub airport.

Figure 3.41: Examples of facilities that might be re-provided in a commercial zone – BA offices Waterside, T5 Sofitel Hotel



In our land use planning exercise, we have sought to estimate the support or ancillary facilities that would be required by an expanded Heathrow. These estimates are necessarily at a very preliminary stage and are based on industry standard growth factors and provision ratios. They would require to be developed further in subsequent stages of the masterplan definition process.

There would also need to be a more detailed analysis of which areas of ancillary support function require to be on land that is airport owned and which can be assumed to be outside the airport boundary. We have currently assumed that a proportion of the support areas will not be on airport owned land but we have identified where existing infrastructure of this sort is assumed to be in use for airport related purposes.

3.9 Land use planning

In practical terms, a growing airport operation will require more office space for airlines, airport operations, and a host of support services. The development land required for the third runway will involve the compulsory acquisition of approximately 500 ha of land with a variety of existing uses on it – e.g. the current British Airways headquarters building at Waterside. Many of these facilities will need to be re-provided in the immediate area of the airport. If this can be done in a location that is better served by public transport than their current locations, this will be a significant step toward reducing the number of additional cars on the road with an expanded Heathrow.

As an example, Heathrow West will need hotels to support an annual passenger throughput of 70 million. This is seven times the size of the current Terminal 4, which has one 400 bed hotel associated with it – soon to be three with a total of 1,600 bedrooms. The masterplan also requires the removal of the current Terminal 5 Sofitel hotel and the use of the site where planning permission has been granted for a second Terminal 5 hotel. These point to a high demand for new hotel bedrooms to support Heathrow West.

These needs can be linked with exhibition and conference centres, among other support facilities, to provide a commercial development zone at our western public transport node. Beyond directly airport-related uses, other less directly associated uses may be supported if there is demand. These might be additional office suites for use by high value businesses for which international connectivity is a prime requirement. These larger office complexes could also incorporate smaller ‘incubator’ units, let at competitive rates to encourage start-up businesses. This would provide support to local investment and local jobs.

This commercial development zone would be sustainable from the transport point of view, being connected via a simple people mover system within a five-minute ride to the western public transport hub. On-site parking would be kept to an absolute minimum, with the vast majority of users arriving on public transport. A Personal Rapid Transit system (PRT), potentially like that currently deployed at Terminal 5, would be one solution to the linking of the two sites. The use of PRTs has been pioneered at Heathrow. They provide a flexible and agile solution, easily integrated with both the public transport interchange and the commercial development zone.

Figure 3.42: PRT system at Terminal 5



Figure 3.43: Paddington basin development



The western commercial development would be based around the redeveloped route of the Colne and Longford / Duke of Northumberland Rivers as they pass through the airport. These give opportunities for landscaping and the creation of high quality public open space between the commercial buildings. This has the potential to become a destination in its own right, stimulating additional high quality commercial development on adjacent land outside the airport boundary. Similar developments using water features and transport connections can be seen at Paddington and Kings Cross.

We are also in the process of developing plans for a commercial development zone at the East front door around the public transport facilities located there. We currently envisage providing 2,500 hotel bedrooms and 40,000 m² of airport-related office space. This would be centred around and linked to the new public transport interchange building. This would again ensure that the development is sustainable from the transport point of view. The development will be delivered in phases with the first hotels being delivered in 2020.

We have assumed, for the purposes of our current cost plan and overall funding model, that there will be a strongly positive stand-alone business case for these elements of the masterplan. However, due to the complexities of trying

3.9 Land use planning

to off-set the revenue stream in the calculations against the capital cost of the development works, we have so far allowed only for the land acquisition, site enabling utilities, public transport link and river landscaping costs in the cost plan. We have therefore assumed no income stream from commercial development in the overall business case and no capital cost for the construction of the new facilities.

Figure 3.44: Potential commercial zone at Heathrow East front door



3.10 Green space

3.10.1 An innovative approach to green space

We have developed an integrated strategy for flood protection, biodiversity and landscape. The strategy will eventually form part of a Local Plan that realigns watercourses and creates new areas of flood storage in an enhanced Colne Valley Park. Our plans see existing river routes diverted and redesigned so as to create new areas of flood storage that, with the introduction of other measures, would improve flood protection for local communities.

Our plans aim to provide better links and access to local countryside and improved recreational facilities. We aim to increase the amount of publicly accessible green space that exists around the airport and to create an enhanced environment for biodiversity. This will create new green corridors that can link together existing outdoor recreation areas, such as those found in the existing Colne Valley Regional Park and at Cranford Park.

Figure 3.45: Our proposal for enhancing green space around Heathrow



Our plans will look at a wide range of measures that aim to enhance the natural environment and improve quality of life for local communities. These are outlined in more detail in Part 5. In summary they include:-

Providing access to quality green space. We will provide new, publicly accessible green spaces in the Colne Valley Park and other key areas around Heathrow. This will be achieved by purchasing land and investing heavily in landscaping new areas around the Airport. Our landscaping proposals will also help to screen the Airport from sensitive locations.

Improving pedestrian and cycle links. We will provide new pedestrian and cycle links to allow people to access and enjoy the new green spaces and recreational facilities from the surrounding areas. These plans include providing areas to the north of the airport (Harmondsworth, Sipson, and Harlington) with enhanced pedestrian and bike links to join them together and allow associations to be made with the park to the west, Cranford Park to the east and connecting into the London Loop long distance path.

3.10 Green space



Developing new public facilities: We are investigating opportunities to provide other facilities, such as new picnic areas, horse riding areas, mountain bike trails, outdoor gyms and a natural swimming pool in the park. There will be opportunities for informal recreation associated with the river and flood storage ponds in the west, and more formal gardens and play areas at Sipson. There will be new allotments at Harmondsworth, encouraging local residents to participate in food growing as well as new play areas for children.

Providing a network of wildlife-rich green spaces. The new green spaces will be designed to form an interconnected wildlife network, maintaining natural habitats and delivering improvements for biodiversity.



Maintaining river environments. The new runway will have significant effects on several local watercourses. We would purchase and develop the land required to divert existing river routes so we maintain and where possible, enhance the existence of river environments.

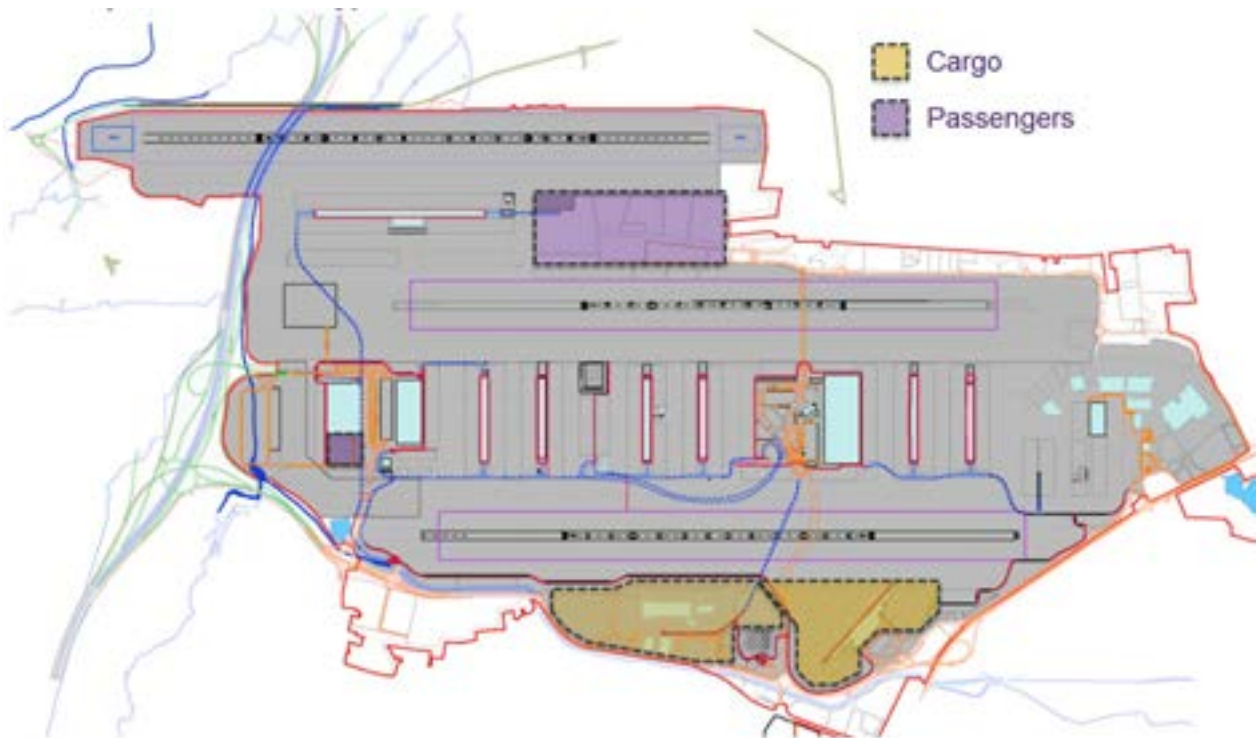
Providing new areas of flood storage: We will create new areas of natural and sustainable flood storage alongside the new and existing river routes to reduce flood risk and to improve flood protection for local communities. We are committed to treating local communities fairly and our plans will require extensive consultation to understand how those communities wish to see their local area developed.

3.11 Future flexibility

3.11.1 Flexibility for the future

A third runway at Heathrow is not just a short-term solution. Our proposed masterplan will provide sufficient capacity to meet the current envisaged passenger demand at Heathrow until at least 2040. This is nevertheless a long way off, and forecasts beyond this point cannot be sufficiently certain for anyone to say definitively whether or not more capacity at Heathrow will be required than could be delivered with the current expansion plan.

Figure 3.46 : Future expansion areas



However, it is likely that there will still be some incremental growth in demand beyond 2040 and our plan has been shaped to allow further expansion of core facilities beyond 2040 in a three-runway world. Growth will continue within the 740,000 ATM constraint as average passenger load factors and the average number of seats per aircraft in the Heathrow fleet continues to grow.

Space has been safeguarded at the western front door to allow this growth beyond 130 mppa. Terminal capacity would be added by extending the new building southward. The design of the building will be modular, as Terminal 5 and 2 were, in order to facilitate 'extrusion' to create more processing capacity.

New pier infrastructure would be placed in the northern apron area beside the one currently planned (see Figure 3.46). Extensions to the baggage and passenger connectivity systems have been planned in the current design in order to make this addition as simple and efficient as possible, particularly to avoid the need to dig up operational taxiways.

At some point in the future, Terminal 4 will come to the end of its economic life. The exact point at which this will happen will be subject to a detailed business case, which we recognise will bring both challenges and opportunities. The challenge is providing another 10 mppa of passenger processing capacity elsewhere on the airport to replace it. This can be done most effectively by building the extension in the west intended for incremental growth beyond 2040 at a sufficient size to also accommodate the Terminal 4 capacity.

3.11 Future flexibility

Consolidating the passenger traffic from Terminal 4 in this way would bring a number of advantages:

- All passengers would now be in 21st century terminal accommodation of a common quality and appearance, completing the transformation journey of the airport into a single, legible airport campus
- All passengers would be in terminals that have access to all public transport modes, driving a higher overall public transport mode share
- All passengers would have access to the transfer infrastructure and the minimum connection times that we have proposed
- The proportion of passengers using the two front doors will rise from 90% to 100%.

The opportunity would then exist to redevelop the Terminal 4 site. The most likely principal use would be for the substantial expansion of cargo handling facilities. This additional land would allow freight forwarding / warehousing facilities to be developed within the airport footprint, potentially removing HGV and van movements from local roads south of the current cargo facility. It would also be possible to provide further support facilities for the cargo operation, including overnight accommodation for drivers. It will be worth considering whether a future rail connection might become feasible, further reducing HGV traffic on roads, and potentially cutting freight delivery times to the regions.

3.11.2 Heathrow – Britain’s national asset

The 740,000 flights per year that a third runway would deliver would allow Heathrow to move ahead of other European hubs. Paris, Frankfurt and Amsterdam currently have capacity for around 700,000 flights a year. Our masterplan would give us enough runway, terminal and cargo capacity for Britain’s hub to outpace the competition. We would have better passenger terminals, better surface access and a better transfer experience. Our plans would allow Heathrow to win the global race for flight connectivity for Britain.

We have a track record of working with leading architects and designers such as Richard Rogers and others to create leading edge designs in Terminal 5 and Terminal 2. Heathrow will be Britain’s 21st-century gateway to the world and the first impression of our country for arriving visitors. We will use the unique opportunity of expansion to deliver a world-class airport of which the whole country can be proud.

Figure 3.47 : Our vision for an expanded Heathrow



References

- ¹ Heathrow Q6 Full Business Plan, January 2013
- ² ACI's Airport Service Quality survey for Heathrow, Q1 2014
- ³ Skytrax World Airport Awards – Best Airport Terminal, 2014
- ⁴ Skytrax World Airport Awards – Best Airport for Shopping, 2014
- ⁵ Consensus Economics – Economic Forecasts
- ⁶ US Energy Information Administration (EIA) Annual Energy Outlook, 2013
- ⁷ HMRC - <http://www.hmrc.gov.uk/air-passenger-duty>
- ⁸ DfT - UK Aviation Forecasts, January 2013
- ⁹ Airports Commission Interim Report, December 2013
- ¹⁰ NATS – Heathrow Airport, 3rd runway TAAM modelling report Version 1.5 May 2014
- ¹¹ DfT – Adding Capacity at Heathrow Airport (2007)
- ¹² ICAO rules - Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR), 2014 (Doc 9643, AN/941)
- ¹³ Airports Council International – Annual Traffic Data: Movements, July 2013
- ¹⁴ <http://www.airport-world.com/home/general-news/item/3739-40th-anniversary-of-paris-cdg-being-celebrated>
- ¹⁵ http://www.globalairportcities.com/page.cfm/Action=Exhib/ExhibID=11/PageOption=PageOptionFields_
- ¹⁶ Heathrow - DOKEN/Midhurst trial report 2014
- ¹⁷ Portland Communications – Consultation Report - (See Appendix 4 of this report)
- ¹⁸ <http://www.easycdg.com/1/passenger-information/connecting-flight-connections-paris-cdg-airport/transit-information/>
- ¹⁹ <http://www.fraport-groundsolutions.com/content/groundsolutions/en/misc/binaer/brochures/fraport-baggage-management/jcr:content.file/gepaeckbroschuere-nachdruck-2012-engl-fuer-web.pdf>
- ²⁰ Amsterdam Schiphol Airport – The Facts 2010

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Part 4

**Connecting
all the UK**



4.1 Introduction

Only Heathrow can bring the benefits of global connectivity to the whole of the UK. Heathrow already has excellent access to the strategic road network, a world-leading dedicated express rail service, and the UK's busiest bus and coach hub. We are also the only airport on the London Underground network. Through committed and deliverable rail projects, improvements to the bus and coach network and new flight connections to more regional airports, we can place Heathrow at the heart of the transport network and connect all of the UK to growth.

4.1.1 The UK's integrated transport hub

4.1.1.1 Building on strength

Heathrow is the UK's direct connection to the world and our country's only hub airport. Over the last 20 years we have invested over £2 billion in surface access, to support journeys to and from the airport. This, alongside our links to key regional airports, has helped to make Heathrow the best-connected airport to the whole of the UK.

We have excellent connections to the strategic road network, providing easy access to the airport for cars, taxis, inter-urban coach services and freight. We are also directly connected to the M25 and M4, with good access to the M1, M3 and M40. And with over 500,000 bus and coach movements a year, it is already the country's busiest bus and coach hub.

Our dedicated express rail service is a critical part of our surface access proposition, offering a fast, premium service to central London. It is designed to meet the needs of airport passengers and is industry-leading in terms of passenger experience (satisfaction: 96%¹) and performance (reliability: 99%²). Our passengers tell us that speed, reliability and convenience really matter – and this is central to the Heathrow Express service proposition.

As the only airport on the London Underground network, the Piccadilly Line offers an important public transport alternative for both passengers and employees. Services provide frequent and direct connectivity to West London, Central London and North London.

4.1.1.2 Connecting all of the UK to growth

Our strategy to improve rail, bus and coach services will allow faster and easier access to Heathrow from towns and cities UK-wide. New runway capacity will also enable connections to more UK regional airports, spreading the benefits of additional trade, tourism and economic growth across the whole country.

To maximise the benefits of this connectivity we will establish a Task Force for regional connectivity to develop policy proposals and recommendations for regional access to an expanded Heathrow. It will include representatives from regional airports, airlines, Chambers of Commerce, Local Enterprise Partnerships (LEP) and business people from around the UK. We will arrange for an expert and independent secretariat to support the work of the Task Force to ensure its outputs form a valuable contribution to the deliberations of the Airports Commission and towards future policy development.

Committed projects like Crossrail, Western Rail Access and High Speed 2 (HS2) will help transform rail connectivity to Heathrow, and Network Rail are developing proposals for the 'missing link' to the South. Thanks to existing and future connections by rail and road, Heathrow will be at the heart of the UK transport network.

This will enable direct rail connections to key economic centres in London (including the City and Canary Wharf) and the Thames Valley. Cities in the Midlands, the North, South Wales and the West of England will be brought closer to Heathrow, reducing journey times by up to two hours. It will make more of the UK attractive to international business and drive key Government objectives around rebalancing the economy.

4.1 Introduction

4.1.1.3 Local connectivity benefits

Improved connections will also benefit local communities around Heathrow. They will make these communities more attractive for residents and businesses, while reducing the need to travel by car. The demand generated by Heathrow helps to maintain the frequent bus, coach and rail services, increases travel choices for local communities and offers connections that would not otherwise exist. To support local connections, we will work with operators to improve the local bus network. We will also consult on extending the UK's only free travel zone, with the opportunity to provide free or discounted bus travel to Heathrow to more local communities. This will support more local employment and help to reduce traffic on local roads, which we know is important to local communities.



4.1.2 Our commitment to sustainable transport

For the last 20 years, the Heathrow Area Transport Forum (a forum of key stakeholders with an interest in surface access to Heathrow) has developed and delivered initiatives to encourage more sustainable patterns of travel.

Working with the Heathrow Area Transport Forum (HATF), we have implemented innovative solutions that have helped increase public transport mode share and reduce the number of employees driving to work. These include the world's largest single site car share scheme, the Heathrow Cycle Hub and the UK's only airport free travel zone for public transport. Our award-winning Heathrow Commuter initiatives support airport workers from over 400 companies across the airport, with discounted travel products and travel advice.

With the support of the HATF, we will continue to proactively manage Heathrow's impacts on traffic congestion and local air quality, and provide more choice and a better experience for all airport users.

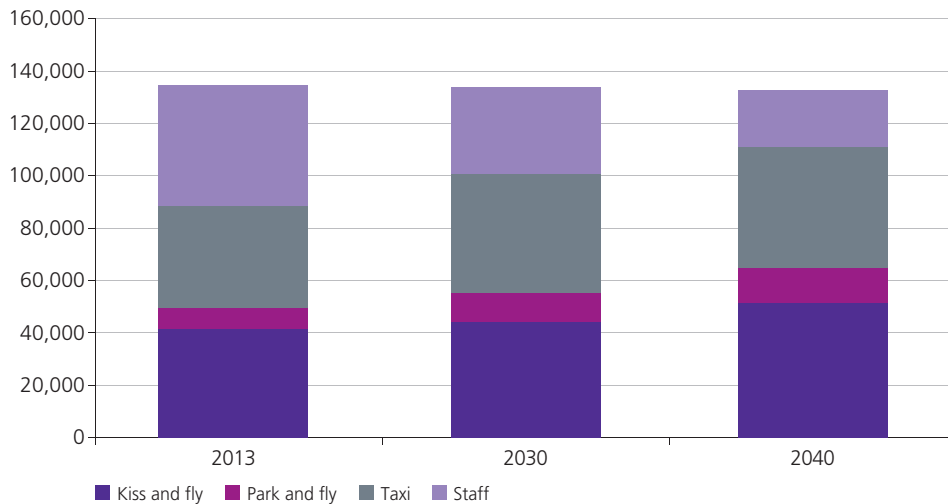
4.1.2.1 Growth without more airport-related traffic

We are committed to ensuring that growth at Heathrow can be delivered sustainably. This means limiting road traffic to and from the airport. Through improvements to public transport connectivity, more efficient use of cars and taxis and reductions in the number of employees driving to work, we can ensure that Heathrow expansion can be delivered with no more airport-related traffic on the road than today.

Our analysis has been based on forecast growth in passengers and airport workforce. It assumes passenger numbers increase from 70 million passengers per annum (mppa) today, to 100mppa in 2030 and 130mppa in 2040. There will be associated growth in the airport workforce, consistent with forecasts in Part 1, from 75,000 today to 90,000 in 2030 and 110,000 in 2040:

4.1 Introduction

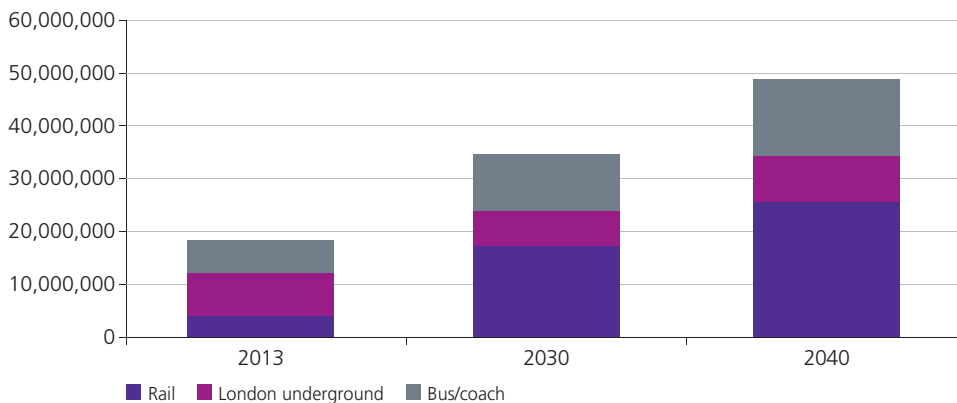
Figure 4.1. Heathrow road traffic forecast in 2013, 2030 and 2040³



4.1.2.2 A public transport-led strategy

Our strategy is public transport-led. Through new rail, bus and coach services we can increase passenger public transport mode share from 40.9% in 2013 to above 50% in 2030, and above 55% by 2040. This would mean almost 35 million public transport journeys per year in 2030 and close to 50 million per year in 2040.

Figure 4.2. Airport passenger public transport demand in 2013, 2030 and 2040

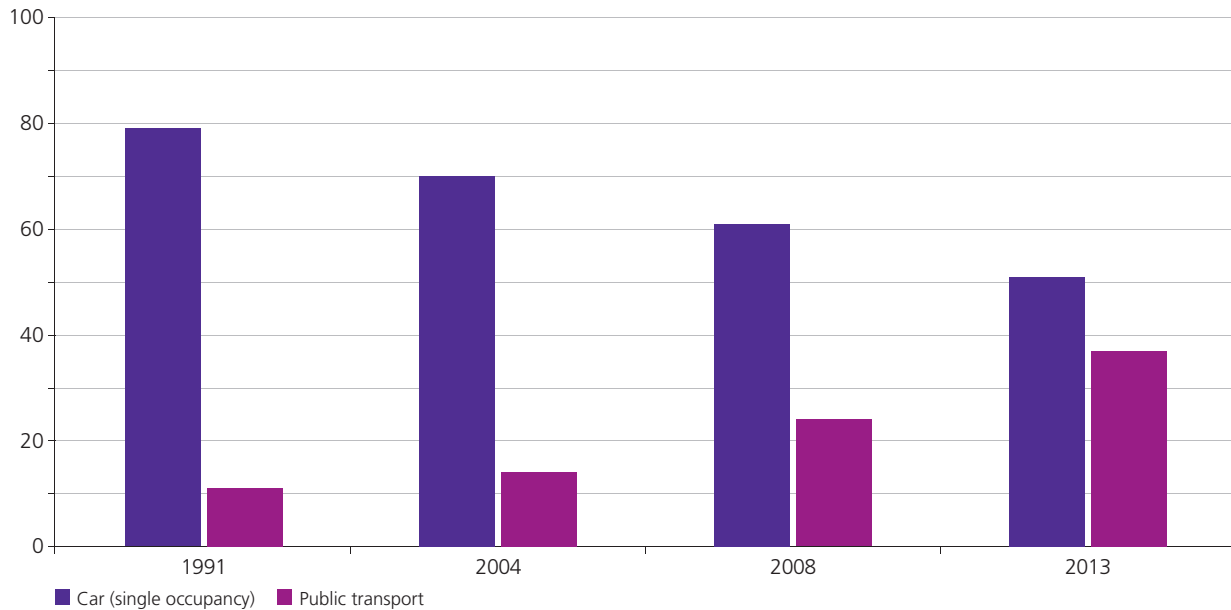


4.1.2.3 Award-winning Heathrow Commuter Programme

Over the last 20 years we have significantly invested in promoting more sustainable forms of travel, for which our commuter programme has won numerous awards. This good work has resulted in a reduction in employees driving to the airport from 79% in 1991 to 51% in 2013, which still equates to approximately a third of all of vehicle trips to and from the airport.

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Figure 4.3. Workforce mode share at Heathrow (1991-2013)



Our Public Transport Levy (PTL) is funded through proceeds from passenger and employee car parking. It supports a range of initiatives including local bus services, discounted public transport products, the world's largest single site car share scheme and the Heathrow Cycle Hub.

Future public transport improvements will be supported by a significant reduction in employee car parking. By 2030, just 24% of our workforce will drive to work in single occupancy cars, and public transport mode share will increase to 48%. By 2040, this will reduce further, with 10% of employees in single occupancy cars and public transport mode share increasing to 65%. Our masterplan proposals will bring more offices and employment close to public transport nodes to support this.

4.1.2.4 Making more efficient use of cars

We will deliver initiatives to make more efficient use of cars and taxis using Heathrow, reducing unnecessary vehicle journeys. We will cut the proportion of passengers dropped off at the airport and increase the number of taxis operating with passengers in both directions.

We believe there may be a case for introducing a congestion charge zone at Heathrow, once public transport improvements are in place. This would provide an opportunity to manage airport traffic levels and emissions by charging those with the biggest impact. We would wish to consult on many issues to ensure any such proposal is appropriate and fair, such as exemptions that could be offered to blue badge holders, low emission vehicles, local residents and licensed taxis.

A charging zone will provide an opportunity to ring-fence revenue (in the form of an enhanced 'Super' Public Transport Levy fund). This could be used to support funding of major surface access schemes, and to fund sustainable transport projects in the wider area to benefit local communities.

4.1.2.5 A more efficient freight operation

Freight and cargo plays an important role at Heathrow and in the wider UK economy. Through our masterplan we are seeking to facilitate growth with an expanded cargo facility to the south of the airport. We will work with operators to ensure a more efficient operation and minimise associated HGV movements.

Our analysis shows that load factors could be increased, enabling higher volumes to be delivered in fewer vehicles. We will also introduce vehicle booking systems to support backfilling vehicles, so that more vehicles are carrying

4.1 Introduction

loads in both directions. With more cargo capacity on airport, we can also reduce the number of shuttle trips to and from off-airport facilities.

We will also work with operators to reduce the impact of cargo and freight on surrounding roads. This will include re-timing deliveries to take place in quieter periods, agreeing routing patterns on appropriate roads and introducing cleaner vehicles into the fleet as technology improves.

4.1.3 Adding capacity, resilience and choice

4.1.3.1 A resilient network

A resilient transport network is critical to the operation of a major airport. Our strategy is not reliant on any one public transport or road corridor. We can offer choice to passengers and viable alternatives if there are incidents or disruption on any particular route.

There is sufficient capacity to support periods of engineering work and unplanned disruption. We have managed periods of engineering works on the Great Western Main Line (GWML) without significant impact on our passengers or the wider transport network. With more services in the future the impact of disruption will be reduced – spreading demand over different modes and routes means the change in passenger numbers on any given route will be less noticeable.

By road there is direct access to the M4 and M25, as well as good access via the M1, M3 and M40. The A4 and A30 provide supporting connections for more local traffic, as well as important alternatives when there is disruption. By creating a southern road tunnel access to Heathrow East and capacity improvements on the southern perimeter road, we are also improving the resilience of the on-airport road network.

We also have a resilient rail network. By 2030, a passenger travelling to London will have a choice of four different rail services at different price points – Heathrow Express, Crossrail, Piccadilly Line and Southern Rail Access – as well as coach services and taxis. If any service is not available due to planned engineering works or unplanned disruption, it will be possible for passengers to find a suitable alternative for their journey.

4.1.3.2 Increasing capacity

Current proposals will more than double the number of trains serving the airport per hour by 2030. There will be three times the number of seats per hour than there is today, increasing to 15,000 seats in each direction. This will ensure the necessary capacity to support growth in passengers and employees travelling to the airport.

Our proposals will also improve capacity on the M25. By separating Heathrow traffic from the mainline M25 through a system of collector-distributor roads, we will improve flow on the M25 for non-airport traffic. We have also allowed for additional lanes within our design, based on initial consultation with the Highways Agency.

4.1.4 An integrated approach to planning

4.1.4.1 Integrated planning for air, road and rail

Long-term planning for future aviation capacity through the Airports Commission is being undertaken alongside similar processes by Network Rail and the Highways Agency. We believe this offers a unique opportunity to plan the UK's infrastructure needs in an integrated way. In developing our proposals, we have consulted with key stakeholders including Network Rail and Highways Agency and have started discussions with Transport for London (TfL). This allows our proposals to be considered alongside the long-term planning processes for the national road and rail networks, as well as London's strategic planning.

By planning together we can ensure surface access improvements are embedded in the strategic long-term planning processes of Network Rail and the Highways Agency. We can build on investment in road and rail infrastructure to make Heathrow a truly integrated transport hub at the heart of the UK transport network.

Through engagement with Network Rail we have developed our rail strategy to ensure the right balance between airport, commuter and other users. At the same time we have developed train service patterns that are consistent

4.1 Introduction

with plans for the wider network and the expected capacity. We have also identified opportunities to explore additional services beyond our core assessment.

Through consultation with the Highways Agency we have been able to take account of the needs of all motorway users in developing our proposals. We have amended our masterplan to retain the existing M25/M4 junction, recognising its important role in the operation of the motorway network. Our proposals also provide an opportunity to make improvements to the M25. These improvements will benefit through traffic on the motorway, as well as enabling our proposals for Heathrow. A system of collector-distributor roads will separate traffic accessing Heathrow and the M4 from the main M25. Engagement with the Highways Agency has also informed our proposed access arrangements to the new Heathrow western 'front door', to include a one-way loop using the existing junction 14a and an enhanced junction 14 of the M25.

We have also begun discussion with TfL around how our plans can be developed to support strategic planning in London. We intend to work with TfL to assess our proposals alongside their forecast for population growth such that our plans are consistent with the long-term planning of London's infrastructure.

4.1.4.2 Engaging with local communities

Through public consultation and ongoing engagement, we have heard some of the key issues for local communities. We did not directly consult on our proposals for surface access as part of the most recent public consultation. However, feedback has been useful to help guide the development of our strategy. We recognise that issues such as traffic congestion, HGVs 'rat running' and inappropriate parking are important to local people. Therefore, we will continue to engage with local authorities and their residents to guide our proposals and develop solutions to tackle these challenges.

Feedback from the consultation also showed that there is support for improved public transport connections to Heathrow from local areas, including better local bus connections and ensuring routes directly serve the terminals. New rail connections are considered vital in providing better access to the airport from outside of London, as well as providing relief to the Piccadilly Line. New routes to Staines, Slough, Maidenhead and Waterloo were identified as desirable, as well as more general comments regarding new connections to the south. The wider role of Heathrow as a transport hub was also recognised.

We have begun engaging with local authorities, including attending individual meetings and other stakeholder forums such as West London Panel. We will continue to engage with local authorities on proposals for the local road network and public transport schemes. The existing HATF will play an important role, as it brings together local authorities and transport operators, as well as regional and national transport bodies.

4.1.5 Structure

The remainder of this part of the report is structured as follows:

- **Chapter 2: Our surface access strategy**
This outlines the proposed new infrastructure and public transport services at Heathrow in the future, as well as other behavioural interventions that would be delivered to support our surface access strategy;
- **Chapter 3: Connectivity benefits**
This explains how UK connectivity will be improved through increased regional air services and our surface access strategy;
- **Chapter 4: Surface access demand and mode share**
This describes the modelling tools used to predict demand in 2030 and 2040, and the expected mode shares and traffic forecasts for passengers and employees; and
- **Chapter 5: Capacity assessment**
This summarises the road and rail capacity assessments undertaken for Heathrow, and considers how the proposals would impact on the wider transport network.

4.2 Our surface access strategy

We have invested significantly in promoting and delivering sustainable transport. Heathrow will see a step change in rail access and a more extensive bus and coach network. We will implement innovative solutions to improve passenger journeys, encourage public transport and ensure more efficient use of private cars and taxis. Initiatives to make more efficient use of cars and reduction in employee parking will further support public transport use. Ultimately, Heathrow can expand with no more airport-related traffic than today.

4.2.1 Improving rail connectivity

Committed rail projects will increase rail services to Heathrow to support more sustainable patterns of travel, improve connectivity and reduce journey times to the airport. These services focus on improving connections to important locations of airport demand and key economic centres across the UK.

We have been consulting with Network Rail, who will provide a separate report to the Airports Commission, to develop a credible and deliverable service proposition. Our surface access strategy has been developed in collaboration with Network Rail, taking into account their wider long-term planning process. We will continue to engage on our rail strategy through Network Rail's Long Term Planning Process.

We have also begun discussion with TfL around how our plans can be developed to support strategic planning in London.

4.2.1.1 Direct connections matter

Research shows airport passengers don't like changing between different public transport services – the 'interchange penalty' is significant. We have therefore sought to develop a strategy that delivers direct connectivity to the airport where possible. Where interchange is unavoidable, this will be encouraged at key strategic interchanges, where the needs of airport passengers can be readily accommodated.

4.2.1.2 Committed and deliverable projects

Our strategy is built around the existing rail network and a solid foundation of committed projects:

- Heathrow Express and Crossrail
- Western Rail Access
- Piccadilly Line upgrade
- High Speed 2

4.2.1.3 Heathrow Express and Crossrail

Since it began operating in 1998, Heathrow Express has offered a fast, dedicated, direct, premium service for airport passengers. It is designed specifically for the needs of airport passengers with level access, wider doors and generous luggage racks. On-board services include free Wi-Fi, at-seat power sockets and comfortable seating, delivering high levels of passenger satisfaction. In the most recent rail user Passenger Focus survey, Heathrow Express scored highest of any rail service in the country for passenger satisfaction (96%).

Our strategy will see Heathrow Express continue to operate its service from Paddington to Heathrow at four trains per hour (tph), extending to Reading when Western Rail Access is complete. Heathrow Express is a critical part of the surface access proposition, particularly for business passengers.

4.2 Our surface access strategy



In 2019, full Crossrail services will begin serving Heathrow, also at 4tph, offering a complementary service to Heathrow Express and the Piccadilly Line. Crossrail will provide a direct connection to the West End, the City, Canary Wharf and East London. It will also offer onward connectivity to a wide range of destinations through interchanges at locations such as Farringdon, Liverpool Street and Stratford.

As Heathrow grows, additional Crossrail trains serving Heathrow will provide higher frequency and more capacity. Network Rail has indicated that increasing the service to at least 6tph is possible, and we wish to explore opportunities for this to be expanded further to 8tph.

It may also be necessary to increase Heathrow Express service frequency, particularly when high speed rail services begin serving Old Oak Common.

4.2.1.4 Western Rail Access

In 2021 Western Rail Access to Heathrow will provide a west-facing connection to the Great Western Main Line (GWML), offering direct services to Reading, Slough, Maidenhead and Twyford. We are proposing a 4tph service to Reading with at least 2tph direct services continuing to Oxford. We believe that a dedicated premium service such as Heathrow Express is best placed to serve these key destinations in the Thames Valley.

We recognise there could be opportunities for long-distance services to be diverted via Heathrow and we look forward to exploring these with Network Rail. However, these have not been included in our core assessment at this stage.

4.2.1.5 Piccadilly Line upgrade

The Piccadilly Line upgrade is a committed project. Timescales for delivery have not been finalised, although the Airports Commission baseline indicates delivery by 2026. The scheme will increase line capacity by 60% through a new signalling system and trains. It will allow faster and more frequent services – making possible up to 18 tph serving Heathrow.

4.2.1.6 Southern Rail Access

Southern Rail Access will improve rail connectivity to key catchments in South London, Surrey, Hampshire and the South Coast. These connections have significant support from Surrey County Council, the Thames Valley and Enterprise M3 Local Enterprise Partnerships (LEPs), as well as Hounslow and Wandsworth Borough Councils. It was recognised in Network Rail's 2011 Route Utilisation Strategy as a strategic gap in the rail network.

As a result of the recommendation from the Airports Commission, in its interim report the Department for Transport (DfT) instructed Network Rail to initiate a project to consider the options for providing this connection. Completion of this study is expected in summer 2015, with design and development to follow.

4.2 Our surface access strategy

For the purposes of our assessment we have assumed new rail infrastructure connecting Terminal 5 to the Windsor lines. This will enable a service stopping at Staines, Feltham, Twickenham, Richmond and Clapham Junction with services terminating at Waterloo. We have included a 4tph service in our core assessment.

We believe there is a strong case for Woking, Guildford, Basingstoke and Southampton to be better connected to the UK's hub airport. Due to existing capacity constraints at Woking we have not included this in our core assessment. This should be considered in more detail as part of the Southern Rail Access study to assess the benefits of new connections to Heathrow so they can be compared against other priorities.

4.2.1.7 High Speed 2

In 2026, high speed rail services will commence between London and Birmingham. Heathrow will be served by a connection at Old Oak Common. Frequent Heathrow Express and Crossrail services will connect Heathrow to Old Oak Common with a journey time of around ten minutes (by Heathrow Express) and a train to Heathrow every 5-6 minutes. It will be particularly important to ensure that the station at Old Oak Common allows easy interchange for airport passengers between high speed and airport rail services.

For the purpose of our core assessment we have assumed a connection to the high speed network via Old Oak Common. We have also safeguarded a station at Heathrow West in line with HS2 Ltd plans. Connecting to the new high speed network via Old Oak common will significantly cut journey and avoiding multiple interchanges through London.

Current Government policy is for a spur to Heathrow to be delivered as part of Phase 2 by 2032. Whilst the spur is not critical to our strategy for growth, we believe there is a strategic case to integrate the high speed rail network with Heathrow. This is in line with international best practice at airports around the world and supported by policy at European level, which sets out that all main European airports should be on the high speed rail network by 2050.

A recent review of the HS2 project by Sir David Higgins identified a number of opportunities, including the potential to bring forward Phase 2 and increase the benefits by connecting HS2 to rail hubs in the North, such as Crewe. Heathrow could provide similar opportunities for wider connectivity in the South, particularly when taking into account the opportunities to interchange onto Western Rail Access and Southern Rail Access.

We will continue to work with DfT and HS2 Ltd to identify the optimum solution for providing fast, frequent connectivity between the North of England and Scotland and Heathrow.

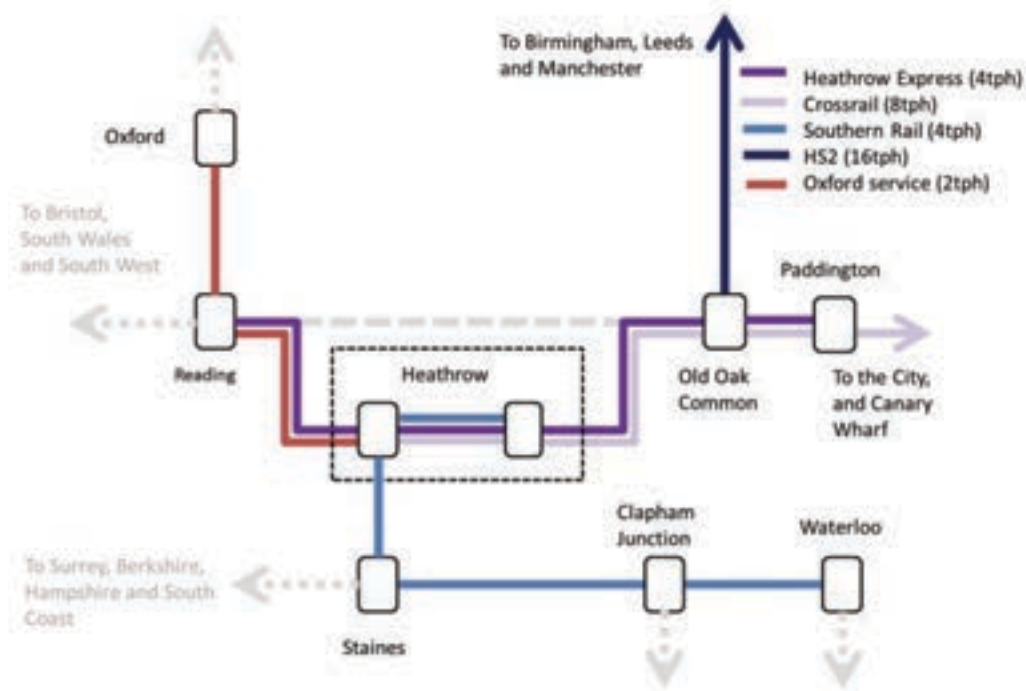
4.2.1.8 On-airport operations

The current rail stations in the Central Terminal Area would serve Heathrow's new eastern 'front door' and the existing stations at Terminal 5 will be extended to serve the new western 'front door'. Rail services to Terminal 4 would need to be stopped to allow more trains to travel through Heathrow and to increase frequency on the main public transport spine. Piccadilly Line services would continue to serve all the existing airport stations.

A high-frequency, multi-modal public transport spine between Heathrow East and West is central to our masterplan. To facilitate through-running rail services at Heathrow, turnback facilities to the east and south of the airport would be built. These would allow Crossrail services to terminate south of the airport, with services on the Southern Rail Access terminating at Heathrow East and continuing through to the turnback at Airport Junction. This will allow use of the rail infrastructure to be capacity optimised and enable all trains to stop at both Heathrow East and West. We will continue to consider the details of this scheme with Network Rail.

4.2 Our surface access strategy

Figure 4.4. Future rail service patterns



4.2.2 Developing our bus and coach network

Bus and coach services play an important role at Heathrow. More than five million airport passengers and 25% of employees travel by bus or coach every year. They provide a flexible alternative to rail services, are able to serve more effectively, dispersed areas of demand and provide crucial early morning public transport connections to support the 24-hour operation of the airport.

4.2.2.1 Local bus services

31 bus routes currently serve Heathrow at a frequency of around 80 buses per hour. This includes 13 routes that provide early morning or 24-hour services, allowing shift workers to access the airport by public transport for a 4am shift.

We will work with operators and local authorities to develop the bus network at Heathrow, focusing on providing more frequent services on existing routes, increasing the number of early morning and 24-hour services and providing new routes where there are gaps in the network. We propose that improvements will include:

- Enhance north-south connectivity through Hillingdon, turning one of the existing routes (for example, U3) into a 24-hour service to serve key employee catchments, and explore options for a new or extended route to Ruislip
- Provide a new route to Wembley, potentially via Ealing, to serve key employee catchments
- Increase the frequency and better promote existing bus routes to the south of the airport – particularly route 555, which operates at two buses per hour in peak times but serves dense employee catchment areas
- Review existing bus services that serve areas to the West (Slough, Maidenhead, Windsor) with frequency improvements and potential for 24-hour running of some routes
- Explore new east-west route serving catchments along the N9 route during the day.

4.2 Our surface access strategy

Our masterplan will allow bus routes to serve both Heathrow's east and west nodes. This will reduce the need for employees to change bus services and provide more direct routes. Bus landside connectivity operating to the south of the airport rather than the north will allow more frequent bus routes serving the cargo facilities and other key employment sites.

Figure 4.5 Heathrow local bus network



4.2.2.2 The free travel zone

Heathrow's strong track record of providing financial support for bus services will continue. We will also extend the airport free travel zone, subject to consultation with local authorities and surrounding communities. One option is to extend it along corridors that serve the immediate local communities to offer free or significantly discounted connections to the airport for employees and local residents. This process has already started with recent changes to the 557 route, to enable residents of Stanwell Moor to access the airport using free bus services. Incorporating further routes would be aimed at improving local connectivity and reducing traffic in the immediate surrounding areas.

4.2.2.3 Inter-urban coaches

Heathrow is easily accessible by coach services due to its location on the strategic road network. It already operates as an important hub for National Express which serves over 75 major towns and cities from Heathrow by coach. The coach network is supported by more than just airport passengers; around 25% of those using the Central Bus Station at Heathrow are coach passengers changing between services not related to the airport.

Working with operators at the airport to develop the bus and coach network we will look at:

- Corridors with existing good coach demand and the potential for growth through marketing and promotions;
- Local catchments where they may be innovative solutions to investigate;
- A short- or medium-term solution for connectivity where a long-term rail solution is sought;
- Gaps in connectivity where a rail solution does not currently exist;
- Services that would enhance the overall coach network, such that they sustain and support the bus and coach hub at Heathrow.

4.2 Our surface access strategy



Where there are suitable opportunities to do so, the Public Transport Levy could be used to facilitate the introduction of new coach services.

Our strategy will see significant growth in the number of coach passengers at Heathrow. We have identified a number of opportunities that would complement our rail proposals, helping to support higher public transport mode shares and providing more choice for airport passengers. Our proposals include the following:

- Increase the frequency of existing services or add new routes to serve Southampton, Basingstoke and Swindon with more coaches;
- Develop the route network to serve High Wycombe and Wokingham, either through a stop on existing services (such as Oxford Airline, Reading Rail Air) or a new route;
- Assess opportunities to serve North West London by coach, making use of the existing hub at Golders Green;
- Undertake marketing and promotion of existing coach routes to Cambridge, Cardiff and Brighton – identifying opportunities to enhance the proposition and raise awareness;
- Introduce a new south London route to serve locations such as Bromley, Croydon and Sutton;
- Support a new alternative route to Milton Keynes via Aylesbury, increasing frequency and providing new routes
- Introduce enhanced services to Surrey to connect to Guildford and enhance frequency to Woking.

4.2 Our surface access strategy

Figure 4.6. Heathrow coach network



4.2 Our surface access strategy

4.2.3 Delivering an efficient road network

The strategic road network provides easy and flexible access to Heathrow. There is direct access from the M4 and M25, good access from the M1, M3 and M40, and important local access provided by the A4 and A30 routes. This range of routes offers resilience - with alternative options should there be problems on the road network.

We are consulting with the Highways Agency to understand the current and future issues. Initial engagement has focussed on the following issues:

- Meeting the long term needs for the M25 between J13 and J15;
- Providing the necessary access for a three-runway Heathrow so that all parts of the airport are served; and
- Ensuring the M25 tunnel under the third runway is deliverable in all aspects.

We will continue to work closely with the Highways Agency to develop our proposals for the motorway network to ensure it meets the needs of all users.

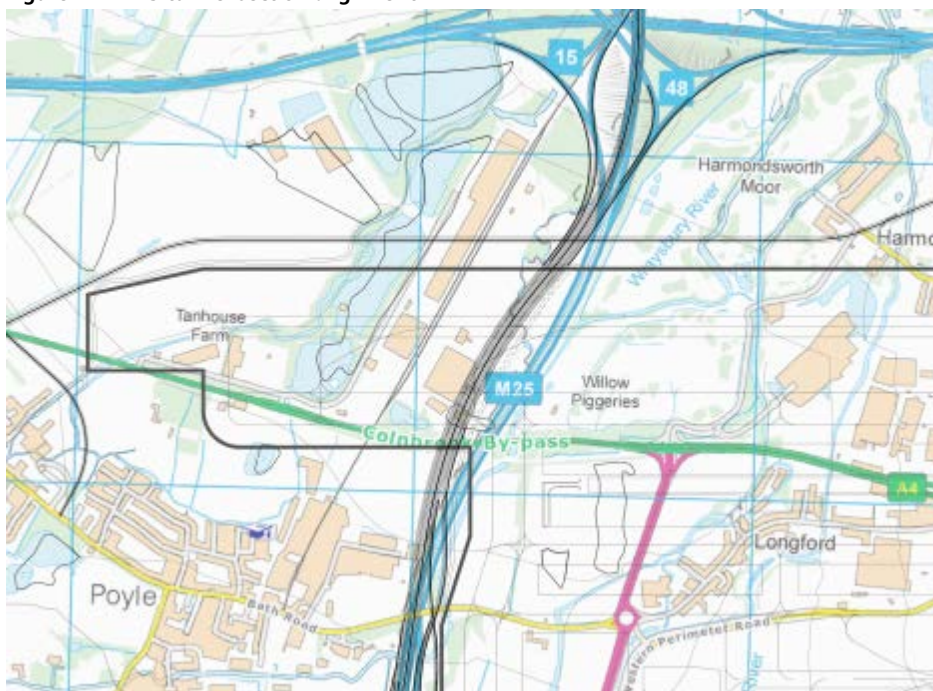
4.2.3.1 Motorway network

The sections of the M25 and M4 close to Heathrow are some of the busiest parts of the UK network. Between J13 and J15 the M25 carries over 100,000 vehicles per day in each direction. The proximity of junctions and complexity of movements between the M4, M25 and Heathrow causes issues with weaving and merging traffic, in turn causing delays to through traffic on the M25 and slow average speeds in peak hours.

The expansion of Heathrow will provide an opportunity to make changes to the network, to improve its operation and increase capacity where needed. We have developed our proposals in consultation with the Highways Agency and we will continue working together to develop the scheme further.

The M25 would be placed in sections of tunnel under the new runway. Our work shows that these could be constructed off the current alignment of the M25 allowing the new sections to be completed prior to closing the existing carriageway (see Part 6, Chapter 8). Short connecting tie-in sections would need to be built on the main carriageway – this work could be delivered using temporary traffic management as appropriate.

Figure 4.7. M25 tunnel section alignment



4.2 Our surface access strategy

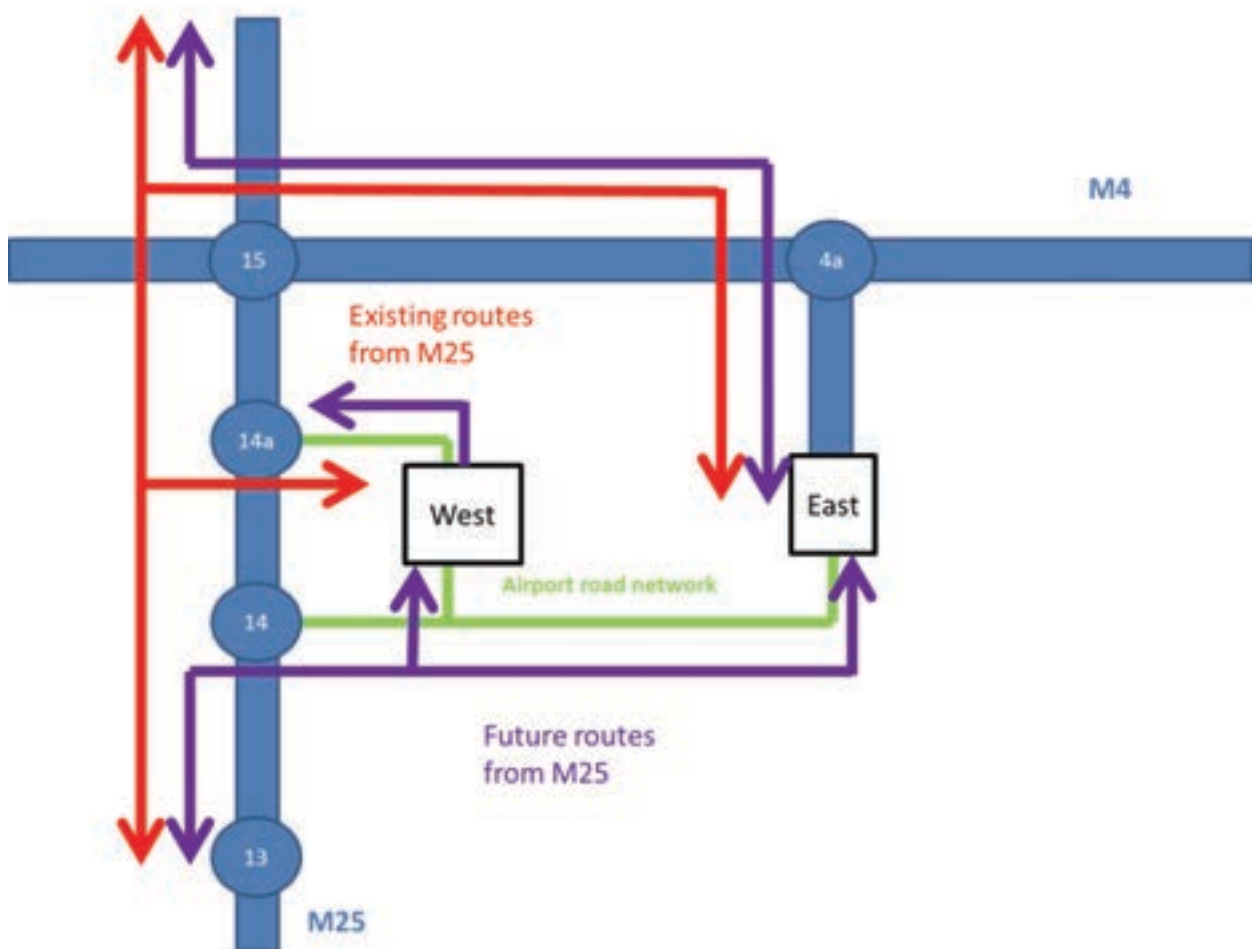
Under our proposals we would retain the existing M25/M4 junction, recognising its importance to the operation of the motorway network. Work to lower some of the slip roads at the junction will enable connections to the new tunnelled sections.

A system of collector-distributor roads would be constructed to segregate through traffic from traffic joining or leaving the M25 between J14 and J15. This will reduce the number of locations where traffic joins and leaves the M25. It will also improve traffic flow on the mainline M25 for all – reducing the weaving that currently takes place by removing the need for large volumes of traffic to cross lanes, which slows traffic speeds.

Access to Heathrow is currently signed from J4 of the M4 (Terminal 1, 2 and 3), and from J4b (via M25 for Terminal 4 and Terminal 5), J14 (Terminal 4) and J14a (Terminal 5) of the M25. We will construct a new Southern Road Tunnel access to the Heathrow east node, which will enable traffic travelling from the south on the M25 to access the airport from J14. This will reduce driving distances and improve resilience. We estimate that around one third of traffic accessing the Central Terminal Area will re-route via the southern road tunnel, helping to reduce traffic using the M4/M25 junction, M4 and spur.

A new one-way access arrangement will be introduced for the Heathrow West campus, making use of an enhanced J14 for access. Traffic would exit via J14a, making use of the existing structure and slip roads.

Figure 4.8. Heathrow Road access arrangement



4.2 Our surface access strategy

4.2.3.2 Local and on-airport road network

Our proposals will divert the A4 to the north of the airport, leaving its current alignment at Colnbrook Bypass and re-joining its existing route to the east of the airport access at Emirates Roundabout at a new junction. This new route will be re-provided as a dual carriageway with existing bus priority measures.

Where possible, we will maintain existing connectivity on the local road network and minimise severance. To replace the section of the A3044, which will be under parts of the new airfield, a connection from the A4 to Poyle will be provided. This will avoid re-routing through less appropriate local routes.

The existing Western Perimeter Road and part of the Northern Perimeter Road will be removed to accommodate the new runway and associated airfield infrastructure. A new Southern Road Tunnel to Heathrow East will be constructed to provide flexible access options, helping to reduce travel distances and traffic on parts of the strategic road network. The Southern Perimeter Road will provide the main landside connection for vehicles and the existing junctions will be upgraded to accommodate the increase in traffic flows.

The roundabout junction where Airport Way meets the Southern Perimeter Road will be grade separated to allow dedicated access to Heathrow West and segregate through movements on the Southern Perimeter Road. There would also be a new and improved junction on the Southern Perimeter Road to allow access to the Southern Road Tunnel. The remainder of the airport road network remains unchanged.

As the proposals are developed further, we will undertake more detailed junction capacity assessments to identify requirements for localised improvements to capacity. We will work closely with local authorities to identify where improvements might have wider benefits – for example, to resolve existing bottle necks, ease traffic flow and improve journeys for local buses and cyclists. We will continue to engage with local authorities and communities to develop proposals for the local road network.

Delivering an efficient on-airport road network will also require effective enforcement of parking restrictions on terminal forecourts. We will continue to work with the Department for Transport to implement the South East Airports Task Force recommendation to establish an airport specific parking enforcement regime. As was set out in the Task Force's final report, such a regime would decrease congestion on forecourts, improve safety and security as well as reducing emissions and pollution.

4.2.3.3 Cycle network

Through our Heathrow Commuter initiatives we will increase the number of people cycling to work at Heathrow. With over 50% of airport employees living in Heathrow's surrounding five boroughs, there is significant potential to increase cycling levels.

We are currently working with surrounding local boroughs to develop plans around improving the cycle network. This will provide better connections to the airport, as well as on-airport routes, and enable safe, convenient and efficient access to the airport for cyclists. We will do the same for an expanded Heathrow.

We already provide cycle parking at all key locations and workplaces around the airport, we will continue to provide high-quality facilities for cyclists as we seek to expand Heathrow. A network of cycle routes will be planned around Heathrow to meet the needs of users in the local area – developed through consultation with local authorities, cycling groups and other stakeholders such as Sustrans.

The Heathrow Cycle Hub has over 2,300 members and offers discounted cycles and equipment, free labour on maintenance and training to all airport employees. We are seeking to further develop this offering and provide additional and improved services to members. This includes enhancing facilities to provide more cycle parking and aspirations to develop it into a gateway to the airport for cyclists.

By providing a full service facility with shower and changing facilities, as well as fast and frequent landside connections to all parts of the airport, the Heathrow Cycle Hub could provide a single point of entry to an expanded Heathrow for cyclists from the north of the airport. It would be possible to build similar hubs at key entrances to the south and east of the airport, enabling fast and easy access for cyclists and serving the key employment locations on site.

4.2 Our surface access strategy

4.2.4 Influencing travel behaviour

4.2.4.1 Improving information and technology

Technology and information are now an important part of the surface access journey to an airport. Wi-Fi and mobile broadband are increasingly available at airports, railway stations and on board trains, buses and coaches. This helps to make journeys by public transport more productive and enjoyable.

Use of public transport is becoming easier through increased use of smarter ticketing technology. Contactless cards are commonplace and use of mobile devices is increasingly prevalent, making ticket purchasing easier and faster. There will be more examples of integrated public transport ticketing services and better integration with airline ticket purchasing. Examples already exist at Heathrow (Heathrow Express, First Group and Singapore Airlines) and in Europe, where Lufthansa offers integrated flight and high-speed rail tickets. We expect such through ticket offers to become commonplace for air travellers in the 2030s.

We are developing Onward Travel Zones in all of our terminals over the next five years. In the future these will be fully interactive, providing support to passengers planning and making journeys and ensuring they can choose the best surface access mode for their needs. Once a journey is chosen many people will then use mobile devices to navigate them live in real time.

Uncertainty about public transport is a major barrier to using it. Waiting for a bus, coach or train service to arrive can be stressful, particularly for a passenger on their way to catch a flight. This can make public transport seem a less attractive prospect than the alternative journey by car. We are committed to providing better information for passengers, including real-time information with accurate arrival times and multi-lingual services providing confidence to users. This will provide more certainty on the reliability of public transport compared to the car.

4.2.4.2 Making more efficient use of private cars and taxis

Our initiatives will make more efficient use of the cars and taxis that travel to Heathrow. This will support more effective use of the road network and reduce emissions.

Heathrow's own analysis shows that many taxis and private vehicles drop off at the airport and so have an empty return journey. This results in approximately 40,000 additional vehicle movements a day to and from Heathrow. This represents over 25% of current car trips to and from Heathrow so reducing them is an important part of our strategy.

We will ensure that sufficient passenger car parking is provided to meet demand without discouraging the use of public transport. If passenger parking is overly constrained, there is a risk that more passengers will switch to taxis or 'kiss and fly', which would generate more traffic from empty return trips and associated emissions.

We will develop a solution to match passengers to drivers that have dropped off at the airport. This will reduce unnecessary traffic movements, benefit taxi drivers by providing a fare in both directions, and potentially support taxi sharing by matching passenger journeys to similar destinations. Membership of this scheme could be predicated on prescribed passenger service standards and vehicle environmental performance.

To support the use of public transport and more efficient use of cars, we will consult on a congestion charge zone for Heathrow. This would only be introduced once suitable public transport alternatives are in operation. We would wish the proposals to be appropriate and fair so that, for example, appropriate exemptions are in place which could include disabled passengers, taxis or local communities. Such a concept could bring significant benefits, helping to reduce traffic movements to Heathrow, reduce emissions and support more sustainable travel patterns.

A congestion charge has the potential to generate significant revenues that could retrospectively fund contributions to major rail, London Underground and road infrastructure improvements. Revenues could also fund sustainable travel initiatives, public transport service improvements and local community transport projects. We will complete further feasibility work to determine the geographical extent of the zone, charging levels and any legal powers required to implement a system.

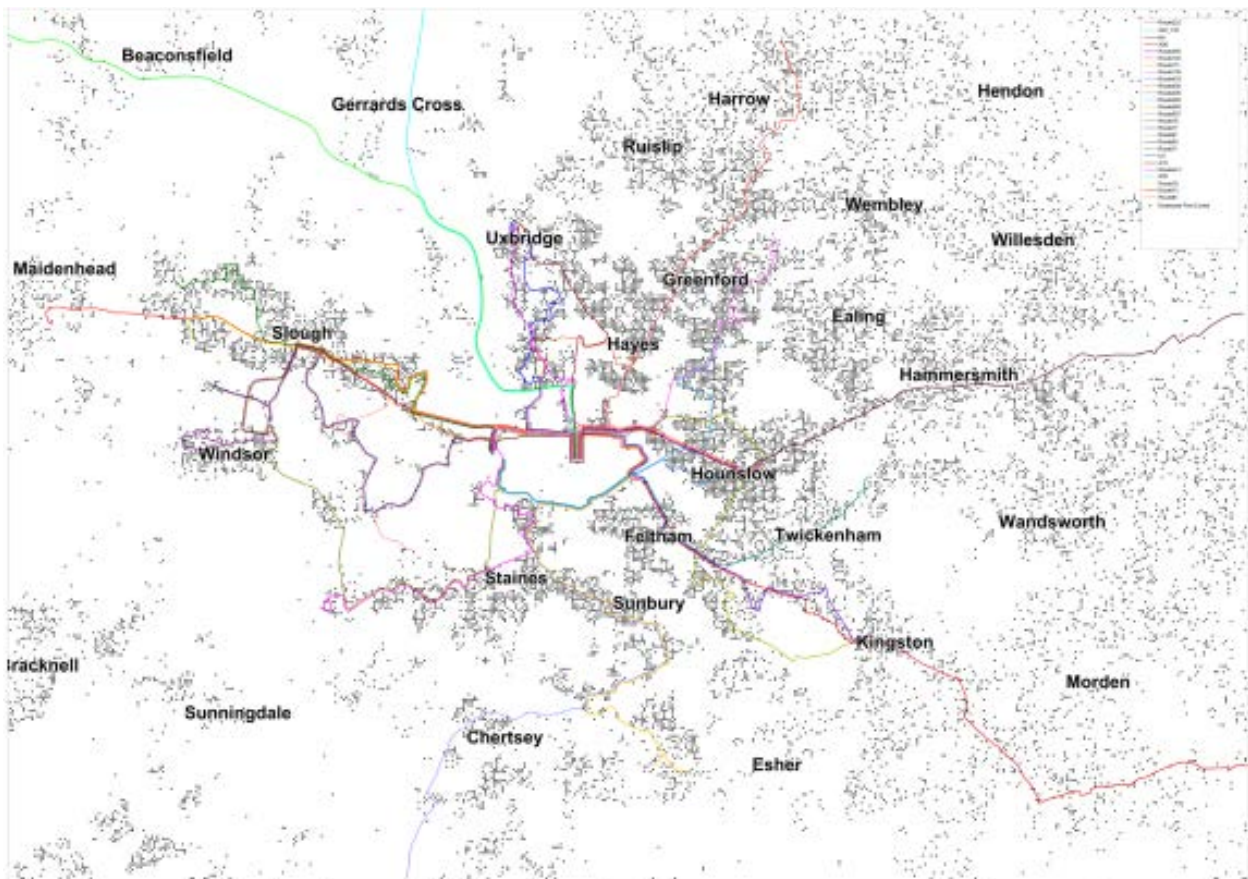
4.2 Our surface access strategy

4.2.5 Managing workforce travel

Workforce travel is important to Heathrow – getting people to and from the airport is critical to its operation. In 2040, a third of trips to and from the airport will still relate to employee journeys. These are repeated journeys that can be more easily influenced than passenger journeys. Encouraging more sustainable patterns of employee travel is therefore central to our surface access strategy.

Through better public transport services, and stricter parking management policies, employees travelling by single occupancy private vehicle will continue to reduce to 24% by 2030 and 10% by 2040. As public transport improves and access to parking reduces, we believe that more employees will choose to live in areas with good public transport links to the airport. The evidence shows this is already happening today:

Figure 4.9. Workforce agglomeration around public transport routes



Our masterplan will also support the use of public transport. Relocating employment land uses close to public transport nodes and areas served by frequent services will make it easier for employees to travel to work by public transport, by reducing overall travel times and the need to interchange between services.

4.2 Our surface access strategy

4.2.5.1 Personalised travel planning

We are committed to promoting personalised travel plans for the airport workforce through our Heathrow Commuter Team. This will ensure that people are aware of the choices available to them and support the use of more sustainable modes. Softer measures such as marketing campaigns have been successful in influencing behaviour, as shown during the London Olympics and through schemes such as Smarter Travel Sutton. Building on these approaches will be important to support growth at Heathrow.

We intend to introduce personalised travel plans for each person who starts work at the airport, to establish sustainable patterns of travel from the outset, rather than having to change established behaviour. Where possible we will encourage use of public transport, car sharing and cycling. There are also opportunities to reduce car use by encouraging occasional use of alternative modes. For example, if all current car drivers found an alternative mode one day a week, workforce-related traffic would reduce by 20%.

4.2.5.2 Discounted public transport travel

Heathrow already offers a wide range of discounted travel products to all employees working at the airport. This includes monthly and annual passes for a range of bus and coach routes (ranging from £25 to £100 a month), Heathrow Express (£180 a month) as well as a 75% discount on Heathrow Connect tickets.

Our discounted product range will be expanded to new bus, rail and coach services. We want to offer discounts on TfL public transport services. With a predominantly local workforce, this could be limited to the immediate surrounding boroughs or particular routes, helping to support local employment and encourage more sustainable patterns of travel.

4.2.5.3 Managing workforce parking

There are currently approximately 27,000 employee car parking spaces at Heathrow, including 15,500 controlled by the airport. By 2040, we expect this to reduce by 50%.

This will need to be a gradual, managed process, and we will work with stakeholders to agree new parking policies and processes. Priority will be given to car sharers and low emission vehicles to promote more sustainable patterns of travel. Policies and procedures will be developed in partnership with airlines and other key Heathrow employers to ensure a fair and reasonable process for allocating parking passes. An outline of the key steps is set out below:

- **Promote integrated, centrally-managed car parking and sustainable travel** – car parking passes would be managed centrally to enable all travel options to be considered;
- **Establish a 'needs-based' assessment** – a new parking policy would allow a needs-based approach to the issuing of car parking passes, to prioritise users. This would be based on mobility, business need, social need, sustainability (low emissions and car sharing) and geographical location;
- **Offer more flexible parking passes** – featuring incentives for car sharing or less frequent usage. Passes would be paid for based on use, rather than simply owning a pass, to incentivise more sustainable behaviour;
- **Introduce more frequent renewal** – moving towards time-limited issue of passes requiring a more frequent assessment of need, as new public transport options are provided at the airport;
- **Reduce parking spaces and parking pass availability over time** – as the airport grows, the number of passes on issue and spaces available to employees will be reduced to encourage a shift to public transport.

We will run campaigns to raise awareness and promote incentives for employees to give up their parking passes and similar to what was implemented (a temporary 'Car Park Pass Swap') during the London Olympics.

We recognise that there are cases of inappropriate parking in local communities. We will work with residents and local authorities to develop solutions to ensure employees and others are not parking in local roads. This could include Heathrow funding the introduction of resident permit parking, supporting enforcement and working with employers and employees to change these behaviours.

4.2 Our surface access strategy

4.2.6 A more efficient freight operation

Freight and cargo are important to the airport operation, airline businesses and the wider UK economy. There are significant benefits to growing the capacity of the cargo operation at Heathrow. This will need to be managed carefully to minimise the impacts of Heavy Goods Vehicles (HGV).

Through servicing, deliveries and cargo operations, we estimate Heathrow generates around 12,500 vehicle movements a day. Almost 75% are related to cargo and mail operations. The majority of vehicles are vans (52%) with the remainder being heavy goods vehicles (either rigid or articulated).

Without intervention, we forecast a 30% increase in freight-related vehicle movements by 2030 and a 60% increase by 2040, equating to around 8,000 additional vehicle movements a day. While this would be a small proportion of the existing traffic on the wider road network, we recognise the potential negative impacts that freight traffic can have on local communities through disturbance, emissions and congestion. Therefore, we have developed a strategy that seeks to limit freight vehicles to similar levels to today.

4.2.6.1 Operational efficiency

We will work with operators to make the freight operation more efficient. This will include optimisation of the fleet mix, higher load factors and provision of more on-airport capacity to reduce shuttle movements to the local warehouses.

As the cargo operation grows, there will be opportunities to improve efficiency through economies of scale. Ensuring the right vehicle for each job will help to make more efficient use of the vehicles serving Heathrow and reduce overall movements.

Our analysis shows that load factors could be increased, enabling higher volumes to be delivered in fewer vehicles. We will also introduce vehicle booking systems to support backfilling vehicles, so that more vehicles are carrying loads in both directions. A combination of vehicle fleet optimisation and better load management will keep vehicle movements at today's levels up to at least 2030.

Our masterplan will deliver more capacity for on-airport cargo facilities, reducing the number of shuttle movements from off-airport facilities to the cargo centre. Given that these represent around a third of freight vehicle movements, consolidation on-airport could deliver a significant reduction in freight traffic.

The freight strategy will be developed further alongside the masterplan for the cargo centre. We will investigate opportunities to connect the cargo centre to the rail network with Network Rail.

4.2.6.2 Reducing impacts on local communities

We recognise that freight and HGV traffic is an important issue for local people. We will work with TfL and other authorities on ways to reduce the impact of freight movements on surrounding communities. This will include looking at re-timing journeys that are not time critical to outside peak periods. Considerate routing for HGVs and other freight vehicles would also make use of the most appropriate roads. We will work with operators to monitor vehicle routing and ensure appropriate measures are in place for those that do not comply.

We also have an opportunity to introduce low emission policies for freight vehicles and provide infrastructure for alternative fuels and electric charging points, in addition to the hydrogen fuelling points already in place at Heathrow. The potential introduction of a congestion charge would help drive change towards a cleaner fleet and fewer vehicle movements, with the possibility for discounts or exemptions for the cleanest goods vehicles.

4.3 Connectivity benefits

Connectivity drives economic growth – and only Heathrow can connect the whole of the UK to the world. New runway capacity will allow more of the UK to access Heathrow and its global connections thanks to more flights to more regional airports. Better surface access will help transform Heathrow. Fast direct connections to London and key strategic interchanges will link our global hub to the UK rail network. By 2032, more than 12 million people will be within an hour of Heathrow. Over 70% of the UK population will be based within three-hours by public transport.

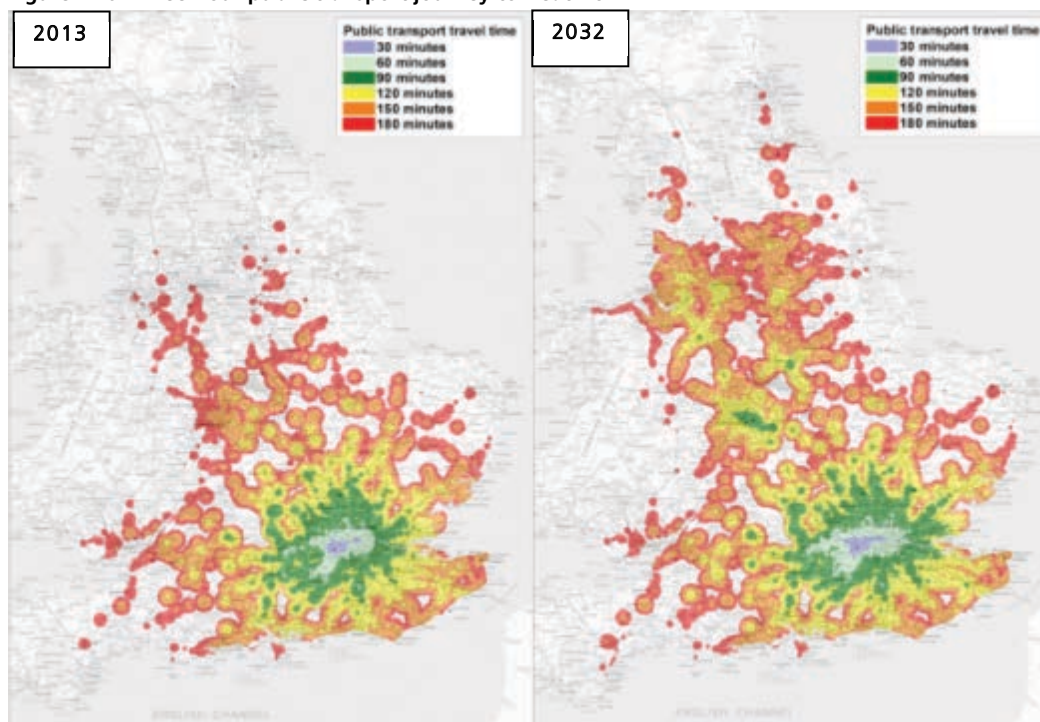
4.3.1 Connecting the UK to Heathrow

Our surface access strategy is designed to deliver easier and faster connections to the whole of the UK, meaning more people and businesses across the UK benefit from Heathrow's global connections. It will help to spread economic growth and rebalance the economy. Locations with better connections to Heathrow will be more attractive to international businesses and investment.

4.3.1.1 Connecting people to Heathrow

Connectivity is about people. By 2032, we will have 1.9 million more people than today within one hour by public transport with a total of 8.6 million. Including access by car this will bring a total of 12 million people within a one-hour journey. Over 70% of the UK population will be within a three-hour public transport journey. Figure 4.11 shows the number of people within given journey times of Heathrow:

Figure 4.10. Three-hour public transport journey to Heathrow



4.3 Connectivity benefits

Figure 4.11. Population within a three-hour public transport journey of Heathrow

Journey band	2013	% of UK population	2032	% of UK population
Up to 30 minutes	963,579	1.5%	1,445,780	2.3%
Up to 60 minutes	6,710,328	10.5%	8,658,216	13.6%
Up to 90 minutes	13,943,294	21.9%	16,622,426	26.1%
Up to 120 minutes	19,922,496	31.3%	28,570,976	44.9%
Up to 180 minutes	35,856,204	56.3%	47,119,370	74.0%

* based on today's population levels

4.3.1.2 Serving the UK regions

Only Heathrow can provide the connectivity needed to support key cities across the UK. A comprehensive regional air and public transport network will ensure that the benefits of growth at Heathrow can be spread across the UK, not just to London and the South East.

More runway capacity will help to protect existing routes to UK regional airports. These include Aberdeen, Belfast, Edinburgh, Glasgow, Leeds, Manchester and Newcastle. It will also allow flights to more UK regional airports. This could include locations such as Exeter, Liverpool, Jersey, Inverness, Isle of Man, Humberside and Newquay, most of which are currently served by routes to other European Hub airports.



Rail journey times to Heathrow will improve dramatically. Through a frequent and fast connection to Old Oak Common and High Speed rail services, Heathrow will provide easy access to cities such as Birmingham, Manchester, Leeds and Newcastle. Western Rail Access will enable faster journeys to Bristol, Cardiff, Swansea and Exeter with the potential for direct services in the future via through-running, long-distance services on the Great Western Main Line. Through Southern Rail Access, Heathrow can also connect to key catchments in Surrey, Hampshire and the South Coast.

4.3 Connectivity benefits

Figure 4.12. Rail journey times to key UK towns and cities

Station	2013		2032*	
	Journey time	Interchanges	Journey time	Interchanges
Birmingham	2 hours 31 minutes	2	53 minutes	1
Bristol	2 hours 05 minutes	1	1 hour 40 minutes	1
Cardiff	2 hours 35 minutes	1	1 hours 58 minutes	1
Leeds	3 hours 46 minutes	2	1 hour 38 minutes	1
Liverpool	3 hours 29 minutes	2	1 hour 48 minutes	1
Manchester	3 hours 16 minutes	2	1 hour 23 minutes	1
Newcastle	4 hours 1 minutes	2	3 hours 07 minutes	1
Oxford	1 hour 22 minutes	1	54 minutes	0
Sheffield	3 hours 32 minutes	2	1 hour 25 minutes	1

*Assuming Crossrail, Western Rail Access, Southern Rail Access and HS2 via Old Oak Common

Our extensive coach network already serves over 75 major towns and cities across the UK. Working with operators we will develop this and fill gaps in connectivity with new or expanded coach services.

4.3.1.3 Direct and faster journeys to London

Heathrow offers flexibility, reliability and choice passengers to and from London. There will be a range of public transport alternatives in times of disruption. There will be fast and direct public transport connections to Paddington, Bond Street, Tottenham Court Road, Farringdon, Clapham Junction, Waterloo, Liverpool Street and Canary Wharf with a single interchange to Victoria and Euston. Heathrow will offer the best connectivity of any London airport to London's major transport nodes.

Figure 4.13. Journey times to key London stations

Station	2013		2032	
	Journey time	Interchanges	Journey time	Interchanges
Canary Wharf	49 minutes	2	40 minutes	0
Farringdon	40 minutes	1	30 minutes	0
Kings Cross St Pancras	36 minutes	1*	36 minutes	1*
Liverpool Street	45 minutes	1	32 minutes	0
Stratford	57 minutes	2	41 minutes	0
Paddington	15 minutes	0	15 minutes	0
Victoria	38 minutes	1	38 minutes	1
Waterloo	39 minutes	1	39 minutes	0

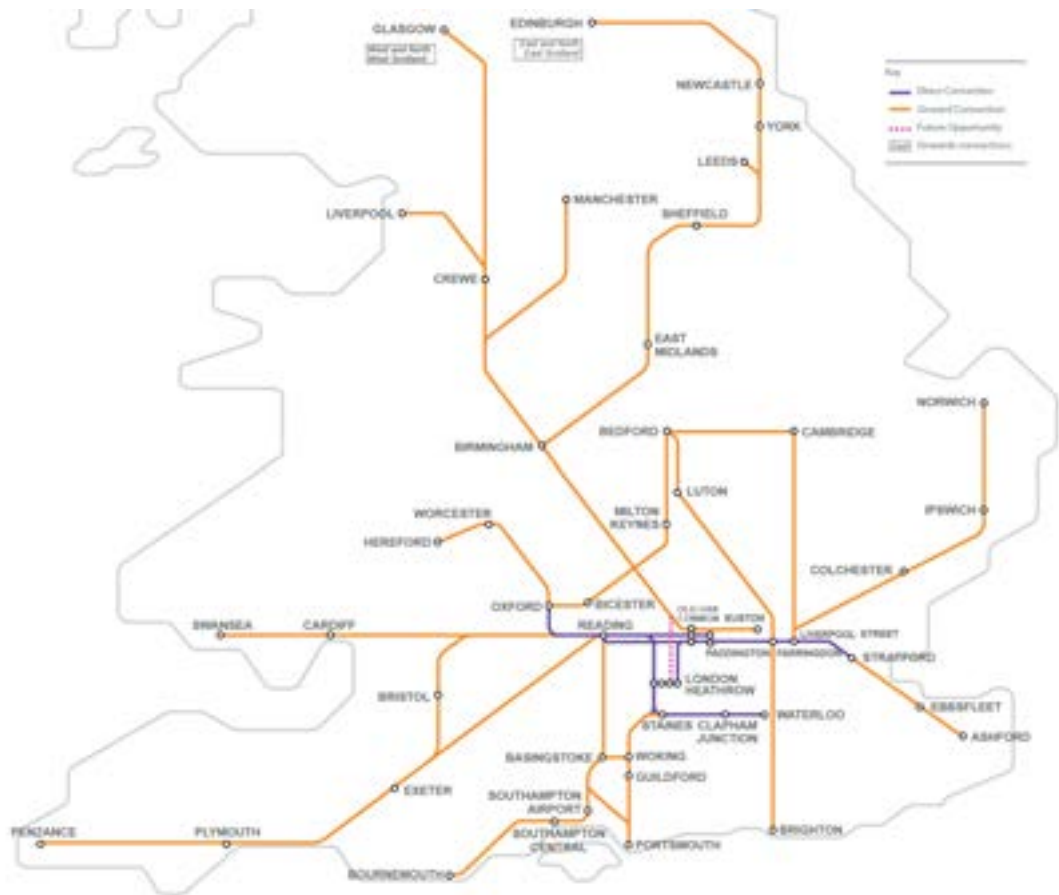
*Note: alternative direct service via Piccadilly Line

4.3.1.4 Connecting to key strategic interchanges

Heathrow is served by a number of interchanges on the wider rail network that act as gateways to the airport. At present stations such as Hayes and Harlington, West Drayton and Feltham provide local access points for airport passengers and our workforce. In the future stations such as Reading, Old Oak Common, Clapham Junction and Woking could provide a more strategic role. Heathrow is best placed to provide fast access to these key strategic interchanges.

4.3 Connectivity benefits

Figure 4.14. Heathrow's connectivity to key strategic rail interchanges



We will work with stakeholders such as Network Rail, DfT, HS2 and TfL to ensure key strategic interchanges provide the best facilities for airport passengers. This will include cross-platform interchanges where possible, good vertical circulation capacity for passengers with luggage, and clear wayfinding and information directing passengers to the airport.

4.3 Connectivity benefits

4.3.2 The integrated transport hub

An important part of our surface access approach for a growing Heathrow is to enhance Heathrow’s role as an integrated transport hub. New public transport connections that are easy for all to use will bring the UK closer to growth. They also strengthen the whole UK transport network.

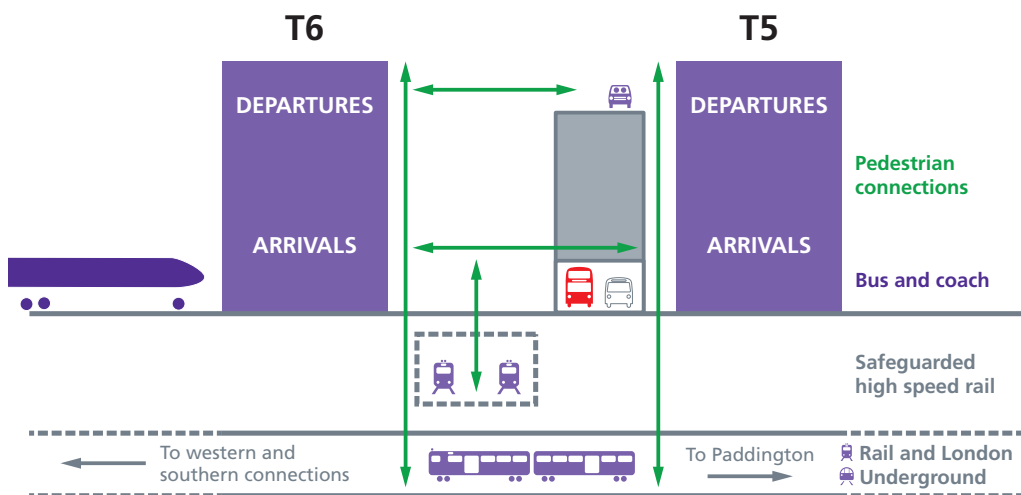
Our masterplan is based around two key transport nodes, Heathrow ‘East’ and ‘West’, linked by a strong public transport spine. Frequent rail and London Underground services will stop at both stations, serving as the landside inter-terminal transfer system. There will also be frequent bus services between the two sites via the Southern Perimeter Road, connecting the main places people work at the airport.

We will deliver high-quality interchange facilities to ensure a great experience for airport passengers and others travelling through Heathrow. Changing on or off trains will be simple, walking times short and access will be provided for all, including those with luggage. This will deliver a truly integrated transport experience for all users.

4.3.2.1 Heathrow: at the heart of the rail network

Our masterplan includes a new multi-modal rail interchange at Heathrow West. This will make it easier for passengers arriving at Heathrow by rail, supporting our public transport led approach. It will also support passengers wanting to interchange between modes, supporting Heathrow’s wider role in the transport network. We will also safeguard for a High Speed station box and spur to HS2, in line with current Government policy.

Figure 4.15 – Heathrow West interchange



4.3.2.2 A thriving bus and coach interchange

The Central Bus Station (CBS) already acts as an important bus and coach hub for airport passengers, employees, local residents and other passengers. Surveys show that around 25% of passengers travelling through the CBS are making use of Heathrow as an interchange, unrelated to the airport itself.

We will work with operators, to develop a route network that supports this wider function. Non-airport passengers can help to make routes viable and increase frequency to the benefit of airport passengers and employees.

Our plans would see the CBS redeveloped to provide a modern facility closer to the new Terminal 2. This will enable more capacity, better waiting and interchange facilities, as well as the inclusion of enhanced real-time information screens for passengers. For an expanded Heathrow, we would expect the CBS to form the main bus and coach interchange for non-airport passengers. Bus and coach services will also serve Heathrow ‘West’ with a surface level interchange. This will provide access to the ‘front door’ for passengers and employees and allow easy interchange with frequent rail services.

4.3 Connectivity benefits

4.3.3 Maximising connectivity benefits for all

4.3.3.1 Establishing a Regional Connectivity Task Force

In Part 2 ‘Listening to our stakeholders’, we set out details of our extensive nationwide engagement with business groups and the people who use Heathrow. We have met frequently with individual businesses and business groups from London and the South East to help us better understand what they would want to see from an expanded Heathrow. We have also engaged with businesses from other parts of the country. For instance, over the past 12 months we have held a series of briefing sessions and discussions facilitated by Chambers of Commerce, from Cornwall to Inverness.

In our submission to the Airports Commission last year, we made a commitment to “connect UK nations and regions to global markets by working with airlines and Governments to deliver better air and rail links between UK regions and Heathrow”. Our meetings around the UK have left us in no doubt of the importance of delivering on this commitment.

What is also evident is that there is no single solution to deliver these connections. It is clear that the different regions and nations of the UK have strong views concerning how connectivity to Heathrow should be provided:

- **In regions with existing air services** protecting the frequency and capacity of existing air services to Heathrow is key, such as those from Belfast, Central Scotland, Aberdeen, Newcastle, Leeds and Manchester
- **In regions that have lost air services due to Heathrow capacity constraints** regaining connectivity is vital, including routes from Inverness, Jersey, Liverpool, Newquay and Durham Tees Valley.
- **In regions too close to make air services viable** improving rail links to Heathrow is important for increasing connectivity, for example from the Midlands, Bristol and South Wales.

We have heard concerns over the perceived lack of attention given so far in the Airports Commission’s deliberations to areas outside the South East of England. It is clear from the outcome of the consultation on the Appraisal Framework that the Airports Commission has strengthened its commitment to examining the impact of the shortlisted runway proposals on regional connectivity. We recognise the significant importance of this commitment, concluding that we need to be able to demonstrate the relevance of expansion at Heathrow to those parts of the UK outside London and the South East.

In order to make progress, we are establishing a ‘Task Force for Regional Connectivity to Heathrow’. Its purpose will be to develop policy proposals and recommendations for improving regional access to an expanded Heathrow. We will invite representatives from the following groups to become members of the Task Force: All Party Parliamentary Group for Regional Airports, regional airports, Chambers of Commerce, LEAs, business people from around the UK and airlines. Heathrow will arrange for an expert and independent secretariat to support the work of the Task Force to help ensure its output forms a valuable contribution to the deliberations of the Airports Commission.

The Task Force will agree its own terms of reference, remit and objectives. We envisage that potential activities of the Task Force would include:

- Highlighting the role of the Task Force and ensuring the regional benefits of a third runway at Heathrow are maximised
- Analysing historic trends in regional air access to London and other hub airports in a study that covers the whole of the UK (including the Devolved Administrations and Crown Dependencies)
- Benchmarking what is done elsewhere in Europe to support/provide for regional access to national hub airports
- Commissioning future prognosis for regional access to major hub airports under different scenarios – both in the UK and in Europe in the short, medium and longer term
- Identifying what service is required by the UK regions outside the South East (e.g. number of slot pairs, at what times of day, for how long and to whom) and why (i.e. the commercial and economic value of services)
- Examining how these requirements could be delivered in a form that would provide long-term assurance to regional interests, but also meet EU slot regulations and state aid rules (i.e. what legal, policy or fiscal mechanisms can potentially be deployed by Heathrow, the Government or other parties).

4.3 Connectivity benefits

Potential outcomes of the Task Force might include:

- Setting out the 'regional slot proposition' of Heathrow expansion – generically and route specifically
- Explaining the impact the proposals would have on regional airports of different sizes and geographic locations (e.g. direct and indirect route networks, market penetration within their catchments, passenger volumes, finances) and their passengers (e.g. choice, fares, convenience, travel times)
- Quantifying the economic benefits of Heathrow expansion to different regional economies and any offsetting gains/losses at a national level
- Describing the potential impact on regional city development and other government policy programmes
- Evaluating associated environmental benefits/costs
- Outlining the mechanisms through which it is recommended the proposition would be delivered – including the role of different stakeholders and any legal/resource implications
- Producing a report, which would include a clear set of recommendations and Heathrow-specific commitments and undertakings.

Preliminary discussions with stakeholders from around the UK have demonstrated there is strong support for the establishment of the Task Force for Regional Connectivity to Heathrow. Together with the improvements to surface access to Heathrow set out in the rest of this section, expansion at Heathrow would undoubtedly “facilitate wider access to international connectivity throughout the UK, including from regional cities and airports” (para 1.16, Airports Commission Appraisal Framework).

4.3.3.2 A hub for local communities

The improved rail connections to Heathrow will also benefit local communities. Improved local bus connections will enable local residents and businesses to access these services more easily and benefit from the improved connections via an expanded Heathrow. This will provide alternative routes to London, better connectivity on the north-south corridor and wider connections to cities across the UK.

We will expand the 'free travel zone' to provide access for more local residents and airport workers. This will help to maximise the benefits for local communities of Heathrow's regional, national and global connectivity.

This and other local sustainable transport improvements would be funded through an enhanced PTL, or proceeds from congestion charging. This will help to ensure the delivery of key elements of the surface access strategy, as well as wider surface access improvements needed in the local area that would improve local connectivity and relieve congestion –helping to facilitate local economic growth. Delivery of these connections will require the continued collaboration with local authorities, Local Enterprise Partnerships and transport operators through the Heathrow Area Transport Forum.

4.3.3.3 Wider connectivity

With future connections in place, Heathrow will sit at the heart of the UK transport network. It will be an important public transport hub for local and regional connectivity, as well as national connections. There will be wider opportunity to interchange at Heathrow to access frequent bus, coach and rail services for onward connections to key cities in the Midlands and North.

There are opportunities to improve connectivity to Heathrow beyond our core assessment. Diversion of long distance services on the GWML and South West Main Line (SWML) would enable direct connections to more of the UK. Direct connections to Manchester, Leeds, Sheffield and Birmingham would be possible with a spur to HS2.

With a wider range of direct connections, Heathrow will have a more important role in the UK transport network than today. This will reduce the need to interchange in London and provide new opportunities for faster and more convenient journeys for airport passengers and public transport users. Given that UK transport investment will develop this wider role at Heathrow, it further strengthens the argument to situate crucial hub capacity in the same place.

4.4 Surface access demand and mode share

By 2030 more than 50% of our passengers will be travelling to and from Heathrow by public transport, making around 35 million journeys a year. By 2040, passenger public transport mode share is expected to increase to over 55%, with close to 50 million journeys per year. Workforce car journeys will have reduced by 50%, despite employees increasing to 110,000.

4.4.1 Methodology

To assess our strategy we have made use of the Heathrow Surface Access Strategic Modelling Suite, which is made up of the following tools:

- London Airports Surface Access Model (LASAM) – airport passenger model used to predict annual, daily and hourly demand by mode
- Heathrow Employee Surface Access Model (HESAM) – employee model used to predict daily demand by mode for airport employees
- Regional Road Traffic Model (RRTM) – strategic highway modelling tool to predict airport and non-airport traffic distributions on the wider road network

These tools have been developed and used over many years through the Terminal 5 Inquiry and the Stansted G2 Planning Application. They allow the future mode share of passengers and the workforce to be modelled, along with resulting daily vehicle and person trips. They are therefore fit for purpose for informing surface access decisions at this strategic level.

The models have been updated to reflect up-to-date Government guidance (such as WebTag) on values of time and fare assumptions. We can share further details of the assumptions and the model with the Airports Commission as required to support its appraisal process.

4.4.1.1 Airport demand

For our surface access assessments we have assumed growth in passenger numbers to 103.6mppa by 2030 and 130.3mppa by 2040. Our workforce would grow to 90,000 in 2030 and 110,000 in 2040.

Figure 4.16 – Passenger and employee forecasts

Year	Passengers	Employees
2013	72.7 mppa	75,000
2030	103.6 mppa	90,000
2040	130.3 mppa	110,000

For the purpose of our analysis, we have assumed that passenger segments (e.g. foreign/UK and business/leisure) will not change substantially. Geographic distribution of passengers and employees are also assumed to be in line with current splits. Transfer rates have been assumed to remain stable, to allow non-transfer passenger trips to be assessed in the surface access analysis. These are conservative assumptions in respect of surface access modelling.

4.4 Surface access demand and mode share

4.4.1.2 Daily trip assessment

The basis of our assessment of daily demand is a busy September day, which represents the worst case for surface access journeys. The equivalent number of personal trips (rounded to the nearest 1,000) is shown below in Figure 5.17. Almost a third of trips are still workforce-related in 2040, demonstrating the importance of airport workers to the surface access strategy.

Figure 4.17 – Daily person trip forecasts

Year	Passengers	Employees	Total
2013	139,000	88,000	227,000
2030	202,000	104,000	306,000
2040	263,000	127,000	390,000

The vehicle trips are calculated within the model using vehicle occupancies. These have been derived from CAA data on group sizes. They are assessed by mode and passenger segment to calculate a weighted average for each of the car-based modes: park and fly (1.69), kiss and fly (1.57) and taxi (1.59). An additional vehicle movement is allowed for the empty return journey for kiss and fly, with 78% of all taxis and minicabs assumed to have an empty return.

4.4.1.3 Transport modes

The models derive mode share for private and public transport modes. For passengers, this is segregated into three forms of private transport: those that park at the airport and leave their car (park and fly), those that are dropped off at the airport (kiss and fly) and those that use a taxi or private hire vehicle (taxi). The models are based on the following modes of transport for passengers and employees:

Figure 4.18 – Mode definitions

Passengers	Employees
Park and fly*	Car driver (alone)
Kiss and fly	Car share
Taxi	Public transport (London Underground)
Dedicated rail	Public transport (rail)
Standard rail	Public transport (public bus)
Alternative rail	Public transport (work bus)
London Underground	Other
Bus/coach	
Charter coach	
Air transfer	

*Car rental is included in the park and fly mode for passengers.

4.4 Surface access demand and mode share

4.4.1.4 Surface access interventions

A series of interventions are applied to the current surface access network to allow the future mode shares to be assessed. We have assumed the following changes to be in place by 2030 and 2040:

Figure 4.19 – Modelled interventions in 2030 and 2040

2030	2040 (additional)
Crossrail (8tph to Heathrow)	Taxi backfilling scheme assuming a 50% reduction in empty returns by 2040
Piccadilly Line upgrade (increase to 15tph)	Congestion charge applied to car modes
Western Rail Access (4tph to Reading, Slough and Maidenhead and with 2tph extended to Oxford)	Further restrictions on employee car parking
Southern Rail Access (4tph to Waterloo, Clapham Junction, Richmond, Twickenham, Feltham and Staines)	
HS2 (16tph serving Old Oak Common)	
Double coach frequencies to represent general improvements to frequency on the coach network	
Additional coach routes to Portsmouth (via Southampton, Basingstoke and Winchester), Luton (via Watford), East Midlands (via Milton Keynes), Brighton and High Wycombe	
Increase all bus frequencies by 50% to represent improvement to the bus network	
Reduction in employees car parking to prioritise car sharing	
Taxi backfilling scheme assuming a 10% reduction in empty returns by 2030	

*Taxi sharing and backfilling are applied outside the model by applying different 'empty return' values for taxis.

A full list of more detailed assumptions can be provided, should these be needed to support the Airports Commission's appraisal process.

4.4.2 Model outputs

Our strategy will help to deliver sustainable growth at Heathrow. This means more journeys by public transport – generating no more airport-related road traffic than today.

4.4.2.1 Passenger mode share

Our analysis shows that more than 50% of passengers will travel to and from Heathrow by public transport in 2030, increasing to more than 55% by 2040. This would mean close to 35 million passenger public transport journeys in 2030 and almost 50 million in 2040, compared to around 18 million today. A summary of the model results is shown below:

Figure 4.20 – Airport passenger mode shares and annual demand in 2013, 2030 and 2040

Mode	2013		2030		2040	
	%	Mppa	%	Mppa	%	Mppa
London Underground	18.4%	8.2	10.4%	6.7	10.7%	9.0
Bus/coach	13.6%	6.1	16.8%	8.5	17.3%	14.5
Rail	9.2%	4.1	25.5%	16.5	30.0%	25.3
Public transport	41.2%	20.4	52.3%	33.8	58.2%	48.8
Taxi	25.2%	11.2	21.1%	13.7	17.6%	14.8
Kiss and fly	23.5%	10.5	17.1%	11.1	15.3%	12.9
Park and fly	10.0%	4.4	9.4%	6.1	9.0%	7.6

4.4 Surface access demand and mode share

The results show that rail mode share will increase to over a quarter of all passengers in 2030 – and to almost a third in 2040. This growth reflects the significant improvements to the rail network in comparison to unreliability and uncertain journey times on the road network. There will also be an increase in the number of bus and coach users to almost double today’s demand. This is as a result of more frequent services and better connections to the airport.

Figure 4.21 – Passenger demand by public transport mode in 2013, 2030 and 2040

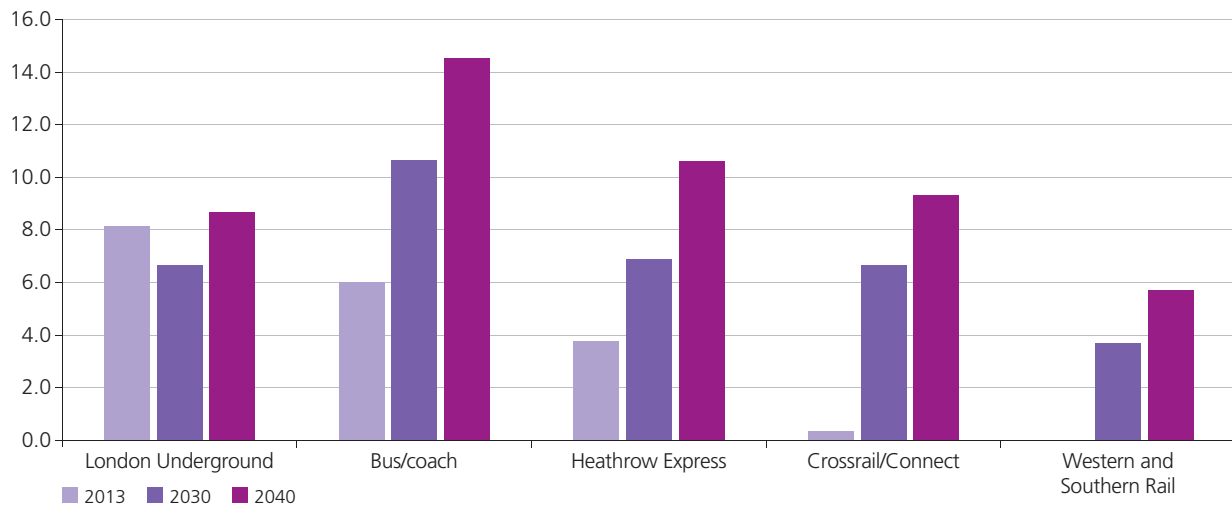
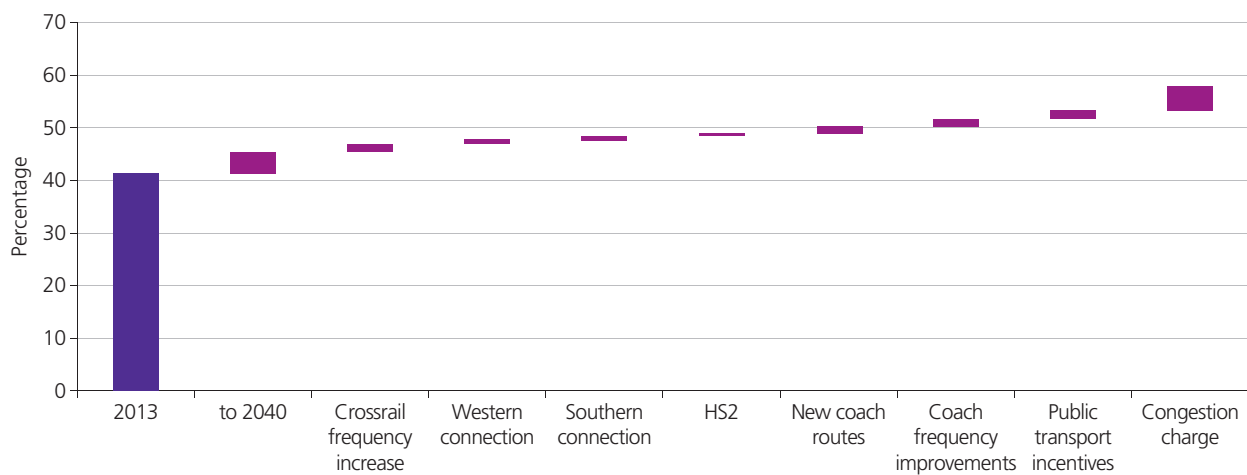


Figure 4.22 – Public transport mode shift by intervention



Kiss and fly, and taxi mode share will reduce significantly due to our strategic interventions as well as congestion on the wider road network. Congestion has a greater impact on drop-off modes because delays occur in both directions given the empty return. A congestion charge also has a greater impact on these modes as the charge is applied to both the arriving and departing journey, whereas a parking passenger would only pay the charge once as part of their round trip. As such, drop-off modes become less attractive in comparison to parking. As public transport improves it will take mode share from both kiss and fly and taxi modes.

4.4 Surface access demand and mode share

4.4.2.2 Workforce mode share

Continuing to reduce employee travel by car will help to offset the expected increase in passenger-related car movements as the airport grows from 70mppa to 130mppa. A summary of the employee mode share results is shown below:

Figure 4.23 – Airport workforce mode shares in 2013, 2030 and 2040

Mode	2013	2030	2040
Car driver (alone)	50.9%	24.4%	10.4%
Car share	2.7%	17.0%	15.2%
Public transport	36.9%	49.1%	64.9%
Other	9.5%	9.5%	9.5%

These figures demonstrate the continued trend of fewer employees driving in single occupancy cars and more people car sharing or using public transport. This is a trend that results from better public transport, less employee car parking and preferential treatment of car sharers.

4.4.2.3 Daily traffic demand

The annual demands and mode shares are converted in the models to generate an average day at the airport in September. This enables the capacity of the road and rail infrastructure to be assessed during one of the busier periods of airport operation. A summary of the average daily traffic demand in September is shown below:

Figure 4.24 – Airport workforce mode shares in 2013, 2030 and 2040*

Trips by	2013	2030	2040
Passengers	89,000	101,000	111,000
<i>Kiss and fly</i>	<i>42,000</i>	<i>44,000</i>	<i>51,000</i>
<i>Park and fly</i>	<i>8,000</i>	<i>11,000</i>	<i>14,000</i>
<i>Taxi</i>	<i>39,000</i>	<i>46,000</i>	<i>46,000</i>
Employee	46,000	33,000	22,000
Total	135,000	134,000	133,000

*Rounded to nearest 1,000

4.5 Capacity assessment

New services will more than double the number of trains serving Heathrow and almost treble the number of seats. This will build the capacity, resilience and choice for passenger growth at Heathrow. These services can be accommodated on the network without undue impact on commuters and other users. Our proposals for the M25 will provide the opportunity to increase capacity and improve flow for through traffic. On-airport roads and station infrastructure will be improved to accommodate growth. The Task Force for Regional Connectivity will recommend how air services from Heathrow to UK regions and nations can be encouraged and protected.

4.5.1 Rail capacity

Through engagement with Network Rail, we have been able to identify the capacity constraints on the network to ensure our proposals are credible and deliverable. Network Rail's initial assessments have been based on the 2019 planning timetable originally developed for Crossrail and Great Western Electrification projects. Should a comprehensive review of the timetable be undertaken, it may be possible to provide a different service proposition.

Heathrow demand is a small proportion of the passenger demand on the rail network. With expansion and mode shift to rail, Network Rail estimates that Heathrow demand will be 5-6% of the peak period demand on the GWML in 2043. Therefore, growth at Heathrow can be managed alongside wider growth on the network – and will not significantly impact on requirements for commuters and other users.

The importance of air passengers has been recognised by Network Rail in its recent London and South East Market Study⁴ report. For the first time, airports were identified as a discrete market, highlighting the importance of good connectivity to airports and their role in the wider transport network.

Network Rail has concluded that the rail services in our core assessment for an expanded Heathrow can be accommodated on the rail network without unduly impacting on planned services for commuters and other users. Further work will be undertaken through its route studies to assess what service patterns will make the best use of available capacity.

4.5.1.1 Great Western network capacity

The future planning for the GWML allows for maintaining a 4tph Heathrow Express service on the main lines. A dedicated airport express service forms a critical part of the service proposition. Our modelling shows that if the Heathrow Express service was replaced with even more Crossrail services it would reduce public transport mode share and increase car use.

We are proposing that Crossrail services to Heathrow be increased alongside existing Heathrow Express services. Network Rail has concluded that 6tph Crossrail Service to Heathrow is deliverable without affecting currently planned services. This would enable a 4tph stopping service to Reading to be maintained, as well as the proposed West Drayton services in the peak hours. It would also allow up to four freight trains in each hour during the off-peak (equivalent to 6tph). We will continue to work with Network Rail to assess whether this could be increased to 8tph. Further consideration of increasing Heathrow Express services may also be required.

There is capacity on the network for a 4tph service to Reading from Heathrow. However, Network Rail's assessment has indicated there will be constraints on capacity for terminating trains at Reading, meaning it may be beneficial to run services through and beyond Reading.

Current constraints on the line from Reading to Oxford would make continuing all 4tph onward to Oxford difficult. Network Rail has proposed that services to Oxford will need to be through existing planned services extended to Heathrow (e.g. East-West rail services). This would allow direct services to other locations such as Milton Keynes.

4.5 Capacity assessment

In the future, there may also be potential for long distance services from Bristol, South Wales and the South West to run through Heathrow. Further work will be required with Network Rail to determine the optimum service proposition operating over Western Rail Access, but our aspiration is for a dedicated premium service such as Heathrow Express to serve key catchments in the Thames Valley.

4.5.1.2 South West Trains network capacity

By 2019, there will be capacity created on the rail network that could be used to address rail access to Heathrow from the south. Capacity enhancements on the network during Control Period 5 (2014-19) at Queenstown Road Station will enable up to 20tph to access Waterloo. This will free up additional paths to Waterloo in the peak hours. Through the Wessex Route Study, Network Rail is developing plans that would enable a 4tph service to Waterloo from Heathrow, although this will be challenging in the peak without additional infrastructure or trade-offs with other services.

Based on the current assessment from Network Rail, direct services to Surrey and Hampshire are likely to be more difficult to provide without substituting Heathrow services for commuter services. This is due to capacity constraints at Woking. Substitution will be challenging given the level of background rail demand from Woking towards London expected on the SWML to 2040.

Capacity constraints at Woking and the Egham level crossing mean that services to Surrey are currently more difficult to deliver without technology enhancements. Although the network is expected to be full during the peak period, there is capacity outside the peak periods that could be used to serve Heathrow.

Network Rail has indicated that if additional capacity were created, then it would be needed to meet commuter demand. We believe there is a strong case for Woking, Guildford, Basingstoke and Southampton to be directly connected to the UK's hub airport. This option should be considered in more detail as part of the Southern Rail Access study to assess the benefits of new connections to Heathrow, so it could be compared to other opportunities.

In the medium term, a high-quality interchange could provide an alternative to a direct service. An appropriate interchange station will need to be identified as proposals for Southern Rail Access are developed – with necessary improvements to ensure it meets the needs of airport passengers.

4.5.1.3 On-train capacity

Our surface access strategy will deliver a step change in train services and capacity to Heathrow. It will more than double the number of trains per hour serving Heathrow and triple the seat capacity in each direction:

Figure 4.25 – Train and seat capacity forecasts

Service	2013		2030		2040	
	Trains	Seats	Trains	Seats	Trains	Seats
Heathrow Express	4tph	1,816	4tph	1,816	4tph	1,816
Crossrail/Connect	2tph	620	6tph	2,700	8tph	3,600
Piccadilly Line	12tph	2,736	18tph	4,536	18tph	4,536
Western Rail Access	-	-	4tph	1,816	4tph	1,816
Southern Rail Access	-	-	4tph	1,920	6tph	2,880
Total	18tph	5,172	36tph	12,798	40tph	14,648

To assess the capacity of the rail services arriving and departing Heathrow, we have used outputs from our LASAM and HESAM models to assess train loading at Heathrow during both the busiest hour and an average hour:

4.5 Capacity assessment

Figure 4.26 – Forecast hourly Heathrow demand by service

Service	2013		2030		2040	
	Busiest	Average	Busiest	Average	Busiest	Average
Heathrow Express	649	359	1,565	651	2,633	1,068
Crossrail	84	89	1,573	766	2,413	1,154
Piccadilly Line	3,173	1,344	2,945	1,119	4,103	1,612
Western Rail Access	-	-	381	158	565	226
Southern Rail Access	-	-	447	186	663	266

This shows that the only potential capacity constraint for airport passengers by 2040 would be on Heathrow Express services. This would only be during the busiest periods and could be managed through higher capacity trains, more frequent services or encouraging a shift to Crossrail services.

Network Rail has undertaken an assessment of the wider impact of crowding on the rail network. This has shown that increasing capacity at Heathrow would have a minimal impact on crowding levels on the wider network, when taken in the context of overall forecast growth. Therefore, we believe our strategy provides an appropriate balance between airport users and commuters.

We have approached TfL to discuss the assessment of the impact on the London Underground and wider London transport system. We will undertake further work with TfL to assess this in more detail.

Our initial assessments show that at an annual and hourly level, there will be fewer Heathrow passengers using the Piccadilly Line in 2030 than there are today. Due to Crossrail, there would be lower levels of demand on the more congested sections through central London. By 2040, airport passenger demand on the Piccadilly Line will have risen back to just above today's annual levels – with potential for busier hourly levels than today. This would be with significantly higher capacity on the line. Therefore, there would still be fewer Heathrow passengers per train than today.

Projects such as Crossrail 2, which will provide additional capacity for London, are expected to come forward in this time horizon (i.e. to 2040). Analysis by TfL shows that this could bring substantial relief to the north-south London Underground lines (such as the Northern, Victoria and Piccadilly Lines). There will also be the start of second generation upgrades to the London Underground network, with new technology allowing some lines to run at or close to 40tph. This additional network capacity will further reduce the likelihood of unforeseen capacity pinch points.

4.5 Capacity assessment

4.5.2 Road network capacity

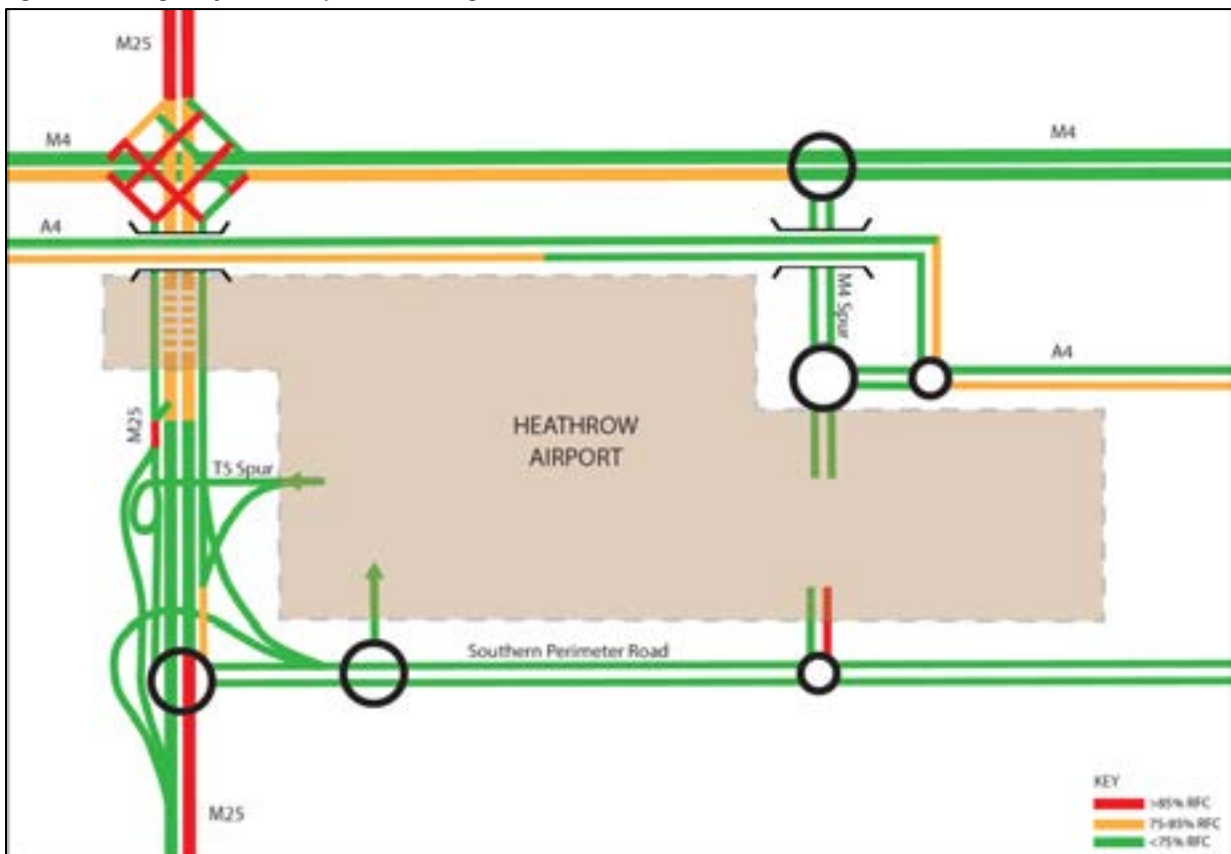
We have undertaken our assessment using our strategic modelling tools, with outputs and conclusions that reflect that approach. It is not a detailed traffic impact assessment, which would be undertaken at a later stage. It does provide a high level view of the impacts of growth at Heathrow on the wider road network and provides a credible basis for decision making.

4.5.2.1 Network operation

The DfT is forecasting 40% growth in traffic on the strategic road network across England by 2040. They are predicting that congestion will increase by 60%, with longer delays for users on the motorway network. Therefore, we have proposed a comprehensive public transport strategy that will not increase airport-related traffic.

Our modelling shows that delays occur at the M25/M4 interchange and that sections of the M4 and M25 will be operating at capacity in the morning peak hour.

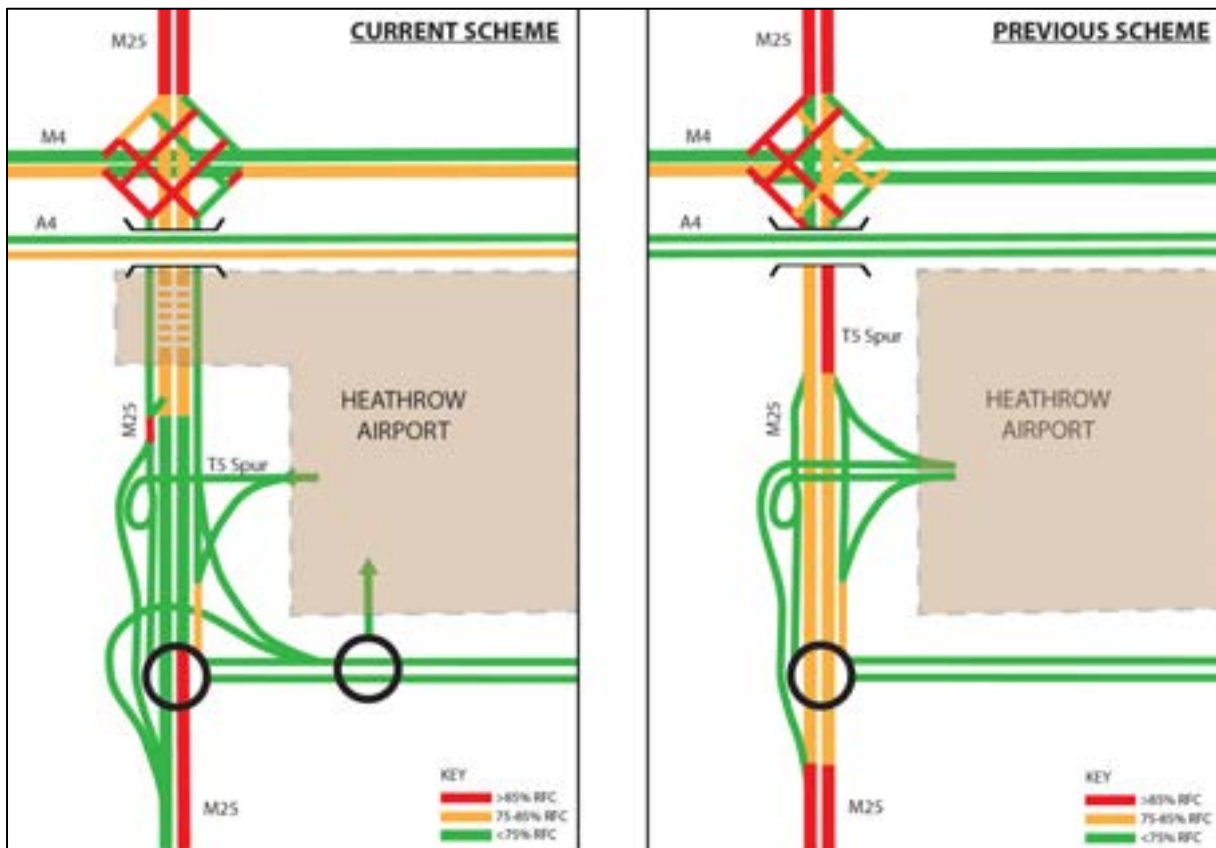
Figure 4.27 – Highway network peak hour congestion



Our proposals for the M25 will provide additional capacity for through traffic by segregating airport traffic from other M25 users. This increased capacity will also help to improve flow on the M25 for non-airport users by removing weaving sections from the mainline, as well as reducing the number of locations where traffic has to merge. A comparison of the modelling of the network for our July 2013 submission and May 2014 submission shows the improvement in operation.

4.5 Capacity assessment

Figure 4.28 – Comparison of network performance on the M25



More detailed traffic impact assessments will need to be undertaken to support journeys on the local road network. This will include full junction capacity assessments to identify where improvements to capacity will be required. We will work with local authorities and residents to develop appropriate proposals, recognising that this is an important issue. In particular we will seek to identify where improvements might have wider benefits – for example, resolving existing bottle necks, easing traffic flow and improving journeys for local buses and cyclists. We will continue to engage with local authorities and communities to develop proposals for the local road network.

The on-airport road network has been designed to accommodate the expected flows. Through our modelling we have amended our masterplan to ensure that the on-airport network will be able to carry the expected demand. These include improvements to junctions along the Southern Perimeter Road.

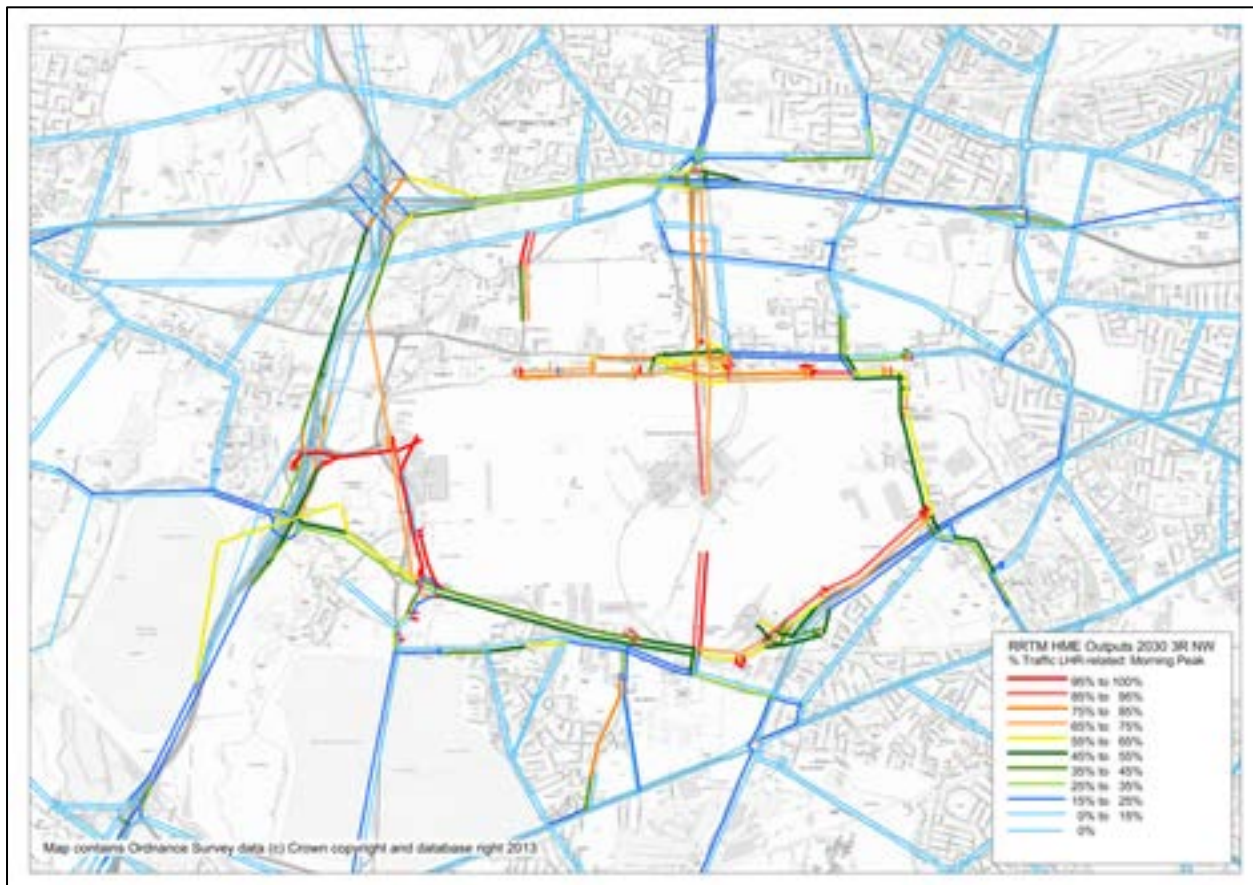
4.5.2.2 Impact of Heathrow traffic

Our strategy will ensure that Heathrow can expand without additional airport-related traffic on the road network. There will be a small increase in passenger-related traffic, which will increase movements on the motorway network, but the proposed improvements to capacity on the M25 and J14 are expected to accommodate this. There will be a reduction in workforce-related traffic movements, reducing traffic on the local road network. This will benefit local movements and reduce the Heathrow's impact on local traffic congestion.

Heathrow-related traffic is a small proportion of the traffic on the wider network. Our assessment shows that other than on the immediate surrounding network, the proportion of Heathrow-related vehicles will be less than 15% of total vehicles in the morning peak in 2030. With background traffic growing significantly faster than Heathrow traffic, the proportion of Heathrow-related traffic on most routes will fall between now and 2040, even with growth at the airport.

4.5 Capacity assessment

Figure 4.29 – Proportion of Heathrow-related traffic on key routes



4.5.3 Regional flight capacity

During our engagement with businesses and politicians from around the UK, many stakeholders expressed the view that to realise the full benefit of air connectivity to Heathrow, regional air services need to be protected. The provision of additional capacity at Heathrow will mean that many of the UK airports that currently have flights to other major European airports will be able to support commercially viable services to Heathrow. However, we have seen in the past that such services can be vulnerable to changes in airline business models and capacity constraints. We do not expect any capacity constraints at a three runway Heathrow to bite until the later 2030s. However the history of the decline of regional connectivity at Heathrow as the airport became capacity constrained over the past 20 years understandably raises concerns that as a three runway Heathrow fills up, services to UK regions will be the most vulnerable. To address this concern, we will invite the Task Force for Regional Connectivity (which is described in section 3.3.1 above) to make recommendations as to how, once services to Heathrow from UK regions and nations have been established, these services might be protected to ensure that an expanded Heathrow will continue to connect the whole of the UK to growth.

References

¹ National Rail Passenger Survey: Autumn 2013, Passenger Focus, January 2014

² Heathrow Express Reliability data, April 2014

³ LASAM and HESAM model outputs, April 2014

⁴ Long Term Planning Process: London and South East Market Study, Network Rail, October 2013

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An aerial photograph of a modern water treatment facility. A central concrete channel with a grassy top surface runs through the center, flanked by two large rectangular basins filled with water. The surrounding area is lush with green trees and shrubs. In the background, industrial buildings and a road with streetlights are visible under a clear blue sky. An airplane is flying in the upper right portion of the sky.

Part 5

**A new
approach to
sustainability**

5.1 A sustainable Heathrow

As the UK's hub airport, Heathrow brings significant economic and social benefits to the country and the surrounding area. But those benefits do not mean that a third runway should go ahead at any cost. People have legitimate concerns about the downsides of a new runway for local communities and the environment. We believe that a third runway should only go ahead within strict environmental limits.

Developing Heathrow sustainably is a key objective for us. This means we have listened carefully to what our stakeholders have told us through an extensive consultation process and taken account of this as our plans have evolved. This feedback has informed the design of our plans to avoid impacts on communities and the natural environment. Since our proposal was submitted to the Commission in July 2013, we have moved the runway south and shrunk the airport boundary in order to reduce the number of people affected by noise and to protect more homes and heritage sites.

Where we cannot avoid impacts, we have set out to reduce them, to compensate communities and to enhance the natural environment and communities. As a result of those steps, our proposals for a third runway at Heathrow will:

- Reduce the number of people affected by noise by 30 – 35% compared to today and provide periods of respite from noise for every community around the airport.
- Commit £550m for noise insulation and residential property compensation if Government supports a third runway.
- Ensure all community facilities, including schools that are lost by the development are re-provided or alternatives provided to meet needs of local stakeholders
- Treat people fairly whose homes are directly affected by a third runway, by purchasing their properties 25% above market value plus paying legal and stamp duty costs
- Improve air quality and meet all health-based pollution limits.
- Provide new green spaces and flood protection for local communities.
- Be resource efficient – cutting carbon emissions from energy use at the airport by 60% compared to today.



5.1 A sustainable Heathrow

5.1.1 Running Heathrow more sustainably today

Achieving Heathrow's current two-runway vision to be 'Europe's hub of choice' relies on managing the airport responsibly. That is why we are working hard to maximise the economic benefits that Heathrow brings, while also carefully managing our environmental responsibilities and being a good neighbour to our local communities. As part of our overall business strategy, we have established Responsible Heathrow 2020, which brings together our top ten goals for the sustainability issues that are most important to us and our stakeholders. Figure 1.1 below summarises our strategic approach and 2020 goals. These goals are supported by detailed strategies which are all available at www.heathrow.com/sustainability

Figure 5.1: Responsible Heathrow 2020



We are already delivering against these strategies. Our business plan for our next five year regulatory period from 2014 – 2019 (known as Quinquennium 6 or “Q6”) includes targets and plans to:

- Support local employment, through the “Heathrow Academy” which supports local people into the work, the Heathrow Business Summit which helps local businesses engage with Heathrow’s supply chain, and the Heathrow Jobs and Careers Fair which engages local school-leavers;
- Continue to reduce the number of people affected by noise from the airport and to trial new airspace technologies to provide more predictable periods of relief from noise;
- Improve aircraft ground movement efficiencies, leading to reduced delays and congestion that cut fuel consumption, save money and reduce emissions;
- Create a low carbon, energy and heat network that links our main terminals with the airport’s energy centres, including the new biomass boiler completed in 2014 which is London’s largest such facility;
- Ensure that nobody at the airport is affected by accident, illness or injury; and
- Contribute to Crossrail to facilitate sustainable passenger and staff travel.

Delivering our “Responsible Heathrow 2020” targets and plans will provide a strong foundation to further improve our sustainability performance as we look to expand Heathrow’s capacity.

5.1 A sustainable Heathrow

5.1.2 Developing a sustainable third runway at Heathrow

Our overall objective has been to develop a masterplan for Heathrow's expansion that is consistent with the principles of sustainable development. We have listened carefully to what our stakeholders have told us through an extensive consultation process and factored that feedback into our approach. We have designed our masterplan to avoid impacts on communities and the natural environment wherever possible. This means that, compared to the masterplan we submitted to the Commission in July 2013:

- The number of people affected by significant noise has fallen, so our plan now means that at least 30% fewer people will be affected by noise than today;
- The number of residential properties required has fallen by over 20%;
- There is no longer the need to redevelop the M4/M25 junction, which means taking less land and disrupts fewer communities;
- There is the potential to retain in-situ valuable historic buildings including the Great Barn and St Mary's Church in Harmondsworth;
- The total area of land take has reduced by 65 hectares resulting in reduced impacts to flood risk, landscape, recreation and biodiversity.

Where we cannot avoid impacts, we have set out to reduce them, to compensate communities and wherever possible to enhance the natural environment. We summarise below our approach to sustainability in line with the chapters that follow.

5.1.2.1 A quieter Heathrow

More flights and less noise

There is not a choice between more flights or less noise. Heathrow can deliver both. Heathrow is significantly quieter than it was in the past. Since the early 1970s both the area and the number of people within Heathrow's noise footprint have fallen around tenfold, despite the number of flights doubling. Our proposals for a third runway at Heathrow will see noise reductions continue. Even with a third runway, we estimate that in 2030 there will be between 30% and 35% fewer people in total within Heathrow's noise footprint than today.

Runway location and new landing approaches

Our proposal sites a third runway around 1 nautical mile further to the west than the existing runways. Every nautical mile further west an aircraft lands means it is flying approximately 300 feet higher over London on its landing approach. In addition, we plan to use steeper landing approaches and have aircraft touch down 700 metres further along the runway than they do today. This will mean that aircraft will be flying higher as they approach Heathrow, reducing noise impacts for all local communities.

Periods of respite from noise for every community

Our consultation with local residents highlights the importance of noise respite, with two thirds of respondents agreeing with the statement that ensuring periods of relief from noise is more important than limiting the total number of people affected by noise.

For this reason and in contrast to both the previous 2007 proposal for a short third runway and to Heathrow Hub's proposal, we have ensured that we can operate runway alternation. This will provide predictable periods of relief from noise for all communities around Heathrow.

No extra night flights, and fewer night flights on existing flight-paths

Night flights are an important part of operations at a hub airport but also a significant concern for local residents. Of the major European hub airports, Heathrow has the strictest limits on operations between 11pm and 6am and the fewest flights. Increasing night flights is not critical to our success as a hub given the time zone we occupy. Our plans do not propose any extra night flights and would reduce the number of night flights on existing flight-paths. Because we only operate one runway for night flights, residents under existing flights paths would have at least two nights out of three without night noise. This means that areas such as Richmond would experience fewer night flights with a third runway than they do today.

5.1 A sustainable Heathrow

New noise insulation and compensation

Heathrow currently operates one of Europe's largest noise insulation schemes with more than 40,000 properties eligible for some form of noise insulation. In areas of high noise or in areas experiencing a significant increase in noise we believe that free noise insulation should be offered to residents. Heathrow is announcing the creation of a total fund of £550m for noise insulation and residential property compensation if Government supports a third runway. The fund would cover the cost of providing new noise insulation and compensation for residential properties as well as for community buildings such as schools. The airport has previously committed that anyone experiencing a significant increase in noise will be offered free noise insulation. We will now work with a panel of local community representatives to develop more detailed proposals for noise insulation and compensation before consulting in the summer.

5.1.2.2 Improving air quality

We can add capacity at Heathrow while meeting all health based pollution limits

As a result of our surface access strategy, there will be no more Heathrow-related vehicles on the roads than today. Those vehicles that are travelling to the airport will be cleaner. Combined with new aircraft technology this means that levels of nitrogen dioxide (NO₂) would be within EU limits. Levels of fine particles (PM₁₀ and PM_{2.5}) are already within the limits. Alongside our strategies to limit the number of cars driving to the airport, we will continue to incentivize the cleanest vehicles to operate airside at Heathrow, building on our existing Clean Vehicles Programme. We are trialling new technologies at the airport and we already host the UK's first publicly accessible hydrogen refuelling site.

5.1.2.3 Quality of life

Fair property compensation

We are committed to treating those most affected by a third runway fairly. We recognise that the compulsory purchase of 750 homes is significant and that such circumstances deserve exceptional compensation for residents. We are proposing a scheme that is more generous than that previously proposed for a third runway and proposals for most other infrastructure projects. Anyone whose home needs to be compulsorily purchased will receive 25% above un-blighted market value compensation plus all legal fees and 100% of stamp duty costs. We will be asking for further views on whether this represents a fair package of compensation in our consultation this summer.

Retain a sense of community, place and identity

Loss of residential and community properties as a result of the proposed runway at Heathrow has been kept to a minimum. Unfortunately it cannot be totally avoided. Where schools are affected, Heathrow will work with local communities and stakeholders to provide significantly better learning opportunities than currently available. Solutions could include a new primary and nursery school located to serve Harmondsworth and Sipson, providing top-quality education facilities equipped with state-of-the-art noise mitigation technology. Historic buildings in Harmondsworth will be offered a viable future and for the remainder of the village we would insulate buildings and improve the streetscape to create a new community focus around a revived central courtyard.

Sharing the benefits of growth locally

Heathrow already has an extensive community investment programme to support the economic prosperity of the area surrounding the airport and provides charitable funding for projects to improve local communities. We have started to explore with local stakeholders what a new "social contract" between the airport and the surrounding area could involve. We are clear that the success of the airport must be directly linked to more investment locally.

5.1.2.4 Enhancing the natural environment

New green spaces and flood zone protection for communities

Our plans would increase the amount of publicly accessible green space around the airport. We have thought about how best to mitigate the effects of the development on local rivers and flood protection and have produced a plan to enhance the quality of rivers, biodiversity and landscape in an enhanced Colne Valley. These measures will protect people and properties against flooding offering the potential for an improved situation compared to today, particularly for the residents of Colnbrook and Poyle. We will also create new green corridors that link together existing outdoor recreation areas such as those in the existing Colne Valley Regional Park.

5.1 A sustainable Heathrow

5.1.2.5 Understanding more about our heritage

Protect important heritage sites and help enhance the archaeological knowledge of the area

Our masterplan provides the option of preserving the Grade I listed Great Barn and the Grade II listed St Mary's Church in their current locations in Harmondsworth. Both are significant community and heritage assets. There is also the option to move the Great Barn to a suitable site such as an open air museum, should further consultation support that.

We will introduce a programme of archaeological investigation and recording within areas where development will occur, comparable to the approach undertaken for the Terminal 5 development. The T5 programme is still recognised as being best practice. It allowed a much greater understanding of the history of the local area.

5.1.2.6 Managing our carbon

We will make the development as low carbon as possible

The Airports Commission's interim report and the Committee on Climate Change have found that a third runway is compatible with the UK meeting its climate change reduction targets. We are committed to making the construction of a third runway as low carbon as possible with similar approaches to those we have used before. We will also deliver a 60% reduction in on-airport carbon from energy use in running the airport.

5.1.2.7 A resource efficient Heathrow

More passengers can still use fewer resources

We have set tough environmental targets for a third runway. This means that compared to today the airport will consume less water, produce 60% less carbon from energy, and create less waste per passenger. This will be achieved by investing in new technologies and practices that increase the efficiency of the airport.

5.1.2.8 Sustainable drainage

Re-use of water and de-icer

Expansion gives us the opportunity to improve the quality of run off and include features that maximise water and de-icer reuse. Our approach to drainage compliments our approach to managing flood risk.

5.1.2.9 Dealing with existing contamination

Responsible land treatment

We will manage any land quality issues so that any potential risks from contamination of land to human health or environment are avoided or reduced. Our approach is to reclaim brownfield land in a safe, sustainable manner that can be beneficial to the local communities around the airport.

5.1.3 Assessment of Effects, Methods and Assumptions

In preparing our sustainability plans for expanding Heathrow we have drawn on best practice approaches to undertake our assessment of the effects of the development. This has been important in influencing the design of our mitigation proposals. Detailed assessments will continue to emerge and we plan therefore to submit these as a technical submission to the Commission in mid-2014. The technical report will detail the methodologies, data and assumptions that have been used. We acknowledge that it is for the Commission to complete its own assessment of impacts. However we will also do further modeling work on impacts.

Where appropriate we will also undertake a monetisation exercise in accordance with the Airport Commission's Sustainable Appraisal Framework guidance. All of this data will be publically available.

Specifically the scope of this assessment report will include the following:

- Detailed results of our noise assessment including a wider range of metrics than is presented in this document
- Detailed results of our air quality assessment
- Our carbon footprinting results

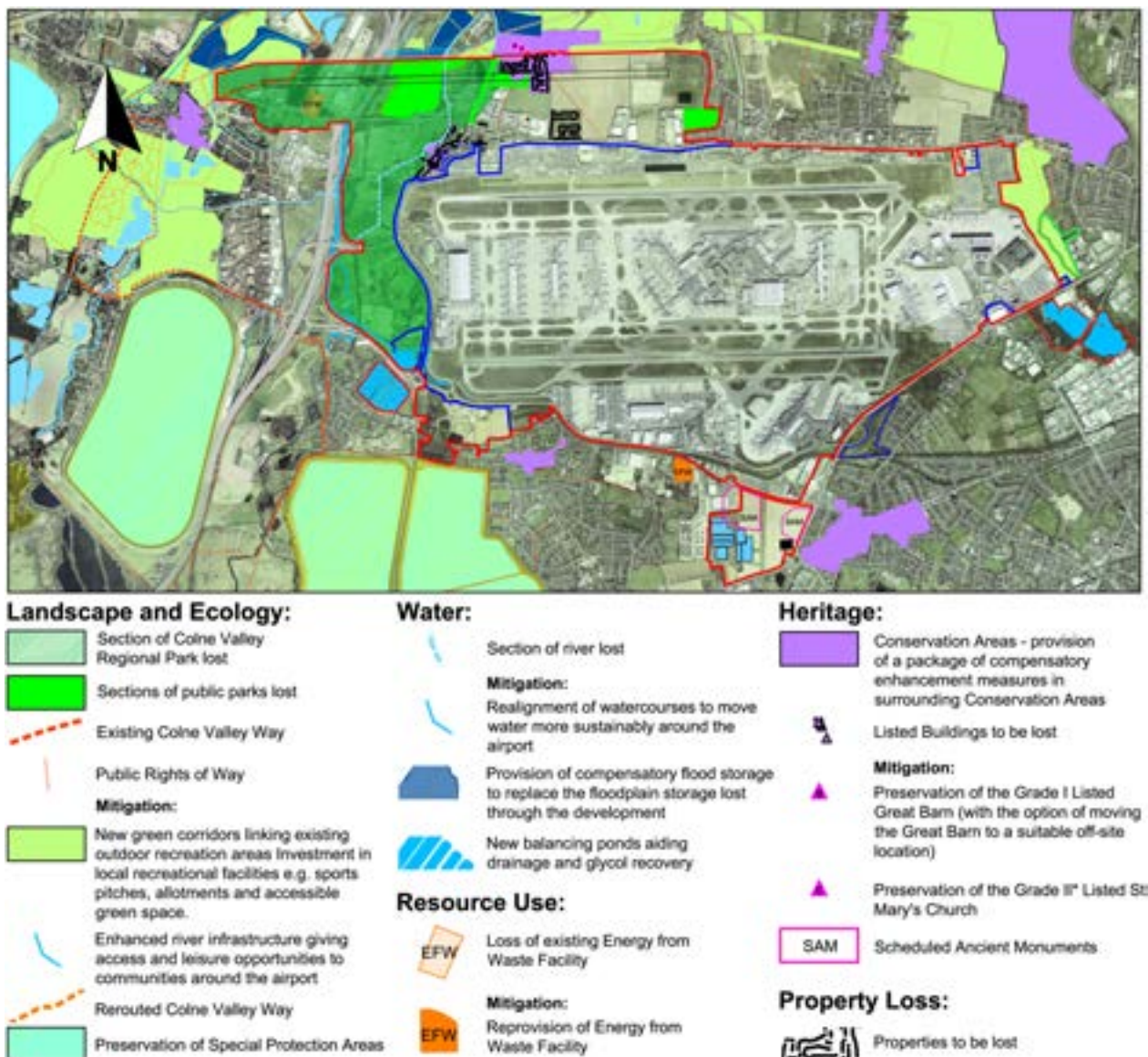
5.1 A sustainable Heathrow

- More detail related to our water and drainage strategies including the results of the modelling undertaken to ensure that our proposals work as intended
- A Biodiversity assessment including consideration of ecosystems services
- A high level Landscape and Visual Impact assessment
- A Ground Conditions Phase 1 report
- Energy, water and waste forecasts.

It is envisaged that this report will be available within a month of this submission.

Figure 5.2 below summarises the key land based impacts and mitigation included within our masterplan.

Figure 5.2: Summary of Key Mitigation Measures (included as Appendix 17)



5.2 A quieter Heathrow

An airport the scale of Heathrow brings significant benefits, but also has downsides for people living nearby. A particular challenge is aircraft noise. There is not a choice between more flights and less noise. Heathrow can do both.

Heathrow is at the forefront of international efforts to tackle noise through quieter planes and operating procedures and has been for many years. Airlines are rewarded for flying quieter planes and penalised when they do not. We have pioneered new landing and take-off procedures. As a result, Heathrow is significantly quieter than it was in the past. Since the early 1970s both the area and number of people within Heathrow's noise footprint have fallen around tenfold, despite the number of flights doubling.

Our proposals for a third runway will see noise reductions continue. With a third runway we estimate that in 2030 there will be 30-35% fewer people in total within Heathrow's noise footprint than today.

Locating the new runway further to the west, displacing the landing point down the runway and using new steeper approaches mean that aircraft will be flying higher as they approach the airport. This cuts noise for local communities. We propose to actively incentivise the phase-out of the noisiest aircraft. By the time a new runway opens, around 90% of flights at Heathrow will be made by 'next generation' aircraft. We have maintained the principle of runway alternation to provide periods of respite from noise for all communities around Heathrow. Respite is a strong preference expressed by local residents in our public consultation.

Adding a third runway will require airspace to be redesigned. Redesign in turn will provide opportunities to optimise arrival and departure routes to meet the objective of minimising and, where possible, reducing noise impacts. Our proposal provides policymakers with the flexibility to minimise the overall number of people affected, the number of new people affected, or to optimise the provision of respite for communities that are overflowed. We believe that an airspace option that maximises respite offers advantages. However, we recognise that there are choices to be made. We need to involve local stakeholders in further significant consultation before finalising airspace design.

While the total number of people affected by noise will reduce, there will still be people in Heathrow's noise footprint. Of the £550 million announced, we have allocated a £250 million fund to pay for free noise insulation and compensation for homes and community buildings in high noise areas or exposed to significant new noise. We will now work with a panel of local community representatives to develop more detailed proposals for a noise insulation and compensation scheme. We will then consult publicly on those during summer 2014.

Night flights are an important part of operations at a hub airport, but also a significant concern for local residents. We are not proposing extra night flights. In fact, the number of people affected by night flights will fall significantly. This is because we are proposing to rotate use of the runways at night. This means that residents under existing flight-paths would have night flights only every third week rather than every other week at the moment.

5.2.1 Our objectives

We support UK government policy on noise and the Commission's objectives. Our noise mitigation strategy objectives are:

- To develop a three-runway airport where noise, including night noise, affects fewer people than today ;
- To maintain the principle of runway alternation to provide periods of noise respite for all communities around Heathrow;
- To pay for free noise insulation and compensation in high noise areas and areas exposed to significant new noise, consulting with local communities when designing our insulation schemes to understand their priorities;
- To minimise the impacts of our airside activities through appropriate mitigation;
- To consider the noise implications of our proposals on public open spaces and other non-residential receptors.

5.2 A quieter Heathrow

5.2.2 The existing environment and our track record in noise management

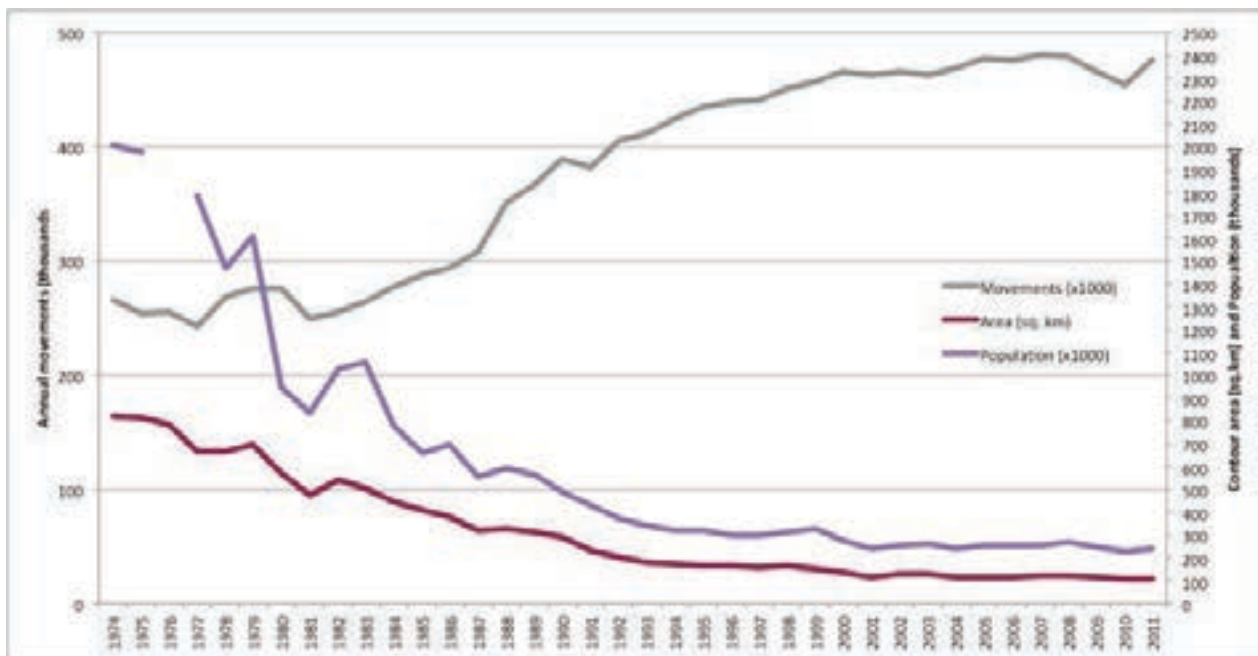
Our strategy, which has been developed in line with the steps of the International Civil Aviation Organisation’s (ICAO) ‘Balanced Approach to Aircraft Noise Management’ focuses on five main themes:

- Quieter planes
- Quieter operating procedures
- Noise mitigation and land-use planning
- Operating restrictions
- Working with local communities.

We have recently revised our Noise Action Plan, which includes over 40 actions that we are taking over the next five years to reduce our noise impacts, based on these themes. We place a strong emphasis on engaging openly and constructively with local communities to understand their concerns and to provide accessible information.

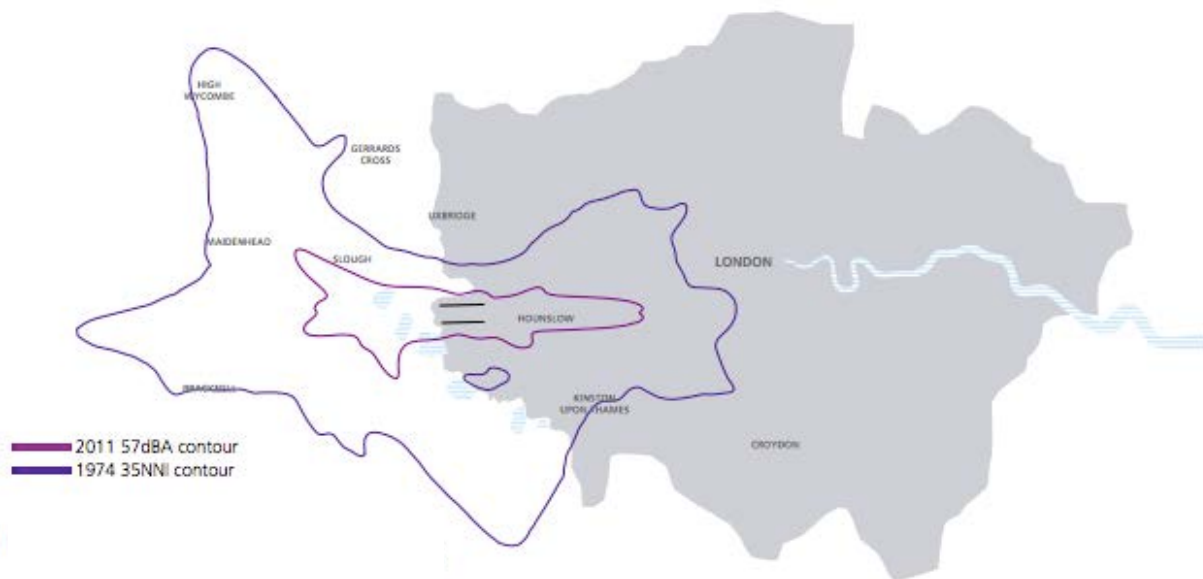
As a result of our approach to noise management, Heathrow is significantly quieter than it was in the past. Figure 5.3 below shows the area and population exposed to average summer noise levels above 57 dB. This is the measure that the UK Government uses to measure significant noise annoyance and we refer to it hereafter as the 57 decibel contour. Figure 5.4 compares the 1974 contour with that of 2011.

Figure 5.3: Area and population within the 57decibel noise contour around Heathrow



5.2 A quieter Heathrow

Figure 5.4: Comparison between 1974 and 2011 57 decibel contour



We have made numerous improvements, many of which have been industry-leading, including:

- Introducing differential noise-related landing charges that reward airlines for flying quieter planes and penalise them when they do not ;
- Improving adherence to noise abatement procedures by working collaboratively with airlines, NATS and the CAA. For example, since the 1990s we have been trialling new techniques to improve departure track-keeping and led the UK aviation industry in improving the use of continuous descent approach ;
- Working with industry partners to develop voluntary agreements, such as not scheduling the noisiest types of aircraft or cargo movements at night;
- Being transparent about our performance – for example, introducing web-based access to flight track information, complaint reporting and investigation and, more recently, publishing Fly Quiet league table showing airline performance on noise;
- Working with local community and campaign groups to agree better ways of communicating about noise and to trial new operating procedures to reduce noise impacts for local residents. Examples of this include the establishment of the Heathrow Noise Forum, working with HACAN on an early morning arrival respite trial or our work with stakeholders to develop a range of supplementary metrics to include in our Community Noise and Track Monitoring Reports.;
- Operating one of Europe’s largest noise insulation schemes, with more than 40,000 properties eligible;
- While our strategy focuses on airborne aircraft, noise from airport activities on the ground can be a concern in communities close to the airport. We have conducted a number of studies into airside ground noise and taken steps to reduce impacts, including the construction of noise walls and restrictions on engine ground running. We have applied our knowledge of reducing ground noise at the current airport to our plans for a third runway.

5.2 A quieter Heathrow

5.2.3 Responding to our stakeholders

Heathrow is committed to engaging openly and constructively with local communities to understand their concerns. We therefore undertook a public consultation before updating our plans for a third runway. Reducing noise is the factor that most residents believe should be considered the most important when planning a new runway at Heathrow. There was very strong support (62% agreed) for continuing to provide periods of respite from noise for all communities around the airport.

Issues raised in the consultation include:

- Night flights were identified as a key concern ;
- Noise insulation and compensation were considered very important;
- A number of specific mitigation measures were suggested, including displacing the landing point further away from west London and adopting steeper glide slopes;
- Aircraft engine ground running noise was identified as a potential issue, particularly at night.

The consultation has actively informed our mitigation strategy. We have reviewed and, where possible, incorporated suggestions as outlined in the following sections.

From our extensive and ongoing engagement with local communities we also know that how noise is measured and described is an important concern. There are a number of methods for measuring the effects of noise, of which average noise exposure contours is one. The Government uses the 57 decibel contour to measure significant effects from aircraft noise. Its 2013 Aviation Policy Framework (APF) continues to use this measure, but notes that “this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves annoyed by aircraft noise”. As such, the APF concludes that this contour “does not necessarily reflect all aspects of the perception of aircraft noise”.

We agree with this view. While we continue to use the area and population within the 57 decibel contour, it is one of a number of contour and non-contour measures that we use, in line with the Airports Commission’s focus on a ‘balanced scorecard’ approach to measuring noise. We have placed particular emphasis on measuring respite and included that in our assessment, as we outline later in this section.

In addition, we have consulted with industry partners, including airlines and aircraft and engine manufacturers to understand the likely development and adoption of quieter aircraft technology. We have also consulted with the CAA on our approach to undertaking noise modelling to ensure we are adopting the most appropriate approach.

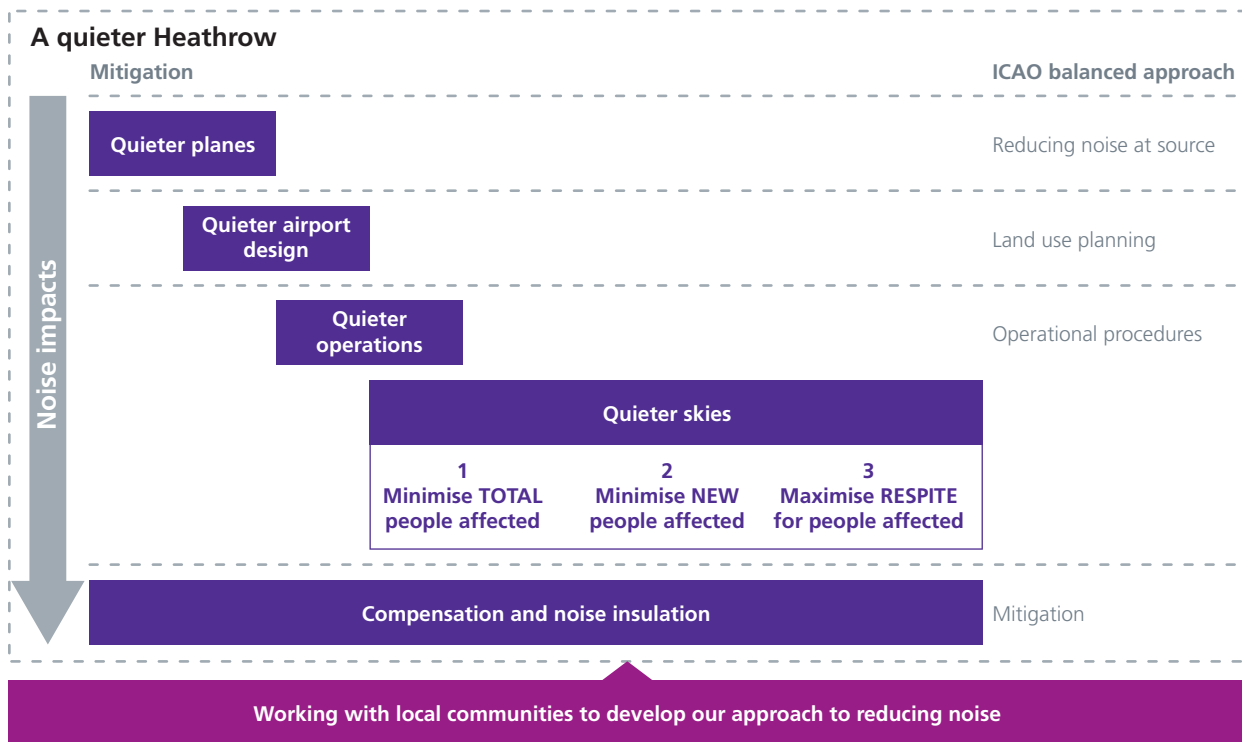
5.2.4 Managing the effects of our masterplan

Since our submission to the Airports Commission in July 2013, we have refined both the design of our masterplan and the way we propose to operate the airport to reduce noise. Figure 5.5 summarises our noise mitigation strategy. We have based our strategy on the internationally agreed ‘Balanced Approach’ to managing noise, involving the following steps:

- Reducing noise at source (quieter planes);
- Designing the airport infrastructure to be as quiet as possible – for example, moving the runway further west (quieter airport design);
- Reducing noise through quieter procedures (quieter operations);
- Considering where and when aircraft are flown (quieter skies);
- Offering mitigation for the remaining noise after all the other measures have been taken into account (noise insulation and compensation);
- Engaging with local communities to understand their priorities – pivotal to our approach.

5.2 A quieter Heathrow

Figure 5.5: Our air noise mitigation strategy



5.2.4.1 Quieter planes

Aircraft today are significantly quieter than they were in past decades, and aircraft and engine manufacturers have set long-term goals to continue to reduce noise in future. Heathrow’s noise standards play a role in influencing future aircraft technology, as they are among the strictest in the world. The new Airbus A380, for example, was designed specifically to fall into one of the quietest categories for night operations at Heathrow¹. Our status as an important hub airport means that airlines tend to deploy newer and quieter aircraft on Heathrow routes. This is also influenced in part by our variable landing charges to incentivise quieter planes. This means that the aircraft operated at Heathrow are on average around 15% quieter than the total global fleets of those airlines. Over 98% of movements at Heathrow are by aircraft that are in the quietest current ICAO standard (known as Chapter 4) and more than 50% are by aircraft that already meet the new Chapter 14 standard to be implemented in 2017.

We have forecast the aircraft types that will be operating at Heathrow in 2030 for both a two- and three-runway airport. We project that by 2030 around 85-90% of aircraft will be the latest and quietest, described by Sustainable Aviation as ‘imminent’ technology – or referred to by us as ‘next generation’ technology. This includes aircraft that are starting to enter service in significant numbers today (such as the A380 ‘superjumbo’ or B787 ‘Dreamliner’), and also aircraft due to enter service shortly for which noise performance can be predicted with a good level of confidence (for example, Airbus A350 or A320 NEO). The remaining aircraft will be the quietest in service with airlines today, along with some of the shorter-range aircraft (such as the A320 family) – so called ‘current’ aircraft. By 2030 we also project that today’s noisiest aircraft, such as the older 777-200 and the 747-400, will no longer be in operation.

By 2040, we project that there will be no ‘current’ generation aircraft operating and that approximately 80% of aircraft will be ‘imminent/next generation’ types. The remaining approximately 20% of aircraft will be ‘future generation’ – i.e. new aircraft types that will enter service from around 2030 onwards.

Our assumptions on the development and adoption of new, quieter aircraft are consistent with those used in the air quality assessment, the Sustainable Aviation Noise Road-Map and informed by discussions with existing airline customers. Our fleet assumptions are broadly in line with Department for Transport forecasts for the two-runway airport in 2030.

5.2 A quieter Heathrow

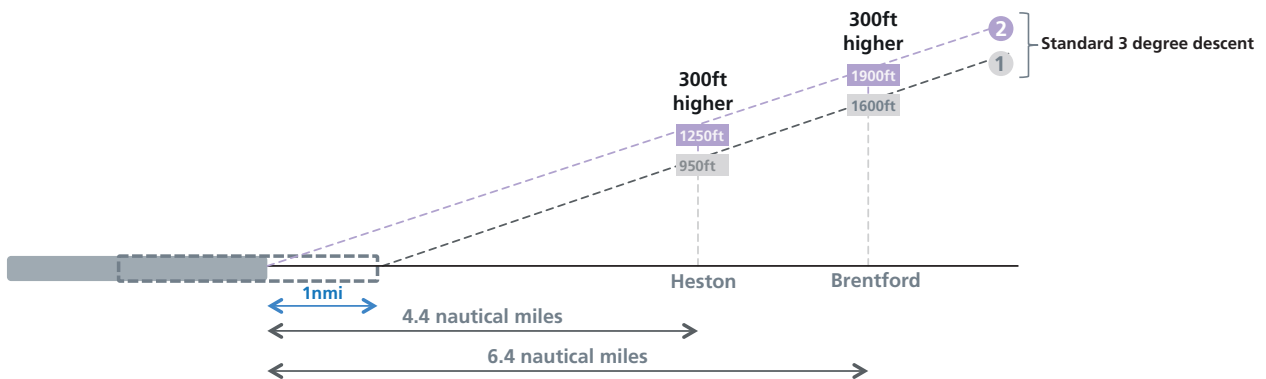
Quieter planes will be introduced at Heathrow largely as a result of projected fleet replacement trends. Adding a third runway will maintain Heathrow’s position as a significant hub airport, and our ability to continue to attract newer, quieter aircraft. We will also continue to use landing charges to incentivise the quieter aircraft and are committed to continually reviewing these charges so that we retain the right level of incentive for airlines as technology evolves. The introduction of new capacity provides a further opportunity to incentivise the use of quieter aircraft by specifying noise performance as a criterion for slot allocation.

5.2.4.2 Quieter airport design – masterplan optimisation

We have used noise modelling to assess the potential noise effects of different masterplan options including the location of the runway. The proposal submitted in July 2013 sited the runway further to the west than our historic proposal for a short third runway. The proposals for the new north-west runway move it around one nautical mile to the west of the existing northern runway. As a result, aircraft are approximately 300 feet higher as they approach Heathrow over London (see Figure 5.6).

Figure 5.6: the benefit of moving the runway west

- ② Approach for new runway location and 3 degree descent
- ① Approach for equivalent existing runway with 3 degree descent

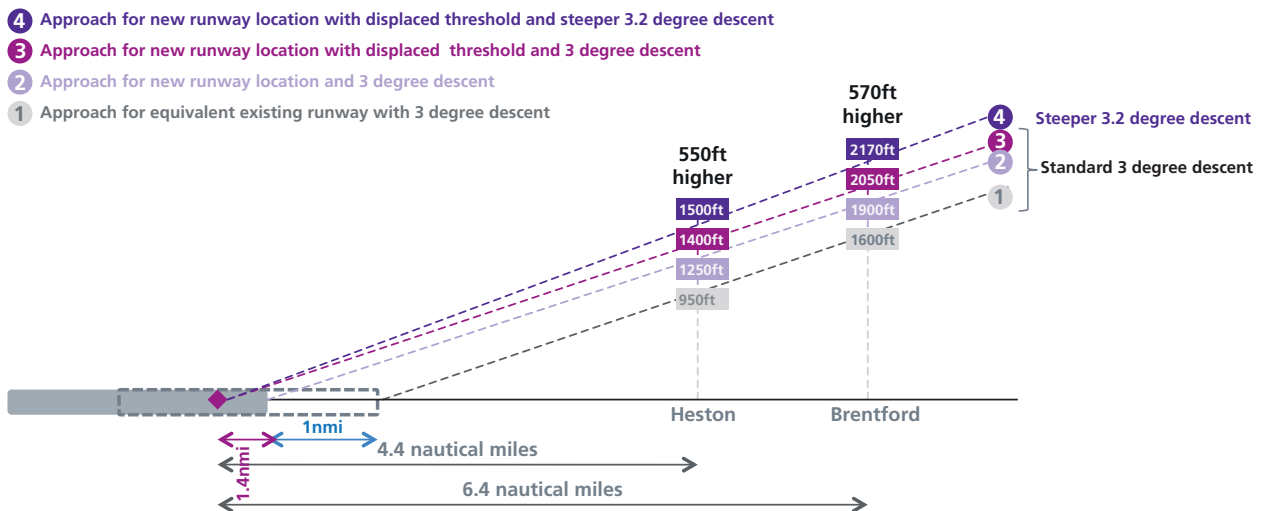


Since the submission in July 2013 we have also moved the new third runway further south (the changes to our masterplan since July 2013 are presented in more detail in Part 3 of our submission). This resulted in an approximate 5% additional reduction in the population contained within the 57 decibel contour (relative to today). This is largely because the south-east part of Slough and more densely populated parts of west London are now less affected.

We have also designed the additional runway and its associated infrastructure so that aircraft touch down 700 metres further along the runway than typically they would today. This is known as a ‘displaced threshold’. The effect of this measure is that, in addition to the revised runway location, aircraft will be flying a further 300 feet higher over London higher as they approach Heathrow to land on the third runway, reducing noise impacts for local communities. Figure 5.7 below illustrates the combined effect on the altitude of aircraft over ground associated with these improvements.

5.2 A quieter Heathrow

Figure 5.7: Designing the airport to reduce noise impacts



The infrastructure changes associated with the third runway also provide a unique opportunity within our overall masterplan to develop significant modifications to the existing runway infrastructure. These enable us to also significantly displace the thresholds of the existing runways. For the existing northern runway this means a displacement of over 1 kilometre and for the southern runway around 800 metres.

5.2.4.3 Quieter airspace operations

The procedures used on individual aircraft, and how airspace is designed, can also reduce noise. Heathrow already employs a number of procedures that do this. We are committed to continuing to develop and deploy new procedures and to work with airlines to promote low-noise practices. Certain measures are within our control while others require collaboration with other organisations and/or changes to government policy. We already work extensively with the CAA, NATS and airlines to reduce noise through quieter operations and will continue to do so. We have focused on steeper approaches, runway use, night flights and airspace design in assessing how operational procedures can help reduce the noise impacts.

Steeper approaches

Steeper approaches mean that aircraft are higher as they approach the airport, reducing the impact of noise on local communities. We have assumed that all approaches to Heathrow will be at 3.2 degrees, compared with 3 degrees today. The principles of this are illustrated in Figure 5.7 above.

When combined with the displaced thresholds, this results in aircraft being more than twice as high over Cranford (for example) than today, and for those at approximately five miles from the airport (e.g. Heston) aircraft would be approximately 50% higher than today.

We believe that a 3.5 degree approach could be achievable for 2040 with the phase-out of current aircraft and advances in technology to manage airspace. A steeper angle of approach represents a significant change to airspace and operations at Heathrow, and needs to meet a range of safety and operational criteria. We are committed to continuing to work with other industry stakeholders to develop and trial steeper approaches.

We have not taken account of the possibility of 'segmented' approaches, when the majority of the approach is at a steeper angle than 3.5 degrees before levelling off to the landing angle. These could offer further potential noise reductions. Through Sustainable Aviation we are working actively with industry partners to research this procedure.

Runway use (mode) rotation

In contrast to the previous proposal for a short third runway and to Heathrow Hub's proposal, we have maintained the principle of runway alternation to provide periods of respite from noise for all communities around Heathrow.

In Part 3, Chapter 1 we described how the adoption of four patterns of runway use (modes) enable us to deliver relief from overflight from arriving and departing aircraft for communities closest to the airport (such as Colnbrook,

5.2 A quieter Heathrow

Poyle, Hounslow, Harlington, and Sipson). There are many ways in which the rotation of these modes could be delivered. Figure 5.8 below indicates one pattern of rotation for the four modes of operation. We would consult the local community and our industry partners to identify the most effective pattern from both an operational and a noise respite perspective.

Figure 5.8: Example operating mode pattern

Assumption	Mode 1	Mode 2	Mode 3	Mode 4
Northern runway	DL	DL	L	D
Centre runway	L	D	D	L
Southern runway	D	L	DL	DL

D = Departing, L = Landing, DL = Departing and Landing

Night flights

Operations at night are an important feature of a hub airport, but also a significant concern for local residents. Of the major European hub airports, Heathrow has the strictest limits on operations between 11pm and 6am and the fewest flights during that period. Heathrow’s night noise standards play a role in influencing future technology as they are among the strictest in the world. The new Airbus A380, for example, was designed specifically to fall into one of the quietest categories for night operations at Heathrow.

We are already committed to reducing the impact of night operations. We have a voluntary arrangement not to land aircraft before 4.30am and not to schedule cargo aircraft at night. Both are adhered to. In 2013 we trialled a new early morning arrivals procedure to provide more predictable respite for communities affected by the small number of arrivals between 4.30am and 6am. As a result of quieter planes and procedures, the area around the airport that was exposed to noise at night was reduced by approximately 25% between 2006 and 2012 (corresponding to a 22% reduction in the number of people).

Our plans assume no change to the current night flight restrictions. To further reduce the impacts of night flights we propose to introduce a runway rotation pattern for those aircraft arriving before 6am to ensure that each runway is used in turn every night or week. The pattern would be influenced by wind direction. This means that residents under existing flight-paths would have night flights at a maximum only every third night or week. Depending on wind direction, this could be as low as night flights only every sixth night or week. We would propose that any rotation system should aim to ensure rotation in turn and single runway operation, but when weather does not permit this strict rotation, then the overall runway use would be balanced across an agreed period. This significantly reduces the impacts of early morning arrival aircraft compared to today.

Figure 5.9: Illustration of early morning arrivals runway rotation



5.2 A quieter Heathrow

5.2.4.4 Quieter skies

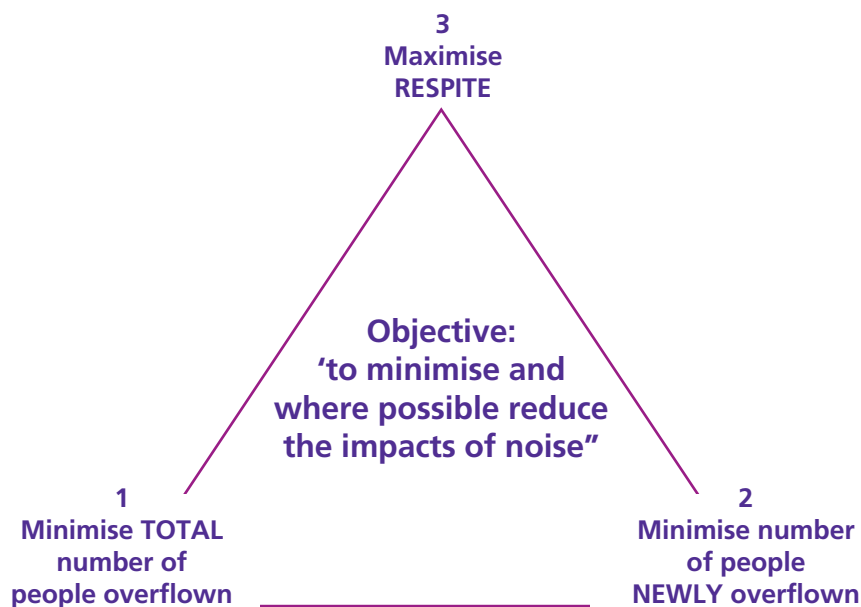
A significant programme of airspace modernisation is underway across Europe, including in the UK and in London which will be completed over the next decade. Airspace, often designed several decades ago, will be able to take advantage of the latest technology to navigate aircraft more precisely and operate more efficiently. Such ‘precision-based navigation’ can also offer significant noise benefits. It allows routes to be designed more precisely to avoid the most densely populated areas. We recognise that this could mean a greater concentration of aircraft on specific tracks. However it will also be possible to create a number of routes for arrivals and departures, and to alternate those routes to deliver predictable periods of respite.

We are committed to taking full advantage of opportunities to manage airspace differently, working with local communities to identify changes that could benefit them. As part of the UK’s Future Airspace Strategy we are currently trialling new airspace management procedures to test the concept of providing predictable periods of respite.

The UK Government’s policy objective, supported by the Airports Commission, is “to minimise and where possible reduce the impacts of noise”. There are choices in how airspace is designed to achieve this.

Adding a third runway at Heathrow would require airspace to be redesigned. There is, therefore, an opportunity to optimise arrival and departure routes to avoid, where possible, areas of dense population and to alternate the areas overflown. Figure 5.10 illustrates three ways in which that overall objective could be achieved.

Figure 5.10: Choices in airspace options



The first is to minimise the total number of people overflown by aircraft. This involves designing flight paths to avoid the densest areas of population, for example. A potential downside could be the exposure of new people to noise and effects on areas of public open space. This is akin to the airspace option used for our July 2013 submission.

The second way is to minimise the number of people newly exposed to noise if a new runway is added. This involves maintaining flight paths as close as possible to those that currently exist, on the basis that individuals would generally have chosen where to live knowing that the area was overflown. However this could mean increasing the frequency of flights over those areas.

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The third is to maximise respite. This involves creating additional routes, but rotating when they are used to provide predictable periods of respite. This could increase the total number of people exposed to noise, but reduce the impact on each individual.

We have developed airspace designs for each of the options above in order to assess how they affect noise. The results are presented in Section 5.2.4.6. At this stage we have developed those designs at a high level only in order to illustrate the broad choices that are available. Any final airspace design relating to another runway at Heathrow would require significant further work. Critically, it would also require significant further public consultation to understand the concerns and priorities of local communities and to develop the right solution.

With a focus on minimising the impacts on people there is a potential to overfly open or 'green' spaces enjoyed for recreational purposes. Our assessment in relation to many of these areas around Heathrow indicates that they are already overflowed.

5.2.4.5 Assessment and noise modelling

We have undertaken air noise modelling using the FAA INM 7d modelling package to enable us to rapidly iterate and develop our assessments. The set-up of the models has been adapted to incorporate noise levels and flight ground track and profile data from Heathrow's noise and track monitoring system. This is the same type of approach used with the CAA ANCON model and is consistent with international standards.

We have commissioned the CAA's Environmental Research and Consultancy Division (ERCD) to undertake noise modelling using its ANCON model, to verify our work. However, given the time required for that exercise and the tight timetable set by the Airports Commission, the results of that assessment are not available to submit in this document.

Inevitably, the technical differences between the two models are likely to lead to some subtle variations in the outputs, including the numbers of people affected by noise. Consequently, in this document we have presented all population data as a percentage change to 2011 using our INM 7d analysis. However, from previous use of both of these models and our extensive efforts to refine the INM model to align with ANCON, we expect the performance trends identified in both to be consistent.

Assessing change

For each of the airspace options described above, we have mapped the change of noise level at postcode points in bands representing significant adverse change (an increase in average noise level of at least 3 decibels), no change and significant improvement (a reduction in average noise level of at least 3 decibels). This has been assessed within an "area of interest" defined by the composite of the outer boundary of the Appraisal Framework noise scorecard metrics (55 dB Lden, 54 dB LAeq,16hr, 48 dB Lnight), for either the existing or future cases.

Assessing respite

We know communities that are overflowed see respite from aircraft noise as important. However, definitions and measures to describe and assess respite are not well developed at this time. In addition, it is not clear how this concept is best delivered for maximum value to those communities that are overflowed.

As part of the Future Airspace Strategy trials programme, mentioned above, we are currently conducting a trial to assess the potential for delivery of respite through rotating departure routes. This includes a social survey based on in-depth interviews to further develop our understanding of the value of respite, and how it might best be delivered. Although the results of this work have not been available to inform this submission, they should be available in late summer 2014. We will share these results with the Commission once known.

Our current trials indicate that aircraft operating under precision-based navigation systems display very close adherence to the designed routes. As a result, we have considered a primarily track-based over-flight approach to describing respite. For each airspace option, we have defined a set of 1 kilometre wide routes to a distance of 15 nautical miles from the airport. For each mode, if a flight is mapped to that route, the postcode is considered to be overflowed, and therefore no respite is provided in that mode to that postcode.

The degree of respite offered by each airspace design option has been estimated for westerly and easterly operations, and then combined. This enables an understanding of the extent and predictability of respite that can be provided to those areas that are overflowed and the proportion of people to which this applies.

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5.2.4.6 Assessment results

Change in overall population exposed to noise

The table below shows the percentage reductions in the population with a selection of noise contours, for each of the three airspace options above. All of the options deliver significant reductions in the number of people exposed to noise compared to today, as a result of the quieter planes, airport design and operations strategies as set out above. This means that even with a third runway, we estimate that in 2030 there will be 30-35% fewer people than today within Heathrow's noise footprint (based on the government's lead metric for the number of people significantly affected by aircraft noise, the 57 decibel contour). The reduction in the number of people in Heathrow's night noise footprint is even more significant, with between 57 and 60% fewer people affected than today. The number of people in the highest noise footprint outside the airport (69 decibels) falls by close to 80% for all options.

Figure 5.11: Percentage reduction in population exposed to key noise metrics

Airspace option	Metric and contour boundary (dBA)	Percentage difference in population inside contour relative to 2011		
		2R 2030	3R 2030	3R 2040
Minimise TOTAL people overflown	Lden (55)	-50%	-48%	-37%
	LAeq, 16h (69)	-66%	-78%	-22%
	LAeq, 16h (57)	-43%	-35%	-21%
	LAeq, 16h (54)	-45%	-41%	-30%
	LAeq, 8h Night (50)	-55%	-60%	-46%
Minimise number of NEW people overflown	Lden (55)	-50%	-45%	-32%
	LAeq, 16h (69)	-66%	-78%	-24%
	LAeq, 16h (57)	-43%	-31%	-18%
	LAeq, 16h (54)	-45%	-37%	-26%
	LAeq, 8h Night (50)	-55%	-57%	-40%
Maximise RESPITE	Lden (55)	-50%	-46%	-35%
	LAeq, 16h (69)	-66%	-78%	-18%
	LAeq, 16h (57)	-43%	-31%	-18%
	LAeq, 16h (54)	-45%	-38%	-24%
	LAeq, 8h Night (50)	-55%	-59%	-46%

Change in patterns of noise exposure for each option

While the overall numbers of people within Heathrow's noise footprint will fall significantly compared to today, the introduction of a new runway and new flight paths will mean that some people will experience an increase in noise compared with today. This section describes, for each airspace option, the change to patterns of noise exposure. Figures 5.12, 5.13 and 5.14 indicate the degree of change within the "area of interest" defined by a composite of the outer boundary of a range of current and future day and night contours (i.e. 55dB Lden, 54dB LAeq, 16hr, 48dB Lnight).

Option 1 – Minimise the total number of people exposed to noise

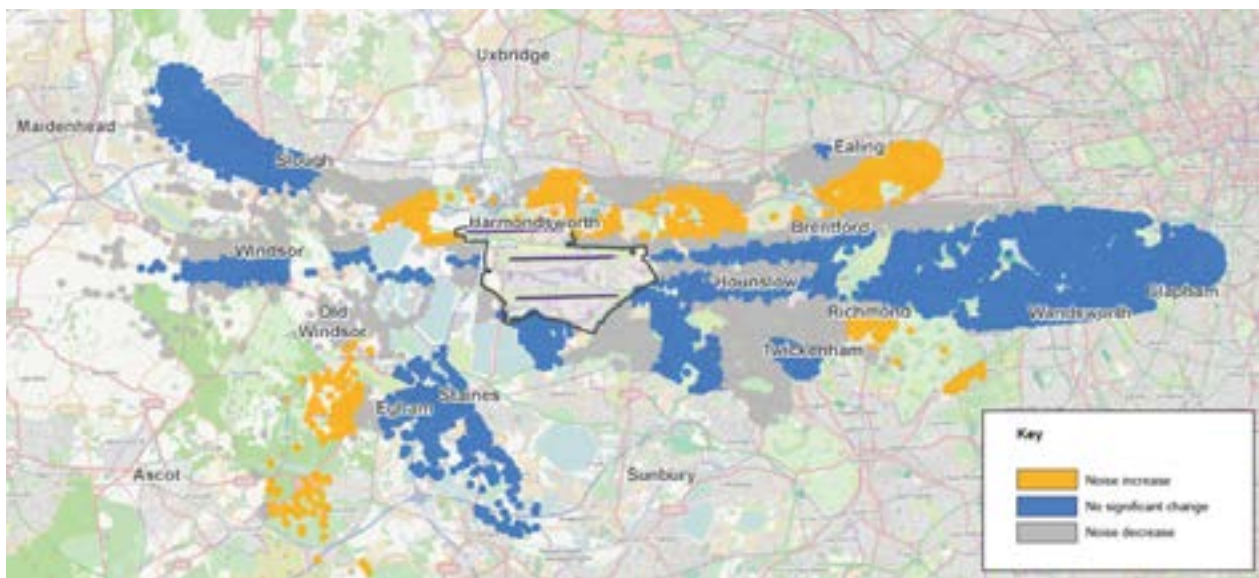
This option was designed to minimise the total number of people overflown. We created routes that avoid the densest areas of population. In some cases this involved creating routes over areas that are not currently regularly

5.2 A quieter Heathrow

overflowed. As a result there are some new people exposed to noise. We provide respite through the principle of rotating the runway use as described above.

This option reduces the population of daytime and night-time exposure most significantly, relative to today. There is approximately a 35% reduction in the number of people within the 57 decibel contour and a 60% reduction in those exposed to night flights. Figure 5.12 below shows the change in patterns of noise exposure around the airport for this option.

Figure 5.12: Minimise total people overflowed – change in noise level using the Summer LAeq,16hr metric within the “area of interest” between 2011 and 2030. (available in A3 format in Appendix 18)



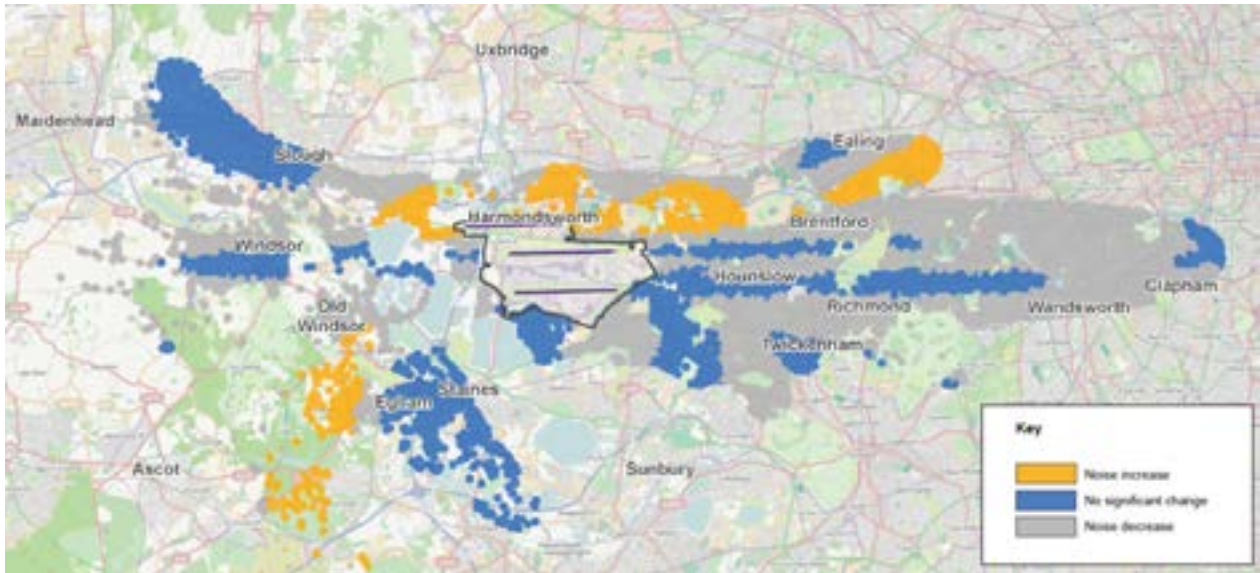
Option 2 – Minimise the number of people newly exposed to aircraft noise

This option was designed to minimise the number of people newly exposed to aircraft noise. We maintained flight paths as close as possible to those that currently exist, on the basis that individuals would generally have chosen where to live knowing that an area was overflowed. This results in more people exposed to noise in total, though fewer people are newly exposed to aircraft noise. However, by utilising the existing approaches where possible, this option results in the loss of respite for some areas overflowed by the existing westerly approaches.

There is a 30% reduction in the number of people within a 57 decibel contour and a 55% reduction in those exposed to night flights. Figure 5.13 below shows the change in patterns of noise exposure around the airport for this option.

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Figure 5.13: Minimise new people overflown – change in noise level using the summer LAeq,16hr metric within the “area of interest” between 2011 and 2030. (available in A3 format in Appendix 19)

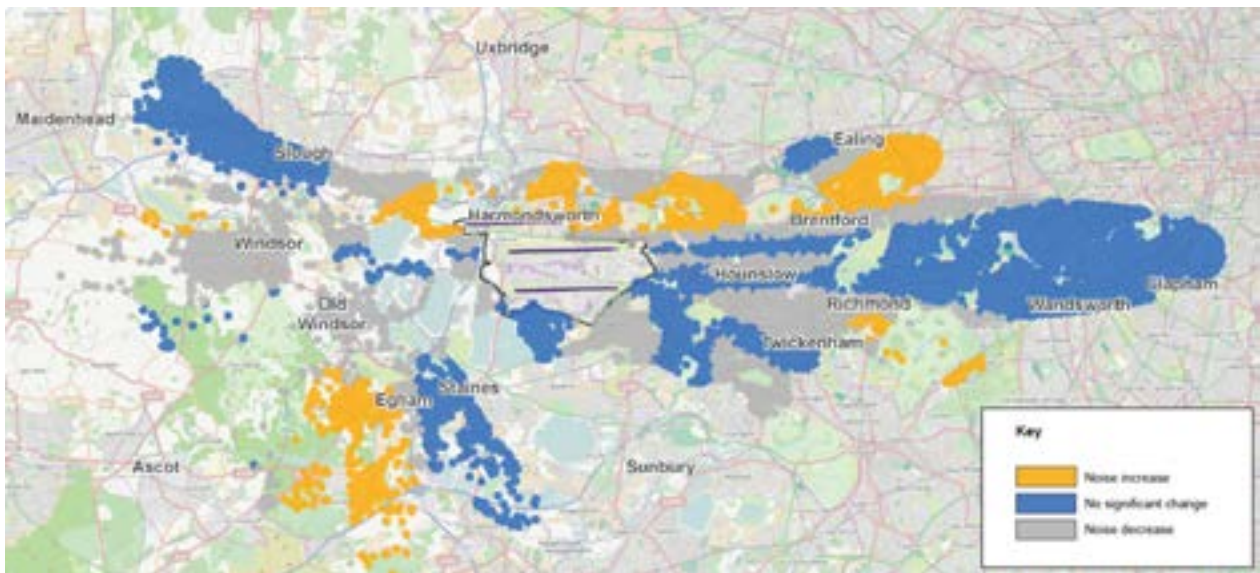


Option 3 – Maximise respite population

We designed this option to provide additional respite for those overflown, as local communities have indicated the importance of these periods of respite. It involved creating additional flight paths, but rotating when they are used in order to provide predictable periods of respite.

All communities overflown within 15 nautical miles (nm) of the airport receive respite from aircraft overflight. This option still delivers significant reductions in overall noise exposure, similar to option 2 above. There is a 30% reduction in the number of people within a 57 decibel contour and a 55% reduction in those exposed to night flights. Figure 5.14 shows the change in patterns of noise exposure around the airport for this option.

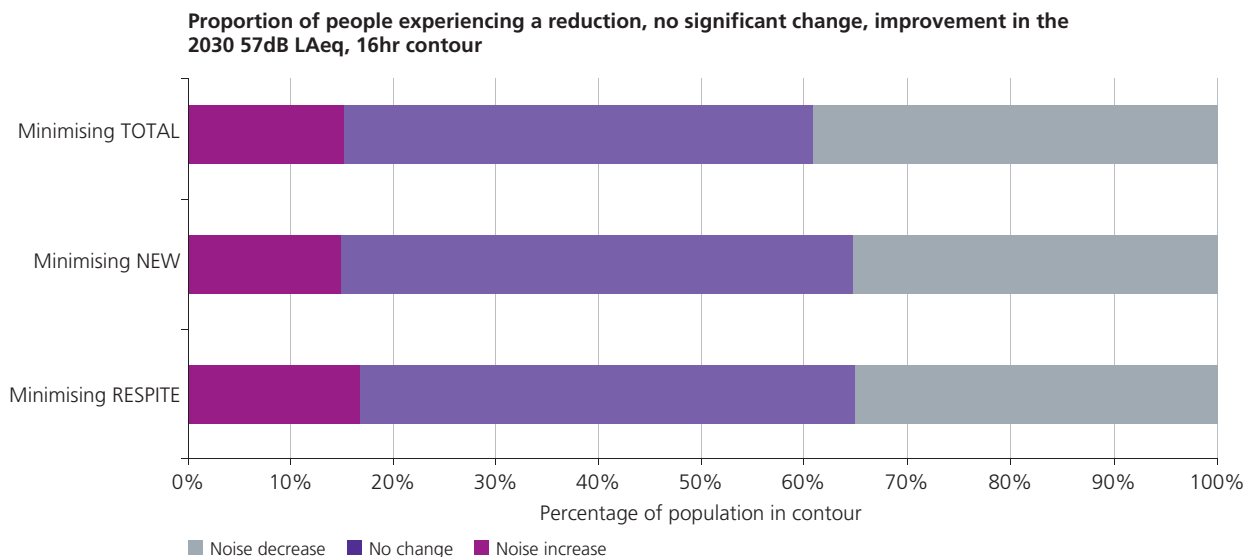
Figure 5.14: Maximise respite for those people overflown – change in noise level using the summer LAeq,16hr metric within the “area of interest” between 2011 and 2030. (available in A3 format in Appendix 20)



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Figure 5.15 presents noise level changes in bands of significance – a significant reduction of more than 3dB (noise decrease), no significant change (no change) and a significant increase of noise of more than 3 dB (noise increase) for those in the 2030 57 decibel contour. In 2030, approximately 35-40% of those in the 57 dB contour will experience a significant decrease in noise compared with today, and a further 45-50% will experience no significant change compared with today.

Figure 5.15: Change in noise exposure relative to 2011 for those in the 57 decibel contour



Assessing respite

In our community consultation there was very strong support (by a margin of 3:1) for continuing to provide periods of respite from noise for all communities around Heathrow. In addition to assessing our airspace options using traditional ‘contour’ measures, as outlined in the previous section, we have therefore also focused on developing measures of the respite provided.

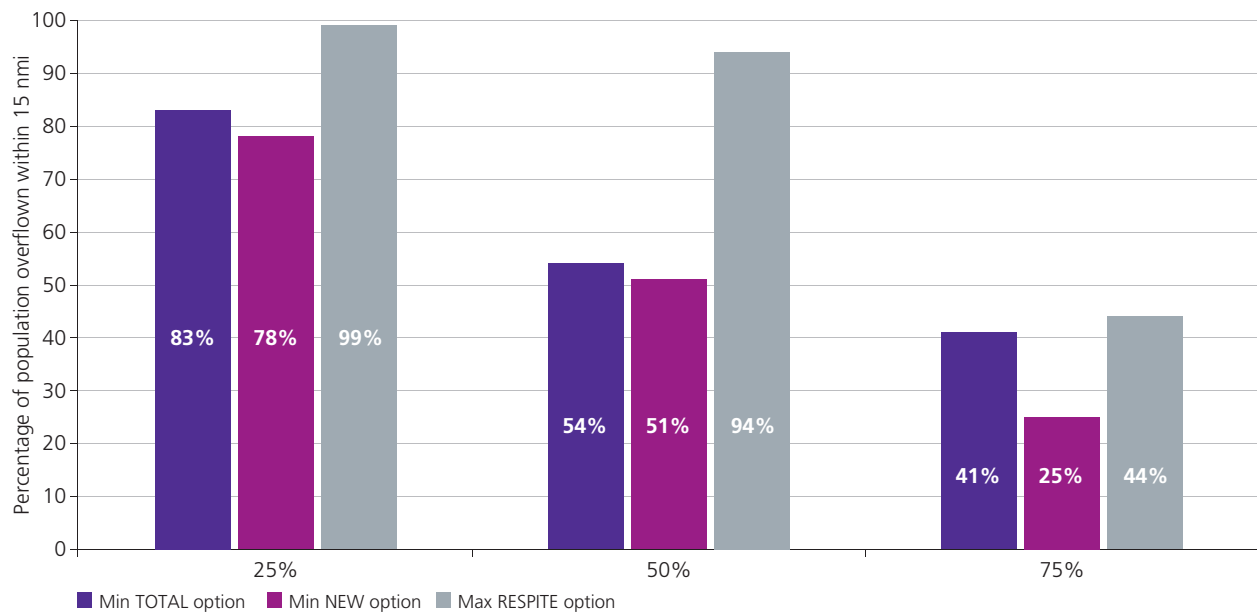
Figure 5.16 shows the percentage of the population affected by noise that benefit from respite for each of the three different airspace options presented. In the ‘maximising respite’ option, 99% of people overflown could experience respite for at least 25% of the time and 94% for at least 50% of the time. In contrast, the two other airspace options (‘minimising the total number of people exposed’ and ‘minimising the number of people newly exposed’) provide much less respite. Around 80% of people experience respite for at least 25% of the time, but this falls to around 50% of people experience respite for at least 50% of the time.

The benefits of additional respite being provided through airspace design and operation by our ‘maximising respite’ option appear to be most evident in areas that are overflown outside the 57 decibel contour.

We believe that an airspace option that maximises respite offers advantages. However, we recognise that there are choices to be made. We need to involve local stakeholders in further significant consultation before finalising airspace design.

5.2 A quieter Heathrow

Figure 5.16: Respite



Social costs

There is much debate about the suitability of metrics in describing annoyance, and whether the existing metrics are adequate. The Airports Commission has placed significant emphasis on monetising the external costs of noise. We have chosen to estimate a ‘social cost’ of noise using relationships for annoyance described in ANASE (2). This considers the rates of annoyance for noise levels greater than 50 decibels (based on the average summer noise contours) and so includes populations that are outside of the standard contour metrics where the differences between the options become more apparent.

The social cost of the three options outlined above is between £200 million and £240 million. The ‘maximising respite’ option has the lowest cost of the three options. We have used this range of costs as one input to inform the value of the fund that we have created for noise insulation and compensation.

5.2.5 Other noise

5.2.5.1 Quieter ground operations

We recognise that for those closest to the airport, noise from activities on the ground can also have an impact. We have sought to minimise the impact of ground operations through optimising aspects of the airport layout, development of appropriately sized and placed acoustic barriers, and through the way in which the airport operates.

We have sought to design the airport to maximise the distance between taxiways, aprons and stands, and those who live near to the airport boundary. We have included noise bunding and acoustic fencing at five key locations to reduce noise from our airside operations for people living in Harmondsworth, Sipson, Poyle, Stanwell and Stanwell Moor. These physical measures include:

- A 5 metre high noise attenuation bund at the boundary with Sipson
- A 3 metre high bund at the boundary with Harmondsworth
- 5 metre high acoustic fences at the boundaries with Poyle, Stanwell and Stanwell Moor.

The design of these measures has taken into consideration their likely effectiveness, design sensitivities of the airfield, and landscape and visual impacts.

5.2 A quieter Heathrow

A Ground Running Enclosure (GRE), designed specifically to reduce this noise, has been included and costs given within our mitigation strategy. This GRE will reduce engine ground-run noise by providing an acoustic screen between aircraft and surrounding communities.

In addition to the physical mitigation measures outlined above, we will introduce a range of operational measures to reduce the noise aircraft make on the ground. These measures share principles with our Air Quality Mitigation Strategy and aim to reduce aircraft air emissions as well. Therefore we will:

- Provide Fixed Electrical Ground Power (FEGP) and Pre-Conditioned Air (PCA) at all new aircraft stands to avoid the need for aircraft to produce noise by using their APU while on-stand. As part of our Air Quality Strategy (Chapter 5), we are aiming to reduce APU running times to a maximum of 40 minutes for wide-body jets and to 20 minutes for narrow-body jets
- Provide stand-by Ground Power Units (GPUs) for use should FEGP be unavailable
- Continue to use Collaborative Decision Making (CDM) that will reduce taxi and hold times, thus reducing the amount of time aircraft produce noise both while stationary and during taxiing. CDM is a management process that involves co-operation between pilots, airlines, ground crew, air traffic control and airspace management agencies which aims to eliminate flight delays both in the air (no stacking) and on the ground (reduced hold and taxi times)
- Introduce new and modern airside equipment, such as electric vehicles and clatter-resistant baggage trolleys, that will further reduce airside noise
- Develop procedures with our ground service operators to ensure all airside equipment is suitably maintained to avoid noise from wear and tear
- Ensure that other noise-producing plant and activities are screened from communities, either through informed placement or further physical measures
- Investigate and consider the strategic use of aircraft stands during quieter periods, such as during the night, to shield airside activities on the aprons from our neighbours.

5.2.5.2 Road noise

We understand that airport traffic contributes to road traffic noise in the areas surrounding Heathrow. We will ensure that a three-runway airport does not generate any more airport-related road traffic than today's two-runway airport.

Our approach has been informed by three-dimensional noise modelling techniques, field surveys and background noise measurements. Road traffic noise due to airport traffic will be managed through the development of our Airport Surface Access Strategy (ASAS).

Within this strategy we have made the following mitigation commitments:

- A provision to erect roadside noise barriers along new and realigned sections of carriageway and, where communities are most likely to experience increases in road traffic noise, as a result of development. We have committed to providing up to 4 kilometres of roadside noise barriers, which will be located and prescribed following detailed assessment
- The masterplan design for the M25 includes placing sections of carriageway within cuttings, which will further assist in reducing road traffic noise. Noise will be further reduced by landscaping
- Low-noise surfacing will be used where practical and effective. We will work with stakeholders to identify where this technology could help improve existing conditions
- Noise insulation will be provided to those who experience significant levels of road traffic noise as a result of development³
- Compensation measures will be considered should any situations arise where road traffic noise measures – such as low noise surfacing, roadside barriers and insulation – are unable to avoid significant impacts.

5.2 A quieter Heathrow

5.2.6 How does the proposed scheme mitigate remaining adverse effects?

Notwithstanding our steps to reduce noise, in the future there will still be homes and community buildings in Heathrow's noise footprint. Noise insulation schemes will play an important role in reducing noise levels inside those properties.

We have allocated a £250 million fund to pay for noise insulation and compensation for homes and community buildings (including schools) in the highest noise areas and in areas exposed to significant new noise. This figure has been informed by the indicative 'social cost' of noise described above and by some high-level scenarios for how such a sum could be allocated around the airport. The specifics of our noise insulation and compensation scheme need to be developed in consultation with the local community. We will now work with a panel of local community representatives to develop more detailed proposal for noise insulation and compensation before consulting in July.

In high-level terms we envisage that our noise insulation scheme would comprise:

- An offer to buy homes at above market value for those in the highest noise areas
- A generous relocation package for those located in higher noise areas that would cover the costs of moving
- A noise insulation scheme for all those exposed to high levels of noise, or those newly exposed to a significant change in noise
- An element that comprises insulation options for schools and other public noise-sensitive buildings (including relocation in the event it is required)
- Ground noise assessment – although traditionally this has not resulted in specific requirements for noise insulation, we recognise that in the course of our dialogue and consultation with the local community this may be an aspect we need to incorporate.

Over the past two years we have supplemented our existing noise insulation schemes with our Quieter Homes Initiative. This includes engaging directly with the homeowner during a property assessment process, offering a 100% contribution to the insulation costs for the property itself and a range of products and styles appropriate for that property. The feedback that we have received indicates that this has been particularly well received. This approach will help inform our dialogue with community representatives and consultation this summer.

5.2.7 Delivering our strategy

Our noise strategy is deliverable and practical. The technological and operational measures we are proposing are based on known aviation technologies, and conservative, expert judgement of what will be possible in future. The strategy will be delivered through a partnership approach between Heathrow and the rest of the aviation industry, including airlines, air navigation service providers and aircraft and engine manufacturers. It will also require ongoing engagement with regulators, policy-makers and communities around the airport.

We believe an effective noise management regime should be underpinned by effective stakeholder engagement and consultation. So we aim to provide clear and accessible information on noise around Heathrow and to take local views into account when developing the best package of measures to reduce noise. We have regularly benchmarked our community engagement against other leading global airports to identify and act upon areas for improvement. We are working increasingly closely with residents groups and local authorities to improve our communications and to trial new noise management procedures, and will continue to develop that approach.

5.3 Improving air quality

We can add capacity at Heathrow while improving air quality and meeting all health-based pollution limits. There will be no more Heathrow-related vehicles on the roads than there are today – and those vehicles that are travelling to the airport will be cleaner. Combined with new aircraft technology, this means that levels of nitrogen dioxide (NO₂) would be within EU limits. Levels of fine particles (PM₁₀ and PM_{2.5}) are already within the limits and are forecast to remain within these limits in the future.

About Air Quality

There are many sources of air pollution in the UK, including power stations, traffic, household heating and agricultural and industrial processes. In the area around Heathrow, the main sources of emissions that contribute to air quality are, in decreasing order of influence:

- The ambient background (arising from emissions outside the activities of Heathrow airport)
- Road traffic (airport and non-airport related vehicles)
- Emissions from airport activities.

The air pollutants of most concern to public health are nitrogen dioxide (NO₂) and fine particulate matter, both of which arise from burning fossil fuels. In the Heathrow area, it is NO₂ that is the pollutant of most concern to health, as presently there are a number of locations where it is above European and national limits.

Emissions from airport activities are on a steady downward trend, for instance we have seen concentrations of NO₂ in the Heathrow area fall by 20% over the past 20 years. The influence of the airport on air quality falls quickly with distance from it. Within two kilometres of the airport, the only air quality monitored site to exceed the EU limit value is located on the M4. The exceedence at that location is largely as a result of road traffic – the majority of which is not airport related.

To assess how much impact activity at Heathrow has upon air quality levels, we use a complex mathematical modelling procedure that takes information on emissions of pollutants, where they are emitted and by which source (aircraft, road vehicles, heating plant), and combines the resulting information with weather data measured at the airport. This model then tells us how much the airport contributes to air pollutant levels at all locations around the airport. The modelling procedure uses 'ADMS-Airport' software, which was recommended as the best practice approach by the panel of experts for the Project for the Sustainable Development of Heathrow (PSDH) in 2002. Since 2006, we have been updating and refining the procedure. This process has involved improving the data on emissions, the way in which the emission sources vary in time and space, and our confidence in the outputs. Based on the comparison with measured pollutant concentrations at monitoring stations around the airport, we know that we have a good measure of the extent to which airport operations affect local air quality.

5.3.1 Our objectives

To deliver our aim of adding capacity while meeting all health-based pollution limits, our objectives have been to:

- Ensure that measures to design-out emissions are incorporated into the plans for a third runway and its supporting infrastructure and
- Where it is not possible to design-out emissions, to reduce emissions from airport operations and associated surface access modes.

5.3 Improving air quality

5.3.2 Our track record

We have a long track record of managing air quality. We implemented our first Air Quality Strategy and Action Plan in 2002, and reviewed and updated it in 2007. Our current Air Quality Strategy runs from 2011 to 2020 and has been designed to complement the measures being implemented by the four local authorities in the area, the Mayor of London's Air Quality Strategy and national initiatives.

We have carried out continuous air quality monitoring at locations on and around the airport since 1993, using equipment similar to that shown in Figure 5.17. All of the data collected can be found on the Heathrow Airwatch website⁴. We also carry out regular and detailed calculations of the quantities of air pollutants that are emitted from airport-related activities (known as an 'Emissions Inventory'), which allows us to track the progress of our emissions reductions programmes and to compare these to our monitoring results.

Figure 5.17: The Heathrow air quality monitoring station



In the last decade we have achieved significant reductions in emissions – even though the numbers of people and aircraft using Heathrow have increased. Emissions of nitrogen oxides (NOx) from airside vehicles have reduced by 25% between 2002 and 2014. NOx emissions from aircraft auxiliary power units have decreased by around 50% over the same period. There have also been significant reductions (51%) over this same period in NOx emissions from car parks, car rental and staff car parking. NOx emissions from the local road and motorway network have fallen by 53% over this period.

5.3 Improving air quality

5.3.3 The existing environment

Heathrow Airport sits within the southern part of the London Borough of Hillingdon Air Quality Management Area (AQMA). The third runway would lie mainly within Hillingdon, with the western end extending over the M25 into the Borough of Slough.

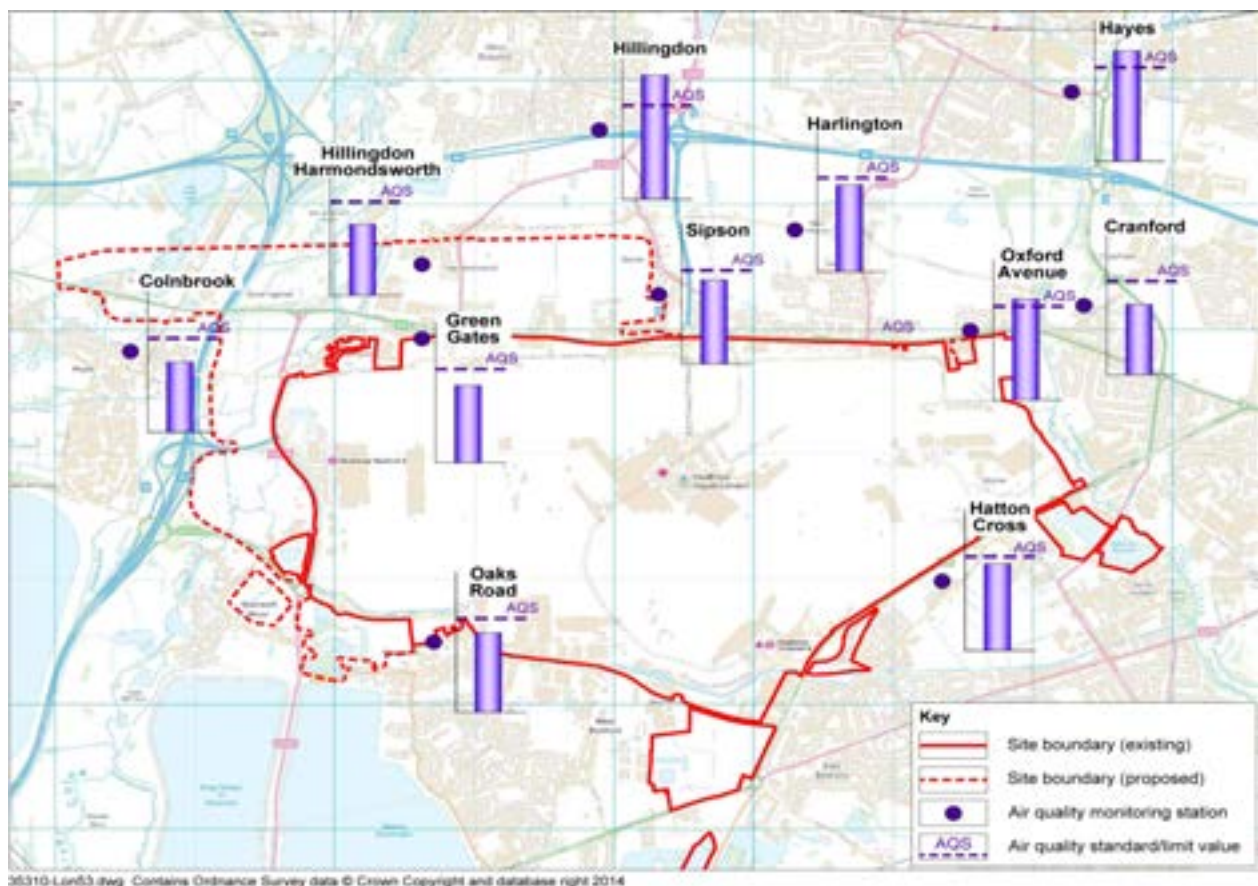
The Hillingdon AQMA was declared in 2001 and was subsequently extended in 2003 to cover all parts of the Borough south of the Chiltern-Marylebone railway line. The AQMA was declared because annual average concentrations of NO₂ were found to be above European and national air quality limits at certain locations, including those close to busy roads and motorways. It is however not the case that the NO₂ limit is exceeded everywhere within the Borough.

Concentrations of the other significant air pollutants – including fine particulate matter (PM₁₀ and PM_{2.5}) – in the boroughs of Hillingdon, Hounslow, Spelthorne and Slough, already meet air quality limits and are forecast to continue to do so into the future.

Air quality monitoring results for NO₂ at the monitoring stations on and around the airport are shown in Figure 5.18 below. The bars indicate the measured annual average NO₂ concentration at the different site locations during 2013 and the dotted line shows the 40 µg/m³ annual average limit that is set in European and national legislation.

Consistent with the findings of the local authorities, the main areas of poor air quality are locations close to major roads and motorways. At these locations, the NO₂ levels are only just above the permitted value. In comparison, typical levels of NO₂ in central London areas during 2013 have averaged between 45 and 85 µg/m³ – up to more than twice the legal limit.

Figure 5.18: Measured annual average NO₂ concentrations around Heathrow Airport, 2013



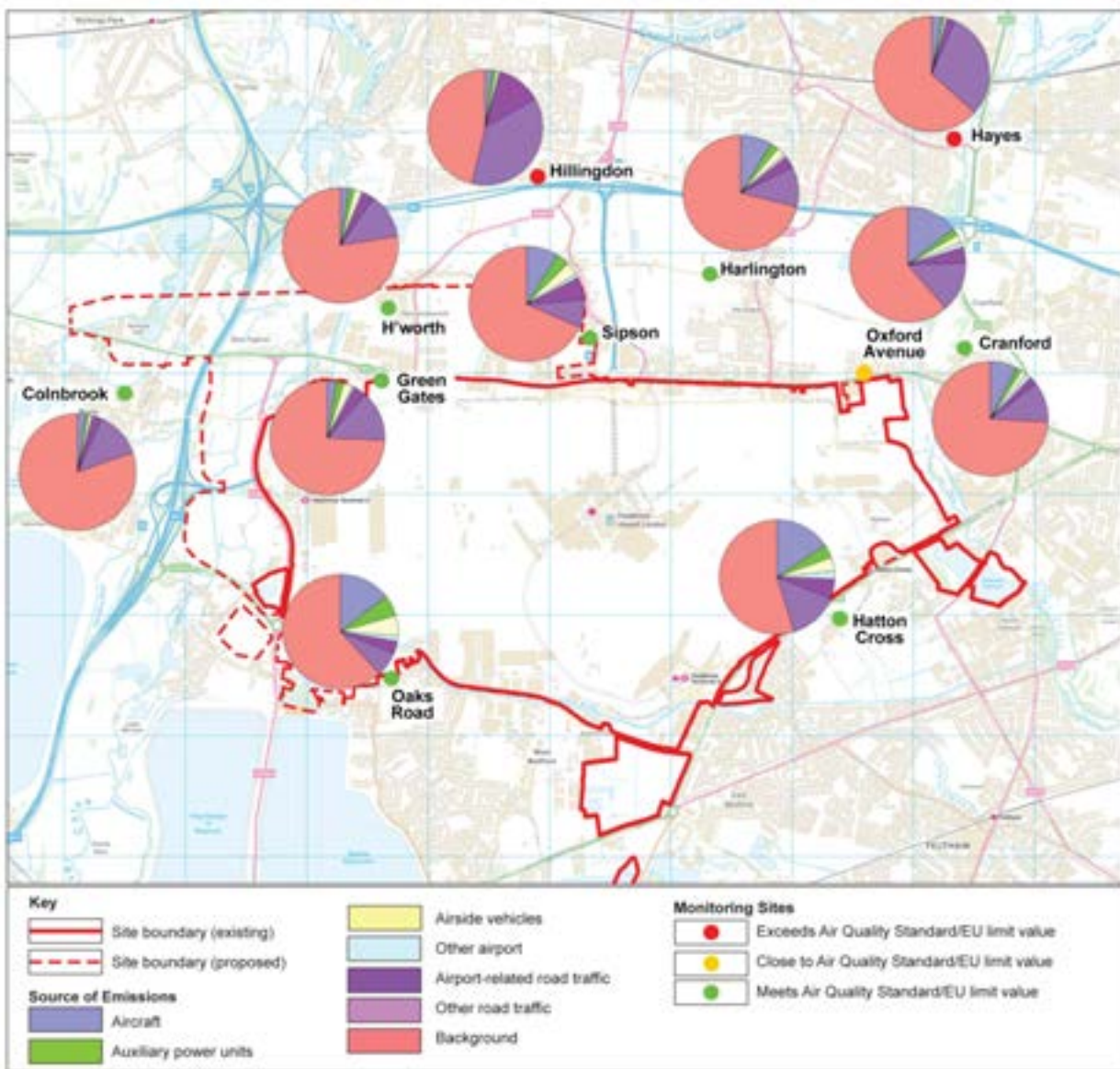
5.3 Improving air quality

The extent to which emissions from Heathrow Airport and other sources contribute to levels of nitrogen oxides in the air at these monitoring locations is shown in Figure 5.19, where the different coloured sections of the pie-charts show the origins of the contributions.

The charts show that the contribution of the airport to Oxides of Nitrogen levels varies between approximately 4% and 31%, depending upon how close to Heathrow the monitoring stations are and whether they are situated down-prevailing-wind of the airport.

The majority of the contribution by a significant margin comes from the background – that level of pollution which is blown into the Heathrow region from outside, containing emissions from the rest of London, England and, occasionally, as we have seen as recently as spring 2014, from continental Europe.

Figure 5.19: Modelled NO_x emission contributions from airport and non-airport sources, 2008/9.



5.3 Improving air quality

5.3.4 Modelling the effects of our proposal

We are in the process of undertaking a detailed air quality assessment of the likely air quality effects of the proposed expansion masterplan, covering the key air pollutants of concern, as required by the Airports Commission. We have completed the modelling for 2030, which demonstrates that the European Limit Values and national air quality standards for nitrogen dioxide and PM₁₀ will be met as a result of the continuing reductions in air pollutant emissions from road vehicles, industry and domestic/commercial sources. We are continuing to undertake the modelling assessment for 2040 and expect concentrations to be no higher than in 2030, owing to progressive improvements in emissions between 2030 and 2040. Air quality modelling is a time-consuming process that involves multiple calculations of very complex equations meaning that the process could not be started until the masterplan was complete. As outlined in Chapter 1, we plan, as part of a later submission to the Commission, to provide a detailed technical report which will outline in detail the results of our modeling. We envisage that that will be available in around a month's time.

Our air quality model has been developed to be consistent with the approach developed and refined from earlier studies on the Project for the Sustainable Development of Heathrow (PSDH) – which is considered to be best practice.

5.3.5 Responding to our stakeholders

We have carried out consultation on the proposed masterplan with those stakeholders likely to be most affected by expansion at Heathrow. We worked hard to launch a six-week public consultation shortly after the Airports Commission's interim report. This has allowed us to ensure that the public's views are fully reflected in our refreshed scheme design. It is clear from the responses that air quality and potential effects upon public health are a significant concern to communities around the airport. Specifically, people are concerned about increased emissions from aircraft and airport-related traffic on the surrounding local road and motorway network. We have sought to address these concerns through our strategy.

5.3.6 Avoiding effects through design

We have taken the air quality concerns of stakeholders on board in the design evolution of the masterplan. Since our July 2013 submission to the Airports Commission, the masterplan has been altered to further reduce emissions of NO_x, NO₂, PM₁₀ and PM_{2.5} and concentrations of these key pollutants at locations outside the airport boundary.

We have been careful in positioning the third runway as close to the existing northern runway as operationally possible. This will avoid cumulative air quality effects from aircraft and road traffic at properties located to the north of the M4 motorway. We have also ensured that the alignment of new roads is kept as far away as possible from nearby communities to limit the effects of road traffic emissions. This has meant, for example, that we are proposing re-routing the A4 to the north of the airport and providing a bypass to the north and east of Sipson.

To build the M25 tunnel, we will utilise well-established design standards for road tunnel ventilation, thereby ensuring no adverse effects upon vehicle occupants or maintenance personnel. In terms of the air quality benefits from providing the tunnel, there are no sensitive receptors within close proximity to the tunnel portals, where the majority of the vehicle emissions within the tunnel would emerge. The preliminary results of the air quality modelling of the 3R 2030 case, which has been set up to include the tunnel as part of the model, show that any NO₂ emissions that exceed the annual average standard are contained within the road corridor. Therefore there will be no effect on nearby properties.

5.3 Improving air quality

5.3.7 Managing the effects of our masterplan

5.3.7.1 Physical mitigation

The airport has been designed to minimise distances between runways, taxiways, aprons and stands and to make aircraft movements on the ground as efficient, and therefore as low emission, as possible. In addition, we have designed surface access road and motorway links to protect air quality at sensitive locations as far as possible. Also, the Surface Access Strategy (see Part 4), which sits alongside the masterplan, has been specifically designed to generate no more road traffic than there is today with a two-runway airport. Given that vehicle technology is becoming cleaner - based on government forecasts of future technology take-up – total emissions from road vehicles travelling to and from the airport will be lower in 2030 than today.

5.3.7.2 Operational mitigation

As well as masterplan design features, we are incorporating the following measures into the future operation of a three-runway airport to reduce emissions of air pollutants:

Cleaner aircraft technology

We will continue to apply and develop emission-based landing charges. This will provide an incentive for operators to use aircraft that are the lowest emitting of their type. In order to encourage a quicker take-up and operation of cleaner aircraft by airlines, we introduced a NO_x charge as part of our landing charges in 2004 and are committed to continually reviewing that. In our Air Quality Action Plan, published in 2011, we set a target for 55% of aircraft to be CAEP/65 by 2020. By 2030 our assessment is that over 98% of the aircraft fleet using a three-runway Heathrow will be a minimum of CAEP/6 complaint and, by 2040, this will increase to 100%.

Cleaner aircraft operations in the sky

We will operate with displaced runway thresholds and steeper approach glide slopes. While this is principally a noise mitigation measure, it also has benefits for air quality. For instance, it will result in lower air quality effects at places close to the airport boundary at the ends of the runways – because aircraft will spend less time in approach close to the ground and will land on the runway at a position further in from the airport boundary and further away from nearby residential areas.

Cleaner aircraft operations on the ground

We will reduce taxi and hold times for aircraft through Airport Collaborative Decision Making (A-CDM). A-CDM is a management process that involves co-operation between pilots, airlines, ground crew, air traffic control and airspace management agencies, with the aim of eliminating flight delays both in the air (no stacking) and on the ground (reduced hold and taxi times). Reducing flight delays will help to reduce emissions from aircraft both on the ground and in the air. An example of this is included in the box below. In May 2012, we became only the fifth airport in Europe to begin implementing A-CDM, which will be progressively rolled-out to improve the efficiency of movements on the airfield.

5.3 Improving air quality

The Perfect Flight

The 'Perfect Flight' concept came about through a partnership of NATS, British Airways and Heathrow, worked out through the 'Sustainable Aviation' partnership. This demonstrates how, in the future, flights could be more fuel-efficient and create less of an impact on the environment.

The 'Perfect Flight' was a normal British Airways service from Heathrow to Edinburgh. Every element of its journey was optimised to minimise emissions and delays.

The plane was allowed to taxi without having to wait on the ground, take-off in a continuous climb – rather than in a series of steps – to reach cruising altitude and make a continuous descent. After landing, the flight crew shut down one engine during its taxi to the gate.

The results were impressive – the flight used 350kg less fuel than normal, with associated reductions in NOx emissions.

While it isn't yet possible for every flight to be a 'Perfect Flight', this demonstration marks an important environmental milestone and the information gathered will support the aviation industry to reduce emissions in the future.

We will provide fixed electrical ground power (FEGP) and pre-conditioned air (PCA) at all new aircraft stands, to avoid the need for prolonged use of aircraft Auxiliary Power Units (APUs). The APU is the small jet engine used to provide electrical power to the aircraft and heat or cool the ambient air in the cabin. Today FEGP is fitted to all pier served stands and its availability is currently over 98%. PCA is currently fitted at all Terminal 2 and Terminal 5 stands and to some stands on Terminal 3 – covering over 50% of all stands. Where aircraft are unable to benefit from PCA they need to run their APUs for longer. In the future, with PCA fitted across all new stands, the amount of time each flight needs to run their APUs will fall to less than half of that today

Cleaner airside vehicles

We will provide low/zero NOx emission fuel-charging infrastructure (electric charging points and hydrogen fuelling) for airside vehicles and equipment, and incentivise their uptake. Our long-term goal is to progress towards a fully low/zero-emission airside vehicle fleet, which is consistent with the Government's intentions for the whole of the UK vehicle fleet. The Government publication 'Driving the Future Today - A strategy for ultra-low emission vehicles in the UK' (published in September 2013) describes the UK's approach. The technology for low and zero emissions vehicle technology is developing and costs are falling. As those developments continue we plan during our current five-year regulatory period – Q6 –to invest further in trials and deployment of low and zero-emissions vehicles. This includes investment in the infrastructure needed to support those vehicles. We would continue to provide such infrastructure as we develop a third runway. We are also currently exploring the measures that we can take to actively incentivise the uptake of low and zero-emissions vehicles.

Surface access

As outlined in detail in Part 4, we have committed to adding a third runway with no more airport-related traffic on the road than today, and to increase the proportion of passengers who use public transport to access the airport from 40% today to more than 50% by 2030. Those commitments make an important contribution to improving air quality in the area around Heathrow. In Part 4 we also outline that there may be a case for introducing a congestion charge for people travelling to the airport once improvements in public transport have been delivered. A congestion charge would reduce traffic congestion levels, help ensure there are no more airport related vehicles on the road, and therefore help improvements in air quality. We envisage that there could be exemptions in place for the greenest vehicles. Funds could be ring-fenced to contribute towards major rail, London Underground and road improvements, as well as pay for further sustainable travel initiatives, public transport schemes and community transport improvements.

We are also committed to encourage customers who do choose to drive to and from the airport to do so in as sustainable a manner as possible. We currently host the UK's first publicly accessible hydrogen re-fuelling site and

5.3 Improving air quality

have installed electric vehicle charging points at passenger car parks. As the technology for low and zero emissions vehicle technology develops and costs fall, we plan to further develop the infrastructure to support customers using these vehicles. We are also currently exploring the measures that we can take to actively incentivise the uptake of low and zero-emissions vehicles at the airport today.

5.3.8 Delivering our strategy

We will deliver our strategy in partnership with our stakeholders (local communities, local councils, the Mayor of London, airlines, NATS, service agents and support industries). This will require us to set clear and achievable targets and carefully monitor our progress in reaching them.

The progress of the strategy will be monitored and reported on an on-going basis, by means of regular updates of the Heathrow air emissions inventory and through comparison with previous years' emissions. This process will also be supplemented by continuing to monitor ambient air quality at the network of sites already established around the airport, together with additional or replacement sites as necessary. We will continue to engage and co-operate with local stakeholder groups, the four local authorities, the Mayor of London and the government.

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Heathrow employs over 114,000 people today. Adding a third runway will provide an additional 123,000 jobs, with over 50,000 of those in the five boroughs adjacent to Heathrow.

Our revised third runway proposal means that 200 fewer homes are within the airport boundary. Nonetheless we recognise that the compulsory purchase of around 750 homes is significant and that such circumstances deserve exceptional compensation for residents. We are proposing that anyone whose home needs to be compulsorily purchased will receive 25% above market value compensation plus all legal fees and 100% of stamp duty costs. We will also offer insulation and compensation for homes and community buildings affected by noise from Heathrow. This will include support with relocation for those in the highest noise areas near the airport. We will be asking for further views on all of our compensation schemes in a consultation this summer.

We plan to work with local people to create a new community hub in one of the villages north of the airport to re-provide lost community facilities. The plans we are setting out also have the potential to increase the amount of publicly accessible green space around the airport, creating new green corridors that can link together existing outdoor recreation areas.

Heathrow already has an extensive community investment programme, for example our £1m annual contribution to the Hillingdon Community Trust. The Trust supports the prosperity of the area surrounding the airport and provides charitable funding for projects to improve local communities. If the airport grows, we are committed to sharing the benefits of that growth locally. We have started work with local stakeholders to explore what a new 'social contract' between the airport and the surrounding area could involve and allowed for this in our cost plan. We are clear that the success of a growing airport must be directly linked to more local investment.

5.4.1 Our objectives

In preparing this strategy and seeking to create a better quality of life for local communities, our objectives have been to:

- Reduce the degree of housing loss and its effects on local communities
- Reduce or avoid disproportionate effects on any social group
- Maintain and improve the quality of life for local residents and the wider population and
- Provide fair and equitable compensation for unavoidable loss.

These objectives respond to the Airports Commission's Appraisal Framework, which seeks to understand the effects of airport expansion on communities and quality of life. The Commission recognises that the loss of property is an unavoidable consequence of airport expansion and requires any property loss to be minimised. It also wishes to understand the community effects associated with the loss of homes and any effects on the integrity, culture and structure of the local community surrounding the airport, as well as any disproportionate effects on particular social groups. In Part 1, we describe the employment effects of our masterplan.

5.4.2 Our track record

Heathrow has a long track record of engaging with local communities to communicate developments at the airport and to understand their priorities. We also have a wide-ranging programmes to support the economic prosperity of local communities and businesses, for example through education and training. Below we outline our overall approach to engagement and then provide more detail on our community investment programme. Figure 5.20 below summarises key facts from our existing community programme.

5.4 Quality of life

5.4.2.1 Community engagement

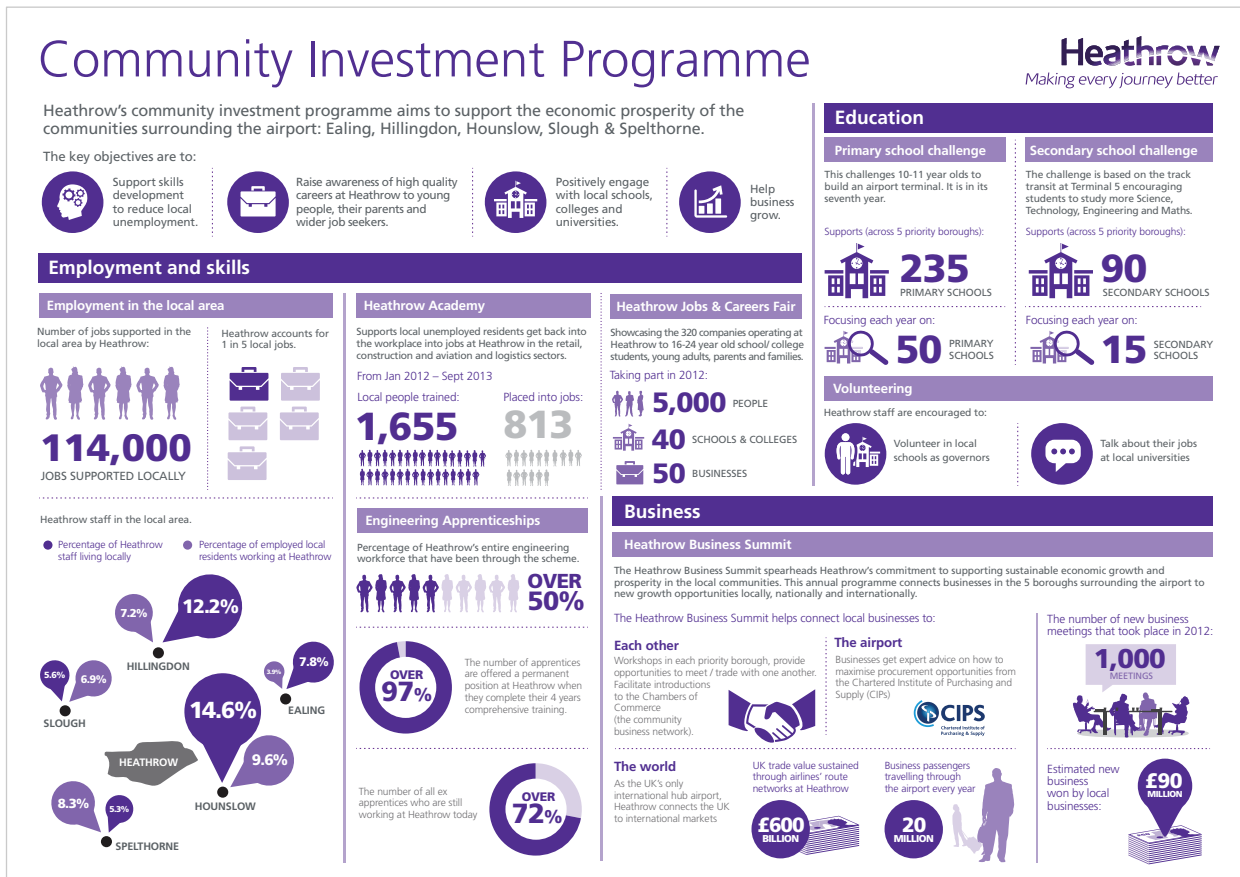
As part of Heathrow's commitment to keeping the local community informed of developments at the airport, and to receive feedback from residents on the effect of the airport on the community, we hold regular meetings with groups of residents, residents associations, local councillors and Members of Parliament. Many of our meetings are open to the public with notes available at Heathrow.com.

The Heathrow Airport Consultative Committee (HACC) is an independent committee that includes representatives of airport users, local authorities, airlines, NATS, the Department for Transport and other bodies concerned with the local area. Meetings of the HACC are bi-monthly and open to the public.

Quarterly 'Local Focus Forum' meetings are hosted by Heathrow for residents' association representatives and councillors from the villages and wards bordering Heathrow. These meetings are useful for Heathrow to share information with local residents and representatives concerning future plans and community investment programmes. They are also an excellent opportunity for us to listen to resident views and to provide information about future plans and community investment programmes.

Additional ad-hoc meetings with and presentations to airport neighbours are offered on request including in relation to trials or changes to the airport's operation. For example during 2013, a number of community engagement sessions were held in both West and East London – in partnership with local group HACAN – as part of Heathrow's early morning departure trial.

Figure 5.20: Community investment programme factsheet



5.4.2.2 Employment and Skills programme

More than 6,000 visitors attended the annual 2014 Heathrow Jobs & Careers Fair, which showcases the 300+ companies operating at Heathrow to 16-24 year old school & college students, young adults, parents and families. The event is marketed directly to students through traditional postcards and posters, but also via Heathrow's

5.4 Quality of life

strategic partnerships with local partners including JobCentre Plus, Association of Colleges and Local Authorities. The Fair is continuously evolving and has its own webpage (which received more than 6,000 individual visits each day in the week leading to the event) and social media campaign.

Since 1977, Heathrow has also provided an Engineering Apprenticeship to over 350 apprentices, of which 75% remain in the business. We invest £200,000 in each of our apprentices that join the programme annually, and, on completion, 97% are offered a permanent position.

5.4.2.3 Heathrow Academy

The Heathrow Academy supports local unemployed people to get into the workplace in the retail, aviation and logistics, and construction sectors. Candidates are sourced through job centres, colleges and housing associations. The Academy offers two to four-week pre-employment training and provides information, advice and guidance on interview techniques, covering letters and applications. This aims to place the maximum number of candidates in sustainable employment.

The core objectives of the Academy are to:

- Provide local unemployed residents with training and support to secure employment at the airport
- Work in partnership with local boroughs to reduce unemployment levels
- Deliver business-led pre-employment training and reduce industry skills gaps
- Support airport employers to access skilled, motivated and local employees, providing recruitment advice free of charge
- Promote the business benefits of local sustainable recruitment that drives greater productivity, improved employee retention and positively impacts the bottom line.

In 2013, 1,007 candidates completed training through the Heathrow Academy, and 525 secured employment.

5.4.2.4 Educational programmes

Heathrow has three key education programmes, which are supported by employee volunteers. Each programme incorporates parental engagement, as we understand the role parents play in influencing academic achievement and career aspirations. Our programmes include:

- **Heathrow primary and secondary school challenges**
As an engineering-based business, we are investing in reducing the skills gap in science, technology, engineering and maths (STEM). This programme aims to encourage STEM-related learning and careers by supporting young people to explore their enterprise skills, develop social and personal skills, encourage team working and build communication skills
- **University guest lecturing**
We have developed strong links with local universities through our own employees. We also want to offer colleagues volunteering opportunities at all levels of education, with many enjoying opportunities to speak to students about their current roles and career journeys. These relationships demonstrate that Heathrow offers a diverse range of careers at all levels
- **School governors**
There are 30,000 school governor vacancies across the UK – and many schools need the skills of business people. This programme allows colleagues to develop a long-term relationship with local schools and also supports their own personal development.

5.4.2.5 Heathrow Business Summit

We know that SMEs are the lifeblood of the UK economy. So as the UK's hub airport, we are committed to using Heathrow's position as a national asset for their particular benefit. Our goal is to enable more UK SMEs to take advantage of new opportunities for growth locally, nationally and internationally.

The Heathrow Business Summit enables local businesses to connect with each other, with the airport, and – through us – with the world. We hold workshops for local SMEs to give them the opportunity to meet and trade

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with one another. Working directly with procurement managers, the Business Summit enables SMEs to explore wider prospects with airport businesses by opening more sub-contracting opportunities for large-scale services.

In partnership with UK Trade and Investment, the Business Summit supported SMEs to access 'High Value Opportunities' across the world – using the airport to make the most of supply, export and growth opportunities. Through this business growth we have increased job prospects for local people.

5.4.2.6 Charitable giving

The Heathrow Communities Fund, established in 1996, is a grant-making charity set up to support and strengthen local communities close to the airport – helping them create significant and positive social change.

To ensure grants go where they are most needed, the Fund works closely with local communities, focusing on education, the environment and economic regeneration. The Trustees include representatives from the communities around Heathrow – their local knowledge helps make sure grants are awarded to projects that will make a positive difference to local life.

Funds are donated from Heathrow Airport, airport passengers and fines imposed on aircraft that breach noise limits. In 2012 the Fund:

- Donated more than £850,000
- Awarded more than 300 grants
- Donated more than £130,000 in support of employee fundraising.

Heathrow also contributes £1 million each year to the Hillingdon Community Trust, which supports community projects in this Borough. Finally, Heathrow's charity partner for the period 2013 – 2016 is Oxfam, providing opportunities for both staff and passengers to help raise vital funds to help fight poverty both in the UK and abroad.

5.4.3 The existing environment

There are three broad community groups in the vicinity of the airport, including:

- Villages immediately to the north and north-west (Longford, Harmondsworth, Sipson and Harlington)
- Communities around the airport to the east, south and west (Cranford, Hatton, Bedfont, Stanwell, Stanwell Moor, Colnbrook and Poyle)
- A wider population including Windsor and Maidenhead, Slough, Spelthorne, West Drayton, Hounslow, and South West London.

Within the immediate vicinity of the airport – to the north and west of the A4 Bath Road and south of the M4 – the communities of Longford, Harmondsworth, Sipson and Harlington (the 'Heathrow Villages') have distinct local identities, but are interconnected to varying degrees. Local service provision, for example, is largely concentrated in Harlington. Three of the four villages host a primary school. There are also community halls, churches, recreational facilities and open space – all of which act as focal points for community life. Harmondsworth Moor is a popular destination for informal recreation for communities across the area.

Heathrow is an important source of employment opportunities for residents of these villages, and its physical presence immediately to the south of the A4 Bath Road along with associated activity strongly influences their setting.

Communities to the east, south and west of the airport (including Cranford, Hatton, Bedfont, Stanwell, Colnbrook and Poyle) are variously connected with the operation of Heathrow Airport, which is the dominant source of direct and indirect employment.

A wider sphere of influence extends across the surrounding area, associated principally with flight paths but also the economic activity generated by the airport.

This chapter focuses primarily on the communities in the immediate vicinity of the airport. Its focus is particularly on our strategy to minimise the impacts of expansion at Heathrow on residential properties and community facilities, and to compensate for unavoidable impacts. It also sets out our plans to develop our existing community

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investment programme so that local communities share in the benefits of growth at Heathrow. For a full picture of our approach to local communities, this chapter should be read in conjunction with the chapters on noise, local air quality, heritage and the natural environment.

5.4.4 Effects of our proposal without mitigation

Adding a third runway will result in a range of direct and indirect adverse effects, including the loss of residential property, community facilities and changes to the noise environment for communities in the vicinity of Heathrow. It will also bring a range of benefits, including employment and training opportunities that will create wealth. Our aim is to ensure that those benefits are accessible to communities in the vicinity of the airport.

We have sought to avoid, reduce and off-set adverse effects and maximise the beneficial effects that development will bring.

We estimate the loss of residential property in Longford, Harmondsworth and Sipson to be just under 750 properties. A number of community facilities would also be lost, namely: Harmondsworth Primary School and nursery, a nursery school in Longford, Harmondsworth Community Centre, Sipson Community Centre, Heathrow Special Needs Farm in Longford, and formal and informal recreation space in Longford, Harmondsworth and Sipson.

We have minimised these losses through careful alignment of the proposed boundary, as set out in Section 4.6 below. We will mitigate those losses and take measures to ensure that no-one is unduly disadvantaged by the loss or re-location of community facilities, including shops and other businesses.

The plans we are setting out also have the potential to significantly increase the amount of publicly accessible green space around the airport, creating new green corridors that can link together existing outdoor recreation areas. These plans are set out in more detail in Chapter 5 – Enhancing the natural environment.

5.4.5 Responding to our stakeholders

Our public consultation earlier this year provided a wide range of opinions on the effects and benefits new runway development would bring to local communities. The majority of comments related to noise levels and the need to minimise their intrusive effects. Our approach to this important aspect of addressing quality of life issues in the vicinity of the airport is set out in Chapter 2 – A quieter Heathrow.

Property loss was identified as an inevitable part of development, and some concerns were raised over the future of heritage assets. Overwhelmingly, however, respondents highlighted the importance of adequate compensation as a critical measure to address a range of effects, including direct losses, blight and changes to the character of local communities. Specifically, respondents to the consultation identified a need for clear and consistent compensation schemes relating to re-location, property blight and noise effects. They also highlighted the need to address wider community development requirements through environmental enhancement, employment training, job opportunities and possible health measures, focused in particular on vulnerable groups. We have sought to address these issues through this strategy.

5.4.6 Avoiding effects through design

Through the masterplan design we have minimised the number of residential properties that are required to be purchased for construction of a third runway. The number has reduced by nearly 200 properties from the north-west option put forward in July 2013. This represents around 20% fewer properties, and has been achieved by moving the runway further south. This relocation means that fewer properties along the northern boundary are lost, benefitting both Harmondsworth and Sipson.

In Harmondsworth, this means that some of the village will be retained. We have sought to develop a boundary between the new airport and the remaining community, so as to maintain the village high street (see Figure 5.21). This is a proposal at this stage and requires further consultation with the local community. For those properties that remain, we will offer the opportunity to relocate as part of our community compensation schemes outlined below.

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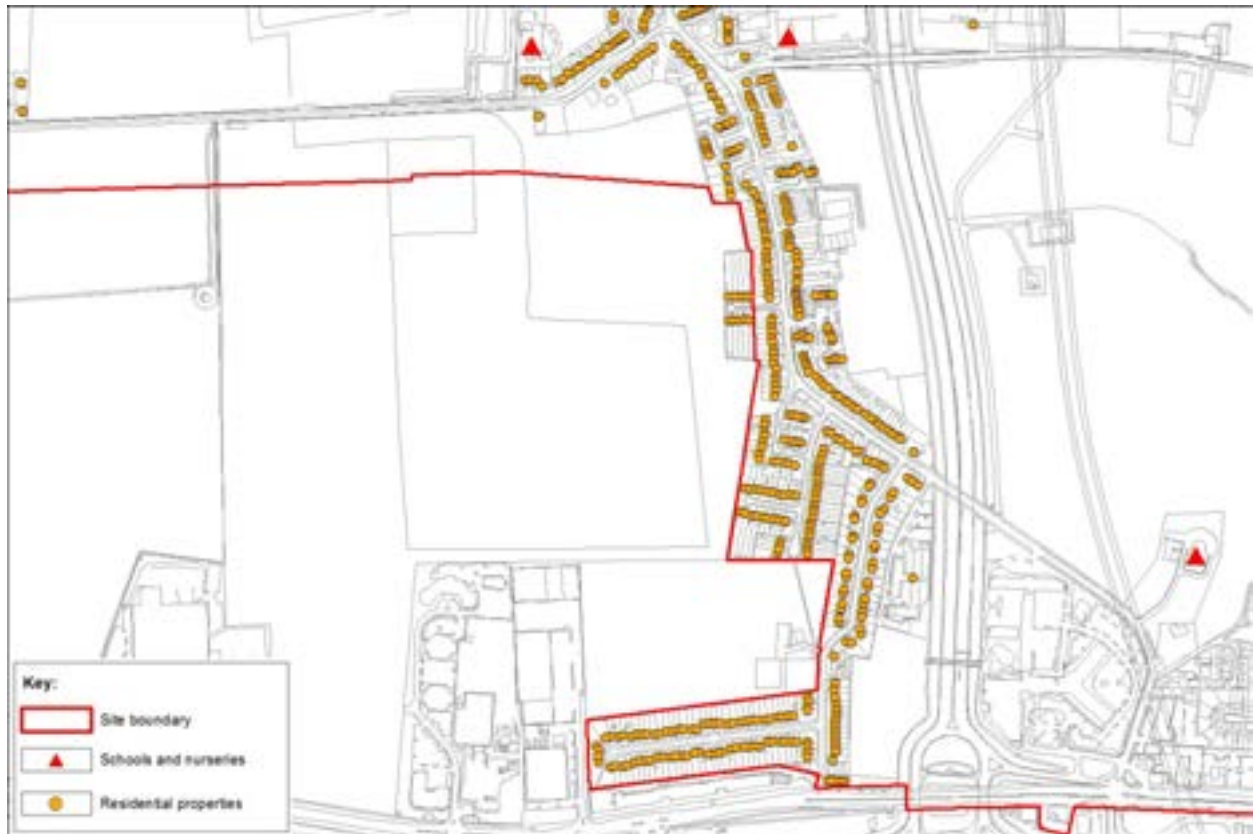
Figure 5.21: Proposed boundary treatment in Harmondsworth (available in A3 format in Appendix 21)



We have also reduced property loss in Sipson. Additionally, the use of displaced thresholds on the runway, along with the creation of bunds, will reduce noise effects on nearby properties. Figure 5.22 provides further details.

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Figure 5.22: Proposed boundary treatment in Sipson (available in A3 format in Appendix 22)



By moving the runway further south we have also avoided the need to redevelop the M25/M4 junction, further reducing the direct impact on local communities.

5.4.7 Managing the effects of our masterplan

We are committed to treating those most affected by a third runway fairly.

Our revised third runway proposal means that 200 fewer homes are within the airport boundary. Nonetheless we recognise that the compulsory purchase of nearly 750 homes (our current estimate is 747) is significant – and that such circumstances deserve exceptional compensation for residents. We are proposing that anyone whose home needs to be compulsorily purchased will receive 25% above market value compensation, plus all legal fees and 100% of stamp duty costs.

We have also allocated £250 million to pay for noise insulation and compensation for homes and community buildings, including schools. This will include property purchase and support with relocation for those in the highest noise areas near the airport. Chapter 2 – A quieter Heathrow, outlines our thinking on noise insulation and compensation in more detail.

Finally, if government policy supports a third runway, a property market support bond scheme will also be put in place to guarantee the value of property until a new runway is constructed.

We recognise that there are many issues to take into account in developing our noise and property schemes. We will now work with a panel of local community representatives to develop more detailed proposals for noise insulation and compensation before consulting in July.

5.4 Quality of life

5.4.7.1 Re-providing and enhancing community facilities

Loss of residential and community properties as a result of the proposed runway at Heathrow has been kept to a minimum. Where change is to occur, Heathrow will support the local area to help to retain a sense of community, place and identity for each location affected.

The villages of Harmondsworth and Sipson in particular will have a different character in future. Changes to the provision of community facilities will be required. For example, the loss of Harmondsworth Primary School is unavoidable under the Heathrow expansion plans. However, we are committed to working with local communities and stakeholders to agree a solution that will provide high quality learning opportunities. These plans include providing a new primary and nursery school strategically located to serve Harmondsworth and Sipson. We will provide high quality education facilities equipped with state-of-the-art noise mitigation technology.

St Mary's Church, Harmondsworth will be offered a viable future as part of a new local hub. This will include a new community centre arranged around the existing central courtyard, with high-quality gardens and with a new community focus.

Our updated proposals provide the opportunity to retain the Harmondsworth Great Barn in situ, or equally to be relocated to a nearby open air museum if ongoing liaison with the owner, English Heritage, and the local community supports this. For the remainder of the village, we would seek to insulate buildings and improve the streetscape.

We would also work with local residents and stakeholders to agree an appropriate future for this area at the heart of Harmondsworth, as well as wider improvements to the main streets of Harmondsworth and Sipson, with higher-quality paving, lighting, trees and other enhancements. Community recreation facilities that will be lost, such as those at the War Memorial Recreation Ground, Sipson will be re-provided in consultation with local residents and stakeholders, ensuring a good fit with local needs and aspirations.

Loss of part of the Colne Valley Regional Park will be re-provided for through a new and enhanced stretch of accessible countryside in the Colne Valley. Additionally, improved connections through to Harmondsworth and across the M25 would also benefit the local area. We would work with residents and stakeholders to agree what improvements and types of facilities could be located in the park to maximise the enjoyment of its visitors, including a new Visitors' Centre and BMX track, for example.

5.4.7.2 Job creation and housing

The estimated generation of nearly 55,000 new jobs across the adjacent boroughs and districts of Hillingdon, Hounslow, Ealing, Spelthorne and Slough will help to build on the strengths and address the weaknesses of these areas. Our work so far concludes that there is sufficient housing available to meet the needs of new employees working at an expanded Heathrow. This means there is no need for new housing developments. For houses that are lost, replacement housing schemes will be progressed with land earmarked for development by local authorities.

If local housing stock is acquired by Heathrow as part of a future property market support scheme, we are keen to make a positive contribution to meet demand for local housing. We will work with property specialists to maximise the properties available for rent to local people. We will also explore working with housing associations to pass ownership of these properties to local people. We are seeking an innovative solution to help meet the demand for affordable housing which is a key issue in this part of London.

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5.4.7.3 A new 'social contract' with communities around Heathrow

Heathrow already has an extensive community investment programme, which supports the economic prosperity of the immediate area and provides charitable funding for projects to improve local communities. If the airport grows, we are committed to sharing the benefits of that growth locally. We have started work with local stakeholders to explore what a new 'social contract' between the airport and the surrounding area could involve. Among the areas that local stakeholders are highlighting as priorities for further discussion are:

- Skills and jobs (for example, building on our successful 'Academy' model to equip local people for airport careers)
- Community facilities
- Education
- Housing
- Business support.

An expanded Heathrow provides an opportunity to build on our active community investment programme. We have allowed for funds to expand this activity significantly. We are clear that the success of a growing airport must be directly linked to more investment locally.

5.4.7.4 Health

There is good evidence linking employment and a strong economy to improved health and life expectancy. A positive effect of expansion at Heathrow is therefore retaining the 114,000 jobs that rely on the airport and generating tens of thousands of additional employment opportunities thereby avoiding the negative health effects associated with a loss of employment. There will be increased employment opportunities in the local area, which also strengthens local communities and supports local public services. Expansion would also produce indirect employment and economic benefits in the regional and national economy. Maintaining and developing the UK's global connectivity also contributes to maintaining networks of interpersonal relationships in an increasingly globalised world.

The noise environment will change with an expanded Heathrow. Fewer people in total experiencing aircraft noise is good for health and well-being. However the introduction of some new flight paths is likely to result in disturbance for those people living close to the airport and experiencing an increase in overflight.

Analysis of air pollutants shows that an expanded Heathrow will be able to operate within strict air quality limits. Positive actions to promote travel to and around the airport by transport modes other than cars will help to manage emissions. We do know that very small changes to pollutant concentrations can result in small changes to health indicators. The implication for our plans is that we will need to strictly monitor actual improvements in air quality in line with forecasts.

However, comparing these various positive and negative impacts is not straightforward. They can affect different geographic areas and have different timescales; the metrics used to measure them are different; and there are different degrees of certainty over the impacts. These impacts also affect individuals in different ways.

Overall, our masterplan has sought to maximise the positive impacts of development at Heathrow and minimise the negatives, in particular by reducing the number of people affected by noise and by meeting air quality limits. We are planning to continue to examine the health effects of our masterplan. We will prepare a detailed 'Health Impact Assessment' in support of a future planning application, should Heathrow be chosen by the Airport Commission and given government policy support. We will also be providing analysis of the monetisation of health effects associated with changes in the noise environment and local air quality in the supporting technical assessment report we plan to provide, as detailed in Chapter 1.

Effects on different groups

We have a good understanding of the different social groups in the communities around Heathrow. This has been informed for example by the detailed equalities impact assessment carried out for our recent planning application to remove the Cranford agreement.

We understand that there are various groups of residents who could be, without our intervention, disproportionately affected by some of the impacts arising from the expansion of Heathrow, particularly noise and

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air quality. These population groups include older people, younger people, those with existing health conditions and those living in deprived communities, who are often less mobile, more dependent on local service provision and can have complex needs. In already recognising this, we are well placed to ensure that distributional impacts to vulnerable social groups are avoided. We propose to implement strategies to address the impacts associated with such groups, based on an understanding of vulnerabilities, their spatial distribution and reasonable opportunities to intervene. These will be developed in consultation with stakeholders, informing our wider response to addressing effects on displaced and remaining communities around the airport.

We will continue to support community development as well as support public health initiatives to help ensure that those living with the influence of the airport can maintain their quality of life and avoid health inequalities. Details of these on-going support packages will be developed as the scope of the needs and opportunities are fully identified.

5.4.8 Delivering our strategy

The strategy detailed above will be delivered in partnership with a range of other organisations, according to the specific needs identified.

We will implement a coordinated programme of compensation for property loss and blight, along with measures for the re-provision of community facilities, environmental enhancement and community development. This will make sure that there is a fair and open approach to ensuring that displaced and remaining residents are not disadvantaged by the development.

We will undertake the re-provision of community facilities in consultation with key stakeholders, ensuring there is no loss of capacity and that accessibility to all facilities is maintained and improved. Provision will be an early priority to ensure a smooth transition.

We will work with local authorities and community groups to agree a new 'social contract' between the airport and its surrounding communities. This will allow local communities to share in the success of a growing airport, with support for local priorities such as employment, education and community facilities.

5.5 Enhancing the natural environment

Our Natural Environment strategy has been developed to provide an integrated approach to address the effects of our masterplan on water, biodiversity and landscape.

Flood prevention is an important issue for communities around Heathrow, particularly in light of the recent flooding that affected large parts of the UK. Our proposals will fully comply with strict legal requirements that ensure new developments do not increase flood risk. Our measures will protect people and properties against flooding, offering the potential for an improved situation compared with today.

The desire to reduce flood risk, along with the need to realign a number of watercourses, has led us to develop a strategy to provide significant flood storage in an enhanced Colne Valley Park. We will divert existing river routes and redesign them to create new areas of flood storage that, along with the introduction of other flood protection measures, would improve flood protection for local communities. Our proposals work alongside existing flood risk management measures in the Colne Valley, safeguarding them so they continue to operate in the way they were intended when built. We will help local communities, like those in Wraysbury, currently at risk of flooding. We will work with the Environment Agency to see how our plans can be evolved to support wider flood risk objectives.

Our wider natural environment strategy is influenced by the measures we are proposing for flood prevention. It can provide better access to local countryside and improved recreational facilities. We will increase the amount of publicly accessible green space that exists around the airport, creating an enhanced environment for biodiversity. In doing this we will create new green corridors that can link together existing outdoor recreation areas, such as those found in the existing Colne Valley Regional Park and at Cranford Park.

5.5.1 Our objectives

At the earliest stage of the development of our mitigation strategies it became obvious that our proposals gave us the opportunity to provide a 'green legacy' for the local area. To ensure we meet flood risk and wider water, biodiversity and landscape requirements, we have produced specific technical strategies which are detailed later within this chapter. However, our overarching focus is to ensure that together they meet our overall objectives for the natural environment, namely:

- To ensure an integrated natural environment solution that achieves a better situation, including reducing the risk of local flooding compared with today
- To ensure the flood prevention measures introduced and any watercourse realignment undertaken are designed to function naturally and sustainably
- To limit the amount of hard engineered flood attenuation and number of watercourse culverts required
- To design the new flood attenuation features and realigned watercourses so they are attractive for local wildlife, thus improving biodiversity for the area
- To create an attractive landscape that provides formal and informal recreation opportunities for local people
- To create a 'green' perimeter to the airport that links existing areas of green space with new ones and offers new access opportunities.

5.5.2 Our track record

We manage our impacts on the natural environment as part of our everyday management of the airport. This includes, for example, the active nature conservation management of around 100 hectares across 13 sites, including four reserve areas that are open for people to enjoy. This commitment has also been a focus for our past developments:

- As part of Terminal 5 we designed and built the Twin Rivers channel – a ground-breaking project to preserve the natural flows of the Duke of Northumberland and Longford rivers

5.5 Enhancing the natural environment

- We have been recognised for our work on biodiversity. Heathrow has been awarded the Wildlife Trust Biodiversity Benchmark Award for the past six years in a row – the only UK airport to receive this award
- We are a founding supporter of the Colne Valley Park Community Interest Company, which provides valuable habitats for protected wildlife as well as important community facilities. Heathrow's work also involves encouraging community volunteering and environmental education.
- Our approach to the supply of woodchip for our new energy centre has ensured that currently unmanaged local woodlands will be better and more sustainably managed. For example, the project has financed improved management of Richmond Park through the planting of trees that will encourage more wildlife.

5.5.3 Our strategy

Our overall strategy has two especially salient areas – the Colne Valley Park and the areas north of the airport. Green space is acknowledged as important for people's quality of life. This has been an important issue for us in developing our proposals.

5.5.3.1 The enhanced Colne Valley Park

Flood prevention and river realignment has driven the natural environment strategy. At the outset we established that the key to delivering the desired level of flood control is to create extensive flood storage areas alongside the rivers in the vicinity of the airport. We therefore propose to realign rivers that are currently located within the extended airport through an area to the west of the M25. We are calling this area the enhanced Colne Valley Park.

The new watercourses will be designed to play a role in reducing the risk of flooding and, together with the new flood storage areas, will complement existing flood risk management. They will also be designed to meet other objectives, in particular to become attractive features within the landscape that will support a wide variety of birds and other wildlife (see Figure 5.23).

Figure 5.23: The Enhanced Colne Valley Park with new watercourses and landscaping



The associated floodplain areas, together with other areas of open space alongside the rivers, will also be designed to enhance the landscape and create wildlife habitats. These areas will include low-lying and seasonally flooded plains, as well as drier flower-rich meadows. These will be designed to attract an abundance of butterflies, breeding birds such as Skylarks, and other wildlife. Areas of woodland and scrub will also be created, with wet woodland in the vicinity of watercourses to provide habitat diversity. In other low-lying areas reedbeds will be created, attracting a different range of birds and other species. Together with other water plants, reeds will also fringe areas of open water, which in turn will attract species including dragonflies and wetland birds. Bird species that pose a risk to aircraft movements will be discouraged by the design of the wetland space and through planting.

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The new landscapes within the enhanced Colne Valley Park will incorporate an extensive network of public rights of way, together with open access areas. This will provide local communities with much improved access to high quality green space that is rich in wildlife. The new opportunities will complement the much more limited access opportunities that exist at present.

5.5.3.2 The north of the airport

Our proposals also aim to give people living to the north of the airport better opportunities to enjoy an enhanced local natural environment. Access opportunities similar to those found within the enhanced Colne Valley will also be created to the north of the airport. Within this area there will be further landscape enhancement to create a range of wetland, together with drier habitats that will attract a wide range of animals and plants. There will also be more simple landscape interventions, such as the planting of new hedgerows and small copses of trees. In parts of this area we will incorporate further floodplain provision that is designed to ensure that there is no increase in the risk of flooding associated with the watercourses that pass through.

The ultimate aim will be to link existing areas of open space, such as Cranford Park, with new green spaces including the enhanced Colne Valley Park, thus creating an almost continuous green corridor that encircles the airport on its northern, eastern and western sides (see Figure 5.24).

Figure 5.24: Our illustrative landscape proposals (for a more detailed drawing see Figure 5.24, (Available in A3 format in Appendix 23)



5.5.4 Delivering our natural environment strategy

Responsibility for delivery of the Natural Environment strategy will rest with us. It is likely that one or more other parties will be involved in the long-term management of newly created habitats including receptor sites for legally protected species, subject to this work being funded by us. We will agree how best to manage and maintain the flood risk infrastructure and new river channels, and also the biodiversity and landscape features including the

5.5 Enhancing the natural environment

recreational facilities provided, working with the Environment Agency, Colne Valley Regional Park, Natural England, ColneCAN (Colne Catchment Area Network) and others. It is possible that management may be undertaken by an existing organisation. Alternatively a trust or management company could take on this role.

We recognise that the successful delivery of this strategy will be closely linked to the wider construction programme. We have carefully programmed the delivery so that flood risk mitigation measures will be implemented prior to the impacts being realised. The flood risk mitigation measures will be constructed in isolation from the existing watercourses to allow for a 'switch over' prior to the beginning of development. This ensures there is no period in which there is no mitigation in place. Early implementation of the strategy is also required by the biodiversity strategy, as new habitats are required to mature prior to the relocation of fauna, some of which may be protected by law.

Although this section has dealt with the Natural Environment strategy in its entirety, technical strategies for water (Section 5.5.5), biodiversity (Section 5.5.6) and landscape (Section 5.5.7) now follow.

5.5.5 Water strategy

Our water strategy ensures the protection of people and properties against flooding, offering the potential for an improved situation compared with today. It protects river flows, water quality and aquatic ecology.

In doing this we have built on existing flood risk management measures in the Colne Valley and taken an integrated approach with the landscape and biodiversity strategies in order to deliver multiple benefits to the enhanced Colne Valley Park. Our strategy is mainly based on the development of an enhanced Colne Valley. Through this we aim to reduce the potential for local area flooding, including for the residents of Colnbrook, West Drayton and Poyle. Other measures will be introduced to try to achieve better protection than today for local communities that will not benefit from our flood prevention measures in the enhanced Colne Valley.

5.5.5.1 Our objectives

Our primary objective is to develop a sustainable and effective strategy that will ensure flood risk is not increased, and protect river flows, water quality and aquatic ecology during and beyond the lifetime of the development. We aim to help local communities, like those in Wraysbury, which are currently at risk of flooding. We will do this by working with the Environment Agency to see how our plans can be evolved to support wider flood risk reduction objectives. Our water strategy will achieve our objectives through:

- Realigning watercourses within the enhanced Colne Valley Park to move water sustainably around the airport, and in so doing form part of an enhanced landscape, limiting the amount of culverting required
- Providing compensatory flood storage to replace the floodplain storage lost through the development. This means flood risk to people and property will not increase and where possible will decrease. Over 320,000 cubic metres of storage will be provided in the enhanced Colne Valley with additional storage being provided in Harmondsworth Moor. Storage will be achieved by regrading the topography to create areas of lower land
- Ensuring the downstream flow regimes are maintained so there is no adverse impact on water quality, ecology or on other water users
- Maintaining connectivity of the aquatic habitat through the Colne catchment, utilising the River Colne and its distributaries across the Colne Valley
- Avoiding any effects on water quality across all water bodies, both surface water and groundwater, through channel design, best practice construction practices and monitoring during operation.

In doing this we will meet the Airports Commission's requirements, particularly "to protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk". It will also mean the requirements of local, national and European guidance, policies and legislation including the Water Framework Directive (WFD), Floods Directive, UK Floods and Water Management Act and the National Planning Policy Framework (NPPF) are met.

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5.5.5.2 The existing environment

Rivers

Heathrow is located within the lower River Colne and River Crane catchments. The area of proposed development is located solely within the lower River Colne catchment. The River Crane is a significant watercourse located to the east of the airport, but is not affected by our proposals.

The River Colne catchment is complex as it contains a number of different channels that branch and interlink along the length of the Colne Valley to the west of the airport. The three main rivers in the Colne Valley are the River Colne, the Colne Brook and the Wraysbury River. The Duke of Northumberland's River and the Longford River are important watercourses which flow around the airport boundary, but they do not have associated floodplains. The rivers can broadly be divided into two systems: one to the east and one to the west of the M25. Appendix 24 shows the key rivers that surround the airport, and extracts are reproduced in Figures 5.25 and 5.26.

River channels east of the M25 motorway

Flowing from north to south, the River Colne and Colne Brook run parallel with each other through the Colne Valley south of Uxbridge. At the village of Thorney, the Colne Brook flows west under the M25. The remaining course of the Colne Brook is described overleaf.

The River Colne continues southwards to the east of the M25 and is joined by the Fray's River at West Drayton – see Appendix 24. Upstream of the M4 the River Colne splits into two channels. The western branch forms the

Wraysbury River and the eastern branch continues southwards as the River Colne. These two rivers flow southwards under the M4 into Harmondsworth Moor (the area of green open space along the Wraysbury River corridor, to the south of the M4 and north of the airport). North of the airport two diversions are taken off the River Colne to form the Duke of Northumberland's River and Longford River. Both flow round the airport and currently form the 'Twin Rivers', which were created as part of the Terminal 5 development.

The Wraysbury River (see Figure 5.26) flows south through Harmondsworth Moor and then along the east side of the M25. At Poyle, the Wraysbury River flows under the M25 and splits forming the Poyle Channel. The Poyle Channel takes the majority of flow from the Wraysbury River westwards under the M25 and through Poyle to the Colne Brook. The remaining flow continues south down the Wraysbury River.

Along the western boundary of the airport the River Colne flows southwards towards Stanwell Moor, from where it continues through Staines Moor Site of Special Scientific Interest (more information on this is provided in the Biodiversity section following) until it reaches Staines-upon-Thames,. There it is rejoined by the Wraysbury River and discharges into the River Thames.



Figure 5.25: Rivers and Floodplains (east of M25)
(for a more detailed drawing see Appendix 24)

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River channels west of the M25

West of the M25 the Colne Brook passes south under the M4. From here it continues to flow south-west around a series of lakes before entering the village of Colnbrook. South of Colnbrook the Poyle Channel flows into the Colne Brook. The combined channel of the Colne Brook then flows south towards the village of Wraysbury, discharging into the River Thames at Egham.

Figure 5.26: Rivers and floodplains east of M25 (for a more detailed drawing Appendix 24)



Local flooding

The airport does not extend into an area at risk of flooding from rivers. The River Colne catchment in the vicinity of the airport has a long history of flooding. The most notable event was in 2003, with other recorded flooding in 1987, 1993, 2000, 2001 and earlier this year (2014). We are aware of existing flood alleviation schemes already implemented by the Environment Agency within the wider River Colne catchment and which benefit local communities. These include:

- The Lower Colne Improvements Scheme (1999-2003), including the flood diversion channel at Stanwell Moor
- The Colnbrook Flood Alleviation Scheme (2005).

Appendix 24 (and Figures 5.25 and 5.26) illustrate the predicted flood extents in the local area. These are taken from the Environment Agency's Flood Zone Maps. Colnbrook, Poyle, Stanwell Moor, Longford and West Drayton are identified as being at risk of flooding during the 1% Annual Exceedance Probability (AEP) Event – this is a large flood event with a 1% chance of occurring annually. The airport is not shown to be at risk and there are no recorded incidents of it suffering flooding from fluvial sources.

Lakes and reservoirs

There are a number of lakes and reservoirs in the area that form part of the South London Special Protection Area (SPA) and which have been designated for the habitat they provide for birds. The reservoirs provide storage for water supply, with water pumped from the River Thames. Those in closest proximity to the airport are Wraysbury Reservoir to the south-west, and King George VI and Staines Reservoirs to the south. Other lakes are created from old gravel workings, with the majority to the west and south of Wraysbury Reservoir which the Horton Brook flows through. A number of smaller lakes can be found in the vicinity of the M4/M25 junction.

Aquifers

A shallow aquifer known as the Terrace Gravels underlies Heathrow and the surrounding area. The Gravels lie on the London Clay, which in turn lies over the major chalk aquifer. The Terrace Gravels are very permeable and typically between 3 and 6 metres thick (the thickness varies across the site due to past gravel extraction). The groundwater levels in the Gravels are usually shallow and within 2 metres of the ground surface. The London Clay is more than 50 metres thick and prevents groundwater interaction between the gravel and chalk aquifers. Groundwater therefore presents a potential flood risk in low-lying areas.

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Water Framework Directive Context (WFD)

The rivers, larger lakes, reservoirs and the groundwater bodies are all defined as water bodies under the WFD. All of the surface water bodies are designated as 'Heavily Modified', with the exception of Horton Brook. This designation recognises the physical modifications to these water bodies, which are for the purposes of flood protection and urbanisation. In fact the reaches of Colne Brook, Wraysbury River and River Colne in the vicinity of the airport include areas that are relatively 'natural'. In contrast, the Longford River and Duke of Northumberland's River are concrete channels that follow the current western and southern airport site boundary. Appendix 27 shows the WFD status of all surface water bodies in the vicinity of the airport.

The shallow gravel aquifer is designated as a groundwater body under the WFD, although it is also failing to achieve 'Good' status as a result of poor water quality due to contamination from past land use.

5.5.5.3 Effects of our proposals without mitigation

The area of development for a third runway intersects a five of watercourses including the: River Colne, Wraysbury River, Colne Brook, Longford River, and Duke of Northumberland's River. In total 12.6 kilometres of watercourse lie within the boundary of the proposal and would be lost without mitigation. Within the boundary of the proposal we have calculated that the floodplain provides 155,000 cubic metres of floodplain storage in the 1% AEP event including an allowance for climate change event. There are additional areas of floodplain storage outside the boundary of the proposal which will be disconnected from the main flood flow routes. Disconnecting areas of floodplain in this way has effect of reducing the available storage for flood waters. Therefore without mitigation the storage volumes would be reduced and flood risk to local communities would be increased.

In the absence of our water strategy, fluvial flood risk to local communities and to the airport itself would increase. Without the strategy, the flow regime in the rivers of the Colne Valley would be substantially altered, to the extent that the water supply to lower reaches of some of the rivers would be cut off. Substantial changes to the water environment of this kind would have impacts on aquatic and riparian habitats, water quality, and downstream users such as agricultural abstractors.

5.5.5.4 Responding to our stakeholders

During our recent public consultation, a number of respondents highlighted the water environment as an issue of concern, with flood risk and the management of surface water runoff specifically commented upon. Recent flooding in the area has further heightened awareness of the importance of managing the water environment.

This feedback has also encouraged us to think about improving the current flood situation. As responsible neighbours to areas of recent flooding, we have sought to identify ways to make things better so that flooding is less likely.

We have consulted the Environment Agency a number of times during the past year and they have provided information about key areas for concern and consideration. This has reinforced our understanding of the key issues that we have prioritised. The Environment Agency confirmed that flood risk should not be increased to either people or property. They reinforced that floodplain compensatory storage needs to be provided for the floodplain storage lost through the development, to ensure that capacity is maintained within the river catchment. The Environment Agency also indicated that they would only consider alternatives to naturalised, above-ground floodplain storage if all other opportunities have been exhausted.

The Environment Agency also provided comments and advice on groundwater contamination, water quality impacts from hydrocarbons and de-icer fluids, changes to groundwater flows, and WFD requirements. They indicated that they currently have concerns about low flows in the River Crane, and as a result we have incorporated into our strategy the potential for increased flows by discharging treated site drainage to the Duke of Northumberland's River.

The Agency also recommended that we should consult and work with the Colne and Crane Catchment Partnerships. An initial consultation response from ColneCAN expressed concerns about possible deterioration with respect to WFD. While these concerns are addressed through our strategy, the catchment partnerships hold valuable local knowledge. We will therefore continue to work with them to understand their concerns and priorities and make sure that we are implementing the best opportunities for enhancement in both catchments. Our water strategy works alongside existing Environment Agency flood management schemes in the Colne Valley and

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safeguards them so they continue to operate as designed and provide benefits to local communities.

5.5.5.5 Avoiding effects through design

Since our last submission to the Airports Commission (in July 2013) we have developed our masterplan to ensure impacts on the water environment are more sustainably and effectively managed. Modifications to our masterplan include:

- Moving the new runway southwards – preserving more natural floodplain within Harmondsworth Moor and reducing the length of culverts that are required
- Elevating the new runway – watercourses can pass under the airport in the shortest possible culverts, and importantly without the need for pumping
- Moving the western end of the runway slightly further east – providing greater flexibility to divert and manage river flows in the western half of the Colne Valley
- Reducing spatial extent – reducing the airport’s footprint so that it now displaces smaller volumes of floodwater
- Providing a river corridor along the western boundary – to minimise the length of culvert required under the airport, we have introduced space for a river corridor between the western boundary of the airport and the M25.

5.5.5.6 Managing the effects of our masterplan

Our water strategy covers five key elements that draw upon the design improvements summarised above:

- Managing flood risk
- Maintaining river flows for ecology
- Managing water quality
- Preserving hydro-ecology
- Managing impacts to other water users.

Managing flood risk

We have developed a strategy comprising of an interlinked series of measures that work together to form a cohesive, robust and sustainable solution. At the highest level our strategy includes river diversions, the creation of new channels and new floodplain storage. Figure 5.29 illustrates our flood risk management strategy, which is described below.

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Figure 5.27: The Flood Risk strategy (for a more detailed drawing see Appendix 25)



We have taken a system-wide view of the challenges and sought to use the scope of our landscape proposals to re-engineer how water moves through the enhanced Colne Valley. Green open space exists to the west of the airfield boundary and we have designed a scheme that utilises this space for flood risk storage, rather than attempting to create hard engineering solutions in close proximity to, or on, the airport. To access the new storage areas we have designed a strategy that includes a new western spur of the River Colne. Our strategy does not simply convey more water westwards through the floodplain, but retains the water within the landscape, and as such, there will be no increase in flood risk downstream.

The strategy to the east of the M25

The River Colne will continue to flow southwards along its current course under the M4. The off-take to the new River Colne Spur described in the following section will reduce the volume of water flowing down the River Colne/Wraysbury River towards the airport. Water that would have flowed down the River Colne/Wraysbury will be diverted along the River Colne Spur. During flood events we will divert a greater proportion of the flood flow down the new River Colne Spur, allowing it to be stored in the flood storage areas to the west of the M25.

5.5 Enhancing the natural environment

Along the southern boundary of Harmondsworth Moor, the River Colne and Wraysbury River will be combined into a single feeder channel which will flow into a wide culvert passing southwards under the north-west runway. A combination of weirs and sluices, with associated fish passes, will act to manage the flows that enter the culvert feeder channel. Two flood storage areas will be constructed in and around Harmondsworth Moor, which will manage water that is restricted from entering the culvert feeder channel. We have identified a need for these two storage areas here to ensure flood risk is not increased in West Drayton. Within Harmondsworth Moor there will be an off-take to provide flows for what will become the Duke of Northumberland's River and the Longford River. This off-take channel will also enter a separate culvert, which will run parallel to the main culvert under the new runway. Downstream of the new runway, the culverts will outfall into two channels. The larger of the two will form the combined River Colne and Wraysbury River, and the smaller of the two will form the combined Duke of Northumberland's River and Longford River.

The smaller channel will follow the airport boundary around to the south where it will reconnect with the current Twin River channels just east of the Terminal 5 and 6 access slip road. The larger of the two channels will flow southwards between the M25 and the edge of the airport. There will be an off-take to the west to form the Poyle Channel and the Wraysbury River. The main channel will then continue to flow southwards and reconnect with the current River Colne in Stanwell Moor.

The strategy to the west of the M25

The River Colne Spur diversion channel will flow from the River Colne southwards through Thorney Golf Course into a short enlarged section of the Colne Brook, just upstream of the M25. Our strategy will utilise the existing M25 crossing and then the River Colne Spur will divide. One part of the diversion will become the existing Colne Brook with current day low flow regimes maintained. The other part will form a new ecologically improved channel flowing through the enhanced Colne Valley Park. Both watercourses will then pass under the M4. The area upstream of the M4 will form the first of our flood storage areas. The area will be completely landscaped to provide ecological enhancement and a minimum of 320,000 cubic metres of flood storage capacity.

South of the M4 the existing Colne Brook will follow its current course for a short distance before being diverted into a new ecologically enhanced channel around the western end of the north-west runway. It will then rejoin its original course in the village of Colnbrook with no further modifications. On the south side of the M4 the new River Colne Spur will flow in a south-westerly direction towards Horton Brook where it will pass under the A4. Outside of the flood storage areas, all new channels will be designed to contain the 1% AEP event peak flow, including an allowance for climate change. In so doing we will ensure flood risk is not increased in the area.

In the area between the M4 and the A4 our strategy provides a second area of new flood plain storage. This compensates for storage lost under the third runway. It also ensures that peak flows downstream of the A4 are not increased in the 1% AEP event including with climate change allowance. The release of water from both storage areas will be controlled.

The final element of the realignment is the reconnection of the River Colne Spur to the Colne Brook. This completes the diversion and maintains the overall mass balance in the river system. South of the A4, the River Colne Spur will flow parallel to Horton Brook for a short distance. The River Colne Spur will then flow south-east under Horton Road and rejoin the Colne Brook downstream.

We have reviewed the potential to reduce fluvial flood risks in the local area. Our new flood storage areas within the enhanced Colne Valley will be designed to provide improvements to the local community in Colnbrook, Poyle and West Drayton. We will aim to achieve further reductions in risk as the strategy is further optimised during the design phase. We are committed to helping local communities, like those within Wraysbury, currently at risk of flooding. We will work with the Environment Agency to see how our plans can be evolved to support wider flood risk reduction objectives.

Our assessment indicates that groundwater-related flood risks are likely to be very limited and can be managed at the detailed design stage. Our strategy accounts for the current preferential groundwater discharge locations (for example, the existing river channels) by ensuring these flow routes will be maintained where possible under the airport. We will achieve this by infilling the channels with crushed rock so water will still be able to flow southwards where it will be collected, without causing groundwater levels to rise.

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Maintenance of river flows for ecology

We will ensure connectivity of flow throughout the catchment with no change to the existing low-flow regime downstream, which is vital for protecting water quality and aquatic biodiversity. The strategy that we have developed is illustrated in Appendix 29. This shows the location of the new channels, as well as the proportion of flow in each channel. Specifically we focus on the flow regimes within the watercourses to ensure there is no change to the flow regime or reduction in the biological or chemical quality of waterbodies beyond the extent of physical modifications. This means that we must maintain connectivity of flows of all river channels in the Colne Valley from upstream to downstream. Connectivity is the fundamental basis by which habitat, water quality, hydro-ecology and the requirements of the WFD can be maintained.

Flow in the Poyle Channel will be reduced to compensate for flow that will be diverted in to the River Colne Spur. There will be no adverse effect downstream of the Poyle Channel in the Colne Brook as water that would have been flowing through it will then be joined by the new River Colne Spur that joins the Colne Brook at its confluence with the Poyle Channel. Our strategy includes improving the Poyle Channel. It will be narrowed and naturalised to 'fit' its new reduced flow. This river corridor will form an important link route within the landscape strategy. South of the airport and after the western boundary channels have separated out into the original Wraysbury River, the River Colne, Longford River and Duke of Northumberland's River, there will be no net change to river flows, providing a clear downstream limit to flow regime changes. This provides the basis on which we will protect the water quality and hydro ecology of the Colne Valley.

Managing Water quality

The route of the new channels passes over areas of known contaminated land. We will line the bed of the new channels with impermeable material (for example, clay) wherever it is necessary to prevent contamination entering the rivers. These areas will be kept to a minimum to allow natural interactions between uncontaminated groundwater and the surface watercourses. This will encourage the aquatic vegetation and habitats to establish in a natural fashion. We will regularly monitor water quality and inspect and maintain the bed structure to make sure that no contamination reaches the surface over time. Impermeable lining will also be used if necessary for flood storage areas where they overlie contaminated land.

We will maintain the existing distribution of flow in the Colne Brook and in downstream reaches of all rivers to prevent any significant changes to water quality. The transfer of water from the River Colne to the Colne Brook via the River Colne Spur will not impact water quality as the two rivers are already connected further upstream and so have very similar water quality to one another. The Colne Brook Spur and the new, smaller channel within the Poyle Channel will be designed appropriately for the amount of flow. They will have a meandering structure, which will maintain velocities and avoid depletion of dissolved oxygen.

Preserving hydroecology

The enhanced Colne Valley, in which the River Colne Spur will be located, will become a high-quality area of open space that will provide an attractive landscape and support biodiversity, as well as re-distributing of flows away from the River Colne. Our priority is to create the River Colne Spur and the diversion of the Colne Brook as natural, meandering channels, with high-quality and diverse habitats including pools and riffles. The channels will be designed with natural banks and bed materials wherever possible. The only exception may be that some impermeable bed lining to protect water quality in areas where ground contamination has been identified. They will have sufficient space and flexibility for natural evolution of the channel structure. Best practice measures, such as transfer of cobbles and boulders from the current rivers that can harbour plant growth and invertebrate life, will be explored. Where appropriate, we will consider transferring fry, parr and fish at other life stages from existing channels, which will assist colonisation of the new channels.

For the re-aligned channels running between the airport boundary and the M25, we will use natural materials for the bed and banks wherever possible. We will provide variety in channel width and depth to provide opportunities for marginal vegetation to develop. This will involve using two-stage channels, to allow a smaller area of flow with improved habitat during low flows that can then spill out into the larger channel during high flows.

The provision of fish passage through the catchment is important in our strategy. We are therefore seeking to minimise the use of culverts. Where this is unavoidable we will design culverts to support fish passage using innovative solutions. We will implement a programme of water quality monitoring upstream and downstream of the culvert to determine if the culverted reaches affect dissolved oxygen concentrations and other dependent parameters such as soluble metals.

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We will take measures to make the Colne Brook corridor an attractive route for migratory fish to swim to the upper Colne catchment. To achieve this, we will support or undertake the installation of fish passages adjacent to existing barriers to fish migration such as weirs in the Colne Brook, and River Crane catchments. We will work with the Environment Agency and catchment partnerships to identify the best opportunities for aiding fish passage and other areas for habitat enhancement in existing rivers in the surrounding catchment area.

Managing impacts to other water users

As responsible neighbours we want our expansion plans to not adversely affect other water users in the local area. We have identified that there are a number of organizations which abstract water and who discharge water into the local rivers. We have considered these and incorporated mitigation in to our strategy, by not altering flow regimes in locations where there are current abstractions or discharges.

5.5.6 Biodiversity

Our plans aim to increase the amount of green space around the airport. We aim to deliver an interconnected network of wildlife-rich green space with a multitude of opportunities for access by local communities. We will help to protect communities from floods by diverting and redesigning rivers, and creating adjoining flood storage and other open spaces.

5.5.6.1 Our objectives

Our objectives in producing this strategy have been:

- To minimise adverse effects on biodiversity – including designated biodiversity sites and important habitats and species
- To comply with the legal framework that relates to legally protected species and designated sites
- To compensate for unavoidable losses by creating valuable new areas of habitat and, where possible, improving existing areas of habitat
- To go beyond compensation to deliver enhancements that will contribute to a net gain for biodiversity
- To protect and maintain, over the long term, the newly created habitats, as well as retain existing habitats that we control
- In delivering all of the above objectives, to ensure there is no unacceptable increase in the risk of bird strike by aircraft
- To take a strategic approach that is focused on meeting the principles of eco-systems services. More detail with regard to how this has been achieved will be provided in our supplementary technical submission
- To provide opportunities for people to experience and learn about biodiversity.

The main mechanism for achieving these objectives, over and above the incorporation of mitigation measures into the scheme design, will be through a major habitat creation exercise to the west of the airport within our enhanced Colne Valley Park. Other areas where habitat creation will take place are located to the north of the airport.

5.5.6.2 The existing environment

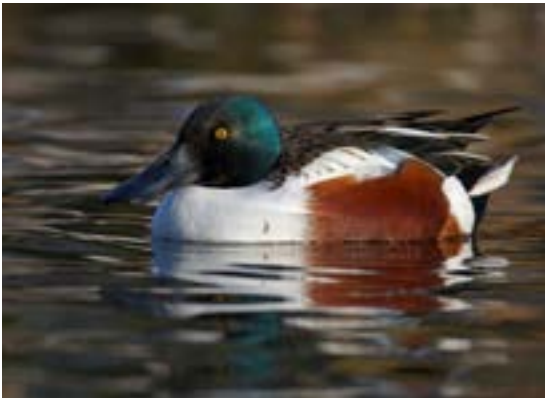
The area around the airport is characterised by a landscape that has been highly modified through sand and gravel extraction, land-filling and the construction of reservoirs. Many of the former sand and gravel quarries now support open water habitats, which, together with the reservoirs, form a complex of water bodies that provides an important resource for a range of wildfowl and other wetland species. Other quarries have been landfilled, with some now supporting extensive areas of unmanaged and species-poor grassland. There are also areas of agricultural land and less modified habitats, particularly further away from the airport. In the remainder of this section, we outline the designated biodiversity sites and notable habitats and species that are most likely to be affected by the proposed development.

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Statutory biodiversity sites

The nearest European designated wildlife site to the airport is the South West London Waterbodies SPAs and Ramsar site. This is designated for its populations of gadwall and shoveler duck species. The SPA/Ramsar site comprises a number of SSSIs, namely: Wraysbury and Hythe End Gravel Pits SSSI, Wraysbury Reservoir SSSI, Thorpe Park Gravel Pit (pit 1) SSSI, Kempton Park Reservoirs SSSI, Knight and Bessborough Reservoirs SSSI, and part of Staines Moor SSSI. The locations of these SSSIs and other non-statutory biodiversity sites that are referred to in this section are shown in Appendix 28 and 30).

Figure 5.28: Shoveler - an important population occurs locally



Other European designated sites that are located close to the airport and under its flight paths include the Windsor Forest and Great Park Special Area of Conservation (SAC), Richmond Park SAC and Wimbledon Common SAC.

Non-statutory biodiversity sites

The following non-statutory sites are partially located within the area of proposed airport development:

- The Lower Colne Site of Metropolitan Importance for Nature Conservation (SMINC) – this includes Harmondsworth Moor Country Park, a restored landfill site
- Old Slade Lake Local Wildlife Site (LWS)⁶ – this comprises four open water bodies (flooded gravel pits), around which wet woodland has developed. The LWS also includes a stretch of the Colne Brook.

Important habitats and species

Areas of semi-natural habitat occur within the area of proposed development, including a few small blocks of mixed deciduous woodland that is a habitat of principal importance for biodiversity⁷. Within this area are several small areas of traditional orchard, which is also a habitat of principal importance for biodiversity.

We know that legally protected species, including European protected species (EPSs), occur within the vicinity of Heathrow and could be present within the footprint of new development and the habitat creation areas. These protected species include several species of bat, otters, reptile species, water voles, white-clawed crayfish, kingfishers and badgers. A large number of species of principal importance are also likely to be present in the habitats local to the airport.

5.5.6.3 Effects of our proposals without mitigation

We have done an initial assessment of the effects of our proposals on statutory and other sites described further below.

Statutory biodiversity sites

We have undertaken an assessment of the effects of the proposed development on statutory designated sites. This has drawn upon aviation sensitivity maps that have been prepared for Natural England (NE), and the findings of the assessments that we undertook as part of the Environmental Impact Assessment and Habitats Regulations Assessment relating to the works required to enable the ending of the Cranford Agreement (2013)⁸. Our conclusion

5.5 Enhancing the natural environment

is that the proposed development is not likely to have a significant effect on the South West London Waterbodies SPA/Ramsar site, or on the three SACs that are under the airport's flight paths.

The River Colne flows through the Staines Moor SSSI and the Wraysbury River flows around its western boundary flows. We recognise the importance of the floodplain meadow habitat in the SSSI, and our water strategy ensures no adverse effects to those habitats or to the rest of the site. The floodplain meadow habitats are maintained in part by high groundwater levels. We will ensure there are no significant changes to groundwater levels to the south of the airport. In addition, the habitats are subject to occasional flooding and this high flow regime in areas outside the airport will be protected by our strategy without increasing risk to people or property.

Figure 5.29: Illustrative cross section through proposed wildlife ponds and wetlands



Non-statutory biodiversity sites and important habitats and species

Construction of the expanded airport would involve land-take from the Lower Colne SMINC and the Old Slade Lake LWS, which could have adverse effects on the integrity of these non-statutory biodiversity sites. There could also be adverse effects on the conservation status of habitats within these sites that are of principal importance for biodiversity under the Natural Environment and Rural Communities (NERC) Act. Some areas of such habitats that are located outside designated sites could also be adversely affected by the proposed development. This includes some sections of watercourses that will need to be culverted under the proposed third runway, and other sections that will be diverted.

Land-take associated with the addition of a third runway could only be implemented if appropriate measures are adopted to ensure that all legally protected species are managed appropriately. Populations of other important species could, in the absence of mitigation, be subject to significant adverse effects. Our mitigation strategy set out below provides the details for managing these effects.

5.5.6.4 Responding to our stakeholders

We have started to consult with NE. Consultation has highlighted NE's main concern, which is the potential for adverse effects on the South West London Waterbodies SPA/Ramsar site and the Staines Moor SSSI. Preliminary discussions with NE regarding the proposals in this strategy informed its development, and NE has welcomed the opportunity to further input into refining the strategy's proposals in due course.

Results of our public consultation show that the public does not rank impacts on wildlife as being of as high a level of concern as many other issues. However, the results indicate some awareness that construction of a new runway and the associated land-take would result in direct loss of both areas of habitat and populations of individual species. There was also awareness of opportunities associated with the development to increase tree cover to improve air quality. This is reflected in our habitat creation proposals.

5.5.6.5 Avoiding effects through design

Since our last submission to the Airports Commission in July 2013 the major change to the design has been moving the new runway further to the south and reducing the development footprint. For biodiversity, this change has resulted in a reduction in the extent of semi-natural habitats that will be lost.

5.5 Enhancing the natural environment

The change to the location of the runway has reduced the extent of land-take within Harmondsworth Moor Country Park which is part of the Lower Colne SMINC by some 25 hectares. Despite approximately 50% of this area being required for flood storage, this will provide an opportunity to create valuable new habitats. In addition, less of Old Slade Lake LWS will be subject to development, although, because of the risk of bird strike, the retained areas will be subject to measures to reduce their value for birds.

5.5.6.6 Managing the effects of our masterplan

We will manage the effects of our plan through a number of dimensions described further below.

Legally protected species

Our proposals will incorporate appropriate mitigation measures that will ensure they fully comply with all legal requirements. For some of these species, there will be a need to translocate populations from land located within the area covered by our proposal. There may also be a need to translocate animals from locations outside the masterplan area, where we are proposing to undertake habitat creation works which are described below. This applies especially to land where there is a need for major earthmoving work to create flood storage areas. The 'receptor sites' to which these translocated animals would be transferred could be located in habitat creation areas where major earthmoving is not required. Where necessary, we will undertake habitat creation and management works in advance of translocation to ensure that the chosen locations are sufficiently mature to be effective as receptor sites.

Trapping of animals that will need to be translocated will take place over a period of up to six months during the time when they are active. Only after this will site preparation works within the trapped-out area be able to start. For some species such as the water vole, it may be appropriate to implement a two-stage translocation programme that involves animals being moved to a temporary area of suitable habitat, with subsequent translocation to their permanent home once this has been created. Along a newly created section of watercourse for example. However, such double handling will be avoided where possible.

Mitigation related to protected species will accord with best practice and a Natural England licence where such is appropriate. We will use tried and tested methods and thus there will be confidence that the mitigation proposed will be successful.

Figure 5.30: Legally protected water vole occurs in the Colne Valley Regional Park



Habitat creation and enhancement

Beyond the species-related measures that are described above, there are limited opportunities to avoid or reduce the potential adverse impacts of the proposed development. In view of this, our approach has been to ensure that our scheme incorporates extensive habitat creation measures that will compensate for the limited areas of wildlife-rich habitat that will be lost. Furthermore, recognising the government's objectives to encourage developments to result in net biodiversity gain, we are proposing a wide range of habitat creation measures that go beyond simply compensating for what would be lost. Opportunities will be taken to enhance existing valued habitats that are currently in sub-optimal condition, or that could otherwise be improved.

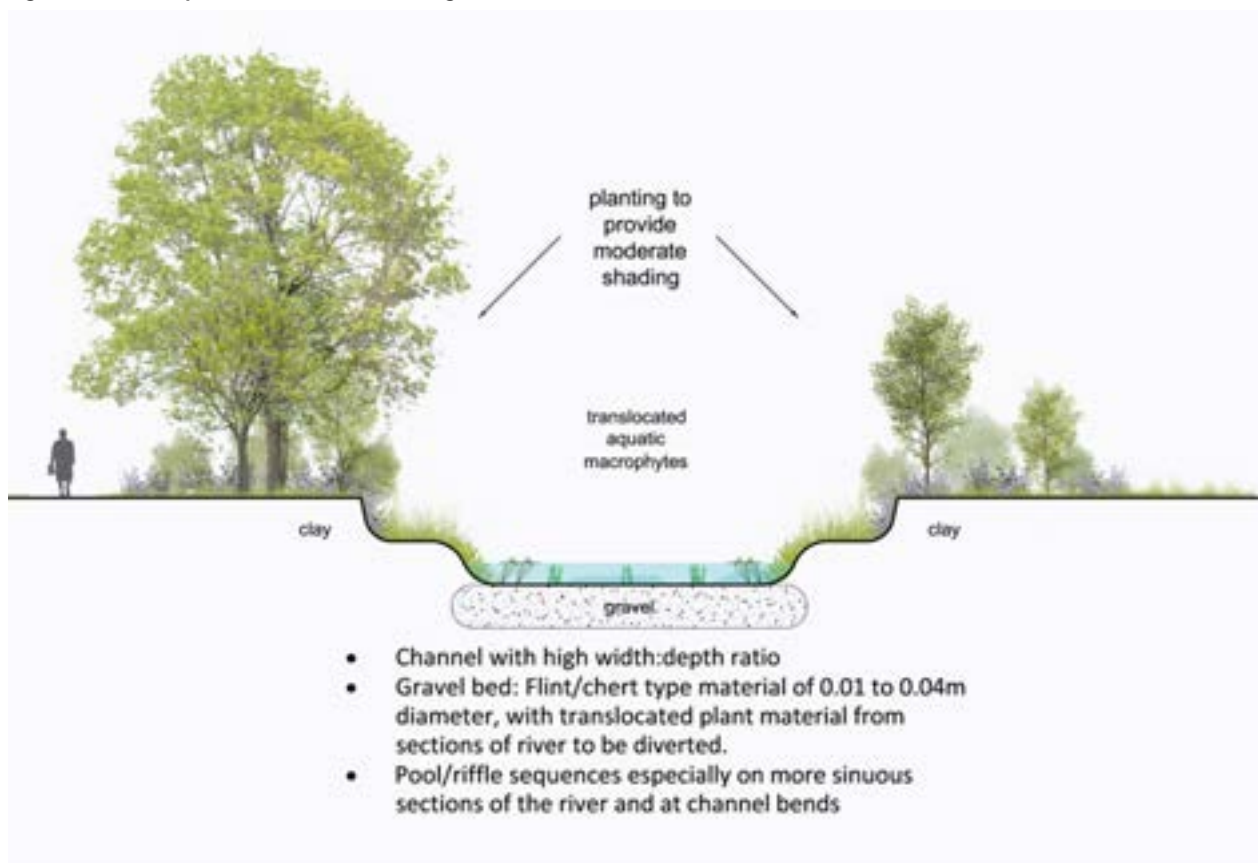
5.5 Enhancing the natural environment

The main focus for the provision of compensatory habitats will be the enhanced Colne Valley (see Appendix 23). This will become a high-quality area of open space that, as well as supporting a wide range of species and habitats, will provide an attractive landscape incorporating a well-designed access network. These attributes will make the area into a regionally important recreational resource for the residents of west London and adjoining counties, whether for walking, cycling, horse-riding or other activities. Because of its rich wildlife, the area will provide valuable opportunities for people to experience and learn about nature, whether informally or formally – for example, through use by local schools and special interest groups such as bird-watching.

The 'spine' of the enhanced Colne Valley will be a new length of watercourse that, at this stage, we are calling the River Colne Spur (see section 5.5.5.6). Drawing upon leading best practice techniques, this new river will be designed to include habitat features that will attract a wide diversity of wildlife. For example:

- A meandering and varied river channel structure with pools, riffles and other features, providing habitats that are suitable for otters, for which artificial holts will be provided for laying-up and breeding, and a wide range of fish and invertebrate species
- Banks that include shallow cliffs, which are suitable for breeding kingfishers and sand martins, as well as berms that will support marginal emergent plants, providing a habitat for water voles and other species
- Willow pollards, which are a characteristic feature of the local area.

Figure 5.31: Example cross-section of a realigned river channel



The retained part of the existing River Colne that lies within the enhanced Colne Valley already includes some features that are valuable for wildlife. These will be conserved and, where appropriate, enhanced. In addition, new valuable habitat features will be created where appropriate. Further details of habitat creation and enhancement within the watercourses can be found in our water strategy.

Alongside the rivers, extensive areas will be set aside as floodplains. These flood storage areas will also provide valuable areas of green space, much of which will be of high value to wildlife. Other large areas that are not

5.5 Enhancing the natural environment

required for flood control will become purpose-designed wildlife habitats. The rivers, with their riparian habitats, will provide movement corridors that will enable species to move between the larger blocks of newly created habitats and from and to sections of the existing Colne Valley to the north and south. This movement will be aided by smaller areas of habitat alongside sections of the rivers that will act as 'stepping stones', facilitating movement of species between the larger habitat blocks. This connectivity will help wide-ranging species, such as the otter, to establish a presence within the enhanced Colne Valley. It will assist many other species to establish and maintain populations in a way that would be more difficult to achieve within an environment where blocks of wildlife-rich habitats are isolated from one another.

The large habitat blocks and smaller stepping stone areas will include a variety of habitats of principal importance for biodiversity, including reedbeds, wet woodland, lowland mixed deciduous woodland, traditional orchards, hedgerows, lowland meadows, eutrophic standing water bodies and ponds. As with the new rivers, these habitats will be designed with reference to best practice which will also inform the way in which they are managed.

Figure 5.32: Standing open water with reedbed – two of the habitats that will be created



We will design wetland habitats to attract a wide range of species including birds – although we will pay careful attention to ensuring duck, geese and gulls are not attracted to areas where they could present an unacceptable bird strike risk. In such areas, open water habitats will be designed to attract only those bird species that do not present such a risk such as the moorhen, together with dragonflies, amphibians and other groups. In areas where bird strike is less of a concern, there may be scope to create open water bodies that are designed to attract gadwall and shoveler (the two duck species for which the South West London Waterbodies SPA/Ramsar site has been designated). This would contribute to compensating for the loss of part of Old Slade Lake LWS, which is used by some of the SPA/Ramsar site's population.

Marginal habitats around open water bodies, together with areas of reedbed that will be created elsewhere within the floodplain, will attract a variety of warblers, reed buntings and other birds. Different bird species will make use of areas of wildflower-rich wet and dry grasslands. These will be designed and managed to attract species of principal importance for biodiversity because their populations have declined rapidly over recent years – for example, lapwing, yellow wagtail and skylark.

All planting and habitat design will be undertaken in accordance with the Civil Aviation Authority's (CAA) guidelines in their CAP 772 Birdstrike Guidelines document. The CAA will act as an important consultee for us in finalising our detailed proposals.

The grasslands will also be managed to attract a wide variety of butterflies and other species, such as reptiles, like slow worms.

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Figure 5.33: Lowland meadow habitats will be created



Elsewhere along the enhanced Colne Valley we will create areas of wet and dry woodland. These, together with areas of scrub, will provide habitats for a range of other bird species. The woodland and scrub habitats will also be designed to attract a diversity of invertebrates, including numerous moths that are species of principal importance for biodiversity.

Figure 5.34: Lapwing will be a target species to attract to the enhanced Park



To the north of the airport, other flood storage areas will be created within an area that we call North Harmondsworth Moor. This will provide the opportunity to create further wetland habitats, together with meadows and woodlands. These areas will also be designed to attract a wide diversity of wildlife, with connectivity to the more extensive semi-natural habitats within the enhanced Colne Valley. Further habitat connectivity will be achieved to the east of North Harmondsworth Moor – the Cranford Park Link will incorporate linear areas of grassland and, in places, woodland, which will connect to Cranford Park, thereby further enhancing the habitat network around the airport.

5.5 Enhancing the natural environment

South of the enhanced Colne Valley, our focus will be on enhancing existing areas of habitat, particularly open water bodies within the South West London Waterbodies SPA/Ramsar site. Some of these are identified by Natural England as having areas that are in unfavourable condition or offering scope for enhancement. These enhancements will be designed to benefit gadwall and shoveler populations, thereby mitigating the adverse effects on Old Slade Lake LWS. There may also be opportunities to enhance other interest features of some of the SSSIs that are located within, as well as outside, the SPA/Ramsar site.

5.5.7 Landscape

We aim to create green, functional and community-centred landscapes around the airport. We will achieve this through our extensive plans to extend and enhance the Colne Valley Regional Park, improved pedestrian and cycle links for local communities around the airport and by creating a strong mix of functional and natural green spaces.

5.5.7.1 Our objectives

In creating a robust landscape strategy that mitigates the impacts of our proposals and importantly looks to enhance the area for people and wildlife, our objectives are to:

- Mitigate any effects on the landscape character resulting from a third runway
- Use landscape as part of the screening package of mitigation for the airport, in co-ordination with other aspects of the design such as security and land-take
- Re-provide any public paths that are impacted
- Enhance existing landscapes and improve access to green spaces for the local community
- Enhance the river infrastructure, giving access and leisure opportunities to communities to the north, east and south of the airport
- To take a long view, considering how the design will mature and evolve as a changing landscape character for the area, and how it will work with ecology, recreation, water management and education into the future including considering the implications of climate change when making our design proposals.

In devising our objectives and ultimately our landscape strategy, resolving satisfactorily the impacts on the Colne Valley Regional Park is our highest priority.

5.5.7.2 The existing landscape

Possibly the major landscape feature of the area is the Colne Valley Regional Park, which runs north/south from Rickmansworth to Staines covering over 40 square miles and has the River Colne as its core feature, but which has an influence that extends to 200 miles of river and canal, and over 60 lakes. The park contains farmland, woodland, nature reserves and country parks, as well as a visitor centre and the Chiltern Open Air Museum. In addition to walking and cycling, people can horse-ride, fish and undertake watersports. It is run by a trust and there is also a Friends of the Park organisation, of which Heathrow is a corporate and founder member.

In its Landscape Character Assessment, NE classifies the area around Heathrow as floodplain/settled floodplain and gravel terraces, distinct village settlements, historic features, linked by busy roads and with a sizeable area covered by current or redundant gravel extraction plants. In addition, the area supports farmland and a number of golf courses. Some of the gravel extraction plants are now landfill sites, or previous landfill sites that have now been restored mostly to farmland.

To the north and east of the airport lie the villages of Harmondsworth, Sipson, Harlington and Cranford. Harmondsworth has a historic core, whereas the others are characterised by post-war suburban housing and more modern development. They have a range of facilities, such as shops, pubs, schools and play areas. Areas of farmland, parks and quarries surround the villages. The M4 lies to the north of these villages and the M4 Spur dissects them.

To the south of the airport is a different landscape character and a more developed feel, incorporating modern airport-associated development, suburban housing and major roads. Apart from the occasional field and two small reservoirs, there is more or less continuous development occurring in a relatively flat landscape. Stanwell village stands out here with its attractive green, flint church and Georgian housing.

5.5 Enhancing the natural environment

Immediately to the west of the airport the landscape is diverse and comprises fields, roads and piecemeal development. Immediately west of the airport boundary runs the River Colne and the M25. Beyond this is Poyle, which has residential areas and major industrial estate, and still further west lies Colnbrook, with its historic core. Although these villages have distinct centres, they run into each other without separation.

Adjacent to the north-west corner of the airport is the village of Longford – another village with a historic centre, but which gives way to modern development to the north, along the Bath Road. Around the edges are scattered traveller camps, some mobile home parks, and smallholdings.

5.5.7.3 Effects of our proposal without mitigation

The following effects, identified as resulting from development of an expanded airport, will be addressed by our strategy:

- Approximately 3.5km of footpaths as designated under the Public Right of Way legislation would be severed or lost.
- The landscape character of the area would change, with green open space being lost.
- Protected trees would be lost.
- The Colne Valley Trail would be severed (a stretch of about 850metres) and the Colne Valley Regional Park affected

Views will be affected by the redevelopment of the airport. Within the village of Longford and within part of Harmondsworth, the traditional village street view will be lost but this will have little impact on more distant existing views into these areas. Views from higher parts of Harmondsworth Moor will also be lost but the park itself is not particularly visible from outside its boundaries.

5.5.7.4 Responding to our stakeholders

To support our assessment we have consulted with NE to gain their views on the methodology for undertaking the Landscape and Visual Impact Assessment. They have provided us with information regarding the landscape character analysis for the area around the airport.

Through our recent local community consultation we established that local people desire more ‘green planting’, and particularly would like more trees in the local landscape. One respondent noted that tree planting would play a positive role in reducing air pollution. Concerns about the potential impact that our proposals would have on the Colne Valley Trail were noted. Each of these points has been addressed in our strategy.

Early in the development of our masterplan we also consulted with the Colne Valley Parks Trust to establish their views on our proposals. This consultation will continue as the details of our landscape proposals are established.

5.5.7.5 Avoiding effects through design

Since our last submission to the Airports Commission in July 2013, the major change to the masterplan has been movement of the new runway further south, thus reducing our development footprint by 65 hectares. From a landscape perspective, this has meant less land-take of green space to the north of the airport and the subsequent retention of footpaths located here and their connections which currently form part of the Colne Valley Regional Park.

5.5.7.6 Managing the effects of our masterplan

The need to mitigate the effects of our proposals on all of water, biodiversity, landscape and recreation features has presented an opportunity to redevelop the Colne Valley Regional Park in line with the principles of the Colne Valley Regional Park Action Plan. Our proposals ensure the creation of new, attractive green space within an expanded park utilising the diverted water-course regime and the new flood storage proposals. We propose a new landscape in the local area which provides a much enhanced recreational offer, with increased opportunities for rambling, cycling, running, dog walking, swimming, fishing, picnicking and interacting with nature. It should also improve local landscape character, which is considered to be currently relatively poor.

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Figure 5.35: Illustration of the enhanced Colne Valley Park with new watercourses and landscaping



Although we make relatively specific design proposals below, the reality is that the detail will be developed in consultation with a range of organisations including local government, statutory consultees, local communities, school groups, sports clubs, rambling groups and the Friends of the Colne Valley Park. We know that what we create must meet local needs and desires if it is to be successful, and accommodate recreation, biodiversity and water management uses.

We will re-provide the Colne Valley Trail as a public right of way, incorporating appropriate links to the communities surrounding the Park, see Figure 5.36. We believe this new route is an enhancement in terms of routing and the landscape character it passes through. It will directly benefit local people, allowing more access options and potentially providing greener routes to access work, schools and other residential areas.

5.5 Enhancing the natural environment

Figure 5.36: Landscape proposals for the enhanced Colne Valley Park to the south of Colnbrook (for a more detailed drawing, see Appendix 23)



1. Sports pitches
2. Formal gardens
3. Allotments
4. Visitor centre and cafe

5. Natural swimming pond and deck
6. Wet woodland
7. Wildlife ponds and wetlands

5.5 Enhancing the natural environment

The new park will have a less industrial character than the section that currently houses the Colne Valley Way. Where it crosses transport routes it will be designed to be both attractive and safe.

The proposals will greatly enhance the setting of the trail and provide extensive access improvements to the wider landscape. Better footpath access is, however, only part of the story. Along the footpaths we want to create a major new landscape and recreational facility. Specifically, this will comprise a bio-diverse landscape and attractive riverscape landscape. New planting in appropriate places will be a main feature, and will include woodland, hedges, and grass/wildflower meadows, designed in conjunction with ecologists, and again supporting our biodiversity objectives. There will also be ornamental planting to add more colour, texture and scent as appropriate, for example in more formal spaces or close to buildings. For local people there will be a variety of planting in greater amounts than exists currently.

Figure 5.37: Illustrative cross section through proposed woodland, river and meadow (for a more detailed drawing, see Appendix 26)



The creation of an enhanced park will be the catalyst for many other improvements, including improved formal recreation facilities such as playgrounds, a visitor's centre and cycle tracks. These opportunities will be discussed with local stakeholders and the community. The Heathrow Special Needs Farm, that will be lost as part of the proposals, will be re-provided in this area.

More widely, including outside the park, landscape mitigation in the form of trees, hedges and landform will be included to screen areas of the airport. We have not attempted to detail exactly where such planting would occur in this document, but we have already largely completed a Landscape and Visual Impact Assessment study that provides such information in greater detail and will be provided as part of our supplementary technical submission. Our landscape proposals do, however, include significant landscape planting as screening along the northern boundary of the expanded airport.

We understand that although our proposals for the new park will be of great benefit for the local community, those most affected by our airport expansion proposals particularly those communities to the north of the existing airport will benefit most from landscape and recreational enhancement right on their doorstep. Therefore we propose to develop a wider green link network. Communities living in Harmondsworth, Sipson and Harlington will benefit especially from new access links to the west into the new park and the east to Cranford Park, the village of Cranford and to the River Crane corridor. These links will comprise new paths for pedestrians and cyclists, and will be supported by improvements to adjacent green space achieved by simple planting such as new hedgerow and tree copses and by providing areas for play. We propose to facilitate this by working with existing landowners to improve the quality of their land and then support its management, rather than to purchase the land ourselves. We recognise that this will require significant buy-in from landowners. Where this cannot be achieved, land purchase will be considered.

5.5 Enhancing the natural environment

Figure 5.38. Illustrative landscape proposals for the area to the north and east of the airport (for a more detailed drawing, see Appendix 23)



In creating these wider green links we will derive inspiration from the existing Harmondsworth Moor. This is a man-made landscape between the river and the M25 that uses landform and planting to create a green oasis in non-rural surrounds. This area is popular with local people and has a countryside-style landscape.

Figure 5.39: Harmondsworth Moor in winter



All planting and landscape design will be undertaken in accordance with the Civil Aviation Authority's (CAA) guidelines in their CAP 772 Birdstrike Guidelines document. The CAA will act as an important consultee for us in finalising our detailed proposals.

5.6 Understanding our heritage

Heritage has been an important consideration throughout Heathrow's development. Within our plans for expansion, we have sought to protect important heritage assets wherever possible.

Our proposals will secure the future for vulnerable heritage assets so people and communities can continue to enjoy them. Our proposals provide options for the preservation of the Grade I listed Great Barn in Harmondsworth and the Grade II* listed St Mary's Church in their current locations. People may feel that moving the Great Barn to another location is beneficial and we plan to consult on this point in more detail if the Government supports our proposals.

Through any development at Heathrow we will build on and promote a deeper understanding of our local area, sharing any new heritage discoveries. This will build on our strong track-record, including the well-received archaeological investigation that preceded the building of Terminal 5.

5.6.1 Our objectives

We aim to minimise impacts on existing landscape character and heritage assets. To achieve this aim, our policy-based objectives are to:

- **Sustain heritage significance**

Through an increased understanding of the past and a commitment to authenticity and quality, we will ensure harm is outweighed by benefits for present and future generations

- **Identify viable options for conserving heritage assets**

We will tackle long-term conservation challenges, not simply the immediate impacts of the proposed runway. Specifically, we will partner with the owners of the great barn and the church at Harmondsworth, in consultation with regulatory bodies, to ensure changes to their setting are resolved appropriately

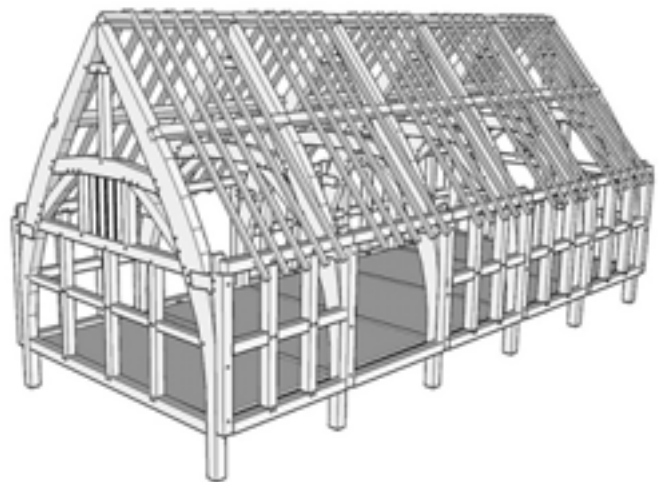
- **Realise cultural value**

Through neighbourhood improvements and by ensuring local heritage is understood, explored and celebrated

- **Promote innovation and excellence**

To create and develop conservation strategies and techniques that ensure heritage assets contribute to community well-being.

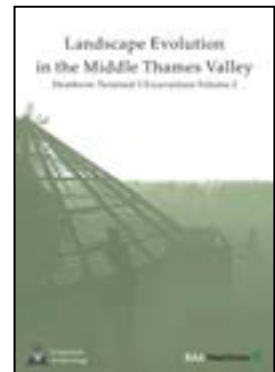
Figure 5.40: The Harmondsworth Great Barn



5.6 Understanding our heritage

5.6.2 Our track record

The Terminal 5 archaeological project proved that major heritage benefits can be delivered as a result of increasing airport capacity at Heathrow. Guided by a strategic archaeological policy that remains a benchmark for the construction industry, we developed an integrated contractual and project management system that successfully delivered the single largest archaeological investigation undertaken during a major infrastructure construction in the UK. We promoted new ideas that enhanced research outputs and, by using digital technology, expanded public access to the results. These achievements were recognised in the British Archaeological Awards of 2008, when the Heathrow Terminal 5 Excavation and Publication was the winner of the Best Archaeological Project, and the Framework Archaeology Freeviewer was highly commended in the Best Archaeological Innovation award.



5.6.3 The existing environment

Heathrow is located at the western end of the Thames Valley National Character Area (NCA). The River Thames is a unifying feature through a diverse landscape of urban and suburban settlements, infrastructure networks, fragmented agricultural land, historic parks, commons, woodland, reservoirs and extensive minerals workings. A more detailed description is provided in the Natural Environment chapter.

Three key landscape characteristics are particularly relevant to heritage aspects (see also Figure 5.41):

- **Metropolitan south-west fringe**

Towards London, the natural landscape is overtaken by urban influences – a dense network of roads (including the M4/M25 corridors and the adjoining commercial estate), London suburbs and other large towns (such as Slough), Heathrow itself, railway lines, golf courses, pylon lines, reservoirs, extensive mineral extraction and numerous flooded gravel pits.

- **Historic Thames**

Royal patronage over the centuries has created important heritage assets of international significance, especially the formal designed landscapes that fringe the Thames, for example Registered Historic Parks and Gardens (RHPG) at Kew Gardens World Heritage Site, Windsor Great Park and Richmond Park.

- **River terrace landform**

A complex sequence of sands and gravels that were deposited by the River Thames as its course altered in response to ice-age climatic fluctuations. The complex evolution of the Thames during this period has left a terraced landform characteristic of the middle reaches of the Thames Valley.

Figure 5.41: Registered historic parks and gardens within the protected area of operation
(For a more detailed drawing see Appendix 31)



5.6 Understanding our heritage

Heritage assets associated with these key landscape characteristics reveal that Heathrow has been inhabited for 12,000 years – and during this period there has been significant change. A dramatic transition from a rural to urban setting occurred during the 20th century, driven by the demand for resources and infrastructure to support the growing capital.

Recent change has had some positive effects in terms of heritage. The airport has invested in architecture of international merit such as the Rodgers Stirk Harbour and Partners' Terminal 5 Building and Foster and Partners/Luis Vidal + Architects new Queen's Terminal. The Heathrow estate includes the Grade II listed Technical Block A, built from 1950-55 to the design of Sir E Owen Williams.

An understanding of the local heritage assets and the cultural services they offer highlights the value of the existing historic environment.

The first group of assets is in 'historic' and 'rural' settlements, comprising the traditional buildings of Sipson, Colnbrook, Cranford, Harlington, Harmondsworth and Longford and, to the south of the airport, the historic buildings of Stanwell and Stanwell Moor (see Appendices 32, 33 and 34). These village settings, which are mostly local conservation areas (CA), occur alongside more prominent 20th century urban development, transport infrastructure and the civil aviation sector. Important heritage assets – such as the great barn in Harmondsworth and some medieval parish churches – do not appear to have fully adapted to the intensified urban setting. This probably contributes to the uncertain viability of current uses and, in turn, to the validity of mitigation measures proposed in this strategy, which could revitalise these assets as cultural resources.

Heritage assets representing all but the last 1,000 years occur exclusively as buried archaeological remains. However, extensive areas of this archaeological landscape no longer survive as a result of gravel extraction and previous commercial development. Around 30% of the proposed runway development area is already totally cleared of archaeological remains due to gravel quarrying alone.

5.6.4 Effects of our proposals without mitigation

The masterplan is broadly consistent with the prevailing historic landscape character of the NCA. However, a number of negative effects arise in relation to the key NCA landscape characteristics:

5.6.4.1 Metropolitan south-west fringe

- **Loss of Longford Conservation Area (CA)**
Including 11 associated Grade II buildings.
- **Reduction of Harmondsworth CA**
The area will be reduced by approximately half, retaining the core heritage settlement form but losing four Grade II listed structures including Harmondsworth Hall and three adjacent walls.
- **Noise effects will lead to loss of significance of the Grade I great barn and Grade II* St Mary's Church**
This may be due to severe noise that could affect how often these buildings are used, an issue on which a viable long-term future depends.
- **Changes to the noise and visual effect on the setting of local CAs**
Including the residual Harmondsworth CA and Colnbrook CA, West Drayton CA, Harlington CA, Cranford Park CA and Cranford Village CA and associated designated heritage assets, along with two Grade II listed buildings at Sipson.

5.6.4.2 Historic Thames

Aircraft noise within the flight corridor may affect the setting of designated heritage assets to the west and east of the airport:

- **West**
Datchet CA and Ditton Park and to a lesser degree the Windsor Conservation Areas, Windsor Great Park Grade I RHPG, the associated Castle (scheduled monument and Grade I building) and Eton College Grade II RHPG

5.6 Understanding our heritage

- **East**

Harlington CA, Cranford Park CA, Cranford Village CA and to a lesser degree on various RHPGs, including Osterley Park, Syon Park and Kew Gardens World Heritage Site.

5.6.4.3 River terrace landform

- **Loss of up to 175 hectares of land associated with non-designated archaeological remains**

Potential for loss of remains of equivalent significance to scheduled monuments.

- **Landscape changes**

These will affect the historic character of the Colne Valley Regional Park.

5.6.5 Responding to our stakeholders

Relevant comments made through the community consultation exercise were limited to the likely impact on historic buildings. Where respondents expressed a view, they asked that historic buildings should be retained or moved. Two respondents specifically expressed the view that the church and Great Barn at Harmondsworth should be retained *in situ*.

A revised masterplan was presented to English Heritage (EH), who acknowledged this reduced the loss of Grade II buildings and avoided direct impact to the Great Barn and church in Harmondsworth. Nevertheless EH was concerned about changes to the setting of sensitive assets retained in close proximity to the third runway. They stressed that appropriate sustainable use was an important consideration to ensure resilience and avoid future vulnerability.

EH also recognise proposals for heritage asset relocation may be suitable in appropriate circumstances. They emphasised that decisions should take account of community opinion and interests, especially in relation to St Mary's Church. In addition, EH notes that the area is recognised as an Archaeological Priority Zone in the Hillingdon Local Plan.

The views of community and regulatory consultees have been considered and we recognise further development of the strategy will require close consultation with individuals and organisations – especially on the future of the great barn and St Mary's Church. Indeed, future arrangements for St Mary's are dependent on there being a clear commitment to long-term community engagement with the mitigation proposals. Our proposals enable the preservation of the Grade I listed great barn and the Grade II* listed St Mary's Church in their current locations, with further options outlined that could strengthen a sustainable future.

5.6.6 Avoiding effects through design

We have refreshed our masterplan since our submission to the Airports Commission in July 2013 that alter the effect on Harmondsworth CA and its associated heritage assets.

As the Commission's Interim Report observes, the initial design had a considerable impact:

"6.106 This proposal would also require a significant number of demolitions... including the loss of the village of Harmondsworth, much of which is a conservation area. A second conservation area in Longworth (sic) would also lose listed buildings. Around 30 listed buildings would be lost, including the Grade I listed great barn and the Grade II* listed St Mary's Church. While Heathrow Airport Ltd has indicated that it will continue to examine the potential to avoid the most severe of these heritage impacts, it is difficult to see currently how this may be achieved other than by relocating the great barn and church".

The proposed changes do not alter the impact to Longford CA and its associated 11 Grade II listed buildings. However, the runway has been repositioned to retain the core of historic Harmondsworth and all but four of the 18 designated listed buildings located within this CA. This offers scope to consider retaining up to 14 listed buildings and the principal streets of the historic core, within a reduced Harmondsworth CA.

5.6 Understanding our heritage

5.6.7 Managing the effects of our masterplan

A third runway at Heathrow would be a catalyst to develop the understanding and use of important heritage assets. We will provide heritage interpretation within the Colne Valley Regional Park. We would support the Chilterns Open Air Museum as a new permanent home for the great barn, if that is what a future consultation supports. Figure 5.42 below summarises our proposals for the key heritage assets affected by the new runway.

Figure 5.42: Summary of Mitigation proposals for heritage assets

Name	Grade	Masterplan proposals
Harmondsworth		
HARMONDSWORTH GREAT BARN	I	Retain <i>in situ</i> or relocate to Chiltern Open Air Museum.
ST MARY'S CHURCH AND CHURCHYARD	II*	Retain <i>in situ</i> with adaption to provide flexible space for worship/community use.
HARMONDSWORTH HALL WALL AND GATES TO SOUTH OF HARMONDSWORTH HALL WALL TO THE WEST AND NORTH OF THE GRANGE WALL TO EAST OF THE GRANGE <i>These are four individual listings that represent parts of two separate assets.</i>	II	Prepare an archaeological building record prior to demolition.
Longford		
KING'S BRIDGE	II	Relocate to the Colne Valley Park as part of the programme of environmental enhancement.
Ten individual listed assets: KING HENRY PUBLIC HOUSE, THE STABLES LONGFORD CLOSE FLATS 1-3 (YEOMANS) THE WHITE HORSE PUBLIC HOUSE WEEKLY HOUSE BARN TO WEST OF WEEKLY HOUSE WALL TO NORTH WEST OF WEEKLY HOUSE LONGFORD COTTAGE QUEEN RIVER COTTAGE / WILLOW TREE COTTAGE ORCHARD COTTAGE	II	Prepare an archaeological building record prior to demolition.
Heathrow Airport		
MONUMENT AT NORTH WESTERN END OF GENERAL ROYS SURVEY BASE	II	Move monument to a location accessible to public.

Our proposals for each group of assets are described in more detail below.

5.6.7.1 Harmondsworth Great Barn

Harmondsworth Great Barn is among the largest surviving timber-framed buildings in England. The barn ceased to be a viable agricultural building in the 1970s. Limited investment in repair and maintenance by subsequent property developer owners prompted emergency repairs and subsequent compulsory purchase by English Heritage in 2012. The barn is now managed on behalf of English Heritage by the Friends of the Great Barn at Harmondsworth – a local preservation volunteer group who open to the public for free each Sunday during a short season.

The barn is best suited as a heritage attraction, especially as adaption involving internal alterations could be detrimental to its significance as a display of medieval architecture and carpentry. However, the offer to visitors is

5.6 Understanding our heritage

currently under-developed, and the barn's immediate future is assured only through public financing – something that could be affected in the long term by government proposals for restructuring English Heritage⁹.

Notwithstanding the implications of an expanded Heathrow, the viability of the barn as a museum visitor attraction is questionable given its location, its conservation needs and the resources available to a small, independent, volunteer community group. Not only do restricted opening times and lack of vehicular access limit opportunities for public enjoyment, there is no independent revenue generation that might support further development as a heritage attraction or meet the long-term maintenance needs (including the urgent repair works currently underway¹⁰).

These issues may be overcome, with the barn utilised to greater educational effect, if it were to be relocated to an established rural museum dedicated to the preservation of threatened buildings for the benefit of public interest and enjoyment. A local example is the Chiltern Open Air Museum, located at Chalfont St Giles, around 19 kilometres north of Harmondsworth. This model for preserving historic rural buildings would also overcome the loss of significance due to changes in setting.

The Chiltern Open Air Museum, located within the Colne Valley Regional Park, is a registered charity¹¹ operated by a small number of full-time staff and a volunteer workforce of approximately 200. The 45-acre site displays a collection of more than 30 buildings, including barns and other traditional buildings. Annual visitor numbers over the past three years average 30,000 and, in addition to welcoming the general public, the Museum operates an education programme specifically for schools.

Harmondsworth Great Barn would be a major acquisition, which may present the Museum with new challenges but will offer opportunities for growth and greater economic security – not least the prospect of increased visitors to view a new and significant attraction. It also offers the prospect that the Harmondsworth volunteers could continue a similar involvement with the care of the barn through the Museum's own volunteer group. Once again, any decision on relocation will need to be made with English Heritage and local people.

5.6.7.2 St Mary's Church, Harmondsworth

St Mary's, a designated Grade II* listed building, is one of a number of medieval and later parish churches surrounding Heathrow that have considerable historic, architectural and communal value. The site includes an attached graveyard subject to provisions regulating the disturbance of human remains, and contains burial monuments that are also listed.

We intend to retain St Mary's Church as a focal point within the historic village setting. However, we understand that increased noise may affect the worship of 25-30 regular congregants. This raises the possibility that the Church becomes redundant as a consequence. We propose to consult with the local Church authorities to identify means of achieving more feasible uses of the Church. For example it could become a new 'community hub', supporting the ministry of the church through community outreach and through offering a range of cultural, social and educational facilities to the diverse local community.

If, as a result of consultation, the proposal for a community hub is not supported, we will consider arrangements for the relocation of the Church, in line with the recommendations for the great barn.

5.6.7.3 Recording Grade II buildings prior to demolition

In contrast to the Grade I/II* buildings, a number of Grade II buildings will be directly impacted. While these do not carry the same level of heritage significance as Grade I/II* buildings, the same principles apply and re-use solutions will be sought where practical. The 19th century cast iron King's Bridge at Longford and General Roy's memorial will be relocated, the former as part of the landscape improvements within the enhanced Colne Valley Regional Park.

However, some Grade II buildings will require demolition, including ten Grade II designations within Longford. These designations include a group of seven domestic buildings located along Bath Road, along with a barn and two public houses – all local examples of 16th to 19th century vernacular architecture. The anticipated loss in Harmondsworth is limited to 18th century Harmondsworth Hall, but there will be additional loss to boundary walls adjoining the Hall and the Grange.

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In such circumstances, there remains a requirement to conserve heritage significance. This conservation will be achieved by archiving a detailed building archaeology record and retaining selected architectural materials at a suitable museum repository. This will form part of the wider archaeological research programme.

Figure 5.43: Archaeological excavations at Terminal 5



5.6.7.4 Colne Valley Regional Park landscape enhancement

Through our masterplan, we will make landscape improvements to the Regional Park, including proposals for water engineering, flood alleviation, biodiversity/habitat enhancements and the re-routing of the Colne Valley Trail. These landscape improvements will utilise brownfield sites, including areas of denuded historic landscape value, such as former gravel extraction sites. We propose to improve the quality of the area through works that also present the heritage of the Colne Valley and re-use displaced heritage assets, such as the King's Bridge at Longford. We will also conduct investigations in areas where landscape engineering may encounter archaeological remains, as part of our wider archaeological research plan.

5.6.7.5 Archaeological research

Successive phases of archaeological research at Heathrow have created an increasingly solid body of knowledge. We propose to investigate a further area of up to 175 hectares. In doing so, we will undertake a programme of landscape-scale archaeological research investigations, post-excavation analysis and public dissemination – improving the understanding of 12,000 years of habitation at Heathrow¹².

5.6.7.6 Conservation areas

Apart from the measures to mitigate individual designated historic buildings, predominantly located within Conservation Areas, we propose to compensate the loss of the following Conservation Areas:

- **Longford (100% loss)**

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Enhancements will be agreed with the Local Authority for Conservation Areas in the vicinity or for improvements to areas that could replace the lost CA. For example, to improve the quality of public spaces within Harlington, West Drayton Green and Cranford Park

- **Harmondsworth (c50% loss)**

In consultation with the Local Authority we will seek to strengthen the remaining part of the Conservation Area.

5.6.7.7 Aircraft noise

Our strategy to reduce noise is set out in section 5.2. In defining the airspace design we will also consider and seek to minimise noise impacts on important heritage assets.

5.6.8 Delivering our strategy

This mitigation strategy is based on heritage mitigation practices previously adopted successfully at Heathrow and elsewhere. We will show the same commitment to innovation, excellence and the development of new strategies and techniques – especially with regard to the relocation of historic buildings – as previously shown during the archaeological works at Terminal 5.

As the principal sponsor for all works other than relocation of designated historic buildings, we will be responsible for the delivery of the mitigation strategy. We will acquire a joint sponsor for any relocation of historic buildings, but will retain funding responsibility.

The physical mitigation works associated with the relocation and demolition of buildings, along with the investigation of archaeological remains, will be progressed in advance of development, subject to processes of land acquisition.

5.7 Managing our carbon

The Airports Commission's Interim Report and the Committee on Climate Change have found that building and operating a third runway at Heathrow is compatible with the UK meeting its long-term climate change reduction targets.

Looking forward to 2050, we support Sustainable Aviation's carbon forecast. This shows how, with the aid of technology, improvements in operational efficiency and increased take up of low-carbon alternative fuels, the level of UK air traffic can more than double without increasing the direct emissions from those flights. Assuming the industry's support for a global carbon trading scheme is implemented internationally, the level of net emissions can fall to as little as half of those today.

Carbon emissions from flights are clearly the most significant contribution to the industry's carbon footprint. Our carbon reduction strategy shows there is also a role for carbon reduction in all aspects of running Heathrow. That is why we are committed to reducing the carbon footprint from our energy use, from passenger and staff journeys to Heathrow, aircraft operations on the ground and, last but not least, the building of new infrastructure. Our forecasts show that by 2030 with an additional runway, Heathrow's carbon footprint is set to fall by nearly 30% compared to today (excluding en route emissions).

5.7.1 Our objective

The Airports Commission's interim Report and the Committee on Climate Change have found that providing capacity for at least one additional runway in the South East – and hence a third runway at Heathrow – is consistent with meeting long-term UK climate change targets. This assessment has focused rightly on the carbon impacts of additional flights as the most significant implication of providing additional capacity. There is also a need to consider more broadly the carbon impacts of building and operating our three-runway masterplan. This strategy therefore aims to identify measures that will minimise carbon emissions from:

- Aircraft flying to their destination and on the ground
- Transport of passengers and staff to and from Heathrow
- The manufacture and transport of materials used to construct and maintain the airport – i.e. embedded carbon.

Our approach to minimising each of these elements of our carbon footprint is detailed below. Our strategy for reducing carbon from energy use is included in section 5.8 – A resource efficient Heathrow and for ground support equipment and operational vehicles at the airport in section 5.3 – Improving air quality.

5.7 Managing our carbon

5.7.2 Heathrow's carbon management approach

Heathrow has been measuring its carbon footprint since 2008. Our carbon management strategy reflects the degree of control that we, as an airport operator, have over the many sources of emissions associated with the airport. We have therefore defined Heathrow's emissions into three categories – those we can 'control', those we can 'guide' and those we can 'influence'¹³.

Heathrow 'controls' CO₂ emissions where it has operational and/or financial control – for example, in relation to on-airport energy use. We have set ourselves a target to cut CO₂ from fixed assets by 34% by 2020 on 1990 levels¹⁴.

Heathrow 'guides' CO₂ emissions by agreeing with airport companies and staff the policies, standards and operating procedures used to manage emissions within and close to the airport boundary. Key examples of initiatives that support our 'guide' principle include:

- Investing in energy efficient rapid transport systems to take passengers from car parks to the terminal ;
- Establishing the biggest car share scheme in Europe ;
- Cutting the number of delivery vehicles to Heathrow by opening an efficient consolidation centre that eliminates unnecessary journeys.

Heathrow 'influences' CO₂ emissions at and beyond the airport by engaging with stakeholders to develop and promote solutions for managing emissions. Key examples include:

- Membership of the Aviation Global Deal Group, which has developed a policy approach for managing aviation's global emissions and has directly influenced negotiations at the United Nations Framework Convention on Climate Change (UNFCCC);
- As members of the Prince of Wales's Corporate Leaders Group on Climate Change, Heathrow has been able to lobby UK and international policy-makers on climate policy, and has been a strong supporter of mandatory carbon reporting;
- Significant investment in rail infrastructure such as £750 million for building and operating Heathrow Express services to drive a shift from car to lower carbon rail journeys to the airport.

Since 2010, Heathrow's carbon management performance has been recognised by ACI and has been certified at Level 3 Optimisation by ACI's Airport Carbon Accreditation Scheme¹⁵.

5.7.2.1 Heathrow's carbon footprint

Figure 5.44 below provides a breakdown of Heathrow's carbon footprint for our 2010 baseline and in 2030. This excludes carbon emissions from the en-route phase, that is the journey from Heathrow to the destination airport once the aircraft has reached 3000ft. These figures show that our carbon footprint is forecast to fall by over 25% during this period.

We have calculated the en-route emissions from flights separately. By 2030, carbon from the en-route flights from Heathrow is estimated at 23.3 million tonnes. With the introduction of increasingly fuel-efficient aircraft, and assuming technology take up in line with those predictions by Sustainable Aviation, this is forecast to fall to 15.4 million tonnes by 2050. This forecast compares to the Department for Transport's figures¹⁶ for carbon emissions at Heathrow of 18.8 million tonnes in 2010 and 18.2 million tonnes by 2050.

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Figure 5.44: Heathrow carbon footprint (excluding en route aircraft emissions)

Source of CO ₂ emissions	2R 2010 baseline (Thousand tonnes CO ₂ /annum)	Three-runway masterplan in 2030 (Thousand tonnes CO ₂ /annum)	% change
Aircraft on the ground and during the landing and take-off cycle (up to 3000ft)	1,190	977	-18%
Transport of employees and passengers to Heathrow	734	521	-29%
Energy use	317	<100	<-68%
Total	2,241	1,598	-29%

5.7.2.2 Managing carbon from aircraft

Taking into account the degree of influence we have over emissions, we have structured our strategy as follows:

Carbon efficiency of flights and a global emissions trading scheme

Our work with Sustainable Aviation has resulted in a carbon forecast for UK aviation up to 2050, as shown below in Figure 5.45.

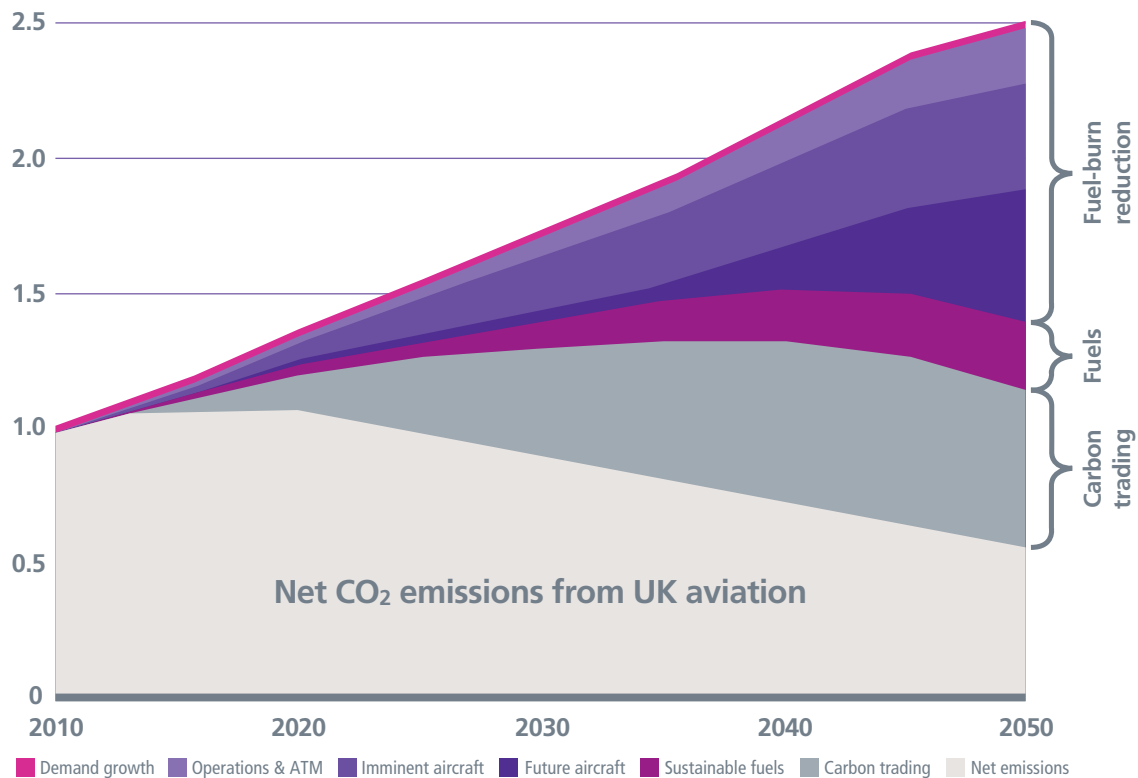


Figure 5.45: Sustainable Aviation roadmap

The Sustainable Aviation CO₂ emissions roadmap shows how, with the aid of technology, improvements in operational efficiency and increased take up of low-carbon alternative fuels, the level of UK air traffic can more than double without increasing the direct emissions from those flights.

5.7 Managing our carbon

Heathrow also has a long-standing policy position on the need to include aviation in a global emissions trading scheme. We believe that aircraft emissions can be further reduced by emissions trading, and that this process provides the industry with the most economically-efficient and environmentally-effective way to abate its carbon emissions. By providing aviation with access to carbon abatement from other sectors, not only does aviation benefit from lower abatement costs, but the carbon market is stimulated to drive further abatement.

Our research shows that passengers value international connectivity and will be prepared to pay their carbon costs to allow them to travel. Through trading schemes, a growing aviation industry can play its part by investing in emissions cuts in other sectors where they can be delivered much more cheaply. Ultimately, and assuming policy makers take steps to internalise carbon costs across the economy, consumers will decide how to allocate their spending to maximise the utility of each tonne of carbon 'purchased'.

We note also that IATA has a long-standing position supporting global market-based measures to tackle aviation emissions. Its targets include:

- Improving fuel efficiency by an average of 1.5% each year up to 2020
- Delivering carbon-neutral growth through a cap on net emissions (taking account of emissions trading) from 2020 onwards
- Cutting net emissions in half by 2050, compared with 2005 levels.
- These targets provide a strong basis for net emissions falling by 50%, as forecast by Sustainable Aviation.

Carbon efficiency on the ground and within Heathrow's airspace

We introduced Airport Collaborative Decision Making (A-CDM) in May 2012 to reduce the time aircraft have to wait in the air and on the ground and hence reduce emissions. CO₂ emissions from aircraft on the ground have been reduced by the introduction of A-CDM and by reducing the number of engines used in taxiing.

We will progressively increase the use of air traffic management and operational practices such as A-CDM. Emissions from circling and delays are estimated by the Airports Commission to increase cruise emissions by up to 8% so reducing delays and stacking has the potential for significant reductions in carbon emissions.

We will provide fixed electrical ground power (FEGP) and pre-conditioned air (PCA) at all new aircraft stands. This avoids prolonged use of aircraft Auxiliary Power Units (APUs) – the small jet engine used to provide electrical power and heat or cool the ambient air in the cabin. Today, FEGP is fitted to all pier served stands and PCA on over 50% of Heathrow stands. Where aircraft are unable to benefit from PCA they need to run their APUs for longer. In the future, with PCA fitted on all new stands, the amount of time each flight needs to run those engines will fall to less than half of time spent today.

By 2030, even with a third runway, the carbon emissions produced by aircraft on the ground and in flight below 3,000 feet will decrease from the 2010 level of 1,190 kilotonnes of CO₂ to just 977 kilotonnes. This is a reduction of 18%, despite the increased number of aircraft movements.

5.7.2.3 Employee and passenger travel to Heathrow

Heathrow is within easy reach of people in London and surrounding regions. Heathrow is positioned just 12 miles from the 'demand centroid' for south-east air passengers. Over 12 million people live within a one-hour journey time, including 6.7 million within one hour by public transport. This excellent location brings with it potentially significant carbon savings when compared with other locations.

Heathrow is already served by a choice of well-established public transport and the strategic highway network. As described in Part 4 our public transport-led strategy will bring almost 2 million more people within a one-hour public transport journey of the airport. Taken together our surface access strategy aims to increase the public transport mode share from today, where just over 40% of passengers use public transport to over 50% by 2030 and over 55% by 2040. We will also continue to reduce the number of staff driving to work, through the continued work of our Heathrow Commuter Team and significant reductions in staff car parking.

Our strategy is predicted to reduce our carbon footprint from staff and passenger travel from 734 kt CO₂ today (2010) to 521 kt in 2030 with a third runway, a reduction of 29%.

5.7 Managing our carbon

5.7.2.4 Embedded carbon

With approximately 60% of the proposed three-runway airport infrastructure already in place, and with Heathrow already supporting just under 480,000 ATMs annually, much of the embedded carbon of our future masterplan is already in place. Our experience also tells us that there is significant scope to recycle and reuse materials for buildings that will be changed or lost as we develop our masterplan. For example, when we demolished the old Terminal 2 building we were able to recycle 99% of the building by weight.

To minimise embedded carbon, the Construction Environmental Management Plan will include measures to reduce carbon emissions during construction. These measures are expected to include:

- Re-use and use of recycled and/or low carbon materials;
- Maximising the use of locally sourced materials and minimising transport distance;
- Encouraging the use of public transport for staff and the use of sustainable transport methods – such as rail transport where feasible – for construction materials and plant.

We will provide an estimate of the embedded carbon of our masterplan in the supplementary technical report we plan to provide within the next month.

5.7.3 Delivering our strategy

We will be responsible for delivering this strategy. We will do so working with our partners, contractors and stakeholders to implement best international practice measures to reduce carbon emissions.

We will continue to engage with industry stakeholders and the UK government to support global carbon trading.

In May 2012, Heathrow became only the fifth airport in Europe to begin implementing A-CDM, which will be progressively rolled-out to increasing numbers of movements up to 2030 and beyond, with increased physical infrastructure and capacity. This will require the co-operation of all involved stakeholders (airport operators, aircraft operators/ground handlers, ATC and network operations) to achieve efficient, timely and environmentally responsible flights.

To deliver the Surface Access Strategy, we will work with the Highways Agency, the London Boroughs of Hillingdon, Hounslow, Spelthorne and Ealing, Transport for London, Greater London Authority, Department for Transport and our staff and contractors.

The transition of the airside vehicle fleet from diesel/petrol power to low/zero NOx electric and hydrogen power will be progressively implemented within our own fleet and with our handling agents.

We will continue to monitor and report annually the carbon emissions of Heathrow Airport, allowing us and all interested parties to judge our success both against this strategy and the UK's targets. We will continue not only to challenge ourselves, but to challenge our partners and stakeholders to find opportunities for greater reductions in carbon emissions.

5.8 A resource efficient Heathrow

Ensuring our operations are resource efficient is something we take very seriously. We already set ourselves challenging targets and monitor our performance against these regularly. With the opening of Terminal 2 later this summer Heathrow will be operating London's largest biomass boiler generating renewable energy for the airport.

Expansion gives us the opportunity to set the bar higher. New infrastructure will include new technologies and practices that help us to operate in the most efficient way possible.

We have thus set even tougher environmental targets for a three-runway Heathrow. Compared to today the airport will produce at least 60% less carbon from energy, consume less water, recycle 80% of its waste and create less waste per passenger.



5.8.1 Our objectives

The efficient use of natural resources – energy, water and waste – is important to Heathrow. We already have targets stretching forward to 2020, summarised in 'Responsible Heathrow 2020' (see section 5.1), that will see the efficiency of the airport improve from today.

In expanding Heathrow, we will build on this foundation and continue to improve the airport's resource efficiency. Specifically, our objective is to enable the growth of Heathrow from a two- to a three-runway airport in the future while reducing carbon from energy by at least 60%, consuming less water, and reducing the waste per passenger compared to 2010 our baseline year.

5.8 A resource efficient Heathrow

5.8.2 Heathrow today

By 2020, our existing resource efficiency targets will see the amount of carbon from fixed assets fall by 34% relative to a 1990 baseline and see an increase in the amount of waste recycled to 70%. We are well on the way to meeting these targets, through performance underlined by a number of headline projects.

5.8.2.1 Heathrow Energy Centre

Heathrow's new Terminal 2 is playing a big part in achieving our vision of making every journey better. It has been designed with the needs of passengers and sustainability as guiding principles.

The new Heathrow Energy Centre will open with T2 in 2014, helping us to meet our energy needs cost efficiently. Heathrow's Energy Centre delivers heat and cooling to the new T2 – as well as to T5 – through a 10 megawatt biomass Combined Heat and Power Plant. It is one of the largest biomass initiatives of its kind in the UK, and the largest in London. The Energy Centre also contributes to the target we set for the T2 building as a whole, which was to improve its energy efficiency by 40% more than required by building regulations (Part L 2006).

When operating at its full potential, it will offset around 40,000 megawatt hours (MWh) per year of grid gas and 12,000 MWh per year of grid electricity – saving around 13,000 tonnes of CO₂ per year. This is a saving equivalent to the annual emissions of 6,500 passenger cars.

Ensuring the 25,000 tonnes of woodchip required annually for the biomass boiler is sourced locally is also helping us further reduce CO₂ emissions and support our local communities. We have set a target to source 75% of the timber from within a 50 mile radius and 100% from within 100 miles. This approach cuts haulage requirements, costs and associated CO₂ emissions from transport. Other benefits include:

- Tightly controlled air quality emissions
- 100% of the ash residue can be collected and reused as soil conditioner in agriculture or forestry
- Promoting local woodland management
- Promoting local economic investment and employment.

The Energy Centre is part of our overall strategy to achieve a 34% reduction in CO₂ emissions from energy use in our buildings by 2020 (from a 1990 baseline and in line with government CO₂ targets). As well as developing lower carbon on-site energy generation like the Energy Centre, we also have an active 'energy demand management' programme to use energy more efficiently in our buildings, and are designing new infrastructure at the airport to be as energy efficient as possible.

5.8.2.2 Waste segregation and recycling

Segregating waste at source makes recycling easier and less expensive. It is essential to help us achieve our waste recycling target. With 320 different companies operating in our terminals, and 200,000 passengers passing through every day, making sure that different waste streams are kept separate is one of our biggest challenges.

To address this challenge, we work closely with our partners in the terminals, such as retailers and facilities companies, on a number of initiatives. For example, We have also been trialling signage for passengers and staff who do not have English as a first language to increase awareness and understanding of what waste should be deposited in each bin. Thanks to these initiatives, and on-going engagement with airport employees, we increased recycling in terminals by 10% during 2013.

To maximise the amount of waste that is segregated, we employ staff to manually sort waste streams. This means that, during 2013, 814 tonnes of green waste was composted on-site and used for airport landscaping. Also 1,375 tonnes of food waste was composted off-site at an anaerobic digestion plant, producing bio-fertiliser and generating energy.

5.8 A resource efficient Heathrow

5.8.3 Less carbon from energy even with more passengers

We have projected our future energy demand based on the future gross area of the terminal buildings and piers. We have also assumed increasing use of fixed electrical ground power and pre-conditioned air as an alternative to aircraft running their auxiliary engines since this is an important part of improving air quality around Heathrow. Our projections have taken into account legislative and regulatory commitments, as well as the Government's overall policy to de-carbonise grid electricity supply.

Taking this projection as our baseline, we have examined technological and operational investment opportunities to improve the energy efficiency of both our existing and new estate. We have assessed these opportunities in terms of their carbon efficiency, their fit with our masterplan and their cost. Taking into account the forecast increase in energy prices, we have developed a strategy that we believe is practical, deliverable and carbon efficient. Importantly it is also cost effective, thus providing a strong business case for investment.

Looking further ahead, it is not possible to say with certainty the exact makeup of the technologies that will be employed. However, our modelling has shown that a combination of best practice measures listed below implemented across the whole airport, will mean that even with 130mppa, Heathrow will be producing at least 60% less carbon from energy use than in our baseline year of 2010. This is in line with the target that the UK Government has set for the economy as a whole.

Our modelling has adopted the following best practice measures to forecast our future carbon from energy:

- Significant investment in photovoltaic systems
- Taking electricity and heat from a new Energy from Waste (EfW) plant that will be needed to replace the existing Lakeside EfW facility
- Ground source heat pumps
- Continual and on-going upgrading of the airport estate
- Night time air purging that will remove the need for expensive and carbon intensive cooling
- Liquid desiccant cooling plants that will efficiently remove heat from terminal air
- Developing a Heathrow SMART grid for energy use control
- SMART buildings that will provide real time building analytics
- Energy efficient baggage handling systems with efficient drives, belts, and motors.

As well as generating some of our own electricity at or around Heathrow, we will continue to consume electricity from the national grid. So in addition to the measures that we will take ourselves, the Government's overall policy to de-carbonise grid electricity supply will also be important in meeting our targets.

5.8.4 More efficient water use

Adding a third runway presents an opportunity to design and implement a highly water-efficient solution. We recognise that the South East of England has water availability constraints so we aim to use water efficiently. The scheme will implement best practice technologies and techniques to keep total potable water use across the airport at levels below today. This implies significant improvement in water use per passenger.

An intelligent approach across Heathrow will provide a better balance between water demands and re-use, water quality, flood water attenuation and the water needs of the wider catchments. Our approach combines major investment initiatives with small-scale, highly efficient fixtures across the airport, along with behavioural and management interventions.

Key features that have the potential to form part of the strategy include:

- Capture of rainwater for use as non-potable water for cleaning aircraft, airport vehicles and also for flushing WCs and in washrooms.
- Integration of grey water harvesting and processing in new terminals through collecting water in above and below ground storage tanks for re-use in terminal washrooms and to meet other non-potable demands
- Vehicle wash recycling systems that will reclaim 95% of all water used

5.8 A resource efficient Heathrow

- The use as standard of highly water efficient fixtures
- Other measures including increased metering, smart controls, leakage detection and prevention, awareness raising and communications campaigns to drive a highly water-efficient airport.

For a future with a three-runway masterplan and 130mppa, our analysis shows that we can expect to use less potable water for the whole airport operation than we used in our baseline year of 2010. This will be enabled by more than halving the water use per passenger compared to today. We already use non-potable water for 14% of our water use and will be increasing this considerably using rainwater and run-off capture systems.

5.8.5 Less waste per passenger

The waste reduction innovations and best practice measures we will implement to deliver significant reductions in per passenger waste include:

- Collaborating with shops and retailers to minimise waste at source
- Implementing sustainable procurement arrangements to cut packaging for all of the airport community
- Moving to paperless offices and passenger manifests
- Reducing waste in airport lounges, for example by better inventory management of food, drinks, magazines and newspapers
- An on-going campaign of awareness raising, and focused communications for office and terminal employees.

We expect these interventions to deliver a reduction of waste from 0.41kilogrammes per passenger in 2010 to 0.35 kilogrammes per passenger with the airport operating at 130mppa. This is a significant improvement in the waste management efficiency of the airport compared to today. However, it will be insufficient to offset the increase of waste from the near doubling of passengers. This means that there will be an increase in the overall waste from about 27,000 tonnes in 2010 to 45,000 tonnes with the airport operating at 130mppa.

Waste management will remain an important focus for us and we will continue to identify new best practice techniques and innovations. Our 2020 target to recycle 70% of waste is predicted to improve to at least 80% of waste being recycled.

5.9 Sustainable drainage

Heathrow's existing drainage strategy ensures water leaving the airport is of the appropriate quality. Expansion gives us the opportunity to improve the quality of run off, for example through the introduction of de-icing pads. We can include features that maximise water re-use. Our approach to drainage complements our approach to managing flood risk.

5.9.1 Our objectives

Our objectives in developing this strategy are to:

- Manage flood risk on-site and, where feasible, reduce flood risk elsewhere by reducing the rates of storm water run-off from the airport to the surrounding environment;
- Manage the water quality of discharges to receiving watercourses;
- Maximise glycol recovery for reuse;
- Maximise water recycling and rainwater capture to reduce water supply demands on the environment.

The mitigation measures we have included as part of our strategy will not result in an unacceptable increase in the risk of bird strike, and ensure all relevant legislation and planning policy, such as the Water Framework Directive (WFD) and the National Planning Policy Framework (NPPF) are met.

We aim to meet these requirements by providing an innovative and sustainable strategy, incorporating the latest treatment, recycling and harvesting technologies to manage and treat all surface water generated by the airport.

5.9.2 Our track record

We plan for sustainable management of surface water run-off from our airfield and associated buildings. This is so as not to increase flood risk and to reduce our impact on the water environment. Our existing approach includes:

- Monitoring discharges from our airfield prior to discharge and reducing pollution risks by treating water. For example, we constructed a managed wetland at Mayfield Farm (see Figure 5.46). This pollution treatment facility has subsequently been improved through the introduction of aeration
- Producing a Surface Water Management Plan (SWMP) for the entire airport within Q6 (2014 to 2018). This will focus on reducing impacts on the environment, identifying risks and implementing measures to achieve the defined environmental outcomes that we have agreed with the Environment Agency.

5.9.3 The existing environment

Approximately 30% of the land within our masterplan boundary (the part that is not currently airport land) is developed hardstanding land. The remaining 70% is made from permeable surfaces such as green open space, gardens or mineral extraction areas. Most of the current developed hardstanding areas are commonly drained by traditional piped systems. Discharge is to the existing public sewer systems and, ultimately, to a number of watercourses, including the River Colne, Colne Brook, Wraysbury River, the Duke of Northumberland's River and the Longford River.

The WFD has classified all waterbodies in the UK on the basis of ecological status or potential. All rivers in the environment local to Heathrow Airport fail to achieve the main aim of the WFD of 'Good' ecological potential. The River Colne (including Wraysbury River) and the Crane are classified as 'Poor', while the Colne Brook and Longford River/ Duke of Northumberland's River are classified as 'Moderate'. A range of factors contribute to this, including high levels of phosphate released into the river in the upstream catchment from diffuse pollution sources.

5.9 Sustainable drainage

Figure 5.46: Existing reed bed at Heathrow's Mayfield Farm Treatment Facility



5.9.4 Effects of our proposal without mitigation

The existing airport has comprehensive surface water infrastructure in place to ensure pollutants cannot enter the natural environment without prior treatment.

By expanding the airport to the north we will be increasing the area of hard standing and the requirements for the management and treatment of surface water. The peak greenfield run-off rate for the site in a 1 in 100 year (plus allowance for climate change) rainfall event is estimated at 1.5 cubic meters per second.

The implications for our existing infrastructure and requirements for new infrastructure to ensure treatment of this increased surface water has been modelled. Design solutions have been identified that can fit with our refreshed masterplan. The details of the assessment modelling will be provided in the technical report described earlier.

5.9.5 Responding to our stakeholders

We consulted with our local community on our plans for development at Heathrow earlier this year. It was clear from this process that an increase in flood risk as a result of increased surface water run-off was a key concern.

The statutory authority on flood management and defence, the Environment Agency, has recently provided initial comments on flood risk and drainage aspects of our masterplan.

The Agency has informed us that, during dry weather, the River Crane suffers from very low flows, which is a concern in respect of meeting the WFD. We have sought to include a provision in our strategy for supplementing the Duke of Northumberland's River (which flows into the River Crane) with treated water from the engineered wetland as a result of these concerns. The Environment Agency advocates the use of Sustainable Drainage Systems (SuDS), such as rainwater harvesting and treatment wetlands, and we have included these in our strategy. Above-ground techniques such as ponds and swales have not been proposed on the airfield, because such features can exacerbate the risk of bird strike. There is also a requirement for a clear graded area around the runways and taxiways for aircraft safety.

The Environment Agency has also confirmed our conclusions that, due to historic landfills underlying the site, soakaways (and infiltration) are unlikely to be an appropriate means of discharge for the airport. We have accounted for this in our strategy by not relying on infiltration.

Our consultation with the Environment Agency highlighted the importance of designing for rainfall events that are larger in magnitude than required design standards. This will provide secondary lines of protection to manage the

5.9 Sustainable drainage

risks associated with partial failure of the system. Our strategy will ensure residual risks associated with exceedence events and risks associated with failure of critical links in the system will be mitigated against.

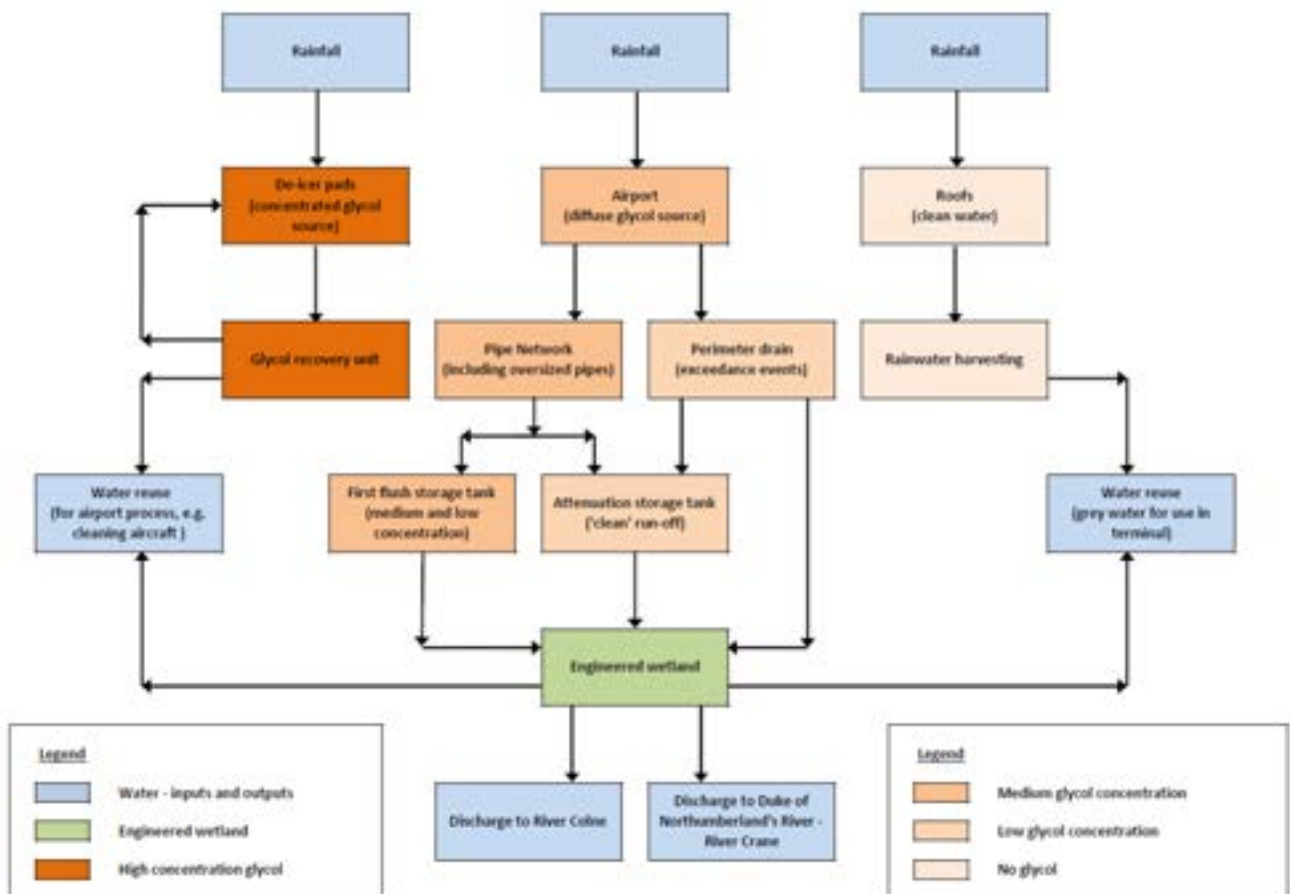
5.9.6 Managing the effects of our masterplan

We have developed our airport masterplan to reduce the adverse impacts of surface water flood risk and surface water run-off related pollution, and to manage the impacts that remain. We have a comprehensive strategy to ensure flood risk is not increased and pollution risks are sustainably managed.

Our strategy is an interlinked series of measures that work together to form a cohesive, robust and sustainable solution. A sequence of standalone elements would not achieve a credible solution. At the highest level our strategy includes measures to capture, maximise storage and improve the treatment of potentially contaminated run-off, and to maximise water re-use.

The following sections describe our strategy in more detail. A schematic of our strategy is presented in Figure 5.47 below and Appendix 35 depicts how the strategy has been built into our masterplan.

Figure 5.47: Drainage strategy schematic



5.9 Sustainable drainage

5.9.6.1 Smaller footprint

Since our last submission to the Airports Commission (in July 2013) we have reduced the footprint of our masterplan. This means there is less hardstanding and therefore the amount of run-off generated has also reduced.

5.9.6.2 Glycol recovery and recycling

We will site purpose-built permanent aircraft de-icing pads at the entry taxiways at both ends of the third runway. De-icer will continue to be used across the airport during very cold weather. The de-icer pad approach will ensure that the most intensive de-icing operations, associated with aircraft de-icing prior to take-off, will be concentrated in areas where recovery is possible. Our approach will reduce the concentration of glycol contamination in water that requires treatment in our engineered reed bed. We will therefore be increasing the capability of the wetland to provide the greatest improvement in water quality possible.

We will recover used glycol from the de-icing pads using dedicated recovery vehicles. Our strategy includes a dedicated drainage network to ensure the highest concentrations of glycol-contaminated surface water run-off will be captured at source. The recovered glycol will be transferred to a dedicated recovery and distillation unit, from which high-grade glycol will be produced for re-use. This reduces our consumption of glycol and contributes to the airport's overall strategy to minimise resource use. We will make use of the soft water that is a by-product of glycol recovery in aircraft and window washing thus reducing our demand on the local water supply.

5.9.6.3 Efficient drainage and storage

A traditional gravity-driven drainage system will serve the main taxiways, stands and runway. On the airfield, underground drains are the most appropriate drainage technique. Above ground, SuDS techniques are not appropriate as they have the potential to attract birds, therefore increasing bird strike risks. They also require earthworks which will contravene our requirement to maintain 'clear graded areas' (i.e. flat surfaces) around runways and taxiways to ensure aircraft safety. The piped system will collect surface water run-off and direct it to the two centrally located underground storage tanks. These storage tanks will be located under the car park to the north of the new Terminal, ensuring access for maintenance will be possible without disrupting airfield operations.

The majority of our drainage system will be driven by gravity, with only one pumped link required. Run-off collected in the underground storage tanks will be drained to the southern boundary of the masterplan. At that point pumps will be used to convey run-off into the engineered reed bed located to the south of the Southern Perimeter Road. We will mitigate risks associated with failure of the pumps by employing a second line of protection in the form of back-up pumps, for which individual flood risk assessments, maintenance strategies and emergency plans will be prepared to minimise the risk and impacts of any failure. We will also ensure the provision of a secondary supply of electricity to ensure pumping is maintained in the event of grid power loss.

Our de-icing pads and glycol recovery system will capture the highest concentrations of glycol-contaminated run-off. As a result only diffuse glycol contamination at medium or low concentrations, will enter the piped drainage system and be routed towards our dedicated 'first flush' underground storage tank. Optical instruments at the inlet will continuously monitor concentrations of glycol in the surface water run-off. A bypass will be activated when concentrations reach low levels, so that run-off could be directed to the adjacent 'clean' attenuation storage tank. Our ability to separate the 'first flush' means that we can ensure 'clean' and 'dirty' surface water run-off will be kept separate. This aspect of our strategy is beneficial in that it improves our control over the treatment process in the downstream wetland, thus enhancing our capacity to provide the best possible treatment.

With the first flush of 'dirty' run-off isolated we can ensure that 'clean' surface water run-off, i.e. run-off that would require little or no treatment in the reed bed, can be captured separately. By having the 'clean' and 'dirty'/'first flush' tanks adjacent to one another, we have incorporated flexibility in the system to ensure that the combined system will be able to store the critical duration 1 in 100 year rainfall storm event including an allowance for climate change. In this extremely unlikely scenario, both tanks would be used for storage irrespective of glycol concentrations, while ensuring the combined discharge from both tanks would not exceed the undeveloped greenfield rates.

5.9 Sustainable drainage

5.9.6.4 Pollution treatment and prevention

We will create a wetland reed bed to help prevent pollution. The floating reed bed provides an innovative sustainable solution to the treatment of contaminated run-off from the airport. Its floating nature will enable it to provide the storage capacity required for stormwater attenuation, in the event that the capacity of the piped system is exceeded. Our wetland will cascade treatment; run-off requiring full treatment could be directed to the first stage of the wetland, whereas 'clean' run-off will be directed to the downstream end for final polishing prior to discharge and/or re-use as grey water within the airport.

Rainfall events exceeding the design standard of the piped drainage system (i.e. exceedance events) will be sustainably managed through the construction of a perimeter drain, which will run around the northern and western perimeters of the masterplan sub-catchment. Run-off will be directed towards this perimeter drain through gentle profiling of the areas of hardstanding. Run-off collected by the perimeter drain will ultimately be conveyed into the reed bed for treatment (and storage during exceedance events), prior to discharge into the River Colne.

5.9.6.5 Rainwater harvesting and reuse

We will maximise water re-use by harvesting clean rainwater directly from the roofs of our new terminals and satellite buildings. Rainwater harvesting tanks will be oversized to provide storage for a 1 in 100 year rainfall event, with an allowance for climate change. This oversized storage capacity will ensure that the maximum possible volume of roof water would be captured for re-use. It will also reduce the volume of run-off requiring attenuation storage and subsequent treatment in our engineered reed bed. The size and location of these will form part of our detailed design. The scheme will be similar to the one used for Terminal 5.

5.9.6.6 Supporting the River Crane

Surface water run-off from the land currently within the airport boundary discharges into a number of watercourses. Where possible we will split discharges from our reed bed to reflect the current inflows to these watercourses. We understand that the River Crane suffers from low flows during dry summer months. We will aim to improve this situation and supplement low flows by releasing clean water from our wetland, at a controlled rate, into the Duke of Northumberland's River and ultimately into the River Crane.

5.9.6.7 Ancillary development

For any ancillary developments located around the periphery of the masterplan boundary drainage within each area will be dealt with separately and likely on the site of the development itself. SuDS drainage systems, designed in accordance with the NPPF and best practice, should be provided for these additional ancillary areas and car parks to ensure that run-off from each sub-catchment is managed.

5.9.7 Delivering our strategy

Responsibility for delivering this strategy will rest with us. We recognise that successful delivery will be closely linked to the wider construction programme. We will also programme the delivery of this strategy so that it performs a valuable function in helping to manage any site run-off from construction with support from specific measures that will be set out in a Construction Environmental Management Plan (CEMP). We will also ensure that the reed bed is established and fully operational ahead of the opening of the expanded airport, so we can mitigate the pollution risk to the water environment.

5.10 Dealing with existing contamination

Our ambition is to manage geo-environmental or land quality issues so that any potential risks from land contamination to human health or environmental receptors are avoided or reduced. We also aim to reclaim brownfield land in a safe, sustainable manner that will be beneficial to the local communities around the airport.

5.10.1 Our objectives

We have undertaken a desk-based ground conditions assessment to establish the likely effects of the scheme on existing contamination. Its findings, the full assessment details of which will be included in our later technical submission to the Airports Commission, have informed the content of this mitigation strategy. We aim to demonstrate that our proposals:

- Manage risks to human health during construction and operation;
- Manage risks to sensitive environmental resources during construction and operation;
- Assess potential waste reduction and materials management options, with the aim of reducing the amount of waste that has to be taken off-site for disposal.

5.10.2 The existing environment

The ground conditions across the area of proposed development are variable, but generally comprise ground underlain by Alluvium, Taplow and Shepperton Gravels and London Clay. The Taplow and Shepperton Gravels are designated principal aquifers by the Environment Agency and therefore represent a sensitive groundwater resource. London Clay is designated as unproductive strata.

Historically the gravels have been quarried and subsequently backfilled with landfilled waste from household and commercial/industrial sources. The potential for contamination in these areas is therefore high.

Other land uses across the area of the masterplan include agricultural land, urban conurbations, commercial buildings and offices, recreation grounds, roads, car parks, 'natural' areas with biodiversity values and a balancing pond (see Figure 5.48). All of these areas are considered to have low potential for contamination. There are also industrial/commercial estates, an energy from waste plant, a gravel pit, a petrol station and a fuel depot, all of which are considered to have moderate potential for contamination.

There are a number of surface water bodies across the area, including the River Colne, Wraysbury River, Colne Brook, Longford River, Duke of Northumberland's River, and several lakes and ponds.

While intrusive investigations have not been undertaken at this stage, our desk-based assessment has indicated the presence of sensitive environmental receptors, including local residents and water bodies that will need to be protected. A number of potential contamination sources, particularly the landfilled areas, will need to be managed.

5.10 Dealing with existing contamination

5.10.3 Effects of our proposals without mitigation

Figure 5.48: Land uses in the vicinity of the north-west runway



The most important possible effect of the development is the potentially unacceptable risks to human health and environmental receptors, including groundwater and surface water that may result from disturbing existing sources of contamination, particularly those associated with the landfill sites.

5.10.4 Responding to our stakeholders

There were no responses made during our recent public consultation that related specifically to land quality or contamination issues. This is to be expected at this stage of the process, as land quality concerns typically arise when construction impacts are imminent.

5.10.5 Avoiding effects through design

Since our last submission to the Airports Commission (in July 2013) the major change to our masterplan in relation to geo environmental issues has been moving the new runway further to the south, therefore reducing the development footprint. This change has resulted in a reduction of approximately 72.5 hectares of potentially contaminated land. This is beneficial from a land contamination point of view since we will be able to mostly develop low-value brownfield land, such as former landfill sites and other industrial/ commercial estates to high value commercial land. This development of brownfield land also avoids the need to use high-value greenfield land.

5.10 Dealing with existing contamination

5.10.6 Managing the effects of our masterplan

There are a number of areas of potentially contaminated land surrounding the area proposed for development – mainly associated with landfill sites. Our strategy will mitigate potential risks from contaminated land through good infrastructure design, safe working practices and sustainable reuse of excavated materials, including contaminated soils where possible. We want to avoid transporting contaminated soils to landfill, which can cause significant environmental and social impacts. We consider this to be achievable, as the development requires a considerable volume of fill materials.

In developing the main site and the Colne Valley there are likely to be large quantities of waste excavated soils. We aim to re-use all non-hazardous waste on-site as part of the land raising that is required on the main development and to create varying landform within the enhanced Colne Valley. We will remediate soils classified as hazardous waste, where possible, and then re-use them on-site. Any materials that cannot be remediated will be safely disposed of off-site in line with UK legislation and duty of care requirements. Soils that do not require excavation, and do not present an unacceptable risk to site end-users or the environment, will be left in-situ.

5.10.7 Delivering our strategy

Consultation with the Regulators (the Environment Agency and relevant local authorities) will be required during the process of putting together a DCO application. This includes establishing the exact requirements of a Ground Investigation strategy.

The strategy proposed meets the high level ambition of the Airports Commission to eliminate any potential for significant environmental harm with respect to land contamination. It will render the developed land safe and fit for intended use. In addition, it has been developed to reflect the principles of sustainability as it attempts to re-use waste materials as far as this is possible.

References

¹ Heathrow Airport, 2013, A Quieter Heathrow - Airbus case study, p19. The A380 was specifically designed to meet the Heathrow night restrictions which prohibited the scheduling of QC4 aircraft at night.

² ANASE (Attitudes to Noise from Aviation Sources in England. Department for Transport, 2007) proposes a relationship between noise level and a 'willingness to pay' to remove the noise. To estimate the social cost of noise we have used this relationship.

³ As per eligibility criteria as set out within the Noise Insulation Regulations (1975).

⁴ <http://www.heathrowairwatch.org.uk/>

⁵ The CAEP standards are expressed as a percentage reduction in aircraft engine NOx emissions in comparison to aircraft engines manufactured in 1986 (pre-CAEP). CAEP/6 aircraft engines display a NOx emission that is a 70% reduction on CAEP/1.

⁶ This site is in Berkshire where non-statutory biodiversity sites are known as LWSs.

⁷ Section 41 of The Natural Environment and Rural Communities Act 2006 (the NERC Act) requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. This list is used to guide public bodies in implementing their duty under section 40 of the NERC Act, to have regard to the conservation of biodiversity in England when carrying out their normal functions.

⁸ Enabling works to allow implementation of full runway alternation during easterly operations at Heathrow airport.

⁹ DCMS English Heritage New Model: Consultation <https://www.gov.uk/government/consultations/english-heritage-new-model-consultation>

¹⁰ London Borough of Hillingdon application reference 27256/APP/2013/1444, approved 17/10/2013

¹¹ The objects of this charitable company are to stimulate public interest in and to promote and encourage the preservation of buildings of architectural or historical interest and in furtherance of this to:

- Establish a museum within the Chiltern Hills for the restoration of historic buildings from the Chiltern Hills
- Provide facilities within the Museum whereby parts of demolished buildings can be stored and displayed
- Bring to the museum buildings threatened by demolition or disintegration from other parts of England
- Carry out research into the best means of preserving and restoring historic buildings and
- Co-operate with others in carrying out the above objectives.

All major new projects must be pre-financed by grants, awards and/or specific donations.

¹² Framework Archaeology 2010 Landscape evolution in the Middle Thames Valley Heathrow Terminal 5 Excavations Volume 2 Framework Archaeology Monograph No3.

¹³ See http://www.heathrowairport.com/static/Heathrow/Downloads/PDF/LHR_Climate_brochure.pdf for details

¹⁴ See Chapter 8 A resource efficient Heathrow

¹⁵ Airport Carbon Accreditation is an independent programme administered by ACI. Airports must have carbon footprints independently verified in accordance with ISO14064 (Greenhouse Gas Accounting). Evidence of this must be provided to the administrator together with all claims regarding carbon management processes, which must also be independently verified.

¹⁶ Department of Transport UK Aviation forecasts, 2013

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Part 6

**The
deliverable
solution**



6.1 Introduction

Heathrow offers the safest, fastest lowest risk solution to deliver new hub capacity. We can deliver new capacity by 2025. Total costs are estimated at £15.6 billion. Our outline financial model suggests an illustrative average airport charge of £24 per passenger from Q7 onwards, £4 more than today. Heathrow offers the most commercially effective and practical route for hub capacity for the UK. Our growth can be financed privately. There is a strong underlying business case at Heathrow. Airlines do have genuine concerns over the commercial model. We will work with them to look at alternative funding models. As importantly, we will need to work with airport users to develop the details of our plans over a number of years. As the UK's largest privately funded construction project our procurement strategy can have a lasting impact on staff, skills and capabilities in firms across the country. Heathrow has a proven ability unlike that at any other player in European aviation to deliver development on this scale - safely, on time, on budget and with quality. This gives us confidence we can deliver the programme. Sustaining public support is the key challenge to delivery. That is why we have taken a new approach since 2010. Today there is support for growth at Heathrow across the country and 48% of local people support Heathrow expansion versus 34% who oppose.

6.1.1 The deliverable solution

We have developed a detailed delivery plan that demonstrates a new runway will be operational in 2025 at a cost of £15.6 billion. Our plan allows for flexibility in increases in terminal capacity in response to changes in demand or other commercial factors. It also means that excessive costs are not incurred up front, ahead of passenger demand.

6.1.1.1 A privately-funded business case

Heathrow is uniquely positioned to fund a new runway in the private sector. Heathrow is by far the largest wholly privately funded airport in the world. We have already delivered one of the UK's largest private sector investments through our £11 billion transformation programme, and have an asset base of £15 billion and annual revenues of over £2.5 billion. We have three of the top sovereign wealth funds, independent private infrastructure investment funds and UK and international pension funds as shareholders. We have a strong investment grade credit rating. As one of the top five corporate issuers of sterling bonds we enjoy extensive support from pension funds and other institutional investors in the UK. Our balance sheet and investment strength are unmatched in comparison to other airports. Demand for landing slots at Heathrow greatly outstrips supply, with airlines willing to spend tens of millions of pounds to secure scarce slots.

For any airport development to be privately funded there must be a clear business case for investors. The total cost of new infrastructure, the complexity of construction and the uncertainty of future demand, all affect investment risk. To attract investment, returns need to be commensurate to risk. A fair regulatory framework with an attractive and predictable cost of capital is critical to a privately-funded business case.

6.1 Introduction

Any scheme must be commercially viable for airlines and offer airport charges that are competitive compared with other European hubs. Airlines have a choice of airports and aircraft are highly mobile assets. We are committed to working with airlines to minimise costs and develop a tariff path that is affordable.

Our preliminary financial model suggests an average airport charge of £24 per passenger between 2019-48, compared to around £20 in the current regulatory period. We plan to work with airlines on alternative funding models that may make new capacity more affordable for passengers, airlines and the airport. We assume some costs to be appropriately funded by the Government rather than by airport users – for example, general surface access improvements and committed rail schemes.

6.1.1.2 Operational by 2025

Large infrastructure schemes of this magnitude require cross-party support to minimise delays in the policy development and planning stages. With Government policy support no later than 2015, construction could commence as early as 2019 and the new runway could be operational in 2025. We believe that all necessary consents can be obtained in line with this timetable. The main determinant of timing is the policy and planning process.

6.1.1.3 Working with our airline partners and our local communities

Heathrow is committed to undertaking meaningful and transparent consultation and engagement with our airline partners and our local communities. We recognise that there is a statutory requirement to consult extensively in the event that Government policy supports Heathrow's expansion. But we also recognise our important on-going responsibility to those affected by the airport and its growth. Heathrow has an extensive communications and engagement programme through which we are already sharing our aspirations and plans for growth. This will be supplemented and built on to ensure our proposals for growth are properly communicated.

6.1.1.4 Building for the UK

As the UK's largest privately-funded construction project, we would expect tens of thousands of people to work on the development of Heathrow's expansion. We have led innovation in the UK construction industry and have been at the forefront of emerging thinking. Based on initial desk based surveys we see no insurmountable obstacles to the key engineering challenges for our masterplan. Our procurement strategy would help sustain and create thousands of jobs throughout the UK – 35,000 people worked on the Terminal 2 project and more than 60,000 on Terminal 5. The investments and skills developed through Heathrow expansion would have lasting benefits for the UK firms involved. We would deploy the successful methods and capabilities developed over the last decade and a half to deliver the various construction packages

6.1.1.5 A proven track record of successful delivery

Heathrow has one of the most successful track records of private infrastructure delivery in the UK. Over the last ten years we have invested £11 billion transforming Heathrow, without disruption, into a live airport that is operating at 98% capacity.



6.1 Introduction

In September 2013 our Terminal 2A project set a new national safety record, with over five million hours worked without a reportable incident.



6.1.1.6 Growing public support

We have taken regular polls of public attitudes and support for expansion at Heathrow. More people support than oppose expansion at both a local and national level. That support is steadily growing. We are very conscious of the need to sustain that support if Britain is to make the choice required to deliver the opportunity for growth.

6.2 Funding plans

Expansion of Heathrow's airport infrastructure is privately financeable. Heathrow is the largest wholly privately funded airport in the world with an asset base of £15 billion and annual revenues of over £2.5 billion. Our business case is built on strong airline and passenger demand. This is demonstrated by airlines trading slots for many millions of pounds. Heathrow is backed by its enviable shareholder base which includes three of the world's top sovereign wealth funds, and one of the world's leading infrastructure investment firms, and major pension funds from both the UK and overseas. Substantial further support is provided for Heathrow's financing by most of the world's largest fixed income investors. With appropriate adaptations to the regulatory regime, Heathrow is the right solution to fund capacity expansion for the UK.

6.2.1 Heathrow builds from strength in private sector funding

6.2.1.1 The largest wholly privately funded airport in the world

Heathrow is by far the largest wholly privately funded airport in the world with a £15 billion asset base financed through a combination of equity and debt raised in global capital markets. Only four of the world's 50 major airports are fully privately funded and Heathrow is many times larger in scale than its closest comparator - Sydney. Heathrow builds from experience, having financed £11 billion in capital investment over the last decade - a scale of investment unprecedented in privately financed airports.

6.2.1.2 A demonstrable record of shareholder support

Heathrow's shareholders represent a cross section of the world's leading private infrastructure investors and include sovereign-wealth funds, pension and investment funds and infrastructure operators. The ability and commitment of our shareholders to the business is demonstrated by £11 billion of investment to transform the UK's hub airport in the last decade, with billions more planned in the next five years. This investment at Heathrow represents well over half of all investment in UK airports since 2000. This has been backed by new equity provided by shareholders, as well as reinvesting of cash from the operation into the business.

6.2.1.3 Heathrow expansion is supported by the scale of our existing business

Heathrow is the third largest airport in the world and has the largest number of international passengers. The quality and resilience of demand at Heathrow provides a solid foundation from which to support the funding of expansion. We estimate that by the time financing of expansion is expected to begin, the current business will generate in the region of £2 billion per year in operating cashflow. This will provide a substantial and readily available source of financing for expansion from reinvestment of cash flow into the business.

The robustness of the current business and predictability of cashflows provide financial resilience. This is key to supporting the financing of Heathrow expansion at a lower cost of capital than alternative proposals. This will deliver significant benefits for airlines, passengers and the UK economy.

6.2.1.4 Heathrow has successfully financed an unprecedented level of infrastructure

Heathrow is experienced in financing major investments in its business and is one of the largest issuers of corporate bonds in the UK. We have over £11 billion in bonds currently outstanding and have raised around £5 billion in debt financing since the start of 2012. Debt investors are attracted to the resilience of the business, the predictability of its cash flows and the strong creditor protections Heathrow provides.

6.2 Funding plans

Heathrow has a well-established debt financing platform that provides access to a diverse range of financing sources. Heathrow is able to issue bonds and raise loans, has raised finance in five different currencies in the debt capital markets, and is able to offer funding to suit different investors' risk appetite and market conditions.

This debt financing platform has been highly resilient, enabling Heathrow to efficiently raise funding from debt capital markets throughout the economic cycle.

6.2.1.5 Our strong investment grade credit rating improves affordability

Key to delivering an affordable cost of funding is the ability to maintain a strong investment grade credit rating. Heathrow's senior debt is rated A- and our business risk profile has the highest rating from credit rating agencies. This assessment is underpinned by the strength of our hub airport status, the resulting resilience of our traffic demand and the predictability of our cash flows.

Expansion is estimated to double Heathrow's asset base over time. It is vital that a mechanism is in place to manage expansion risks, particularly through the construction and early operation phases, to maintain strong investment grade credit ratings. These ratings are critical to achieve predictable access to the capital markets on the required scale. This will also ensure a more attractive cost of funding, supporting affordability for all stakeholders.

Maintaining Heathrow's credit ratings, which are among the highest in the markets for a privately funded airport, gives a strong foundation from which to attract funding.

6.2.3 Heathrow is an established and resilient financing platform

6.2.3.1 A strong financing platform is required to support the quantum of funding

We will borrow billions of pounds to fund our expansion. Borrowing on that scale requires a strong diverse financing platform. Heathrow's established debt financing platform has supported substantial capital investment in the business for many years. Heathrow has over £11 billion in bonds outstanding, and has raised £5 billion in debt financing since the beginning of 2012. In addition, we benefit from significant capital support from a large number of global banks. This support currently includes provision of £2 billion in revolving credit facilities, as well as working capital facilities and hedging support.

Heathrow's strong financial market presence as outlined is critical to meet the funding needs of a multi-billion pound capacity expansion. With a scalable debt financing platform, we are well placed to efficiently raise cost-effective capital to support expansion.

6.2.3.2 Access to the sterling bond market

Characteristics of the sterling bond market are complementary to the needs of long-term infrastructure investment. In particular the market has the ability to provide long-dated debt, typically with up to 30-40 year maturities readily available. Heathrow is currently among the top five corporate issuers of sterling bonds with £8 billion of on issue. This is a substantial part of Heathrow's overall financing, representing slightly over 50% of its asset base, and is provided predominantly by pension funds and other institutional investors in the UK.

We believe the market would be able to absorb a 50% to 100% increase in exposure to Heathrow with a supportive credit rating. This reflects unsatisfied current demand in the market and an expectation of natural expansion of the sterling market over time. Sterling bond market support will remain critical to providing a solid long term foundation for funding the existing and expanded business. Nevertheless, the size constraints of this market suggest it alone could not absorb the debt financing requirements of capacity expansion.

6.2.3.3 Funding from alternative sources of sterling debt

Heathrow anticipates that further pools of sterling funding could be available from a number of alternative sources. This would alleviate the pressure on financing from conventional debt capital market sources. We would look to access sources of capital, such as the European Investment Bank and infrastructure funds, and seek to build on our success in securing sources of sterling funding from other non-UK institutions with sterling capital to invest.

6.2 Funding plans

6.2.3.4 Non-sterling markets diversification

Capacity expansion on the scale envisaged in any of the Airports Commission's short-listed options cannot be financed in the private sector without significant reliance on non-sterling bond markets. The credibility of Heathrow's financing plans are further enhanced by the fact that we are the only UK airport to have accessed non-sterling bond markets and in fact already have bonds issued in four non-sterling currencies – Euros, US Dollars, Canadian dollars and Swiss francs. As a result we have a wide range of well-developed relationships with bondholders around the world.

Given the scale of funding requirements for expansion, we would expect to increase our level of bond issuance in established non-sterling markets and, if required, expand into new markets. The Euro and US Dollar debt markets are many times larger than the sterling market, therefore providing a wider pool from which to raise capital. The net benefit would be diversity in sources of funds, enabling competitive choice in access to markets.

6.2.3.5 Access to the UKs Government guarantee scheme

Under the Infrastructure Act 2012, Her Majesty's Treasury has made provision for £40 billion of financial guarantees to support a wide range of UK infrastructure projects, including transport facilities. The guarantees are provided at market rate, but benefit from the UK Government credit rating.

We believe that expansion of Heathrow would be a candidate for participation in the scheme. This would provide some alleviation to the capacity constraints of the sterling market discussed in Section 6.2.3.2 by reducing the level of exposure to Heathrow credit risk, as the Government guaranteed bonds would have 'quasi-gilt' characteristics. Access to this scheme would also enhance confidence in UK's commitment to expansion.

6.2.4 Funding expansion before opening the runway

6.2.4.1 Building investor confidence to drive an efficient cost of capital

Expansion of Heathrow will deliver long term assets that create value for passengers, airlines, the airport and the UK economy. As with any infrastructure investment, significant capital must be invested upfront and investors need confidence in the ability to recover invested capital and make a return commensurate with the risk taken.

The 'RAB-based' regulatory model is broadly suitable, as it enables the risk adjusted recovery of invested capital, provides predictability of cash flows within a regulatory period, and allows for key 'building block' assumptions to be reset at the start of each period.

Putting in place appropriate incentives to support the on-going, major capital commitment that is required is critical to attracting capital from equity and debt investors. There must be an ability to make returns commensurate with risk in the context of a stable regulatory environment. Confidence in the framework should attract capital from the widest pool of investors.

6.2.4.2 Cashflows to support the construction phase

Significant capital commitment is required in the construction phase. The period of capital requirement for construction, prior to operation is estimated to be 5 years, over which time approximately £5.5 billion of capital investment will need to be funded. Capital is expected to be sourced from a combination of debt and equity funding (including retained cash flows from operations).

Previous projects at Heathrow have established a precedent whereby airport charges are increased prior to delivering revenue from the expanded assets. This provides support to access capital markets at a beneficial funding cost, providing a net benefit to user charges over the life of the funding.

6.2.4.3 Funding expansion in advance of runway opening

Prefunding provides a lower cost of long-term funding for the whole airport. We recognise that there may be a disparity between prefunding by incumbent airlines and subsequent benefit accruing to operators of the new slots, given the constraints of EU slot regulation. We are keen to explore commercially viable ways of prefunding.

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6.2.5 UK commitment and investor confidence

Funding on such a large scale requires a business case and a supporting framework that provides investors with confidence on achievability of returns. Investors will look at the business case to determine the fundamental viability of the expansion. They also look to the structure and type of economic regulation that underpins the expansion to determine the deliverability of returns over time. In addition, they will gain comfort in Government and cross-party commitment, such as protection from policy change, willingness to address major risks and commitment to deliver non-airport infrastructure to support the expansion.

6.2.6 Outline financial model

6.2.6.1 Regulatory model

The Airports Commission recognises the importance of economic regulation to the extent that, “the regulatory framework, with its role in determining the rate of return for airport investors and the landing charges paid by airlines, has clear implications for the commercial viability of long-term options”.¹ The Commission also refers to areas where there is a need for “changes to the system governing the economic regulation of airports to support the delivery of long-term options”.² However to date, neither the Airports Commission nor the Civil Aviation Authority (CAA) has been explicit about the potential regulatory issues and implications arising from expansion at Heathrow.

Heathrow, along with many other UK companies under economic regulation, is subject to price control. This is set to give investors an expectation of earning the appropriate rate of return (Weighted Average Cost of Capital - WACC) to be earned on a Regulated Asset Base (RAB) over a multi-year period. For airports this period is five years, but for other sectors this varies from three years (telecoms networks), to five years (water companies), to eight years (energy networks).

To date, this model has been viewed as generally successful in the low-risk utility sectors:

- The multi-year price cap strikes a balance between protecting consumers and providing companies with an incentive to seek cost efficiencies and additional revenue opportunities within the price control period
- The RAB provides investors with a degree of assurance that regulators will honour investments – albeit with the WACC earned on the RAB adjusted in each price control period to reflect the regulator’s view of the opportunity cost of capital to investors.

The RAB has allowed companies to finance asset investment programmes using relatively low-cost investment grade debt. Without the concept of the RAB, borrowing costs would likely be higher, with companies having to resort to more expensive equity financing. Consequently, it is reasonable to assume that without the RAB model, prices to consumers would be higher.

As the Commission says, changes will be required to the system governing the economic regulation of airports to support the delivery of long-term options. Even the current regulatory settlement does not encourage the company to invest in the existing two runway airport. Investment in a third runway and the related infrastructure will magnify the risk to investors:

- New runway capacity will require a wave of new investment with a long payback period – significantly increasing the average asset life at Heathrow
- Construction phase risk:
 - The construction period of around 15 years increases risk relative to the airport’s current capital programmes, particularly with regard to issues such as cost overruns and delays
 - Any lack of return from these assets during the construction phase will also add further to risk
- Operational phase risk:
 - Operational cost risk - e.g. under-estimation of the running costs of the new facility
 - Commercial revenue risk - e.g. new passengers may be lower spending
 - Traffic volume risk given the uncertain speed (ramp-up) and level of take-up of new capacity and potential greater volatility of incremental traffic

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- Financing risk: airport expansion will require an unprecedented scale of access to UK and international bond markets for a privately-financed transport infrastructure business. It will be initially unclear what depth the UK corporate bond market has to meet this demand, and what returns will be required on this debt and supporting equity
- Regulatory risk, including: apparently arbitrary decisions by the regulator to reduce the WACC in future price control periods or impose RAB write-downs.

The length of the investment payback period magnifies each of these risks - particularly the regulatory risk after the investment has been made. The Airports Commission should be aware that these issues are not unique to expansion at Heathrow. They would apply equally, if not more so, to Gatwick, and would be extreme in the case of a new build airport in the Thames Estuary. These risks are more easily managed by the airport and airlines within an expanded existing hub airport at Heathrow than they would be at any other location.

6.2.6.2 The stabilisation period

At the point at which investment is committed, Heathrow will enter a period of heightened risk for all the factors listed above (and possibly others), requiring measures by the regulator to mitigate this level of risk. This period will start from the point of committing the first significant investment, for at least 15 years. This is roughly the period for construction and for operational, commercial revenue and aeronautical revenue risk to become clear, although the average asset life will be longer. We refer to this time as the 'stabilisation period'. This stabilisation period in particular will require a fundamental change to the approach of regulation to mitigate the heightened risk to providers of capital.

The stabilisation period will be a significant challenge for financing the project. Under the existing regulatory model, all risk is borne by the airport for the full five years of each regulatory period. Since risk will increase as described above, a reallocation of risk between airport and airlines must take place in order to achieve an acceptable balance.

These concerns affect how the existing regulatory regime should be adapted. In order to allow investment, we believe that the regulatory environment needs to include a number of commitments:

- Retention of RAB based regulation
- A guarantee that all efficiently incurred capital expenditure (including development costs) is included in the RAB, with safeguards to prevent write-downs
- Clarity and necessary assurances that surface access infrastructure outside the airport would be funded by the Government
- Recognition that long term investment in major new airport infrastructure requires greater certainty on the long term return to shareholders, with implications for the structure of the regulatory period
- A mechanism to provide investors with a longer visibility horizon for the WACC
- Adoption of a higher WACC to cover the additional risks of capacity expansion
- Mitigation of the heightened risk to the airport with additional measures. These could include revenue and cost risk sharing between the airport and the airlines.

6.2.6.3 The effect on airport charges

The Airports Commission's Interim Report presented preliminary results showing that airport charges at Heathrow may need to rise by 50% above Q6 levels. Our own modelling shows a lower increase. Nevertheless a rise in airport charges is inevitable under regulation similar to that today. The critical period will be from 2024 to 2038 – the period in which the RAB will have increased significantly, but without yet a corresponding growth in passenger numbers.³ This price path could be smoothed (or profiled) by use of a Q6 re-opener, allowing the price to rise above the building block level towards the end of Q6 and the next regulatory period, and allowing the additional revenue generated⁴ to be used as a means of reducing prices in subsequent regulatory periods.

There are alternatives that Heathrow is keen to explore with our airline customers. It may be possible to replace a proportion of the existing airport charges with a direct purchase of landing rights by airlines - with proceeds going either to the Government (and in turn used as a contribution towards the funding of the capacity expansion), or directly to the airport itself. This would need to be consistent with European rules on allocation of airport slots. We hope to develop proposals alongside our airline partners.

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6.2.6.4 WACC

The WACC must reflect the investment risk of a three-runway Heathrow. In turn, the regulatory environment will determine investment risk. Without visibility of the regulatory environment we are as yet unable to propose an appropriate WACC. For this reason, for the purposes of this submission alone, we have used a 'placeholder' WACC assumption of 6% (real, pre-tax).

However, we stress that we are unable to comment on whether a WACC of this level will be sufficient to incentivise investment in runway expansion at Heathrow, or any other airport. Based on Heathrow's analysis for Q6 a WACC at this level would be insufficient. We recommend that the Airports Commission carefully consider the trade-off between the required WACC (and consequently the expected level of airport charges) and the risk inherent in the regulatory environment.

6.2.6.5 Passenger forecasts

Our traffic forecasts assume that Heathrow is able to maintain a 1% pa growth rate under its two runways until the opening of the new third runway in 2025. At this point we assume that new capacity will be taken up in a phased manner consistent with experience at other major airports where new runway capacity has become available. This raises the growth rate to 5% pa for the period 2025 to 2030. As the new capacity is taken up, growth rates will begin to taper-off from 2030, reaching passenger volumes of just over 130 million by 2040. From this point on growth will continue at a much lower level of around 0.3% pa, consistent with an increasingly mature aviation market. Figure 6.1 shows our forecasts. Our forecast sits within the unconstrained passenger forecast produced by the Airports Commission – see Figure 6.2.

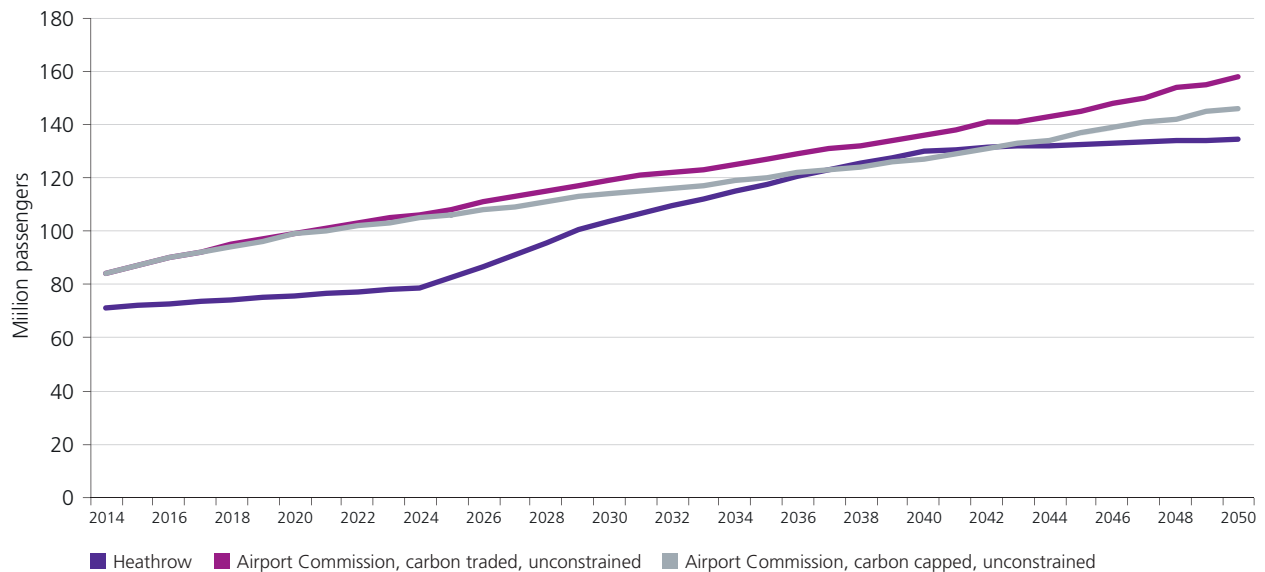
Figure 6.1: Passenger forecasts

Year	2 Runway passengers per annum (millions)	3 Runway passengers per annum (millions)
2015	72.8	72.8
2020	75.9	75.9
2025	79.5	82.6
2030	82.5	103.6
2035	84.9	117.6
2040	86.8	130.3
2045	88.5	132.7
2050	89.9	134.6

It is conceivable that the growth rate after introduction of new capacity could exceed 5% pa. However, airlines have indicated that the growth rate needs to take into account the speed at which airline networks can be developed with the optimal mix of long-haul and short-haul feeder flights to preserve the hub model. Nevertheless, faster take-up of the new capacity would lower airport charges, and we consider this in the sensitivities below.

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Figure 6.2: Comparison of Heathrow and unconstrained Airports Commission passenger forecasts



6.2.6.6 Capital Expenditure

Capital expenditure on new assets for construction of the third runway and associated terminals is discussed further on in Part 6. The phasing of the capital over time has been linked to the forecast growth in passenger volumes.

In addition capital expenditure will be required on refurbishment and replacement of existing assets. This has been calculated based on the expected replacement interval for different classes of asset, with intervening refurbishments for some longer life assets such as buildings. As a general rule, assets are replaced at full cost when they reach the end of their replacement interval. Exceptions include IT assets that we can expect to replace at a lower cost. Some flexibility has been applied to replacement of buildings, in order to avoid significant replacement construction during the peak of new asset construction.

6.2.6.7 Government funding

As a general rule, using Government funds to finance the development may be prevented by the prohibition on state aid and therefore needs careful analysis. As a result, our business case assumes full private sector funding of the development of Heathrow Airport for the purposes of a third runway and associated airport facilities.

We assume that off-airport road and rail surface access will be paid for mostly by Government as is standard elsewhere in the country, and so does not feature in our financial model. This is because off-airport transport links will benefit the wider community and be open to both airport and non-airport users in a fair and non-discriminatory manner. For example, non-airport users will benefit equally from improvements made to the M25, and from the additional rail links to the west and south of the airport. The Airports Commission's Interim Report says, "...any surface access improvements to support proposed new airport infrastructure are likely to be at least part-funded by the Government..."⁵ Therefore, only half of the M25 re-routing costs are included. This proportion is in line with the costs linked purely to the runway works rather than general enhancements.

The burden on Government funding of surface access can be materially offset by revenues from a congestion charge scheme for the road network around Heathrow (see Part 5, Section 3.2.3).

6.2.6.8 Operational Expenditure and non-aeronautical revenues

Our starting point for operational costs and non-aeronautical revenues is the exit point of the CAA's Q6 regulatory settlement.

A cost elasticity of 0.4 to passenger numbers is assumed based on analysis by the CAA indicating a range of 0.3 – 0.5.⁶ In addition, for Q6 the CAA assumed an underlying 'frontier shift' productivity gain of 1% pa.⁷ For our model we assume a lower figure of 0.5% pa, since our starting point is the exit point of the Q6 regulatory settlement

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which presupposes productivity gains have been made, and also because there will be less scope for 'frontier shift' productivity gains in new state-of-the-art facilities that will comprise around half of the airports new infrastructure.

Figure 6.3 shows the assumptions we make for the principal operational cost categories.

Figure 6.3: Operational cost drivers

	Cost driver
Security costs	Linked to passenger numbers, elasticity 0.4 Step up for new terminal opening 0.5% year on year efficiency
Operational staff costs	Linked to passenger numbers, elasticity 0.4 Step up for new terminal opening 0.5% year on year efficiency
Facilities	Linked to terminal airport size 0.5% year on year efficiency
Utilities	Linked to terminal airport size 0.5% year on year efficiency
Rents and rates	Linked to terminal and runway size 0.5% year on year efficiency
Other operational costs	Linked to passenger numbers, elasticity 0.4 0.5% year on year efficiency
Commercial	Linked to passenger numbers, elasticity 0.4 Step up for new terminal opening 0.5% year on year efficiency
Rail	Linked to passenger numbers, elasticity 0.4 0.5% year on year efficiency
Central support services	Linked to passenger numbers, elasticity 0.4 0.5% year on year efficiency
Pensions	Linked to staff

Figure 6.4 shows the assumptions we make for the principal non-aeronautical revenue categories. Elasticities are based on established econometric relationships.

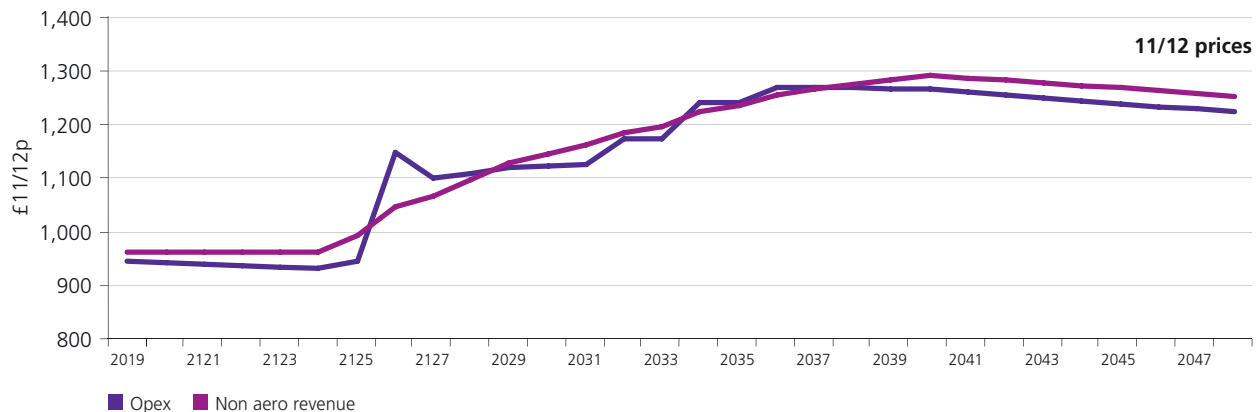
Figure 6.4: Non-aeronautical revenue drivers

	Driver
Car parks	Linked to passenger numbers, elasticity of 0.9 Adjustment to reflect CPI trend rather than RPI
Retail and concessions	Linked to passenger numbers, elasticity of 0.9 Adjustment to reflect CPI trend rather than RPI Uplift to retail sales per new passenger of 20% to reflect opening of new retail space in new terminal buildings
Property	Linked to terminal and runway size
Rail	Linked to passenger numbers, elasticity of 1 Adjustment to reflect CPI trend rather than RPI
Other commercial income	Linked to terminal airport size
Other regulated revenues	50% of the income linked to passenger numbers, elasticity of 0.9 Adjustment to reflect CPI trend rather than RPI

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Figure 6.5 shows the resulting trend in operational expenditure and non-aeronautical revenues. As would be expected, operational costs react more immediately to the opening of new facilities, while the impact of commercial revenues lags somewhat.

Figure 6.5: Operational costs and non-aeronautical revenues



6.2.6.9 Outputs

Figure 6.6 shows the summary output of the outline financial model for the whole of Heathrow Airport, including expansion. We assume perfect price setting through the regulatory model where the airport earns the WACC on RAB in each regulatory period. For the sake of presentation we only present the results in five year blocks.⁸ – this does not imply five year regulatory periods are appropriate. We also assume a notional 60% debt gearing. In line with usual regulatory practice, the actual level of gearing will be a matter for the company's shareholders to decide.

Under the assumptions used (particularly the 6% placeholder WACC), the average airport charge (averaged over departing and arriving passengers)⁹ peaks at just over £27 in 2034-2038 (compared with an average of around £20 in Q6). From 2039 onwards, the airport charge declines as passenger volumes build up and the asset values depreciate. By 2044 the charge is back below Q6 levels, and will remain so. Between 2019 and 2048 the average charge is under £24. This is a modest increase on Q6, which will be more than offset for passengers in more competitive airline ticket prices induced by greater capacity.¹⁰ As yet, however, we do not know what the appropriate level of WACC will be, since we have insufficient visibility on the overall risk framework, particularly the regulatory regime.

We are aware that the airport charge needs to be affordable for passengers and the airlines that use Heathrow. We are also aware that, under a pre-funding model, those airlines already using the airport are obliged to bear a disproportionate share of the cost of expansion compared to any new airlines that may fly to Heathrow once we have new capacity in place. We are committed to working with our airline customers to explore alternative and more appropriate charging structures.

One possibility for reducing the airport charge burden would be to reduce the higher rate of Air Passenger Duty (APD) on long-haul flights that disproportionately use Heathrow. APD revenues would, in any case, rise dramatically with the additional long-haul flights following expansion at Heathrow. If APD rates remained at their current level in real terms, we estimate that by 2040 incremental revenue to the UK Government would rise by £960 million per annum, as a result of additional flights from Heathrow. A simple £20 reduction in long-haul APD applied non-discriminately across all UK airports would reduce the average charge at Heathrow by around £4 per passenger.¹¹ This would leave a net benefit to tax revenues of £80 million per annum for Heathrow expansion. Therefore, it should be possible for the average overall charge to not rise above its existing level, while retaining a net benefit to Government revenues.

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Figure 6.6: Financial schedules for total airport inclusive of expansion for the third runway

£millions, £11/12 prices	2019-23	2024-28	2029-33	2034-38	2039-43	2044-48
<u>Income statement</u>						
Aeronautical revenues	7,802	11,042	14,088	16,550	15,165	12,758
Other revenues	4,813	5,167	5,819	6,260	6,431	6,320
Operational costs	-4,700	-5,235	-5,715	-6,292	-6,303	-6,174
EBITDA	7,914	10,974	14,192	16,518	15,293	12,905
<u>Balance sheet</u>						
Closing RAB	17,323	23,682	29,702	27,287	21,448	18,228
<u>Financed by:</u>						
Shareholder equity	6,929	9,473	11,881	10,915	8,579	7,291
Debt	10,394	14,209	17,821	16,372	12,869	10,937
<u>Assumptions</u>						
Passenger volumes	383.2	434.6	532.4	601.1	651.8	665.4
Aeronautical revenues / passenger	20.35	25.26	26.49	27.50	23.29	19.18
WACC placeholder				6.0%		
Gearing				60%		

6.2.6.10 Scenario based risk assessment

There are risks associated with the results shown above, particularly the passenger number forecast and the capital expenditure required. Assuming perfect price setting through the regulatory model where the airport earns the WACC on RAB each regulatory period, the impact of these risks will be on the average charge. Figure 6.7 shows the impact of a series of risks.

The greatest risk is a lack of passenger take-up for the new capacity. In practice the impact of this would be mitigated by adjustments to the capital expenditure programme since less terminal capacity would be required.

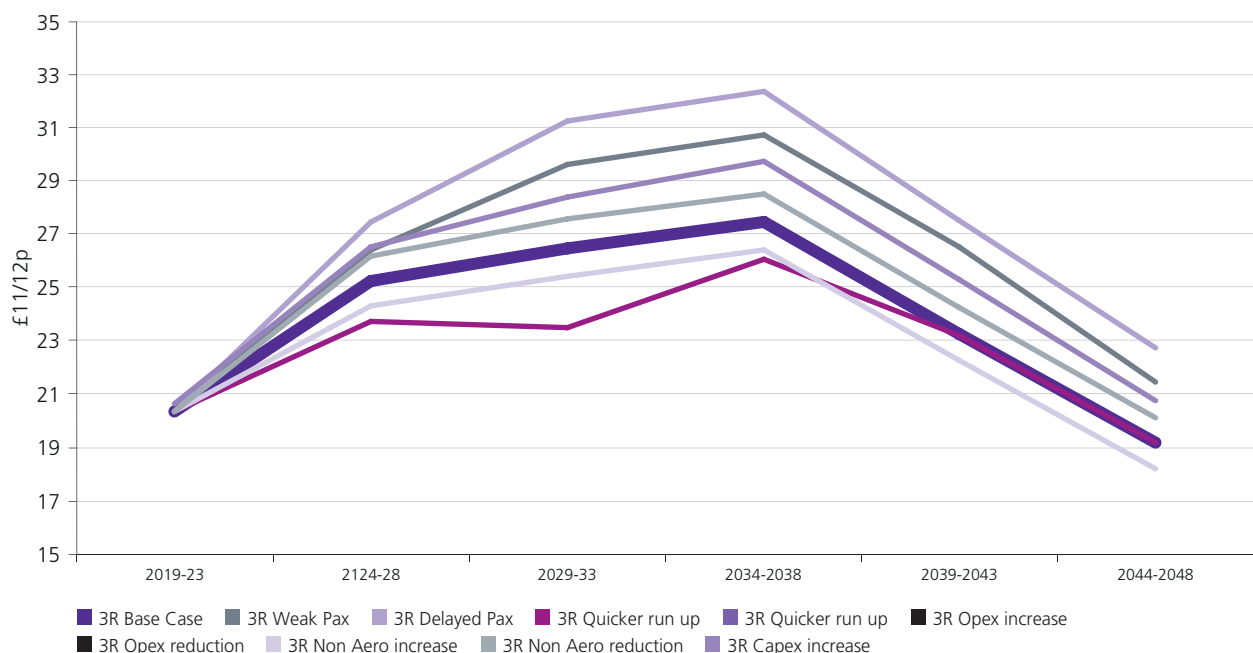
On the other hand, if take-up of capacity is faster than forecast in our base case, the average charge will peak at £26, and average just under £23 over the period Q7-Q12.

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Figure 6.7: Risk impact sensitivities

	Description	Impact on aeronautical revenue / passenger					
		2019-2023	2024-2028	2029-2033	2034-2038	2039-2043	2044-2048
Base case		20.35	25.26	26.49	27.50	23.29	19.18
Weak passenger demand for new capacity	Passenger growth peaks at only 3% (rather than 5% in base case), reaching 122m by 2050 (rather than 135m)	20.34	26.46	29.61	30.77	26.55	21.50
Delayed take-up of new capacity	Take-up of new capacity is delayed by one year, due to either demand or supply issues	20.35	27.50	31.27	32.36	27.53	22.74
Faster take-up of new capacity	Passenger growth peaks at 7.5% (rather than 5% in base case), but still peaks at 135m as in the base case	20.35	23.73	23.52	26.06	23.21	19.20
10% higher opex	Incremental opex 10% higher in all years after 2025	20.35	26.23	27.56	28.56	24.25	20.11
10% lower opex	Incremental opex 10% lower in all years after 2025	20.35	24.29	25.43	26.44	22.34	18.24
10% higher commercial revenues	Incremental non-aeronautical revenues 10% higher in all years after 2025	20.35	24.32	25.41	26.45	22.31	18.22
10% lower commercial revenues	Incremental non-aeronautical revenues 10% lower in all years after 2025	20.35	26.21	27.58	28.55	24.27	20.13
10% higher capex	Capex on 3R assets 10% higher in all years	20.64	26.53	28.41	29.78	25.32	20.76

Figure 6.8: Impact of alternative scenarios on the Heathrow price path



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6.2.7 Perspective on Heathrow's investment business case

Heathrow Airport Holding's shareholders represent a cross-section of leading private global investors in infrastructure, including three of the world's top sovereign wealth funds, one each of the UK's and Canada's largest private pension plans, an experienced airport operator, and an independent infrastructure investment firm. They invest globally and are long term investors in infrastructure that provides essential services to communities worldwide. This includes both greenfield developments, brownfield expansions, and investments in established assets. They have deep expertise in risk management, including funding, construction, operations and demand forecasting. Their investment focus includes, but is not limited to, aviation infrastructure. Their teams of experts constantly assess opportunities in order to allocate capital globally.

Our shareholders have committed substantial resources to transform Heathrow into one of the best performing airports globally. They have invested over £11 billion during the past decade, including the world leading terminals (i.e. Terminal 5 and the soon to open Terminal 2), first-class hub infrastructure such as baggage, improved passenger experience, greater resilience and more efficient use of Heathrow's capacity. These investments in Heathrow represent well over half of all the investment in UK airports since 2000. They have been backed by new equity provided by the shareholders and reinvestment of cash generated by the operation of Heathrow, and sustained over many years.

Our shareholders believe that expansion of Heathrow serves the UK's national interest, including economic growth and job creation, enhanced international trade and improved value for the consumer. Independent studies support the view that there is substantial unmet demand at Heathrow and this will only increase in the coming years. Elsewhere in the world, major investments are being made in hub infrastructure. Our potential to grow successfully is strong, and may be even stronger, if Heathrow is allowed to compete with these hubs. The proven nature of Heathrow's hub business model makes it more viable as an investment case than alternatives built around more speculative options.

The case for Heathrow is strengthened by the scale of the existing airport. The existing business with over £2.5 billion in annual revenues and established cash flows gives a base commensurate to the scale of the investment required for Britain. The proportional increase in the asset base attributable to expansion is less than at other locations, so Heathrow will be building on its existing strength. This also means that costs are spread more widely across more passengers, lowering the cost for each passenger. Heathrow, therefore, delivers better value for money compared to other locations.

6.2.8 Conditions supporting investment

The strength of the case for Heathrow expansion will not, however, attract private investment without a supporting investment environment. The expansion of Heathrow is a substantially riskier investment compared with Heathrow today and necessitates new approaches to risk sharing and higher financial returns for investors. Heathrow and its shareholders welcome dialogue with the Airports Commission, the Civil Aviation Authority and other stakeholders in order to identify and address the risks attributable to expansion and the appropriate investor returns. The shareholders "in principle" support for the expansion assumes successful resolution of these matters.

New runway capacity will require a wave of new investment with a long payback period – significantly increasing the average asset life at Heathrow. We see scope for risk over the construction period, uncertainty over future traffic and revenues, and risk relating to the future regulatory environment. These risks and uncertainties are not unique to Heathrow and will apply to any of the airport expansion proposals currently being studied by the Airports Commission.

There are, therefore, conditions that are critical for the UK in order to support investment in national infrastructure and aviation with private funds. We highlight in particular the following conditions:

6.2.8.1 Policy commitment and stability

Private investors, including Heathrow's shareholders, will be encouraged by strong Government support for expansion, the speed and clarity of the process to develop policy commitment and the mechanisms put in place by

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government in order to provide greater stability over the long periods of time required to successfully deliver an investment of this nature.

6.2.8.2 Regulatory framework

Successfully attracting private investment to fund Heathrow's proposal for the expansion necessitates modifying the established regulatory model for airports in a number of ways, including, but not limited to, the following:

- **Regulatory structure**

Whilst our modelling assumes continuation of a Regulated Asset Base model, a fundamental review is required to assess risk allocation between the airport, the airlines and the Government, given the extensive magnitude of the investment required and its substantially greater risk to investors compared with Heathrow today.

- **Investor returns**

Even with Heathrow's large and established business, an investment over a number of decades that exposes investors to a significant demand risk is of a very different nature compared with operating and maintaining the assets of a more mature airport. In the latest regulatory period, the CAA has already materially reduced the return to investors (via the regulated WACC) to a level that has impacted the shareholders' ability to fund future investment. Our shareholders would expect a substantial revision to the WACC to account for construction and demand risk, as well as long term changes in financing costs, that reflect the risk of a greenfield development. Any view of the investment case at the moment must come with heavy caveats until there is greater visibility of the UK regulators approach to investment return.

6.2.8.3 Operational framework

Our preliminary view of the business case for expansion of Heathrow makes a number of important assumptions regarding the operations of the airport. For example, material changes to the number of ATMs, operational use of the runways or airfield, restrictions on their economic use, or other impacts on the underlying aviation economics and demand could diminish private funding for the expansion.

Similarly, Heathrow today and in future relies upon elements of the wider infrastructure. If the UK altered the assumed framework, for example around surface access to the airport, this could materially affect the business case for expansion.

6.2.8.4 Economic and market conditions

For an investment on this timeframe and with the current level of policy uncertainty, it is inevitable that views can only be based on prevailing economic conditions. These include, but are not limited to, macroeconomic demand, foreseeable financial market conditions and geopolitical considerations. We have considered a number of scenarios in testing the business case and it appears sufficiently robust. The general conditions supporting any investment will need careful review at a point far closer, and thus with more certainty in terms of policy and planning, to the time of commitment of large-scale private investment in any expansion plans.

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6.2.9 Assessment of the potential for private finance

Subject to a satisfactory risk sharing investment environment, we believe it will be possible to finance an expanded Heathrow with private money. Our confidence is supported by the fact that today Heathrow is already the largest wholly privately funded airport in the world.

However, private financing for an investment of such a scale will not be straightforward. It will require financing, both debt and equity, on a scale rarely seen in UK markets for a single private entity. Successfully financing expansion depends heavily upon the right level of policy, regulatory and operational certainty. Many other factors will emerge if the development is progressed. We anticipate working closely with the UK authorities over a number of years to develop greater confidence in the business case.

At this stage in the evaluation process it is impossible for us to give binding commitments as this certainty does not exist. We are committed to developing a business case and have invested millions of pounds at our risk to develop these proposals. This financial commitment demonstrates both our belief in the potential for Heathrow's case, and our seriousness in pursuing expanded capacity at the airport as a privately funded investment.



6.3 Our timetable

We can deliver a third runway by 2025. Our programme is challenging but realistic. It requires designation of an Airports National Policy Statement in 2017 allowing for development consent in 2019, four years after the Airports Commission recommendation. Providing we get development consent in 2019 the first flight will take off from our new runway six years later. Our construction schedule balances risk against cost with our terminal capacity brought on stream to meet demand as it arises. This plan delivers runway capacity at the earliest opportunity but maintains flexibility to adapt the terminal phasing to meet demand and any changes in airline requirements.

6.3.1 Our timetable

Our timetable is based on two key factors:

- Obtaining planning consent and;
- Optimising the construction sequencing.

We have assumed that we will start preparing a Development Consent Order (DCO) application as soon as Government confirms support for our proposals in Q3 2015. A four year period will follow allowing for Government to consult on and designate the Airports National Policy Statement (NPS) in 2017. We have assumed that our DCO application will be approved by the Secretary of State in summer 2019.

Our construction schedule takes into account the following key construction and operational considerations:

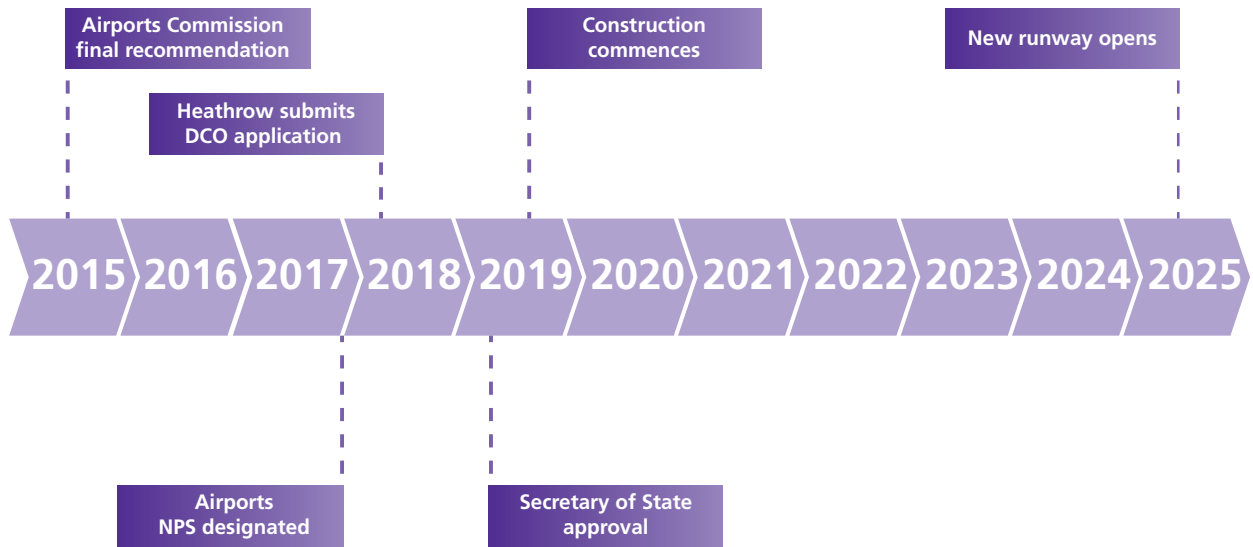
- Limiting the impact of construction on our current airport operations
- Benchmarks for construction durations using our recent Terminals 5 and 2 developments
- Benchmarks for construction durations against Highways Agency, Environment Agency and major civil engineering ground-works data
- Minimising airport road congestion by bringing forward the Southern Road Tunnel development early in the schedule
- Integrating new facilities such as terminals, satellites, baggage facilities and track transit systems to meet the operational requirements of the airport as demand grows.

Operational considerations play a large role in overall airport campus development. This means the airport and the airlines are able to use the planned three runway operation from day one. The phasing of apron and terminal developments have been planned with the optimum airfield capacity in mind. The construction sequence also aligns with the most commercially efficient development of the terminal facilities.

While there may be opportunities to improve our runway opening date but these are reliant on a combination of factors outside of our control.

6.3 Our timetable

Figure 6.9: Timetable to runway opening



6.3 Our timetable

6.3.2 Planning strategy

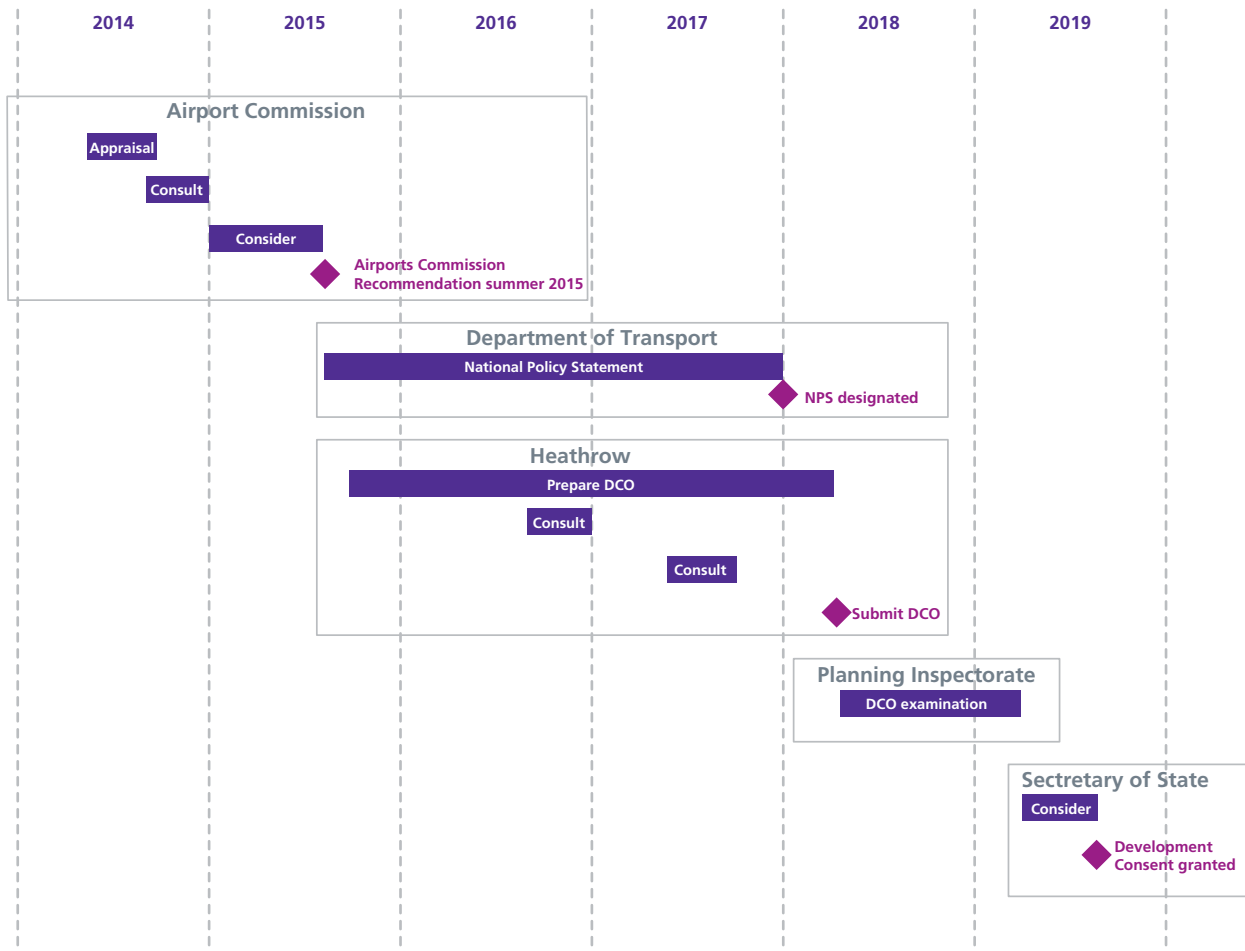
Our programme to achieve development consent is challenging but realistic. We highlight the assumptions, milestones and triggers that have informed it. We have identified the key risks to achieving consent and the possible mitigation. Those responsible for establishing the necessary policy and decision-making framework have a crucial role to play in ensuring the timely delivery of new airport infrastructure.

6.3.2.1 Key milestones, triggers and assumptions

Our programme for achieving development consent assumes a number of key strategic milestones. These are that:

- Airports Commission issues its final report in summer 2015
- Government announces support for the Airports Commission recommendations and instructs preparation of an Airports NPS around autumn 2015
- Government designates an Airports NPS in 2017
- Heathrow submits its Development Consent Order (DCO) application in 2018
- Secretary of State grants consent for Heathrow’s expansion in 2019.

Figure 6.10: Planning Timetable



6.3 Our timetable

If Government takes a clear policy decision soon after the Commission reports, then development consent can be delivered by 2019, with the first flights using a third runway in 2025. We have assumed it will take up to 2½ years after a decision to endorse the final recommendation of the Airports Commission for the Government to designate the NPS. However, the Airports Commission process brings significant advantages in providing essential evidence for the NPS, which could substantially reduce the time to designate it.

Achieving development consent for expansion is dependent on positive support for Heathrow's growth from the Airports Commission, the Government and the Planning Inspectorate. Should this not transpire and milestones above not be achieved, then the programme will risk delay or failure. Later in this section we set out the risks to achieving our programme, together with proposals and recommendations for mitigating them.

6.3.3 Construction strategy

We have developed a construction schedule that meets our primary objective of bringing our new runway into use as early as possible. Subject to planning approval being granted in 2019, our new runway will be operational in summer 2025. Our overall construction strategy has been broken down into three phases:

- Runway and associated works
- Western Campus Facilities – stands, track transit and baggage tunnels, terminals “J” and “K”
- Eastern Campus Facilities –stands, systems and track transits, terminals A,C, D and E (including Phase 2 and 3 of the current T2A).

6.3.3.1 Phase 1 – Runway and associated works

Where we have not already been able to acquire land by agreement, we will at the earlier opportunity use the compulsory purchase powers granted by the DCO to acquire the land necessary to commence early construction works. The DCO will permit starting on site for the time-critical river and road diversions in mid-2019, after the execution of contracts and a mobilisation period.

Work will commence in mid/end-2019 on the new Southern Road Tunnel (SRT) and the extended station boxes between Terminals 5 and 6. The SRT is provided early in the programme to enable landside connectivity between west and east to be re-routed to the south when the time comes to close the Northern Perimeter Road to build new taxiways in this area. The SRT and railway stations also generate excavated material that will be used as fill for the future runway platform. At this stage, filling can take place in the Colne Valley in the areas available to the east and west of the M25 and river diversion works.

The M25 diversion is anticipated to take just over four years and has two distinct phases. The first is the construction of the cut and cover boxes to the west of the existing motorway and the second is the switch of traffic from the old alignment to the new. Once these moves are complete, filling of the central portion of Colne Valley can be concluded – completing the runway platform. Runway and taxiway construction can be developed on several fronts to enable commissioning trials and the opening of the runway by mid-2025.

6.3.3.2 Phase 2 - Western Campus Facilities

Groundwork will commence in 2022 for terminal K (Satellite Concourse), J (front door) and the passenger and baggage links between them. These developments also generate significant volumes of fill for the runway platform. These works are anticipated to take four years leading to a ‘soft’ opening in late-2026 and 2027 respectively. We anticipate a single shell and core build out of J, with a phased fit-out of facilities that brings additional capacity on stream by the end of 2027

The opening of “T6” would coincide with the provision of airside Track Transit System (TTS) connectivity to the existing T5A – linking “T6” with “T5”. This connectivity is extended on to T5B and T5C to provide direct concourse-to-concourse connectivity throughout the West terminal campus by the end of 2028.

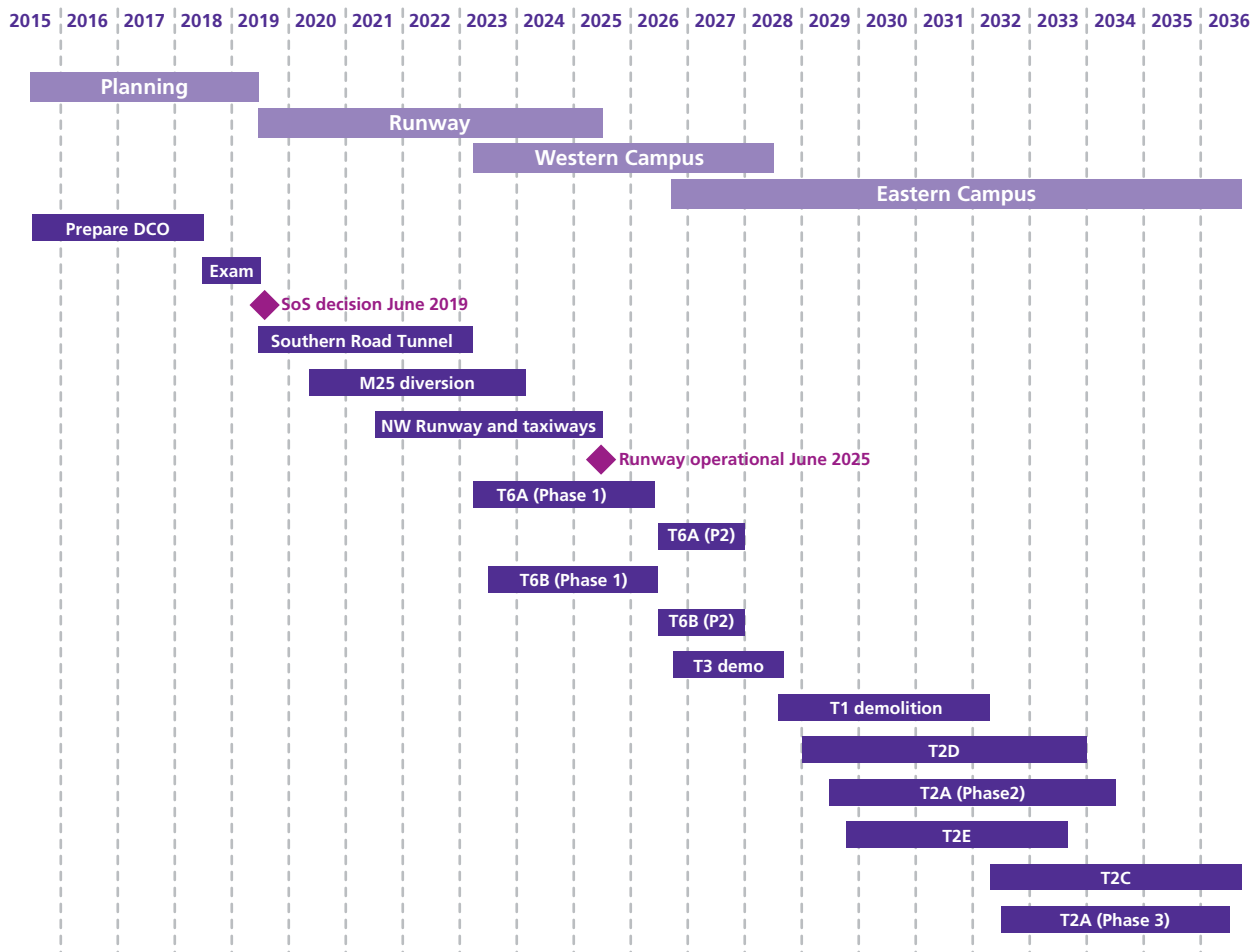
6.3 Our timetable

6.3.3.3 Phase 3 - Eastern Campus Facilities

A 'soft' close of T3 will be implemented progressively throughout 2026-27 as airlines relocate to the west. This process will be complete by the end of 2027, along with the completion of K and J. Demolition of T3 piers will commence in 2027 as less demand in T3 enables sections of pier to be decommissioned. Demolition of the T3 terminal building will commence in 2028 following full closure.

The demolition of T3 enables the TTS passenger connectivity link to be provided from T5C – via T2E (E) and T2D (D) – across the CTA to T2A (C). The TTS will be constructed concurrently with the development of T2A Phase 2 and T2D. T2A Phase 2 and T2E will open at the end of 2033 while T2D and the cross-campus TTS passenger connectivity system will open in 2034. The final phase of construction, developing T2A Phase 3 & T2C (A), will commence in 2032 and open at the end of 2036. Beyond this, long-term plans may include a further development of T6A and a new satellite T6C (L), enabling T4 to be closed in the late 2030s or 2040s.

Figure 6.11: Construction plan



A more detailed schedule illustrating the underlying logic and dependencies within our plan is included in Appendix 36.

6.3 Our timetable

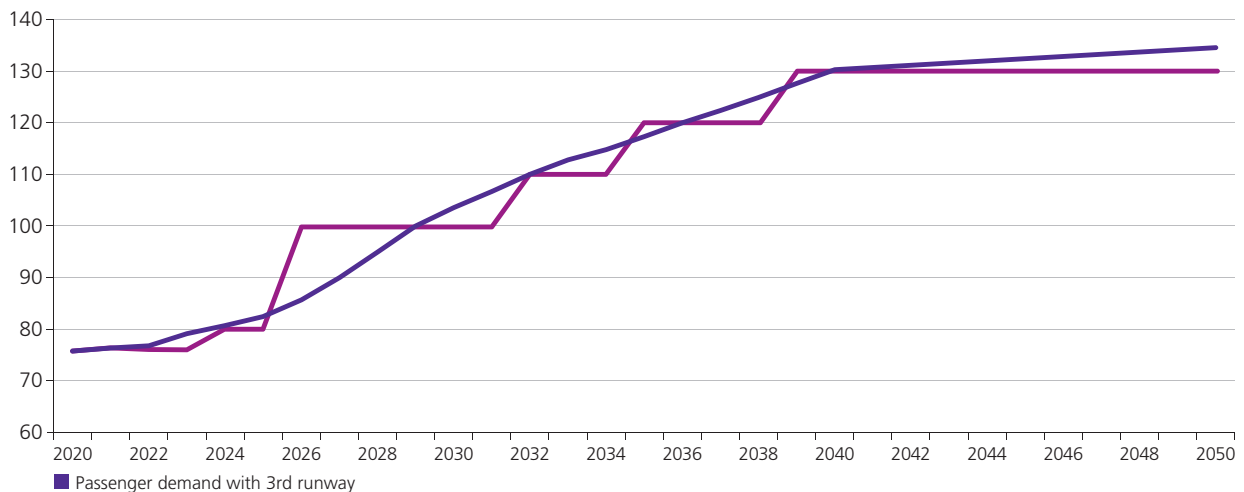
6.3.4 Terminal phasing plan

Our secondary objective is to build terminal and apron infrastructure, just as demand is expected to materialise. This approach maximises capital efficiency. With large infrastructure projects such as this, it is difficult to exactly match demand – therefore the supply tends to follow a stepped profile in comparison to the smooth profile of demand.

We have assumed that delivering the supply steps slightly ahead of the demand line is preferable, as it covers a degree of upside risk and ensures the demand line does not overtake the supply before the next delivery step.

Figure 6.12 demonstrates how the development sequencing would progress, showing the overall passenger capacity of the airport at each stage.

Figure 6.12: Supply of terminal capacity against demand



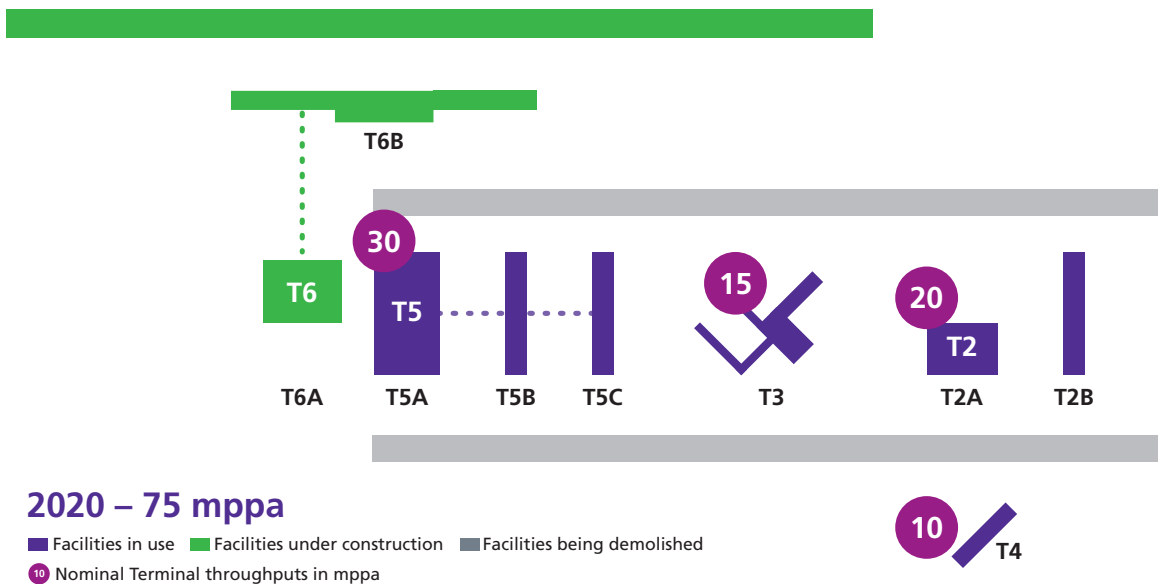
We will deliver capacity in managed steps to ultimately achieve our East and West terminal configuration. We have adopted a strategy that creates new capacity in the west – allowing space to be created to redevelop the eastern campus. This process has already been successfully used in the development of Terminals 2 and 5.

6.3 Our timetable

6.3.4.1 Stage 1 – 2020 – 75 mppa

With the new runway scheduled to open in 2025, it is important to ensure a balance of airfield operations. Creating balance will prevent airfield congestion in the early years of operation and add new stand capacity to the northern apron as soon as possible. Therefore, our plan commences with the construction of Terminal 6 (J) and its associated satellite (K).

Figure 6.13: Terminal Phasing Stage 1



6.3.4.2 Stage 2 – 2025 – 80 mppa

We have shown the starting capacity of a three-runway airport in 2025 as 80 mppa, rather than the 75 mppa capacity of a two-runway airport. This difference is because the two-runway operation is constrained by the number of runway slots and stands available to support the operation, rather than by the absolute terminal capacity that currently exists.

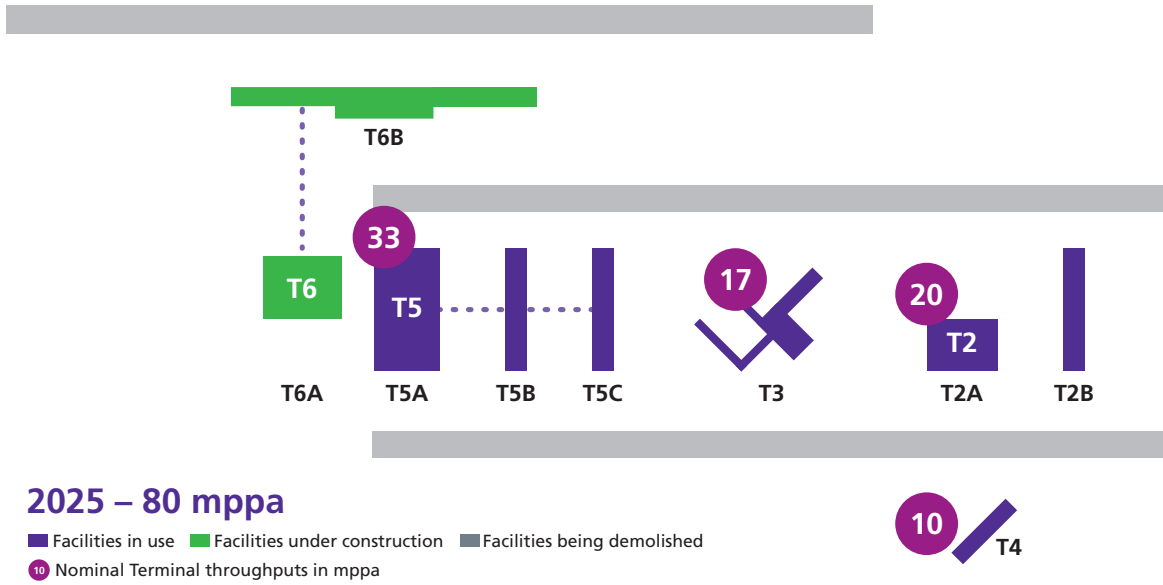
With the building of the new apron to the north of the airport we will have sufficient aircraft stands to allow us to take advantage of the existing surplus terminal capacity – even before new terminal building and pier infrastructure is delivered.

This process will allow us to commence runway operations ahead of the new terminal facilities being available, with two advantages:

- The terminal and apron infrastructure will be more complex to deliver and will therefore take longer to construct than the runway. The staggered opening of runway and terminal capacity fits naturally within this delivery timeframe
- The decoupling of terminal and runway availability reduces the risk of bringing additional capacity online.

6.3 Our timetable

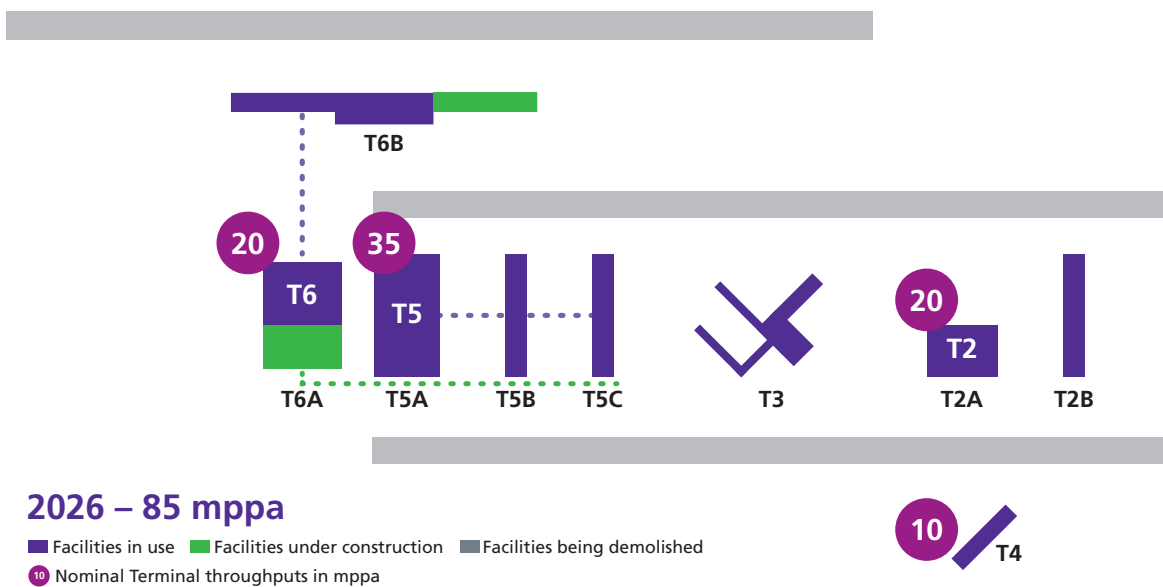
Figure 6.14: Terminal Phasing Stage 2



6.3.4.3 Stage 3 – 2026 – 85mppa

Terminal 6 (K) will commence operations in 2026 – adding an additional 5 mppa to the airport.

Figure 6.15: Terminal Phasing Stage 3

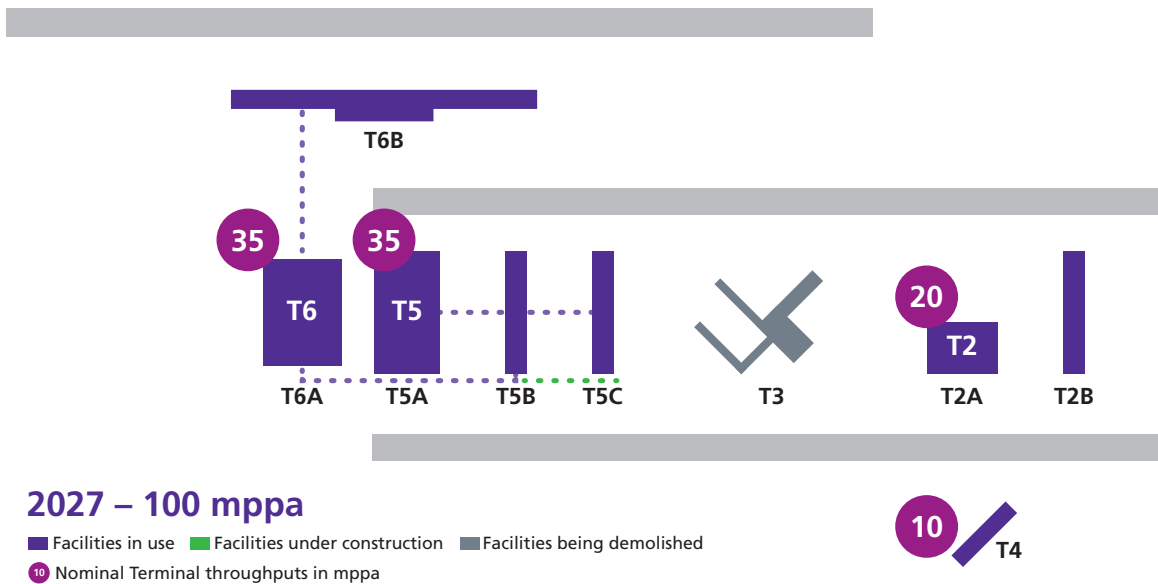


6.3 Our timetable

6.3.4.4 Stage 4 – 2027 – 100 mppa

Terminal 6 (K and J) will be fully operational in 2027, serving 35 mppa. T3 will be closed and the airport capacity will stand at 100 mppa.

Figure 6.16: Terminal Phasing Stage 4



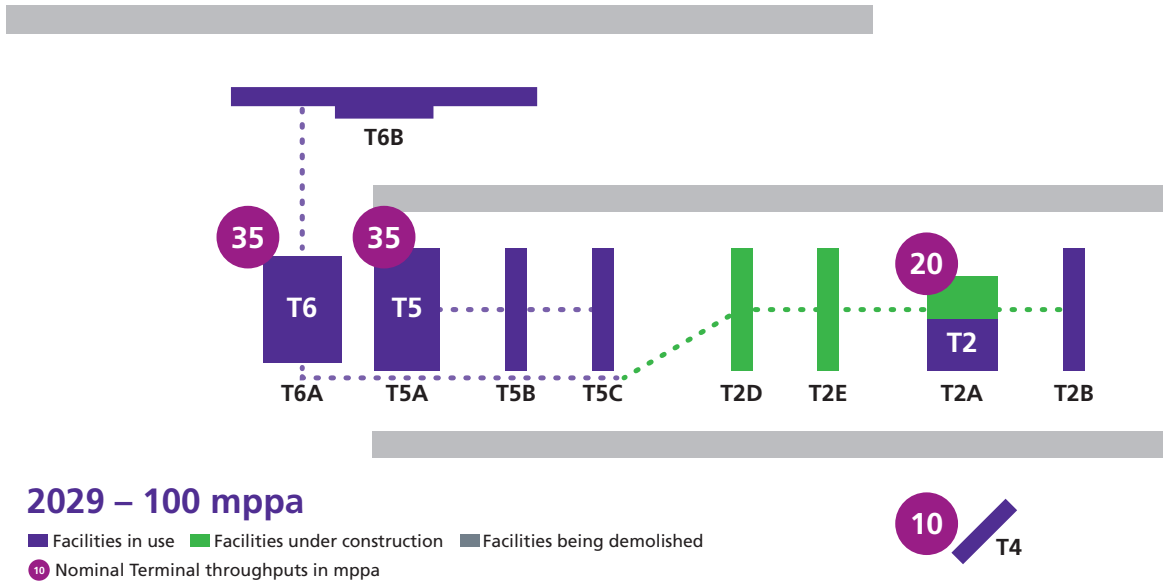
6.3.4.5 Stage 5 – 2029 – 100mppa

Stage 5 switches to the eastern side of the airport with a 150m extension of Terminal 2A (Phase 2). Terminal 2 has been designed specifically with this extension methodology in mind. Like Terminal 5, it is a modular building that can be ‘extruded’ along its length to increase capacity.

At the same time, a second pier (T2D) or D to the west of Terminal 2 will be constructed on the site of the current Terminal 3 building. The benefit of this approach is to connect the west terminal zone to the east terminal zone earlier, by constructing the underground TTS, which carries passengers between the concourses. This will create a single airport campus that delivers excellent passenger connectivity.

6.3 Our timetable

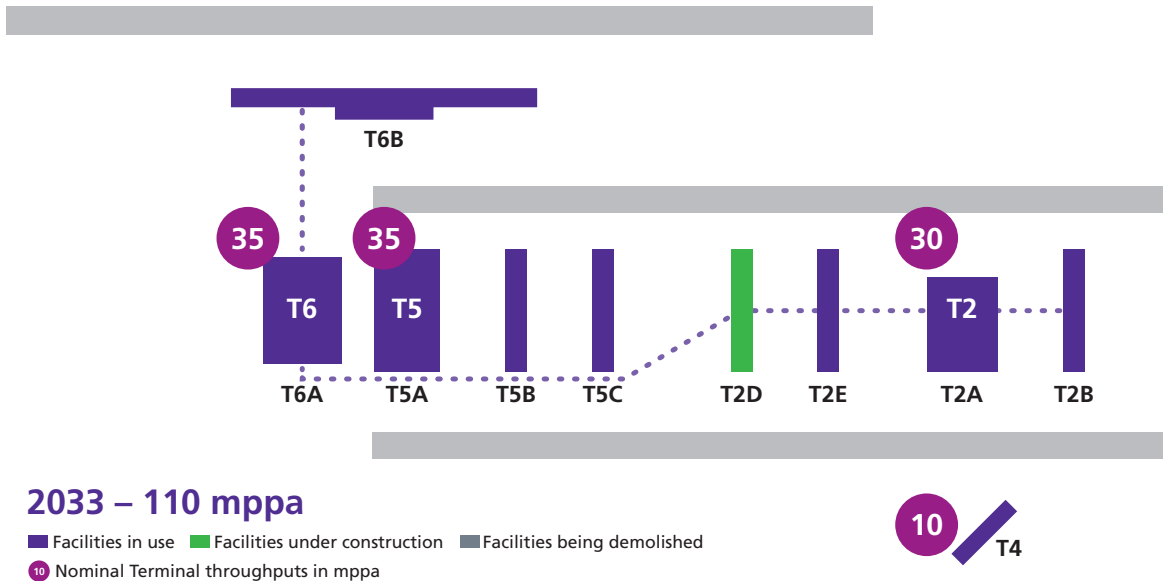
Figure 6.17: Terminal Phasing Stage 5



6.3.4.6 Stages 6 and 7

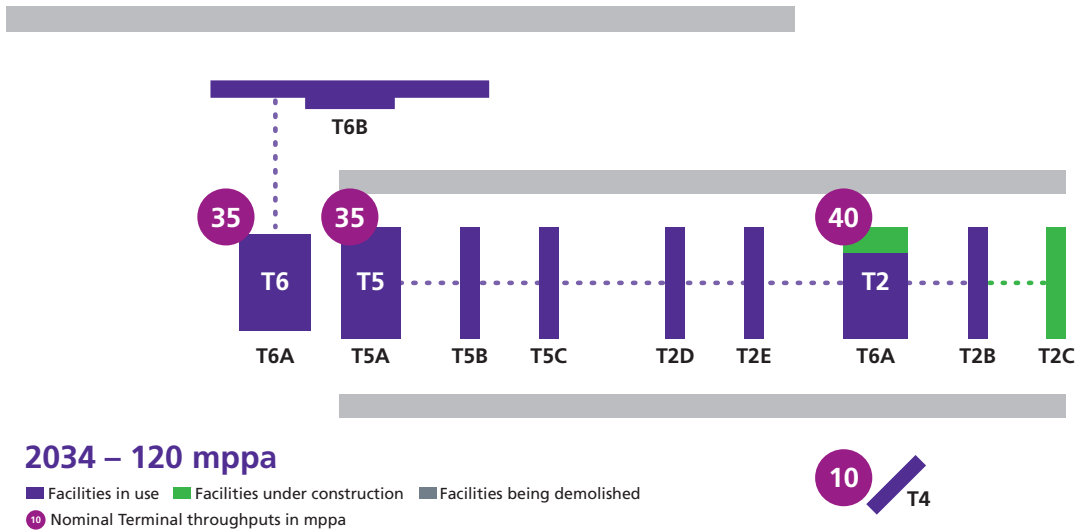
Terminal 2 will eventually have four pier buildings. Steps 6,7 and 8 will build out to this plan, concluding with the completion of T2D (D) in 2034.

Figure 6.18: Terminal Phasing Stage 6



6.3 Our timetable

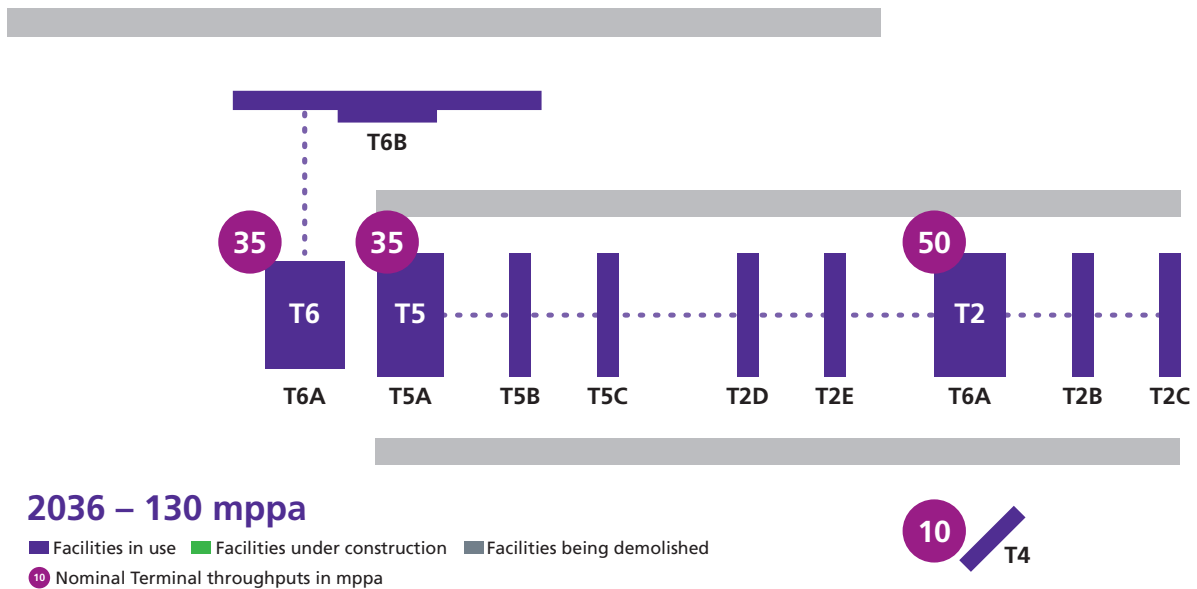
Figure 6.19: Terminal Phasing Stage 7



6.3.4.7 Stage 8 - 2036 – 130 mppa

2036 will see the completion of T2A Phase 3, the T2C extension and the final satellite pier – bringing the total airport capacity to 130 mppa.

Figure 6.20: Terminal Phasing Stage 9



The development sequence illustrated above represents what we at present consider to be the most reasonable given the choices available to us, the passenger demand profile and our vision for the airport. Having choices available at various stages of the development process will give us the ability to flex the plan to meet future circumstances, such as changes to airline and alliance business models.

Clearly, there will need to be extensive consultation with all stakeholders – particularly the airlines at Heathrow – before such a strategy can be turned into a mature plan. We have not yet engaged at this level of detail with the airline and airport operators community but will be doing so over the coming months.

6.3 Our timetable

Adopting this staged approach brings inherent flexibility to our proposals. The build plan can either be accelerated or slowed down to meet changes in demand. Similarly, as each phase progresses through the design and development stages, new thinking and innovations can be built into each successive phase of the development.

6.3.5 Timetable risks

There are many risks to our timetable. Four in particular stand out.

6.3.5.1 Airports National Policy Statement

Designating a robust NPS to provide the decision-making framework for a DCO is crucial. It is the means by which the Government will formally set out its policy on the need for and location of new airport capacity. This provides the primary policy against which the Secretary of State will base his decision.

The need for clarity, precision and consistency in any national aviation policy is essential to a smooth planning process. This is also critical to achieve our programme as designed since a clear and effective decision-making framework is fundamental to delivery.

Failure to designate the NPS in the timescales assumed, even in light of a positive Government announcement to support Heathrow's growth, will delay delivering new airport capacity. Without an NPS, considerable time would be spent settling policy issues, including matters of principle, as part of any Development Consent Order application.

Minimising the risk of an NPS not being designated means ensuring that its preparation meets necessary legislative requirements and due process, and that its policy recommendations are based on sound and thorough evidence. The Airports Commission process brings significant advantages in this respect. Much of the Commission's consideration and assessment of the need and the effects of new runway development required to support its own recommendations can provide essential evidence for any NPS.

Based on the experience of those NPSs already designated, we have assumed that it will take some 2½ years for the Government to designate the Airports NPS. Effectively using the Airports Commission evidence base could substantially reduce the time required to prepare and designate an NPS.

Any successful legal challenge to the designation of the NPS could also adversely affect Heathrow's programme. Precision and consistency in both process and policy can minimise the risk of a successful legal challenge.

6.3.5.2 Strategic and local policy

By setting out the Government's policy on the need and location of new runway capacity, the NPS will effectively supersede any local and regional policies that oppose the principle of Heathrow's expansion. Notwithstanding that, we acknowledge the importance of the policy context within which Heathrow operates. Our approach ensures that the majority of the potential negative effects arising from an expanded airport are thoroughly understood and can be mitigated. We are confident that we have provided a robust case to overcome issues of policy conflict.

Moreover, we are going beyond statutory requirements to ensure that those more acutely affected by the impacts of expansion will be fairly compensated.

Our on-going commitment to collaborate with statutory consultees, local Boroughs, key agencies and stakeholders will help to improve our proposals and our chances of success. Our programme will be based on the theme of 'no surprises' on key policy matters. We will aim for all relevant agencies and bodies to be supportive in principle of our proposals. Our Ten Commitments recognise the importance of local concerns as well as national and regional issues. We believe that this approach mitigates the risk of Heathrow's proposal failing on strategic and local policy issues and that the risk is low.

6.3.5.3 Resource and cost risk

The preparation of planning applications for major airport development proposals is resource intensive. Heathrow incurred significant cost write-offs (i.e. tens of millions of pounds) when the Government cancelled previous policy support for new runway proposals at Heathrow and Stansted. Each stage of the planning process outlined above carries distinct risks, therefore our programme is based on an approach that seeks to carefully balance resource cost against risk.

6.3 Our timetable

If there is a positive announcement in favour of Heathrow we could commence preparation work early. However there is clear financial risk.

Progressing a project through the policy and consenting process will be contingent on achieving regulatory approval for such expenditure. If the airport regulator is to help the timely delivery of infrastructure in the passengers' interests it must ensure that cost recovery is available at the appropriate time to properly take account of the inherent risks to the airport.

6.3.5.4 Construction risk

Building our runway and associated airport infrastructure will be a complex undertaking. The construction of Terminal 5 presented similar challenges and Heathrow adopted a proactive approach to risk management allowing suppliers to focus on delivery. In building Terminal 2, Heathrow adopted a more balanced approach to risk sharing with our supply chain dictated by the specific nature of the project and building on our learning from Terminal 5.

In delivering £11 billion of infrastructure over the last ten years, our risk management processes are mature and embedded within our culture. Our phasing plan inherently mitigates risk by providing "break points" within our build programme allowing the plan to adapt and flex to any changes in circumstance.



6.4 Obtaining consent

Over the last 20 years, Heathrow has successfully taken several major infrastructure programmes through the planning process. As a result, we have a good understanding of the effort and focus that will be needed to obtain development consent for Heathrow's expansion. It is with that experience, however, that we are confident that development consent for our proposals can be delivered by 2019.

6.4.1 Obtaining consent for our proposals

If the Government makes a clear policy decision soon after the Airports Commission reports then development consent can be delivered by 2019. A stable, consistent policy context is critical in providing an effective decision-making framework. Making sure that our proposals address those important issues in local, regional and national policy is key to achieving development consent. A comprehensive and holistic approach to preparing our application for development consent is fundamental to a smooth planning process and swift delivery.

We set out below the current and future policy context, highlighting the principal policy implications of our proposals. We consider how policy may need to change in the event that Government supports Heathrow's expansion. We set out how we would wish to engage with policy makers to deliver a solution that achieves consensus and meets wider objectives. Our proposals have been driven by strategic policy issues at all levels. We show that our approach to preparing our application for development consent is robust.

6.4.2 Current Policy context

Heathrow is located within the Greater London administrative area under the jurisdiction of the Mayor of London. Land required for our north-west runway proposal falls primarily within the London Borough of Hillingdon, although it extends into the Borough of Slough to the west. Heathrow features heavily in many of the surrounding borough's local planning, economic and transport strategies. Heathrow is also a key strategic issue in wider regional and sub-regional strategies.

In some cases, the current policy framework addresses the possibility of expansion at Heathrow as envisaged by the previous 2003 Air Transport White Paper (ATWP)¹². It does not, however, anticipate the runway proposal currently being considered by the Airports Commission. It does not address the possibility of a new hub elsewhere in the UK with Heathrow closing, or indeed expanding airports elsewhere in the South East.

We engage constructively with policy making at all levels to promote the airport's interests in local planning, transport and economic policies and strategies. We acknowledge those matters of concern to our local boroughs and have worked hard to ensure that our strategies reflect local issues.

6.4.2.1 Aviation Policy Framework (2013)

One of the key objectives of the Aviation Policy Framework¹³ (APF) is to ensure that the UK's air links continue to make it one of the best connected countries in the world. This includes increasing links to emerging markets so that the UK can compete successfully for economic growth opportunities.

The APF defers any decisions on the nature, scale and timing of any additional airport capacity to maintain the UK's global hub status to the Airports Commission. It does, however, set out the Government's position on general aviation matters intended to guide plans and decisions at the local and regional level. Principal issues at the local level remain those related to aircraft noise, air quality and surface access.

In respect of aircraft noise, its objective is to limit and where possible reduce the number of people affected by aircraft noise. It sets out expectations with regard to compensating and insulating households most affected by noise. Our proposals illustrate how we will meet the APF's requirements by reducing the overall number of people

6.4 Obtaining consent

affected by noise and ensuring that those most affected will be fairly treated through offering generous compensation and mitigation packages that meet or improve on these expectations.

With regards to air quality and surface access, the APF reiterates the need to meet EU air quality standards. It recognises that road traffic around airports remains the main problem in terms of air pollution. We fully accept our responsibility to minimise the air quality impact of airport related surface transport. We have set out a number of commitments to ensuring that air quality standards in the vicinity of Heathrow can be achieved. This includes a comprehensive package of surface access improvements primarily designed to reduce car use. This will ensure there will be no more airport related cars on the roads around Heathrow in 2030.

Generally, we are confident that the robustness of our proposals and the package of mitigation offered will ensure that we can meet the objectives of the APF.

6.4.2.2 National Planning Policy Framework (2012)

The National Planning Policy Framework¹⁴ (NPPF) provides an overarching framework for local plan making and decision taking. A key thread of the NPPF is a presumption in favour of sustainable development. Achieving sustainable development requires striking an appropriate balance between economic, social and environmental interests through the planning system.

The NPPF places significant weight on the need to support economic growth. It sets out the need to assess the quality and capacity of existing infrastructure and plan for new investment. This includes transport infrastructure and it encourages local plans to support the growth of airports taking into account national aviation policy. It sets out the need for local councils to work across boundaries in collaboration with other authorities and infrastructure providers to develop strategies to support infrastructure provision. This includes transport investment to support the growth of airports.

Supporting the expansion of Heathrow's role as the UK's hub airport is vital to achieving the economic dimension of sustainable development. This is not just for the local areas around the airport but for the wider regional and national economy. Should the Government support a new runway at Heathrow, we would wish to work with surrounding boroughs, the GLA, adjoining LEPs and relevant agencies and infrastructure providers to ensure that the economic benefits of Heathrow will be maximised through relevant planning, economic and transport strategies.

In terms of the social element of sustainable development, the NPPF seeks to provide strong, vibrant and healthy communities. Enhancing Heathrow's economic contribution, local employment and the wider social and leisure opportunities that air travel brings all address these social objectives. These are coupled with appropriate mitigation and compensation for those adversely affected.

The environmental element of sustainable development seeks to protect and enhance the natural, built and historic environments. There will be inevitable impacts on these interests from Heathrow's development. However, the environmental commitments as part of Heathrow's growth will ensure that expansion can take place consistent with national policy objectives. Overall, our approach to planning for Heathrow's growth and the benefits that will be delivered, will be consistent with the NPPF.

6.4.2.3 The Mayor's London Plan (2011)

The London Plan¹⁵ provides the strategic planning framework for London. It reflects the proposals and policies contained in the Mayor's Economic Development and Transport Strategies. The London Plan was examined and adopted in the context of both the Government's decision to cancel previous policy support for a third runway and the Mayor announcing his own plans for a Thames Estuary Airport.

The London Plan maintains that adequate airport capacity is critical to London's competitive position. It supports expanding international and national transport links. It recognises Heathrow's status as the UK's only hub and its critical importance to the London economy. But it does not support any expansion that would increase the number of flight movements. This is because of the noise and air quality impacts already being experienced by residents in the vicinity of Heathrow.

At a strategic level, Heathrow's growth is inextricably linked to enhancing London's world city status, promoting its attractiveness to foreign investment and ensuring the continued success of its established commercial and leisure

6.4 Obtaining consent

sectors. In terms of connectivity, the benefits of expanding Heathrow would comply with the Mayor's strategic transport policies relating to transport integration and improving surface access to airports.

At the micro level, the London Plan recognises the role of Heathrow as a focus for economic growth. The wider Heathrow area is identified as one of London's Opportunity Areas, where economic objectives are driven by the strength of the airport. The significant employment benefits generated by an expanded Heathrow would help achieve the Mayor's economic and tourism related objectives, particularly for outer London. These include the provision for 12,000 jobs in the Heathrow Opportunity Area. The plan envisages that the area will "*continue to benefit from airport related growth, particularly with regard to transport and logistics, business and hotels and leisure and tourism.*"

The London Plan supports improvements to the facilities at Heathrow to optimise efficiency, passenger experience and public transport accessibility. Our proposals will meet these requirements. With appropriate mitigation, our proposals will also largely comply with the Mayor's sustainability policies, including those relating to air quality and noise. With less people overall affected by Heathrow's noise contours in 2030 with a third runway than today, and by retaining runway alternation, our proposals would satisfy the Mayor's policy objectives in this respect.

There will, however, be some conflict with current policies on loss of Green Belt, heritage assets, housing and open space given the land-take requirements. Although some conflict with such policies is inevitable, we are developing solutions to reduce, limit and mitigate impacts on key policy designations. However, we consider it likely that the development of the UK's hub airport will be deemed in the national interest, and supported by national policy because of its exceptional economic benefits. This would comprise the very special circumstances needed to justify development in the Green Belt.

Overall, were it not for the Plan's assumption that existing noise and air quality would worsen, a third runway at Heathrow would generally be in compliance with the London Plan.

6.4.2.4 Sub-Regional Strategies

Local Enterprise Partnerships (LEPs) have now effectively replaced the previous regional planning and economic bodies, albeit in most cases on a smaller geographical scale. There is no formal regional policy relating to Heathrow outside of London, although many LEPs have now produced economic strategies which seek to inform strategic infrastructure planning in the interests of promoting economic growth. The LEPs outside of London are increasingly exerting their influence in aligning economic priorities across local authority areas. Some of these are setting out a clear need for additional investment in hub airport capacity and improved transport infrastructure to airports.

For example, the Thames Valley Berkshire LEP recently submitted its Strategic Economic Plan¹⁶ to Government. This sets out its vision and investment priorities for the area, including those for transport infrastructure improvements. The LEP covers the six unitary authorities within Berkshire and includes the dynamic Thames Valley economic region, home to a number of major headquarters and business clusters. All rely on good access to international connectivity. Improving rail access to Heathrow from both the west and the south, and ending the uncertainties around the airport's future are key elements of the strategy. It specifically recognises the significant investment benefits that Heathrow brings to the Thames Valley area. The LEP's website¹⁷ is explicit in its commitment to the future of Heathrow as the UK's hub airport in order to protect the £137bn 'Western Wedge' economy.

Similarly, the Enterprise M3 LEP, covering large parts of Hampshire and Surrey along the M3 corridor, also recognises the proximity of Heathrow in bringing economic prosperity to the area. The LEP's Strategy for Growth¹⁸ sets out the LEP's infrastructure priorities, including sufficient aviation capacity for business travel and access to Heathrow for businesses across the sub-region. Its accompanying action plan supports maintaining Heathrow's hub status and expanding airport capacity to support new routes to fast growing emerging markets. The LEP's Strategic Economic Plan¹⁹ also highlights the need for a fast, efficient and reliable rail link to Heathrow. This has been highlighted as a priority in both business surveys and economic analysis. The LEP, in collaboration with a number of other LEPs to the west and south of Heathrow, including Thames Valley Berkshire LEP, recently produced the London Heathrow Economic Impact Study (2013)²⁰. This revealed how an extra 35,000 jobs could be created by 2040 if Heathrow expanded and that the region would see an annual GVA boost of £3 billion as a result.

Heathrow's expansion, coupled with its comprehensive supporting surface access strategy, would secure significant benefits for these supportive sub-regions' economies. We remain committed to working collaboratively with the LEP's in achieving their strategic objectives.

6.4 Obtaining consent

6.4.2.5 Local Policy

Local policy across many of the surrounding boroughs recognises Heathrow's significance as an economic and employment hub and the benefits this brings both locally and across the UK. Many of the local authorities' planning and transport strategies support improved transport links to the airport. They acknowledge the importance of Heathrow as a transport hub and the wider connectivity benefits this provides, particularly for airport workers and passengers in accessing the airport. There are clear policy objectives to maximise these benefits. Heathrow's expansion would meet these objectives.

Local policy is in some cases explicit about balancing Heathrow's benefits against some of the airport's negative local effects. These include impacts relating to air quality, aircraft noise, traffic generation and development pressure. It is assumed in many cases that airport expansion will go hand in hand with a worsening of these effects. As set out earlier, we are confident that our proposals can achieve an overall improvement in the noise climate, meet statutory air quality limits, and not increase airport related traffic.

We have and will continue to engage closely with local boroughs in addressing the implications of noise sensitive uses in areas of high noise exposure around the airport. Local authorities do however continue to approve residential development within the Heathrow noise footprint. This largely demonstrates that aircraft noise is not considered significant enough by these authorities or developers, nor indeed by the residents that choose to live there, to preclude housing altogether.

A new runway would additionally create inevitable conflict with policies relating to the protection of Green Belt, heritage assets, employment land and housing. Loss of these assets and designations can be mitigated against to some degree through appropriate contributions towards or direct re-provision of displaced facilities.

As is the case with the London Plan, there remains a degree of opposition towards Heathrow's expansion. For some authorities, this stems from a fear of a worsening of these environmental impacts. For others, the opposition stems from the Government's decision to cancel previous policy support for a third runway. As a result, some authorities and their respective policies would prefer to see Heathrow continue to operate within its current boundaries under a "better not bigger" approach.

In summary, Heathrow's growth would bring considerable economic and transport connectivity benefits to the surrounding boroughs and generally comply with the borough's strategic growth policies. The principle of Heathrow's expansion would be at odds with the some of these local authorities' established policies.

6.4.3 Future policy context

Despite current support for a continuation of Heathrow's role as a generator of economic activity, there remains a degree of local policy opposition towards Heathrow's expansion. A government policy announcement that favours Heathrow expansion would need to set a clear national policy framework within which local policy would need to be reviewed and, where necessary, amended. We would anticipate that national planning policy for airports would need to be brought forward through an Airports NPS. This would set out the specific need for a new runway at Heathrow.

In many respects, local planning policy would not need to be significantly amended. Heathrow's economic success is valued and supported in all local policy documents. This success in turn drives many of the economic strategies for the area, all of which seek to benefit from the airport's economic influence. Heathrow's economic and transport role is also central to the plans of the sub-regional LEPs. These are supportive, in principle, of additional growth at the airport and in achieving better access to the international connectivity that is so important to these economies. Heathrow's growth can be achieved within the grain of current and emerging strategies.

We want to work closely and collaboratively with local, sub-regional and regional authorities and other agencies to ensure Heathrow's expansion can be effectively delivered in an integrated manner. We believe that significant benefits and wider objectives could be achieved through a collaborative and cross-boundary approach to planning for Heathrow's growth. Our experience with Terminal 5 demonstrated how a collaborative approach with the surrounding local authorities and transport agencies led to the successful planning and delivery of transport initiatives to support the airport's expansion. Importantly, this constructive collaboration continues today under the Heathrow Area Transport Forum. Other sub-regional partnership mechanisms, such as the LEPs, have also been instrumental in delivering local transport initiatives and bringing forward major new transport schemes.

6.4 Obtaining consent

We see real opportunities in bringing together and properly coordinating economic, transport and planning interests. This approach could be initiated following a Government policy announcement to support Heathrow's growth, and could logically continue until the airport's expansion has been completed. Taking into account the timeframe for airport expansion, including the delivery of any associated development and strategic transport initiatives, this partnership could exist for many years. We believe that such an approach would be invaluable in maximising Heathrow's benefits and managing its impacts across an area that better reflects the airport's influence.

6.4.4 Planning principles

The Airports NPS will set out the key planning principles for any new runway development. If it follows the approach of other NPSs, it will provide guidance for the Planning Inspectorate to assess the generic and specific impacts of any airport development. In advance of the NPS, Heathrow has developed its own principles to guide the development of its proposals.

We have sought to ensure that our expansion proposals are designed to maximise the economic benefits to the UK economy. They must also minimise any adverse effects through a comprehensive approach to careful design, mitigation and compensation. Since our submission to the Airports Commission in July 2013, we have built on our Ten Commitments that set out what Britain can expect from a third runway and an expanded Heathrow. Each of these commitments has helped to shape our current proposals, and each has a clear planning consequence.

Figure 6.21: Planning consequences of our Ten Commitments

	Commitment	Consequence
1.	Connect Britain to economic growth	Locating a third runway at Heathrow will maximise the economic benefits that can be achieved from new runway development. In planning the runway, it is important to ensure that its capacity and operational flexibility are maximised.
2.	Connect UK nations and regions to global markets	Reinforcing rather than diluting the UK's hub airport at Heathrow will achieve maximum connectivity and generate maximum economic benefits for the UK. This will build upon the economic strength of London and the Thames Valley, where the concentration of economic activity has promoted the development of nationally important economic clusters. Consequently, Heathrow's expansion would draw on the existing infrastructure of support services, transport and employment resources, rather than requiring major new greenfield development to facilitate its development and operation.
3.	Protect 114,000 existing local jobs and create tens of thousands of new jobs nationwide	A commitment to a third runway at Heathrow can reinforce and build upon existing economic strategies, rather than undermine them.
4.	Connect exporters to global markets	Air freight, as well as passenger traffic, drives economic growth markets. This commitment recognises Heathrow's role as the UK's dominant gateway for air freight – facilitating more air freight than all other UK airports combined. It will be important for a three-runway Heathrow to enhance its physical air freight capacity and to develop access strategies that optimise connectivity with suppliers and markets. Meeting this opportunity will reinforce the economic importance of Heathrow to local, sub-regional and national business.

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	Commitment	Consequence
5.	Build more quickly and at lower cost to tax payers than building a new airport	This commitment reinforces the benefits of airport expansion at Heathrow and optimises the use of the extensive network of existing infrastructure (transport, social and economic) that has developed around Heathrow over the past 50 years.
6.	Reduce aircraft noise and lessen noise impacts for people under flight-paths	Locating the runway to the north-west of Heathrow enables aircraft to be routed higher over London. The location of the new runway and its detailed design should minimise local noise impacts. Airspace design and commitments to quieter aircraft can form an important part of the planning package to ensure fewer people are affected by noise than today.
7.	Treat those most affected by a third runway fairly	This commitment includes the need for generous compensation for those losing their homes. It also requires very careful attention to be paid to communities severed or directly affected by the airport's proposals. Both of these points will be important parts of a comprehensive package of mitigation measures that will address environmental effects.
8.	Keep CO ² emissions within UK climate change targets and play our part in meeting local air quality limits	A third runway can be used to incentivise more fuel-efficient aircraft, while a comprehensive Sustainability Strategy will form part of the overall planning proposals. This commitment necessitates sustainable energy and transport strategies.
9.	Increase the proportion of passengers using public transport to access Heathrow to more than 50%	This commitment seeks to reinforce Heathrow's role as a major integrated transport hub, creating opportunities for further public transport investment. This will ensure that Heathrow is genuinely accessible from all parts of its catchment area: locally, regionally and nationally. Accessibility can be achieved through important but incremental investment in additional connectivity, reinforcing Heathrow's role as the nation's transport hub.
10.	Reduce delays and disruption	This commitment requires Heathrow's proposals to optimise the capacity of a new runway while ensuring the sustainable operation of the airport. It means that the operation of the expanded airport and the networks serving it need to be planned and enhanced where necessary to be resilient in the face of change and unforeseen events.

These commitments have driven the development of our masterplan. Their consequences are apparent through the whole of this submission – directly informing the scale and capacity of the new runway infrastructure, the detailed nature of the surface access strategy and the comprehensive approach to identifying, reducing and mitigating impacts. In each case, very considerable care has been taken to limit the physical impacts of the development through careful site selection and design.

The Airports Commission has played a part in this process by shortlisting our north-west runway option for further consideration. This option was in preference to others that the Commission considered to have more severe noise impacts, provide less capacity, require the loss of more residential properties or directly impact internationally designated sites. Our current option improves materially on all planning issues when compared to our 2007 runway proposal.

Heathrow's commitments also affect the operational characteristics of the airport. The new runway is spaced sufficiently far from the existing northern runway to allow the full benefits of independent operation – and enables a continuation of the existing strategy of runway alternation. We have set out how the overall noise impact of

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Heathrow can be reduced, consistent with an additional runway. Nevertheless, there will be new noise impacts and Heathrow's planning principles extend to ensuring that any development consent would be accompanied by fresh commitments to enhanced noise insulation and compensation, backed by a £250 million fund.

We do not underestimate the extent of physical and operational impacts that would arise from our north-west runway proposal. We are committed to a comprehensive package of mitigation and to limiting those impacts through an iterative design process. This process would continue beyond the timescale of the Airports Commission's work throughout the preparation of a Development Consent Order (DCO) application. Collaborative engagement with all stakeholders will play an important part in developing the third runway proposal to maximise its benefits and limit its impacts.

The location of Heathrow is also important in limiting additional impacts of development. Heathrow lies at the focus of a network of infrastructure investment and substantial economic activity. That network serves the airport and provides the essential employment, service and other support functions that a hub airport requires. Heathrow has access to this economic base, including a very large, dynamic and specialised labour market. This means that, unlike other options, the economic role of Heathrow can be enhanced without the need for large scale additional supporting development. For example, Heathrow's expansion can be achieved without additional greenfield development of homes and infrastructure which a hub airport necessarily requires. These facilities already exist to serve Heathrow and maintaining and enhancing them is central to local and regional planning strategies.

Heathrow does not expect expansion of the airport to result in substantial additional planning impacts beyond the footprint of the airport masterplan. Building from strength in this way is an important planning principle that supports the case for Heathrow's expansion.

Against this background of principles that will guide Heathrow's development of its proposals, national policy stability will be vital. Our experience from Terminal 5, and from the cancelled proposals for new runways at Heathrow and Stansted, hold important lessons that underline the need for clarity, precision and consistency in national aviation policy. It is critically important for the maintenance of the UK's hub status that:

- The conclusions of the Airports Commission are soundly based and clearly, unconditionally expressed
- The NPS needs to be similarly compiled and expressed – it needs to provide as much clarity as possible about its support for a particular airport expansion and to justify the reasons for selecting that strategy
- The NPS should then leave all un-resolved issues to the DCO process, rather than to a further policy making process.

An NPS prepared against this background would provide the necessary clarity to enable major investment decisions to be confidently undertaken.

6.4.5 DCO application strategy

We propose to obtain consent through a Development Consent Order application as outlined below.

6.4.5.1 Single consenting regime

Consistent with the 2008 Planning Act, Heathrow will seek to apply for as many of the consents required as possible through one single application for an order granting development consent. A single consenting process will:

- Provide clarity for all affected parties
- Ensure inter-related components of the development will be considered together
- Streamline the overall path to consent and delivery
- Minimise the opportunity for challenge
- Minimise the risk of overall delay.

There are other consents that frequently fall outside the scope of DCO applications. Examples include:

- Protected species licenses
- Environmental permits
- Licenses under the Water Resources Act or the Water Industry Act, or consents for land drainage.

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Another consent that is unlikely to be included within a DCO application is the consent necessary to affect an Airspace Change Proposal. This process has its own protocol, consultation requirements, assessment obligations and consenting process. We would work closely with the CAA and NATS to build on work recently undertaken to scope the application and assessment process, such as assessing the effects of any Airspace Change Proposal as part of the environmental assessment required for a DCO application. In this way, the direct and indirect effects of revised flight paths can be properly assessed as we prepare our DCO application. This approach would provide a high degree of confidence in the robustness of any Airspace Change Proposal and its ability to fit in with the DCO process in a timely manner. Heathrow would act as the promoter of the Airspace Change Proposal.

We would work with the relevant statutory bodies to include as many of these consents within our DCO application as practical. We will work closely with the Consents Service Unit established by the Planning Inspectorate in this respect to develop a Consents Management Plan, as recommended by the Planning Inspectorate's practice guidance.

6.4.5.2 Scoping the content and detail of our DCO application

In consultation with all relevant stakeholders, we will start to define the scope of development and the level of detail to be included within our DCO application. We believe that the surface access infrastructure, and any environmental offsetting and mitigation works, should be included within the same application as the airport expansion itself. There would be real benefit to both the programme and management of the various principle elements of the scheme if they could be combined into a single DCO application. Other elements of associated development would also need to be considered for inclusion within our DCO application. Careful scoping with statutory agencies and the Planning Inspectorate will be necessary in relation to these elements of the project, as the powers to include them in the application are clearly available through the DCO process.

For mitigation works, Government guidance is clear that associated development for major infrastructure projects can include development that supports the principal development or helps address its impacts. Examples of this type of associated development extend to works such as landscaping, flood mitigation measures, compensatory habitats, noise barriers and mitigation of impacts on the historic environment. Including such measures in our DCO application brings greater certainty they will be provided.

Other associated development might include airport related development and facilities displaced by our runway proposal. It might also include additional ancillary development needed to support the operation of the expanded airport. This could include additional hotel development, freight facilities and airport related office space. The guidance requires such development to be proportionate to the nature and scale of the principal development. Again, we would scope and agree these matters with the Planning Inspectorate as part of the pre-application process. There would be genuine practical benefit in delivering all necessary associated development as part of a single DCO application.

We will lead the application's development, ideally bringing together multiple agencies into a single delivery team. This approach would provide clearer accountability and integrated delivery – and minimise the interfaces necessary to deliver planning consent for our proposals. We would envisage specialist staff seconded from the statutory authorities into our project team to maximise project success.

In terms of the level of detail of our proposals, our current intention is that those elements of the project that can be defined directly as 'infrastructure' will be subject to detailed design. Other ancillary structures, buildings and associated development will be subject to greater flexibility. As detailed specifications for these elements will not be available at the time of application, these will be effectively applied for in outline in accordance with advice from the Planning Inspectorate having regard to the 'Rochdale Envelope' approach. The Environmental Statement would assess the implications of any flexibility for which we applied. Again, Heathrow and its experts have substantial experience of such an approach. For example, a number of the consultants closely involved in the development of the Stansted second runway application form part of the current Heathrow team. That application is the best example to date of an application for major runway development.

Our DCO application would be formulated with regards to these matters and to the critical path for construction and delivery. Those elements of the project that can be early deliverables would be applied for in detail, with the DCO application structured to minimise the extent of pre-commencement requirements in relation to these aspects of the project.

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DCO “requirements”, which are akin to planning conditions on a normal planning consent, would reserve the final approval of detailed matters (e.g. materials, landscaping, public realm, design, etc) for the Local Planning Authority. The DCO regime allows a bespoke system to be put in place for the discharge of requirements. We would work with the appropriate authorities in putting together the relevant provisions to ensure, for instance, that the authorities have sufficient resources to enable the timely implementation of the development.

6.4.5.3 Consulting on our proposals

Through our on-going engagement programme, and the extensive consultation on our proposals earlier in 2014, we have already established a useful dialogue with local communities and other stakeholders. In the event Heathrow announces its intention to apply for development consent, it will be required under the 2008 Planning Act to undertake formal consultation with a wide range of stakeholders as it prepares its application. We recognise the importance and benefits of early consultation in major infrastructure planning. Consultation and the feedback received play a key role in improving the design of our proposals and their impacts before they are submitted. One of the hallmarks of the major infrastructure planning process under the 2008 Planning Act is the need to carry out robust and meaningful consultation during the design development and application preparation stage. We are fully committed to this approach. More detail on our consultation and engagement methods – particularly during the DCO application preparation process – is set out later in this document.

6.4.5.4 Incorporating mitigation and obligations into the DCO

As with any development consent, approval for a new runway would be granted subject to a detailed regime of planning requirements and development obligations. In principle, these controls and commitments would be imposed as part of a DCO, where they are:

- Necessary to make the development acceptable in planning terms
- Directly related to the development
- Fairly and reasonably related in scale and kind to the development.

In practice, the detail of that regime of control can only be developed as the application proposals are refined and assessed. This process will determine the extent to which controls are needed to ensure the development is constructed and operated in accordance with the effects that have been assessed. This approach will also define the commitments necessary to ensure that adverse effects are limited, mitigated and compensated.

The application drawings themselves would feature a substantial commitment to embedded mitigation. This mitigation will then be secured through the use of DCO requirements, tying any consent to the detail of the submitted drawings. A detailed Construction Method Statement would capture and commit to best practice construction techniques that limit environmental effects during the build stage.

A wide range of controls over operations could also be secured by the DCO requirements – which could extend to many features of the application. As an example, ground noise effects will be limited by bunds and acoustic barriers designed as part of the application drawings and captured by DCO requirements. The Construction Method Statement would control how the bunds are constructed. Operational mitigation, such as the use of Fixed Electrical Ground Power and pre-conditioned air, along with commitments to airside electric vehicles or APU shut down rules will also be secured through DCO requirements or obligations under Section 106 obligations of the Town and Country Planning Act 1990. Substantial best practice on this regime of controls has been developed for many major infrastructure schemes. We have significant experience in developing and successfully implementing these control regimes through both the development of Terminal 5, and more recently, Terminal 2.

Infrastructure is not exempt from the Community Infrastructure Levy (CIL), but CIL is less responsive to meeting particular needs generated by the impact of development than are Section 106 obligations. In the case of a major new runway development, a Section 106 planning agreement would be the principal mechanism for managing development impacts. Any CIL charge could be ring-fenced for more bespoke and appropriate infrastructure solutions. Possibly this would be in conjunction with Section 106 requirements, providing benefits across a larger area and contributing to local and wider strategies. We would expect to work closely with the local authorities and statutory agencies to scope the Section 106 requirements and look at the best approaches to utilising CIL and leveraging wider benefits.

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6.4.5.5 Maintaining flexibility in our approach

Change is inevitable during the time between initial design and implementation, particularly given the length of the consenting process. From our perspective, building flexibility into any consent is crucial. From the community's point of view, it is important to ensure that any development consent is not a 'Trojan horse' for a different type of development. These objectives need not be incompatible, as there are well known techniques for containing the range of potential variations within parameters that can be properly assessed in terms of their impacts. These impacts can then be fixed by DCO requirements.

It is important to recognise that any development proposals advanced now, as part of the Airports Commission process, cannot be fixed in stone. Such proposals have evolved through detailed work and appraisal and represent the best current estimations of our preferred proposals for a new runway. They have not, however, been subject to appraisal by the Airports Commission, which we expect will be key in us further refining and adapting our proposals. Neither have they been subject to rigorous environmental assessment nor sufficiently informed by public consultation as part of the DCO process. Both processes are likely to be important in informing the optimum detailed proposals that would form the subject of a future DCO application.



6.5 Consultation & engagement

We are committed to meaningful and transparent consultation. We recognise the need to consult extensively under the Planning Act 2008 in the event that Government policy supports Heathrow's expansion. We also recognise the important and on-going responsibility we have to those that might be affected by the airport's growth. We therefore have an extensive engagement programme – sharing our aspirations and proposals at each stage and incorporating feedback into our plans. Effective consultation and engagement will be a fundamental component of our approach to achieving planning consent and successfully delivering Heathrow expansion.

6.5.1 Consultation and engagement strategy

To successfully deliver major infrastructure schemes it is crucial to carry out meaningful consultation during the development stages of the project. Thorough and effective consultation and engagement to ensure that our proposals are better informed and understood by those that will be affected.

Our proposals will go through three stages of consultation and engagement. Firstly there will be a national consultation carried out by the Airports Commission in autumn 2014, with the purpose of informing its final recommendation to Government.

Secondly, in preparing an NPS, the Government will be required to conduct a national consultation on its draft policy statement. This stage will provide an opportunity to comment on its emerging policy and the evidence underpinning it. This would be a Government-led consultation and so would be independent of any consultation and engagement carried out by us.

Thirdly, when we prepare our application for development consent, we ourselves will also be keen to consult on our proposals as we further develop them into a detailed submission. We anticipate that Heathrow's consultation under the Planning Act 2008 would include at least two stages of formal consultation.

In addition to these formal stages of consultation, we will continuously engage with our stakeholders to understand views on our plans as they progress. But our extensive engagement will not end when we achieve planning consent. Our track record with Terminal 5 demonstrated the importance and value in maintaining on-going engagement during the implementation stage of our proposals.

Our approach to consultation and engagement is outlined further below.

6.5.2 Principles for future consultation and engagement

The importance of genuine stakeholder consultation and engagement is evident from Heathrow's work over the last few years. We have continued to engage with a wide range of resident groups and elected representatives regarding our expansion proposals. Since we first published our outline plans in July 2013, we have welcomed the feedback received from stakeholders and valued the opportunity to hear residents' views. We have identified issues of concern with our previous plans and have addressed them where possible.

We are committed to ensuring that our approach to consultation and engagement remains meaningful and transparent. We will consult comprehensively on both our approach to consultation and on our proposals as these are developed. We recognise that effective consultation is a fundamental part of the design process. We also acknowledge both the positive and negative impacts for people living near the airport – and that some may feel strongly against our proposals. We will utilise our extensive communications channels and consultation methods to ensure that both informal and statutory consultation requirements are applied in a rigorous, open and comprehensive manner before, during and after any application for a DCO. We will ensure that those affected by Heathrow's expansion will have had sufficient opportunity to express their views and influence our proposals.

6.5 Consultation & engagement

At each stage of consultation, we will aim to make it as clear as possible what elements of the scheme are settled and why, and what issues remain to be decided. This process will allow us to properly and fairly manage the expectations of those being consulted.

We will keep the frequency and level of our engagement under constant review, ensuring it keeps pace with relevant milestones and responds to local sentiment. We will keep our online presence up to date and will correspond at appropriate milestones with residents that have signed up for regular updates. We will continue to employ a variety of communication tools including on-line, social media and more traditional methods such as newspaper advertisements and direct mail to reach a range of communities. We will use a wide network of stakeholder groups and contacts to ensure that hard to reach groups and those who may not historically have engaged with Heathrow are not precluded from the process.

We will respond sensitively and in a timely manner to stakeholder concerns. Throughout the process residents will be able to contact us via our 24-hour hotline, email or in writing, using the freepost address.

There will be appropriate and on-going informal public engagement around our inputs to the Airport's Commission process, allowing us to ensure awareness of our proposals, that our intentions are clear, to properly manage expectations and minimise potential uncertainty for those likely to be affected by the airport's expansion.

We are acutely aware that blight is a key issue for local residents and businesses, and therefore intend to consult on compensation proposals later in 2014. This consultation will be informed by the views from a community working group established following the recent public consultation in February 2013. Feedback from this consultation will be taken on board to develop schemes that we will be able to launch quickly, should the Government establish policy support for Heathrow's expansion.

6.5.3 Airline engagement

Our airline partners are one of our key stakeholders, with whom we have a well-established programme of engagement. As with our previous expansion proposals, we will establish a formal programme of engagement with our airlines. We will create a clear set of detailed project requirements as we move through the planning process and develop our proposals into a detailed scheme. This engagement will continue right through to the end of construction.

6.5.4 Consultation to support our DCO application

If the Airports Commission recommends that Heathrow should be expanded and the proposed third runway is included in an Airports NPS, we will need to bring forward an application for an order granting development consent under the Planning Act 2008. The 2008 Act and the regulations made under it impose detailed requirements on any developer for pre-application consultation with local planning authorities, certain prescribed statutory bodies, persons with an interest in land and local communities. This consultation is consistent with the government's aspiration generally to increase public engagement in the planning process for major infrastructure.

We will consult the local planning authority for the proposed development about our proposed consultation strategy for local communities and, in particular, about the way in which we will consult those living in the vicinity of the proposals. This strategy will then be published as a Statement of Community Consultation (SoCC). We will then have to consult the local community in accordance with our SOCC.

We will also have to consult local planning authorities, certain prescribed statutory bodies and persons with an interest in land. This is likely to be undertaken at the same time as we consult local communities.

Where a development requires 'environmental impact assessment' (EIA), there is also an obligation on the developer to consult on Preliminary Environmental Information (PEI). Our proposed development will require EIA and so we will consult on PEI.

Once we have undertaken consultation, we will report back on the responses received, how we have taken them into account and how they have helped shaped our proposals.

6.5 Consultation & engagement

In deciding whether to accept our application for development consent, the Planning Inspectorate will have to decide whether we have carried out adequate consultation under the Planning Act 2008. We will engage closely with the Planning Inspectorate with respect to our proposed consultation strategy, and as our consultation process is implemented, to ensure that statutory requirements are being met.

6.5.4.1 Statement of Community Consultation (SoCC)

As stated above, one of the first formal steps under the Planning Act 2008 process will be for us to engage with the local authorities for the proposed development about how we intend to consult the local community about our proposals. This engagement is intended to inform our preparation of a SoCC, which will set out our proposed consultation strategy. We will also engage closely with the Greater London Authority and other local authorities adjoining the airport's boundary, as well as those further afield that might be affected by our proposals. We will engage closely with statutory agencies and consultees to inform the detailed development of our proposals.

6.5.4.2 Pre-application consultation

Robust community consultation will be a fundamental component of our pre-application work. We will ensure that our consultation is:

- Meaningful (i.e. there is a genuine opportunity to influence the proposals)
- Comprehensive (i.e. it seeks to address as many relevant issues as possible)
- Compliant (i.e. meets the requirements of the 2008 Planning Act and any appropriate guidance)
- Accessible (i.e. no-one is prejudiced from taking part).

The first formal stage of consultation for nationally significant infrastructure projects, often referred to as Stage 1, would normally relate to high-level issues and options relevant to the proposed development. In our instance, this might have included consideration of options around the runway's location, length and operation, or the location of any new terminal. The Airports Commission process has already addressed many of these issues in its assessment and shortlisting of Heathrow's proposal. We believe it is likely that any subsequent NPS would be both site and scheme specific in its recommendations (i.e. that there should be a runway at Heathrow to the north-west of the airport). Based on this assumption, we anticipate at least two formal stages of consultation as we develop our proposals towards a DCO application. Our first stage of consultation would logically follow on from any Airports Commission process and any subsequent site-specific policy recommendations in the NPS. We would anticipate this taking place in around Q4 2016.

Our second stage of consultation (Stage 2) would also normally set out the preferred scheme, with a view to addressing any significant outstanding issues before the final application package is submitted. We would anticipate this happening around Q3 2017.

6.5.5 Feedback integration

Parts 2 and 3 of this document demonstrate that we have listened to feedback from our consultation exercise and altered our proposals by moving the runway further to the south. At each stage of formal consultation, we will give feedback to local communities and others detailing how their views have been taken into account in the development of our proposals. Our application for development consent will include a formal Consultation Report that summarises all stages of informal and formal consultation leading up to the submission of the application and reports back on the responses received, how we have taken them into account and how they have helped shaped our proposals. It will be supplemented by continued informal engagement with local communities and others – through both existing and additional engagement events – to help explain the outcome of any consultation and aid understanding of the proposals and the process.

As the delivery programme progresses from 2015 to 2019 we would naturally expect the nature of any changes to our proposals to become smaller in scale. Consultation and engagement feedback is then seen as an iterative refining of our proposals towards final consent, helping to build confidence and certainty on scheme delivery.

6.5 Consultation & engagement

6.5.6 Post-consent engagement

Our commitment to consultation and engagement will not end once we have secured planning consent for Heathrow's expansion. On the contrary, implementation of our proposals will require a different level of engagement to ensure the successful and sustainable delivery of our scheme and compliance with our obligations and mitigation, particularly in respect of construction related impacts.

A Code of Construction Practice (CoCP) will be central to ensuring our construction process is rigorously managed across the areas impacted by the airport's expansion and associated construction activities. Effective consultation with our local communities and statutory agencies will be crucial in developing the CoCP and any more specific supporting Construction Environmental Management Plans. These mechanisms will control activities such as lorry routes, delivery times, air quality monitoring and construction noise.

Proactively keeping the community informed about our construction work will be a high priority. In addition to our on-going engagement programme, this will be achieved through a variety of mechanisms including a Community Liaison manager, newsletters and a dedicated hotline.



6.6 Transition

Introducing new capacity quickly is essential for maintaining our position as a global hub airport. We will also need to add new capacity in a managed way. This will ensure commercial viability, as well as our ability to work within environmental and social constraints. Heathrow supports the short and medium term measures that were announced by the Airports Commission in December. We will introduce them as soon as reasonably practicable since they offer immediate benefits before new capacity is available. Heathrow will use the experience from Terminals 2 and 5 to bring the new runway and facilities into use in a safe and efficient manner.

6.6.1 Short and medium term measures

As a hub operating the busiest two-runway airport in the world, we are acutely aware of the impact of capacity constraint. We have made significant investments over recent years to improve Heathrow's resilience to the benefit of our customers. We therefore welcome the range of improvements to be implemented in the short and medium term, as recommended by the Airports Commission in its Interim Report.

Heathrow is already working closely with key stakeholders, including NATS, CAA, DfT and the airlines, to deliver improvements over the next five years. We are committed to accelerating the delivery of the short and medium term measures that we are the lead authority for. These include runway alternations for easterly operations and an independent arrivals runway.

There are also a number of recommendations where Heathrow is not the lead authority. Where this is the case, we are committed to working closely with the relevant authority to help bring about improvements. All parties need to fully understand their respective roles and responsibilities, and make firm commitments to deliver the recommendations to minimise any unnecessary delay. We fully support the Airports Commission's recommendation to strengthen the governance of the Future Airspace Strategy. We would welcome full Government support for the recommendations and their timely implementation.

Support for trials is also important, including those recommended by the Airports Commission. In our view, trials are vital to ensure that effective strategies are implemented in the future. We therefore highlight our belief in the value of explicit dispensation for trial activities.

6.6.1.1 Airport Collaborative Decision Making (A-CDM) and Departure Planning Information (DPI)

Heathrow successfully implemented Airport Collaborative Decision Making (A-CDM) and Departure Planning Information (DPI) in summer 2013. Further benefits can be achieved with a network of A-CDM airports providing better information to stakeholders and passengers.

We are currently studying in more detail the possibility of "smoothing" the arrivals schedule in the early morning. The schedule between 6 and 7am is busy and the airport normally operates both runways for arrivals in that period, meaning that local communities do not benefit from respite. We believe that moving some arrivals to the period between around 5.30am and 6am could not only improve efficiency at the airport but also remove the need to use both runways between 6 and 7, therefore providing better respite. However we recognise that arrivals before 6am are a concern for the local community and that there have been concerns about this trial. While we believe that it does offer benefits for the local community, we must take local views into account in developing our strategy. We will continue our work on how such a trial might operate and share that with local stakeholders to get their views. The Government would need to consult on any trial which will provide a further opportunity for engagement.

6.6 Transition

6.6.1.2 Tactically Enhanced Arrival Management (TEAM)

Heathrow implements TEAM when a threshold of 20 minutes' delay on arrivals is predicted. The Airports Commission refers to the Enhanced TEAM procedures that were used during the Operational Freedom trials in 2012/13. With enhanced TEAM the threshold is reduced to 10 minutes. Heathrow proposes that the early morning trial referred to above is undertaken first. Its impact on TEAM operations would then be proven before undertaking any further consultation on the enhanced use of TEAM.

6.6.1.3 Redefinition of departure routes

Heathrow is working closely with NATS to re-design Heathrow's airspace. We welcome the revised Government Air Navigation Guidance in supporting this initiative. A funded programme of work is already in place including trials which run from now until 2016. The first trial commenced on 16 December 2013. We support trialling new operating procedures as a vital component of the process which leads to effective noise management. As we set out in our London Airspace Management Programme (LAMP) requirements document, there is a need to deliver improvements in operational efficiency, resilience and airspace design, as well as improvements in noise and emissions. Finding the right balance between all these requirements is a key objective. As we move towards a full public consultation on LAMP we believe it is important to undertake these trials. These will not only gather vital operational evidence to help inform airspace design, but also test potential opportunities to manage aircraft noise better.

We believe that a more informed, factually-based LAMP consultation process would be good for all stakeholders. Additionally, we recognise the need to better understand respite and community attitudes towards noise. We are actively seeking to incorporate research in this area as a major aspect of the trials programme. It is critical that sufficient resource is available within NATS, CAA and DfT to support the programme. We would welcome the full support of the Government in further simplifying and accelerating the associated airspace change processes.

6.6.1.4 Independent arrivals runways

Heathrow has begun work with NATS and CAA in this area and the necessary investment is included in our current business plan. We expect the recommendations to be implemented by 2018.

6.6.1.5 Runway alternation for easterly operations

To enable Easterly Alternation the airfield requires additional infrastructure. In particular additional Runway Exit Taxiways (RETs) on runway 09R and Runway Access Taxiways (RAT) on 09L are needed when operating runway alternation for easterly operations. The required RETs are currently being built. These will be operational in summer 2014. The access taxiways require planning permission. This was refused by Hillingdon Council in February 2014 for a Runway Access Taxiway on runway 09R. Heathrow is developing a response to this planning refusal.

6.6.1.6 Westerly preference

Heathrow supports this recommendation but we suggest that it is implemented after runway alternation is enabled on easterly operations. We also support a review of the wind preferences within the night rotation/alternation pattern should be undertaken. This would enable Heathrow to identify the best set of runway preference arrangements over a 24-hour period.

6.6.1.7 Reduced engine taxi

We fully support and promote the use of reduced engine taxi. Current operators implementing reduced engine taxi at Heathrow include BA, Lufthansa and Delta. Each airline has to determine its own standard airline operating procedures. We continue to work with airlines to encourage them to take this up.

6.6.1.8 Adherence to schedule

Heathrow supports this recommendation. We are already working with NATS and airlines within the Future Airspace Strategy (FAS) framework to develop the concept of operations. Efforts to reduce the bunching of arrival aircraft at Heathrow and improve adherence to the schedule are expected to reduce arrival delays, emissions and

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improve the experience for those passengers. We anticipate progressing this by 2015/16.

6.6.1.9 Time Based Separations

Heathrow is working closely with NATS on the implementation of Time Based Separations (TBS). We agree that the use of TBS at Heathrow would significantly reduce arrival delays caused by strong winds. It will have a positive effect on the airport's resilience on windy days and improve the passenger experience. The current NATS implementation plan for Heathrow is to commence operations with TBS in spring 2015.

6.6.1.10 Ground-based navigational systems

Heathrow supports this recommendation. We have included investment in our Q6 business plan in two new navigational aids to improve resilience. This includes the replacement of Heathrow's current Instrument Landing System (ILS) and implementing Ground Based Augmentation System (GBAS) to support new aircraft capabilities (i.e. B787, A380, A350).

6.6.1.11 Independent Aviation Noise Authority

Heathrow recognises that there is need to rebuild trust between all interested stakeholders in relation to aircraft noise. We therefore support in principle the concept of an Independent Noise Authority. We would suggest that the exact scope and remit of such a body requires much more detailed consideration. It could, for example, provide an independent verification of data as a basis on which to build good local relationships and workable solutions.

6.6.1.12 Minimising use of airspace for military purposes

While this is not directly an airport issue, Heathrow welcomes any efforts in the industry to improve airspace efficiency and reduce passenger delays.

6.6.1.13 Establishing a Senior Delivery Group

We fully support the Commission's recommendation to strengthen the governance of the Future Airspace Strategy and would welcome full Government support for the recommendations and their timely implementation. We are already participating in the Senior Delivery Group's work.

6.6.1.14 Strategic plan for delivery of the schedule

NATS is working closely with Heathrow to deliver a plan for 'the following day'. The plan will demonstrate how the next day's operation will be delivered, as well as ensure that any necessary actions are taken in advance to avoid incurring delay. This will be a key role of the airport's future Airport Operations Centre (APOC) that will be operational from 2014.

6.6.2 Transition to new capacity

6.6.2.1 Construction phasing

Our construction phasing plan aligns with the predicted growth in passenger demand but is flexible to adapt to any changes in demand that may arise. This will smooth out the resource profile, reducing pressure on the UK's construction industry. The runway will be operational in 2025 and terminal capacity will be brought on stream incrementally from 2025 to 2039. As we have described earlier, there will be a clear sequence of terminal capacity availability:

- Runway operational (2025)
- T6A Phase 1 (J) (2026)
- T6B Phase 1 (K) (2026)
- T6A Phase 2 (J) (2027)
- T6B Phase 2 (J) (2027)
- T2A Phase 2 (C) (2032)

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- T2E (D) (2033)
- T2D (E) (2034)
- T2A Phase 3 (C) (2036)
- T2C (A) (2036)

Our phasing plan and operational readiness strategy will mean a 'soft' opening of terminal facilities. Discussions will take place with our airline partners to develop an airline move strategy that considers their current and future operational requirements. We will build on extensive experience over the last decade to design a structured operational readiness programme.

6.6.2.2 Building on our experience

Over the past 16 years Heathrow has regularly brought into use major new pieces of infrastructure including the Heathrow Express railway (1998), the new control tower (2007), Terminal 5 (2008) and, shortly, Terminal 2. Although in the case of Terminal 5 the journey has not always been smooth, each time we have learned and improved our knowledge. We have now introduced a new phase to our major programmes called Operational Readiness (OR). Its objective is to turn physical infrastructure into operational facilities on time and to budget, and without disruption to our passengers and airlines.

The following are critical to the success of the operational readiness phase:

- **A strong governance model**
This involves setting up an appropriate and accountable body that can align construction, operations, commercial, technology and stakeholders to commit to the delivery of the business outcome
- **A defined and consistently applied stakeholder management process**
Coordinating strategic management, planning and communication with the accountable stakeholders.
- **First-class transparent communication**
Ensuring all parties understand what the work is about and how important it is for the overall programme and business outcome
- **Formalised and base-lined plans of operation for normal, irregular and emergency conditions**
These are essential for achieving success and ensuring that the works carried represent value for money
- **Excellent programme management**
This ensures a strong team is in place to track construction progress, operational readiness, safety, sustainability, time, cost and quality
- **Thorough early, strategic management and planning of OR activities**
To foster a successful OR programme and mitigate unforeseen problems, a substantial amount of strategic management and planning is required at the start of an OR programme.

Our OR reference model takes a view through the project lifecycle starting with:

- **Connected leadership**
Establishing governance, management and control of OR and associated activities
- **Operations and activation**
Developing process and procedures for use in the new facility and trials to prove that people, process, systems and the facility work together
- **Preparing people**
Ensuring people are ready for transition in terms of role definition, recruitment, training and familiarisation
- **Transition of ownership**
Management of the change from a building site into an operational facility.

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6.6.2.3 Our operational readiness programme

We will put in place an operational readiness programme that is appropriately accountable, skilled and resourced. This programme will commence in 2021, four years in advance of our planned opening of the new runway, and will continue as each new terminal facility is brought into use. The costs for our OR programme have been based on our experience of Terminal 2 and are included in our cost plan.

6.6.2.4 Programme set-up

Within the establishment of the programme, we will define the:

- Vision and mission statement
- Objectives and outcomes
- Parameters (time, cost, quality)
- Governance (organisation, accountabilities and escalation).

This work must be aligned to the business outcomes expected from this programme of works. The latter can be very short in timescale, but can take from one to three months depending on the programme's scale and complexity. They are typically carried out by a small number of skilled experts in close coordination with senior members of the construction and operational communities.

6.6.2.5 Programme definition

As part of the programme set-up phase, or immediately afterwards, all of the strategies and plans need to be written for each of the key work streams within the programme.

These should define the 'who, what, where, when, why and how' for each of the key work streams or activities expected to be carried out for the life of the programme.

Due to the strategic nature of these works, they can be short in timescale but typically can take between one and twelve months to produce depending upon the scale and complexity of the programme. They are typically carried out by a small number of experts in close coordination with the appropriate construction and operational communities. These activities are generally not carried out by the construction teams but by teams skilled in the requirements of interfacing with a large number of stakeholders and accurately documenting the required outcomes.

6.6.2.6 Execution of operational readiness activities

Once the strategies, management documentation and plans have been signed off and agreed, the execution phase delivers the works agreed against defined processes and procedures while reporting progress against the schedule.

The duration of these works, and the resources and skills required, depend significantly on the scale and complexity of the works and can range from a few weeks up to 18 months. However, they will generally take place prior to practical completion and continue up until the final airline relocation has taken place.

6.6.2.7 Migration

Migration covers the period from when stakeholders commence transition to the new facility go-live and first move of airlines through to the final step with all airlines migrated.

The objective of the migration stage is to plan and execute all activities that stakeholders need to complete to facilitate the move. The dependencies on facilities and other stakeholders will also need to be defined and monitored so that remedial action can be taken if there is deviation from the migration plan. The duration of these works, and the resources and skills required, depend significantly on the scale and complexity of the airline migration sequence and can range from a few weeks up to 12 months.

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6.6.2.8 Programme management throughout

Throughout the life of the programme strong measurement and monitoring that reports back to the OR leadership on progress, change, risks and issues is required so that informed and early decisions can be made. In addition, targeted and aligned stakeholder management is required throughout the programme of works.

6.6.3 Slot release policy

We have assumed a 5% pa growth in traffic from the point at which new runway capacity becomes available in 2025. This implies a similar, if not identical release of new slots. Releasing capacity as quickly as possible may maximise revenue. Arguably it might also be seen to increase connectivity most quickly. However, this will only be the case in a sustained way if new services are commercially successful. Releasing slots too rapidly will be neither feasible nor optimal, for the following reasons:

- Airlines may not have the fleet capability to accommodate immediate increases in capacity
- Airlines have stated that it would be difficult for them to add the optimal mix of short- and long-haul capacity to their networks in a balanced way
- A gradual release of capacity is also consistent with the phasing of the terminal capacity build-out. It is not practical to have terminal capacity for 130mppa available for the opening of the new runway in 2025
- From an environmental and local community point of view, a sudden release of capacity in 2025 will not be helpful. By delaying the take-up, more time is given for the introduction of quieter and more carbon efficient planes into airline fleets
- Airlines will require a period of time to establish routes in new markets before offering further routes
- Gradual release allows effects to be monitored as capacity comes on stream. If constraints are tested, for example if technological progress is slower than predicted, new mitigations can be implemented before more capacity is provided.

Our proposed approach is therefore to gradually transition to full capacity over five years or more from 2025. We believe this will deliver real sustained benefits to the UK. This approach will foster competition, allowing all those airlines, including those not currently flying from Heathrow to make use of new capacity.

We will continue to discuss these issues with our airline partners, and refine our plans accordingly. In practice ACL Ltd is responsible for slot allocation. The Airports Commission, in its final report, may wish to propose a framework that ACL could consider in order to meet objectives such as domestic, regional and international connectivity, and environmental impacts.



6.7 How we innovate

As the world's busiest two runway airport, we have embedded continuous improvement in everything we do. We are constantly innovating to deliver the best passenger experience. Innovation has played a major role in our recent performance improvements and will continue to play a key role at all levels at Heathrow. Innovation that helps passengers to experience a high quality and seamless passenger journey can be both visible and invisible to the passenger. Innovation also happens at all stages of the passenger journey. Innovation for its own sake is of little value; we ensure that we innovate with intent with a clear improvement objective.

6.7.1 Making Heathrow the preferred choice for passengers

Heathrow's passenger strategy is to streamline the end-to-end passenger journey through (i) simpler journeys, (ii) empowered passengers, (iii) a reliable and predictable service and (iv) a personalised experience. Innovation plays a critical role in delivering this as it can influence all key stages of the passenger journey outlined below.

6.7.1.1 Travelling to and from Heathrow

Heathrow has invested heavily in helping to make the passenger journey through the airport as smooth as possible. Heathrow.com provides a range of services such as booking parking online or informing passengers of any potential holdups. We have developed our own app that provides the latest flight information to keep passengers up-to-date. This app is the most heavily downloaded airport app in the world. In the future, passengers will also be able to print their bag tags along with their boarding pass, allowing them to simply drop their bag upon arrival at the airport and avoid the manual process.

Our Heathrow Express rail service, owned and operated by the airport, is the only direct express airport rail service in the UK. Unique in the UK, our direct control of the service allows us to extend the passenger experience right through to Paddington. We recently delivered a major mid-life refurbishment programme that includes free wi-fi provision throughout, at seat power sockets and 1+1 airline style first class carriages. Our Express (standard) class carriages are the equivalent or better than first class on the national rail network. Heathrow Express has recently received scores recognising it as the best train service in the UK. The National Passenger Survey (NPS), run by Passenger Focus, found in its biannual review that 96% of Heathrow Express customers were pleased with their experience. This score compares favourably to the London and South East average for the period of 82%, and the national average of 83%.

In 2011, we introduced the world's first commercially operated personal rapid transit system (PRT). Heathrow invested in the latter stages of this incubated research project and turned it into an award winning reliable new mode of transport that removes 70,000 bus journeys from Heathrow's roads each year. The system comprises 21 autonomously driven battery powered vehicles operating over 3.8 kilometres of track. PRT provides our business passengers with quick and convenient access to Terminal 5. PRT will continue to play an important role in on-campus connectivity as we will continue to support the evolution of PRT as we develop our Masterplan.

In 2008 Heathrow was the first airport in the world to use "Car Finder", a unique technology to help passengers find a parking space and then retrieve their car after their journey. The system uses automatic number plate recognition technology to track a car as they enter our car park. The car is tracked by CCTV cameras and green lights illuminate above empty spaces as the car approaches. The cameras record the bay the car is parked in. On returning, the driver inserts their ticket into a Car Finder kiosk which matches the car to the parking bay and shows a 3-D map of where the car is located with additional helpful information such as lifts and stairs to make it even easier for the passenger to return to the car.

6.7 How we innovate

6.7.1.2 Check-in and bag drop

Heathrow leads the world in innovation at check-in. Our new Terminal 2 check-in is different because it allows passengers with different airlines to check-in at the same desk. The emphasis is on delivering a smooth and efficient check-in experience for our passengers combined with an exceptional standard of customer service. Terminal 2 check-in makes better use of terminal floor space. This model capitalises on the interests and ambitions of Star Alliance airlines. The check-in model sweeps away the traditional banks of dedicated check-in desks. Instead groups of airlines share desks and other check-in facilities.

For passengers, Terminal 2 check-in is all about speed and friendly customer service. Passengers will benefit from faster self check-in and bag drop. For airline staff, there's a much stronger sense of community and of membership of the Star Alliance. Because airlines and handlers work together in a shared environment, they'll find it easier to respond to passengers' travel needs. In the future this model is expected to be the norm across all current and new terminals.

We are also introducing self-service bag drop across the airport. Passengers will be able to use touch-screen and thermal printing technology, weigh their bag, print and attach their bag tag, and deposit their bag into the baggage handling system without any assistance from an airline agent. Passengers will benefit from shorter queuing times and take more control of their experience enjoying an improved experience at check-in.

6.7.1.3 Security

Heathrow is trialling innovative 'glasses-free 3D' technology at the entrance to the security zone in Terminal 1 to help passengers prepare for the security process. Large screens show 3D images of items that are not permitted through security, such as scissors and liquids over 100ml. Passengers are shown how to dispose of them in the recycling bins provided. The technology aims to reduce queues at security by cutting down on the number of bags that are rejected and have to be manually searched.

Our security screening equipment is highly advanced. We have installed an automated tray return system, cutting edge x-rays and have widespread use of body scanners. We have led Europe in implementing liquid screening technology. We are working closely with IATA as a pilot airport on their Smart Security programme. The programme seeks to strengthen security through better use of technology, increased operational efficiency and improve passenger experience.

6.7.1.4 Departure lounges

In 2012 we announced a partnership between Apple's Passbook and our passenger loyalty programme. This was a first in a European multi-retailer environment and allowed passengers to store their loyalty card and access current retail offers and coupons all in one place. Promotions and discounts appear on the device screen as they travel through the airport.

In 2013, we launched our new loyalty programme, Heathrow Rewards. The new programme better reflects what our more frequent passengers have told us they want. It includes loyalty points that don't expire, 90 minutes free wifi (non-members receive 45 minutes) which is a better offering than any other European hub competitors and an enhanced website. Heathrow Rewards offers benefits for passengers and staff including rewards for shopping at the airport, using our car parks and pre-booking travel on Heathrow Express. We also gain valuable insights into our passengers' preferences, allowing us to tailor products and services.

Heathrow has some of the world's best Premium (CIP) lounges. In 2008, Virgin Atlantic's Clubhouse was named the best business class lounge by Skytrax, beating off competition from Cathay Pacific and Qatar Airways to pick up the award. Featuring a spa and a sauna, the Clubhouse offers several different areas for passengers to enjoy, including a hair salon, a den complete with a pool table, a cinema and a cocktail bar.

Qatar Airways' new Premium Lounge at Heathrow Airport's Terminal 4 is its first dedicated lounge for First and Business Class passengers outside of its Doha hub. The facility is designed to resemble a boutique hotel and offers a five-star service. As well as offering entertainment, it will feature hotel-style refreshment facilities and a business centre with free Wi-Fi.

No.1 Heathrow won the best refreshments category of the recent Priority Pass Lounge awards, by offering a variety of complimentary food options to order, as well as a comprehensive wine, spirits and soft drinks list, also

6.7 How we innovate

complimentary. Facilities such as YoTel and transfer passenger facilities also cater for the less premium passenger. In an expanded Heathrow we will seek to create an airside hotel facility.

We have installed free power charging stations in all terminals, before and after security. The stations are compatible with UK and European plugs as well as USB cables.

Heathrow is also one of the best places in the world for retail shopping. Heathrow won the 'Best Airport for Shopping' for a fifth time at the World Airport Awards. With over 52,000 square metres of retail space and more than 340 retail and catering outlets, Heathrow has the highest retail sales of any airport in the world ahead of Incheon airport in South Korea. With the opening of T2 this June, it will be the first airport in the world to have its own personal shopping lounge and two restaurants created by Michelin starred chefs including Heston Blumenthal. Terminal 2 will also host a new 3,600m John Lewis store. The store represents a huge step forward in the John Lewis's international strategy by opening up the brand to an even wider customer base.

In 2012, we opened a pop-up park in Terminal 5. Passengers were able to relax and enjoy views of the airfield while waiting for their flight. The park included grass, hedges and plants, as well as rosemary bushes and jasmine, which can help promote relaxation and enhance wellbeing pre-flight. The new park followed research which found that 33% of people take up to five days to get into holiday mode, while 42% continue to check emails, texts and voicemails while on holiday.

Heathrow is in the process of developing a ground-breaking wayfinding solution that allows passengers to visualise their journey through the airport on computers, tablets and smart phones. The tool displays 360 degree photo panoramas of every passenger area in the airport and its grounds. This provides passengers the opportunity to get an overview of their trip through the terminal before they leave home. Passengers select their starting point and where they want to get to from a drop down menu of airport locations. They then receive a metre-by-metre visualisation of their route.

6.7.1.5 Departure Gate & Boarding

Further technologies are being tested to provide a more automated and personalised passenger experience before boarding.

Virgin Atlantic launched a ground breaking trial of wearable technology in the Upper Class Wing at Heathrow. It was the first passenger-facing wearable technology trial of its kind in the industry. Real time flight information and destination updates were provided using the smart glasses and watches.

In 2013 Heathrow passengers were also the first in the world to use self-boarding using automated ticket presentation gates as part of our drive to improve the passenger experience. Passengers pass through an automatic electronic barrier which takes an infra-red scan of their face. This information is checked against biometric data taken at check-in stage. When matched the barrier allows the passenger to pass and board their flight. This technology means that a passenger's identity is only checked once by airlines staff through the departure process, reducing the time it takes for passengers to board. It also allows airline staff to spend more time with those passengers who require greater assistance.

6.7.1.6 Arrivals

Innovation on arrivals has an impact as soon as passengers disembark. Their first need is information. For example, to find their way or make an onward connection. Having trialled kiosks and screens, we increasingly find people relying on mobile devices of their own. Therefore we are continually building our suite of live maps, online guidance and the like.

A second point of need is for fast processing at immigration. We led the UK in earlier generations of automatic e-passport gates. We are now investing heavily with the Home Office to deploy the latest gates across our terminals. Passengers notice the difference – we consistently see higher satisfaction in feedback from those using e-gates. We are also working with border authorities to use technology to accurately measure queues, predict and resource to demand and design immigration halls for maximum efficiency. A third aspect of innovation for arriving passengers is facilitating onward travel. We have replaced fixed information desks with mobile support and interactive travel centres. We have also increasingly designed terminals to reduce onward connection times. In the new Terminal 2, passengers can go from plane door to terminal door in under 10 minutes without having to change level.

6.7 How we innovate

6.7.2 General service innovations

Over the last few years Heathrow has made significant efforts to establish and improve customer services at all stages of the journey and established global best practices in multi-lingual support, use of twitter and reservists.

6.7.2.1 Reservists

Similar to the concept of the Territorial Army, our “Reservists” are deployed to our Terminals in the event of severe disruption. All non-operational staff are required to sign up to the Reservist programme and which forms an integral part of our crisis management response procedure. The Reservists are supported by regular training and an online shift booking system that allows staff to book shifts and co-ordinators to ensure the right people are deployed to the right terminals in the correct roles depending on the operational need. All Reservists deployed to terminals are equipped with iPads and Blackberries to enable passengers to easily re-book flights, find alternative accommodation and contact relatives if necessary.

Figure 6.22: Reservists operating in our terminals



6.7.2.2 Multi-lingual support services

Heathrow has also made a number of key improvements to the airport including the introduction of a dedicated a team who speak 38 languages. They are planned throughout the journey to provide assistance at key points.

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6.7.2.3 Instant Feedback

Using the flexible and mobile 'Happy or Not' kiosks, Heathrow has one of the largest footprints of insight feedback machines in Europe. We use this feedback to continually improve service such as security and operations.

Figure 6.23: Happy or Not kiosk graphics



6.7.3 Innovation to improve airport operations

A large number of innovations have recently been established at Heathrow that enable the airport to operate to the plan. These are largely invisible to passengers but greatly enhance airport operations.

6.7.3.1 Integrated baggage

T3IB is a state of the art integrated baggage facility that will allow baggage processing in a single facility and will reduce manual handling of bags, reduce costs and bag misconnects. T3IB will operate a secure robotic baggage system that will be among the world's most sophisticated.

6.7.3.2 Ground-Based Augmentation System (GBAS)

The Ground-Based Augmentation System (GBAS) is a safety-critical system that augments the GPS Standard Positioning Service (SPS) and provides enhanced levels of service. It supports all phases of approach, landing, departure, and surface operations within its area of coverage. The current Instrument Landing System (ILS) suffers from a number of technical limitations such as VHF interference, multipath effects (for example due to new building works at and around airports), as well as ILS channel limitations. GBAS is expected to play a key role in maintaining all-weather operations capability.

6.7.3.3 Airport Collaborative Decision Making (A-CDM)

Heathrow introduced A-CDM in 2013 to improve the operational efficiency of all our airport partners by reducing delays, streamlining the predictability of events and optimising the utilisation of resources. Based on a common platform of information, A-CDM allows all partners to more accurately predict when resources will be required and respond in times of disruption. A-CDM is already aiding our recovery and resilience in poor weather conditions.

6.7.3.4 Airport Operations Centre (APOC)

Heathrow is transforming the way we manage our airport based in part on our Olympics experience. 2014 will see the consolidation of multiple control rooms across the airport into a single location. Known as the Airport Operations Centre (APOC), it will take the lead in the co-ordination and control of Heathrow to ensure the smooth running of our whole operation and support wider punctuality, airport capacity and resilience.

APOC will bring together terminal, airfield and landside operations together into a single command and control facility. With representation from external agencies such as our airline partners, UK Border Force and the

6.7 How we innovate

Metropolitan Police, APOC will be the “controlling mind” constantly seeking to improve the passenger journey by smoothing our peaks and disturbances in our operation.

APOC will reach out beyond UK borders to ensure that inbound aircraft arrive just in time for arrival without the need to stack over south east England. It will then manage the arrival and distribution of passengers through appropriate stand allocation and onto the immigration and baggage halls. APOC will review incoming passenger flows arriving by rail to ensure that this peaky traffic is well accommodated through our security lanes. By bringing together these functions into a single consolidated control facility, we will smooth out peaks and minimise passenger delays throughout the passenger journey.

APOC will ensure that there is consistency across our operation ensuring that standard operating procedures are implemented. APOC will then seek to identify trends and look for continuous improvement by identifying opportunities to improve performance.

6.7.3.5 Positive boarding (Ready to fly)

Heathrow Airport has adopted a new technology known as ‘positive boarding’ to ease the airport process for passengers and reduce flight delays. The software, which is linked to passengers’ boarding passes, is now live in all terminals and is compatible with all airlines’ computer systems. It enables airlines to see what stage of the departure process a passenger is at and gives them bespoke information to help make sure they get to the gate on time. Since its introduction, first with BA in T5 as ‘Ready to Fly’, it has greatly impacted on time boarding by eliminating uncertainty on passenger priority. This technology is another world first at Heathrow.

6.7.3.6 IT solutions

Heathrow has invested £400 million in IT infrastructure with four key aims:

- To improve the passenger experience by giving them the information they need when they want it, both online and in the airport, supporting a quick and easy transit through the airport
- To provide the airlines and other firms at the airport with the systems, IT services and infrastructure they need for quick and secure check-in, baggage handling, stand and gate management to ensure that journeys are smooth and hassle free
- To give the airport and its airlines better systems to deal with events and incidents to minimise disruption and provide the information they need when they need it
- To simplify an unnecessarily complex set of systems at the airport so as to give Heathrow a better quality of service and reduce costs.

6.7.4 Run our airport, responsibly, safely and securely

6.7.4.1 Facial recognition security checks

Following a successful trial alongside the UK Border Agency, Heathrow Airport will implement infrared facial recognition checks to heighten security. All passengers travelling through Terminals 1 and 5 will be subject to the check when they present their boarding pass before boarding their flight. The idea behind the implementation of the biometric checks is to ensure an international traveller cannot swap tickets with a domestic passenger in the departure lounge. The system being used is the Aurora Imaging Recognition system, which can confirm the identity

6.7.5 Keeping people Informed

6.7.5.1 Social Media

We have established a strong following on Twitter with a number of accounts focusing on different areas of our business below is a list of them:

@heathrowairport – the official Heathrow Airport Twitter feed

@heathrownoise – provides live updates on Heathrow’s runway operations every day 7am to 10pm

@yourHeathrow – news and events and people of Heathrow

@heathrowexpress – Heathrow express twitter feed providing service updates

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According to a study of regional and international airports Heathrow Airport is the most followed on social media website Twitter. Twittairport estimates that Heathrow has 171k followers

In 2013 we launched YourHeathrow.com, a microsite to engage with all those who are interested in Heathrow, whether passengers, workers or our local community. Established to keep people informed, share their experiences and to get people involved with Heathrow. The site is designed for ease of use on tablets and aims to provide an online venue for education and debate amongst all our users.

By combining an image-led design with new media elements, such as Computer Generated Imagery and video, and mobile responsive formatting – the Hub Capacity Microsite will also allow for Heathrow staff to easily promote the company’s key messages online and at events through the use of mobile tablets.

In April 2014 we launched the Heathrow Airport Manual. In the format of the internationally recognised “Haynes Manual”, the book has examined every element of the airport from runway construction and maintenance, to the complex airspace around London. The manual is full of facts and figures that reveal the inner workings of an international transport hub that allows 70 million passengers to pass through Heathrow every year. The manual is the first of its kind and provides unprecedented insight and access to every aspect of the airport. This publication follows many innovative communications exercises over the last few years including “Writers in Residence” and the live TV programme “Airport Live”.

Figure 6.24: Heathrow Airport Operations Manual



6.7 How we innovate

6.7.6 Innovation for an expanded Heathrow

As the examples above illustrate Heathrow is extremely active in using innovation to improve the airport experience and operation. In many cases we lead the world on specific technologies, processes or products. By its very nature these innovations develop rapidly. It is impossible to predict the technological possibilities for airports in the late 2020s, 2030s or beyond with confidence. We are expert at including innovation in all our developments. We have designed our expansion plans so we will be able to do so throughout the delivery phase. Furthermore we will do so with a focus on innovation that delivers real benefit for passengers, airlines or our communities rather than innovation for innovation's sake. We are confident we will create a world leading airport experience of which Britain can be proud.



6.8 Engineering plans

There are no insurmountable technical challenges to expanding the airport as envisaged by our refreshed plan. We have extensive experience of delivering very large, nationally significant infrastructure projects. With our excellent track record on Terminal 5 and now Terminal 2, we are confident that this project can be delivered on time and on budget.

Here we describe the types of engineering solutions that will be required to develop the 3R North West scheme. In line with the Appraisal Framework requirements these are largely informed by desk-based studies. We have commissioned targeted engineering studies where appropriate to inform the definition of our mitigation strategies.

River diversion, flood mitigation, construction above landfill and the works to bridge over the M25 are all key challenges which have been addressed. The need to complete these enabling works early in the overall construction programme has been understood.

The engineering solutions identified employ well-understood techniques, many used in earlier phases of development at Heathrow. A number of these solutions have been award winning, including the Institution of Structural Engineers Supreme Award for Structural Engineering Excellence and Royal Institute of British Architects (RIBA) National Award for Terminal 5.

The costs of the work have been developed based on our extensive experience of construction at Heathrow and other appropriate industry benchmarks.



6.8 Engineering plans

6.8.1 Safety & Compliance

6.8.1.1 High Level Evaluation of Site Location

Heathrow's location requires aircraft approaching or departing from the airport to overfly parts of London. It is clear from the results of the Heathrow's recently completed public consultation that public safety as a result of overflight is a material public concern. Highly effective safety regulation of aviation in the UK and the exemplary performance of aviation operators the UK contribute to deliver very high and ever-improving levels of safety. The evidence base exists, established over many years of operation at Heathrow, to demonstrate that the material public safety concerns about the location of Heathrow can be allayed by objective consideration of that evidence.

Assessments have been made of the proposed three runway Heathrow, taking into account the proposed method of runway operation, in order to generate anticipated 10^{-4} and 10^{-5} contours for the Public Safety Zone at each end of the three runways. As shown in Figure 6.25, the inset threshold for each of the runways significantly reduces the off-airport 10^{-5} contour for each of the existing runways from its current extent.

Figure 6.25: New PSZs for 3RNorth West compared with existing 2 Runway PSZs



6.8.1.2 Compliance with CAP168 and EASA Aerodrome Regulation

The scheme has been designed to comply with the requirements of CAP 168 at all stages of its development. Minor adaptations will be made to the scheme if necessary in order to comply with the new EASA Aerodrome Regulation.

The European Commission has agreed the draft regulations and rules prepared by the European Aviation Safety Agency (EASA), and published the Aerodrome Regulation and its Implementing Rules (Commission Regulation (EU) No 139/2014). To support this, EASA has recently published its Acceptable Means of Compliance (AMC), Certification Specifications (CS) and supporting Guidance Material (GM). These came into effect on 6th March 2014, at the commencement of a conversion period affecting all applicable UK aerodromes including Heathrow, which will need to have changed to the EASA rules by 31 December 2017. As these requirements come into effect, the scheme will be adapted in order to comply with any revised requirements.

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Any non-compliant features will be tested and a safety case demonstrated by quantified risk assessment. It is anticipated that the only features potentially requiring such an approach would be the two Visual Control Room (VCR) towers and, possibly operation of the Around the End Taxiways (ATETs) during certain runway modes.

6.8.1.3 Compliance with Engineering Standards

In addition to the UK and European aviation related regulations, there are a wide range of engineering and other aviation standards with which the development of a three runway airport will comply. These include:

- International Civil Aviation Organisation (ICAO) Document 9157 Aerodrome Design Manual
- ICAO Document 9643 Manual on Simultaneous Operations on Parallel or Near Parallel Runways
- Civil Aviation Authority (CAA) CAP 724 Airspace Charter
- CAA CAP 725 Airspace Change Process Guidance Document
- CAA CAP 642 Airside Safety Management
- Department for Transport (DfT) Design Manual for Roads and Bridges (DMRB)
- BSI Building and Construction Standards
- BSI Engineering Standards
- European Structural Design Eurocodes EN 1990-1999

6.8.1.4 Risk Assessment for Specific Features

Aircraft operations at and approaching the three runway airport would be controlled during normal operations from two Visual Control Rooms (VCR), one being the existing tower to the west of the current Central Terminal Area and the other being a new VCR constructed to the south of the new north runway. These would both be of a height that penetrates the Obstacle Limitation Surfaces defined in CAP168. The safety case for the three runway operation with these two towers configured as planned would need to be demonstrated by a quantified risk assessment. The safety case will need to go through the appropriate process as there are no airports in the UK which have multiple VCRs in operation. It is worth noting however that a number of large European and US airports do have multiple VCRs, such as Amsterdam Schiphol and Dallas Fort Worth. At Schiphol for example, Tower West was built to provide coverage to the new Runway 18R36L whilst Tower Centre provides coverage to the remainder of the airport.

The scheme has been planned with the inclusion of Around The End Taxiways (ATETs) in order to eliminate crossings of the central runway in all but the lightest operations. Although operations on ATETs are not explicitly covered in CAP168, they are covered implicitly by compliance with the Obstacle Limitation Surface provisions. Notwithstanding that compliance, it is anticipated that a quantified risk assessment may be required to demonstrate the safety case for unrestricted operation on the ATETs during those modes of operation of the central runway that involve would overflight of the ATETs by landing or departing aircraft.

6.8.1.5 Specialist Engineering Works

We have a strong track record of delivering major engineering projects. Our proposals will inevitably include complex buildings and structures. We do not envisage any specialist engineering works necessary over and above what might be expected for a project of this scale. Heathrow and our supply chain has the experience and the knowledge to engineer and construct these projects.

6.8.1.6 Passenger and employee safety

The safety of passengers and all airport staff is our number one priority. The design of new buildings will follow that same approach adopted in recent years for the design of Terminal 5 and Terminal 2. These large buildings adopt a fire engineering approach. Typically this divides the building into zones and operates a process of phased horizontal evacuation of passengers and staff from zone to zone in response to alarms.

This approach is designed to assure personal safety in all instances in large buildings, whilst avoiding intrusive compartmentalisation that constrains the use of the building. It also enables rapid business recovery in the event that an alert proves to be a false alarm as passengers have been evacuated in a horizontal direction as much as

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possible, and only vertically if required. Business recovery once passengers have changed level can be difficult to achieve efficiently and can significantly impede recovery of the operation.

All offices, service buildings and vehicle parks will be designed in accordance with current standards in order to ensure the safe and efficient evacuation of personnel in the event of an incident.

6.8.1.7 Scalability

Our proposals have been designed to comply with CAP168 (and its successors) at all stages of development up to 740,000 Air Transport Movements per annum.

6.8.2 Levels

6.8.2.1 Topography

Heathrow Airport is located on a plateau sitting above the shallow valleys of the River Colne to the west and the River Crane to the east. The plateau and the river valleys all fall gently to the south towards the River Thames which, at its closest, lies some 4km to the southwest of the airport.

The existing airport site is at 22m Above Ordnance Datum (AOD) in the southwest corner rising to a high point of nearly 27m AOD near the Renaissance hotel on the northern edge of the airport. The site of Runway 3 rises from about 21m AOD in the Colne valley at the western end of the runway to just over 27m AOD at its eastern end.

The ground is ideal for airport construction with slopes which provide good drainage but are not of a severity that they present any problem in meeting vertical geometric requirements for airfield construction.

6.8.2.2 Proposed Ground Levels

Levels on the existing airport will remain unchanged. Provisional levels have been established for the runway platform and the site of the western terminal buildings, facilities and aprons in order to address the following considerations:

- Seeking to achieve a cut-fill balance across the full airport and mitigation sites in order to minimise import and export of material from the site
- Maintenance of a free surface, including in times of flood, for the River Colne / Wraysbury River diversion beneath the runway
- Achievement of a satisfactory vertical alignment of the relocated M25 in cut and cover tunnels beneath the runway.

This has been achieved with a runway platform set at approximately 26.5m AOD at its western end over the M25 and at approximately 28m AOD at the eastern end. This is well above assessed flood level and provides for the River Colne / Wraysbury River diversion beneath the runway to be constructed with a soffit at 23m AOD allowing for structure, engineered fill and runway construction above. The M25 descends to a lowest point at 13m AOD beneath the runway and taxiways.

There is a minimum of 10m clearance between all airfield pavement levels and the M25 carriageway level in order to provide a minimum 6.45m in all locations for high load route clearance for vehicles using the M25. This is in accordance with the Department for Transport Design Manual for Roads and Bridges (DMRB) Volume 6 Road Geometry, Section 1 Links, Part 2 Cross Sections and Headrooms, Table 6.1 Standard Headrooms at Structures. The apron area has an overall fall from north to south, albeit all aprons drain away from the satellite building so the northern side of the satellite falls from south to north, i.e. against the overall trend.

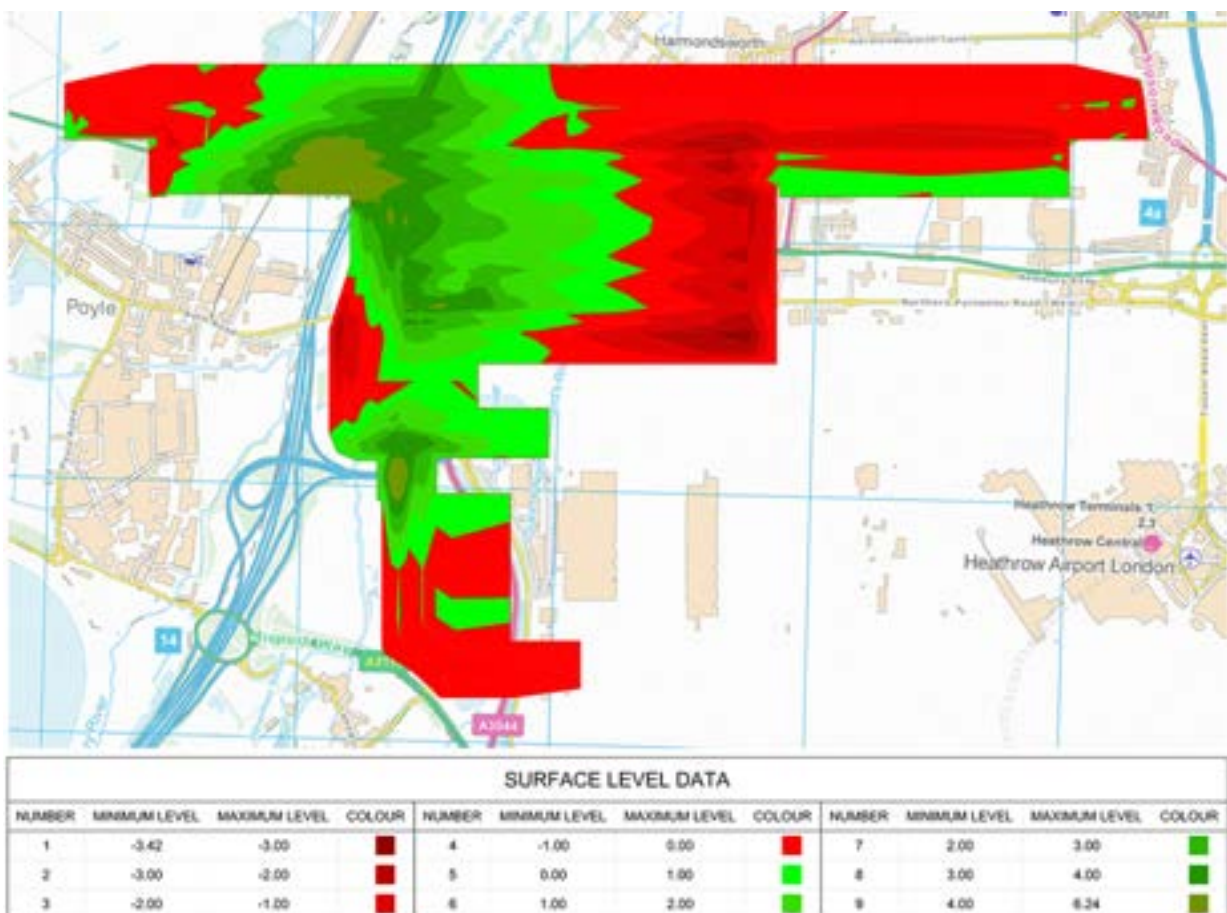
Figure 6.26 shows a preliminary earthworks level difference model for the Runway 3 and Apron 6 site. The earthworks have been designed to comply with CAA CAP 168 gradients and tie in with local levels around the boundary. A proposed profile of the runway, plus cross sections along the realigned M25 route, through the new satellite zone and through the T5/T6 to M25 Exit Spur Road is shown in Figures 6.27, 6.28, 6.29 and 6.30.

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A full site topographical survey has not yet been carried out, but interpolating existing Ordnance Survey data, an estimate of the volume of cut from bulk earthworks and basement and tunnel excavations is 4.8 Mm³ and an estimate of the volume of fill is 3 Mm³.

Additional fill is also anticipated to be won through the creation of new flood storage areas for the realigned Colne Valley to the north and west of the airport. This surplus fill is likely to provide greater choice in how areas of landfill below the development are addressed, and may well permit the runway platform above the M25 and river diversions to be raised as design develops in order to reduce the depth of the M25 diversion and to provide even greater freeboard for the river diversions beneath the runway.

Figure 6.26: 3R NW Preliminary Earthworks Level Difference Model



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Figure 6.27: Proposed Runway 3 Profile

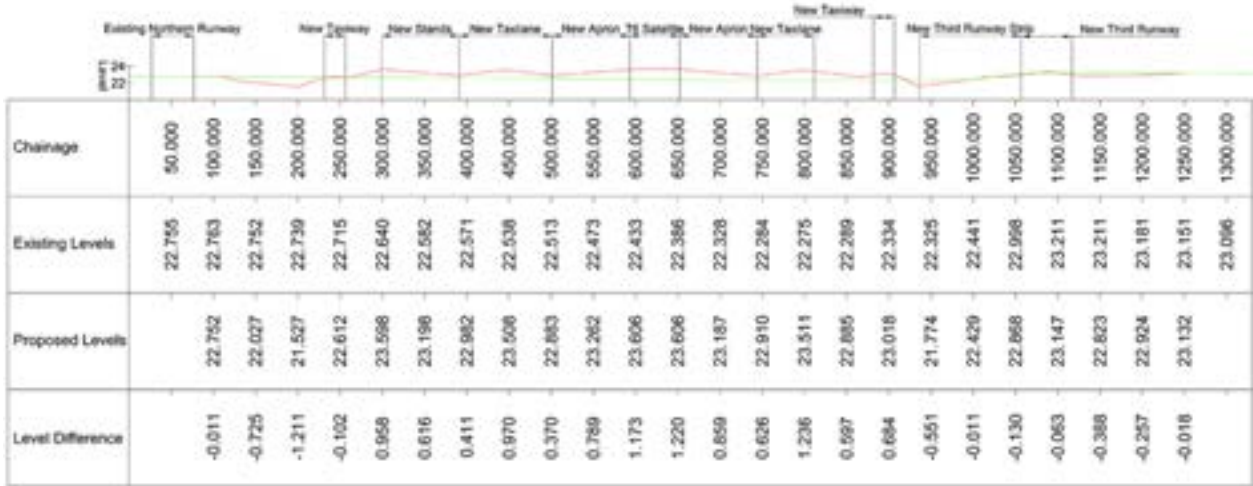
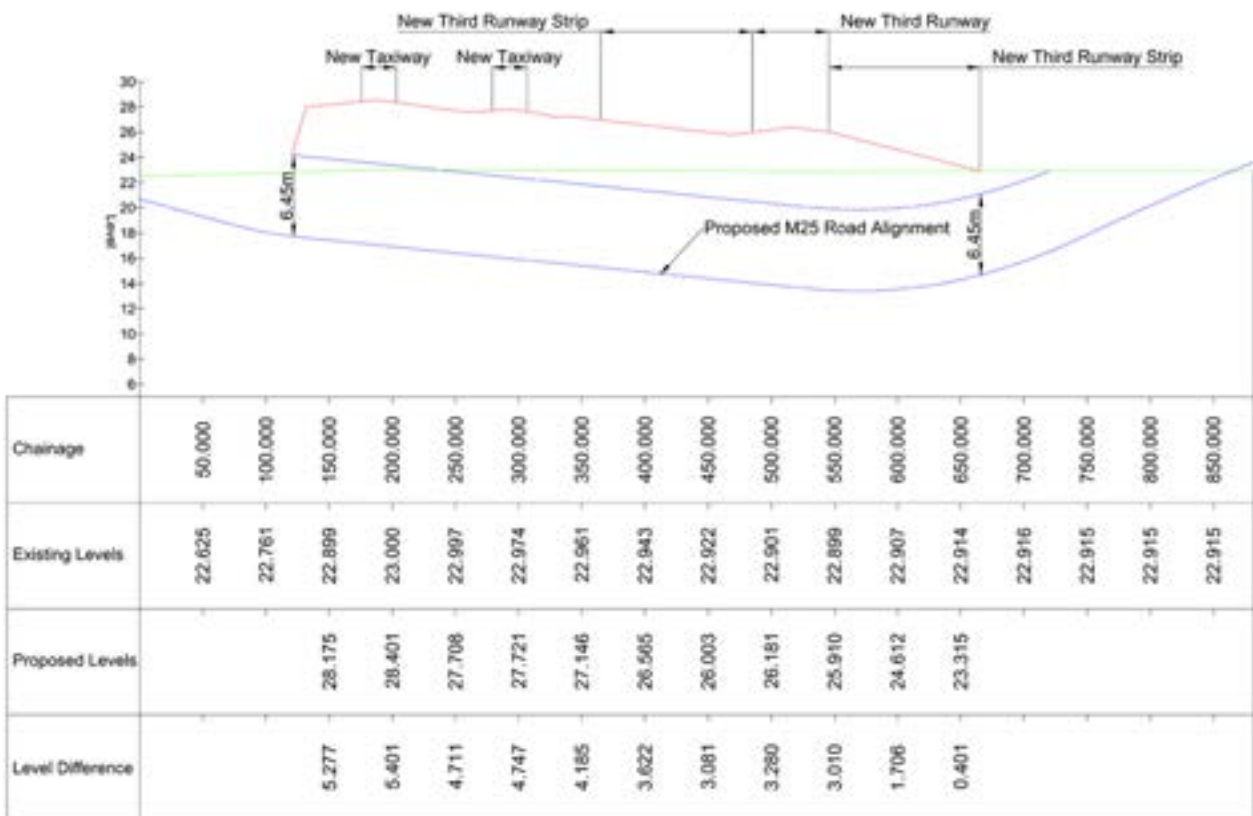


Figure 6.28: Proposed M25 Cross Section Underneath Runway 3



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Figure 6.29: Proposed Cross Section Through T6B Satellite

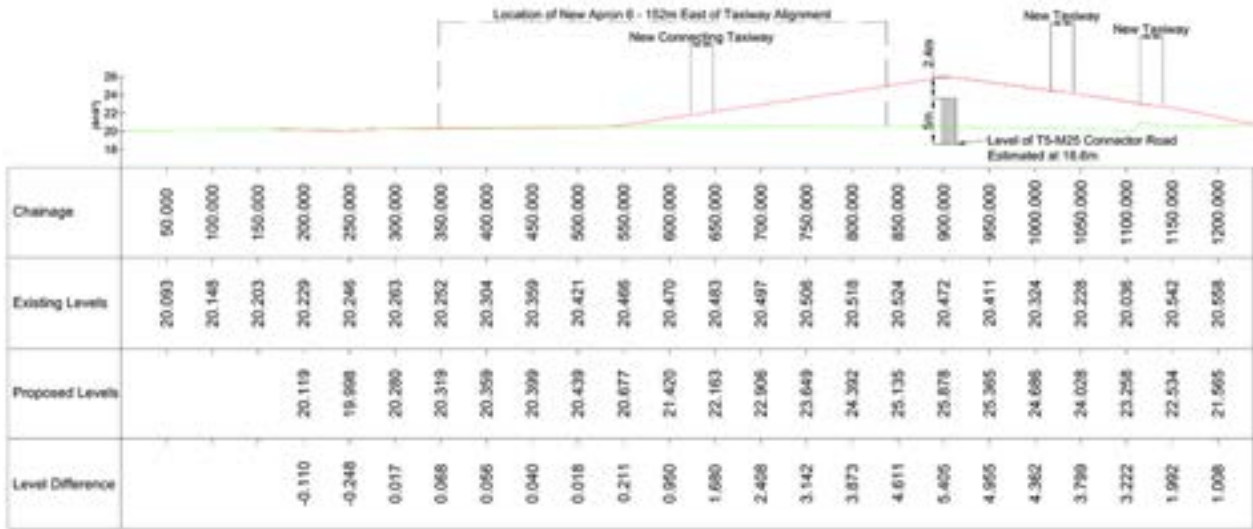
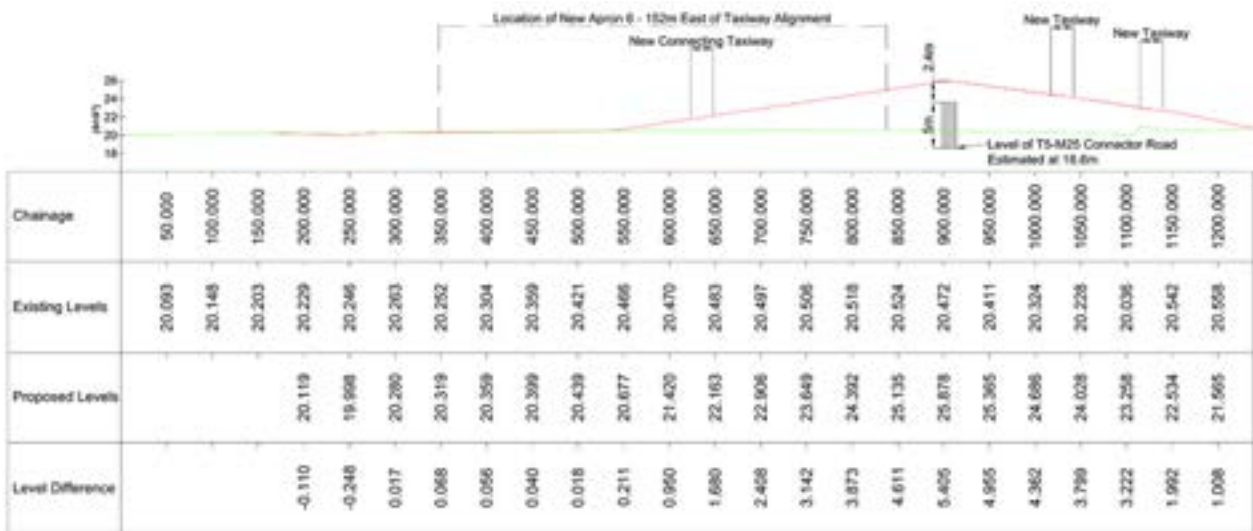


Figure 6.30: Proposed Cross Section Through T5/T6 to M25 Exit Spur Road



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6.8.3 Geo-environmental

6.8.3.1 Ground Conditions

The prevailing geology of the area is typically 6-7 metres of construction-quality river sand and gravel deposits overlying 30-40 metres of London Clay, interspersed by extensive areas of former minerals extraction and subsequent landfill. The London Clay overlies Taplow Gravels which are designated a Principal aquifer by the Environment Agency and therefore represent a sensitive groundwater resource. The London Clay is designated as Unproductive Strata.

The underlying geology in the area is remarkably consistent and is the dominant factor in the engineering of the substructures of large buildings and tunnels. However, there is considerable variability in the shallower depth as extensive extraction of sand and gravels has taken place across areas of the site which have subsequently been backfilled with landfilled waste from household and commercial/industrial sources. These areas of landfill are significant for the engineering of aircraft pavements, and they also represent potential contamination sources in terms of soil and groundwater quality and ground gas production.

The Flood Risk and Mitigation Strategy describes in more detail that the western part of the site comprises the Colne Valley with multiple watercourses and a high ground water table, as evidenced by the many lakes in unfilled former sand and gravel works in the area. These are sensitive surface water receptors.

6.8.3.2 Specialist Engineering Solutions - Building Sub-structures

Heathrow has gained extensive experience over the past ten years of major sub-structures construction with the development of T5 and the ensuing redevelopment of the older terminals at Heathrow, of which Terminal 2 represents the first step.

The overarching commentary on construction of buildings at Heathrow is that the existence of extensive and very uniform deposits of London Clay at relatively shallow depth delivers a highly predictable engineering medium for the sub-structures of large buildings. These will typically be on piled foundations using friction piles into the London clay.

Large basements below the principal buildings have been constructed using diaphragm wall or secant pile techniques for the basement walls. Whilst these are large scale engineering solutions requiring highly specialist skills to deliver economical solutions, these are conventional, well-understood civil engineering techniques delivered with great precision in a very uniform medium.

One factor requiring care when constructing large basements in the Heathrow area is to enable the continued flow of groundwater in the sand and gravel deposits in a generally southerly direction towards the River Thames. Measures to achieve this will be part of our design.

For smaller buildings, a choice exists, depending on local ground conditions and/or economics, either to use piled foundations or to use pad footings. Pad footings have been an economical solution for lighter buildings on undisturbed sand and gravel deposits which presents an ideal formation for this solution.

6.8.3.3 Specialist Engineering Solutions - Infrastructure Works

The construction of infrastructure works presents more variability as the deposits above the London clay are likely to constitute the formation level for any construction above.

Where infrastructure is founded on undisturbed sand and gravel deposits, these are an ideal formation and design and construction can be expected to be straightforward. However, these mineral deposits may more usefully be excavated for use as aggregate elsewhere on the site and replaced by engineered fill.

Where the sand and gravel has been extracted, infrastructure construction in these areas will either be on engineered fill e.g. compacted London Clay arising from excavations elsewhere on site, or in areas of landfill.

Construction in landfill areas gives rise to the potential use of one or more of a number of specialist engineering solutions that will need careful consideration on a case by case basis in close collaboration with the Environment Agency in order to determine and agree details of the proposed solution. These solutions include:

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- Excavate and replace. Agreement would need to be reached with the Environment Agency as to whether the excavated materials are suitable for reuse on site e.g. as fill material in earth bunds on the perimeter, or whether the degree of contamination requires that they be removed offsite to a controlled landfill site
- Treat landfill materials or improve foundation conditions in landfill areas, using one of a combination of the following techniques depending on suitability for the particular element of infrastructure:
 - Improve properties of landfill in situ, for instance by dynamic compaction (DC), vibro-compaction (VC), pre-loading or in-situ mixing
 - Improve properties of landfill by excavating and re-compacting, perhaps with lime/cement
 - Transmit loads through landfill to competent strata, for instance by use of stone columns or piles.

Other than in areas of landfill, soft ground conditions are not a major issue given the geology of the area – the only location where this might be experienced is locally within the Colne Valley. The runway platform will be constructed on embankment some metres above the flood plain and above the M25, so treatment or removal of this soft ground will be a minor factor in the overall scale of construction.

6.8.3.4 Specialist Engineering Solutions - Tunnels

Heathrow has extensive experience of tunnelling in the area, as evidenced by the complex network of tunnels beneath the airport. This comprises a mixture of bored and cut and cover tunnels.

For both types of tunnel, the important material is London Clay, as bored tunnels are bored within the London Clay and cut and cover tunnels will be of a size that is founded on the London Clay. London Clay is an ideal tunnelling medium as it is a remarkably consistent soft rock, with high impermeability.

The depth of London Clay in the Heathrow area is sufficiently deep to enable bored tunnels to cross one another within the clay without risk of breaking into the gravel aquifers above and below. For cut and cover tunnels, these can be founded on the London Clay with conventional engineering techniques, if necessary including the use of tension piles to resist uplift.

6.8.3.5 Specialist Engineering Solutions - High Water Table

The high water table in the area is not a major issue for construction – techniques to deal with groundwater (e.g. waterproofing of basement structures) are well-understood and Heathrow has extensive recent experience of dealing with these matters in the design and construction of Terminal 5 and Terminal 2.

It will be necessary to ensure that the extensive sub-surface roads are engineered to provide protection against ingress of groundwater and also against flooding from the watercourses in the Colne Valley. The sub-surface roads include the M25 tunnels, the access roads to and from the west terminal area site which pass beneath the taxiways and the A3113-Southern Perimeter Road underpass.

Construction techniques which will be considered include:

- Construction as underpasses with water-retaining side walls to prevent ingress of groundwater and tension piles to prevent flotation of the box structure;
- Creation of a cut-off wall down into the London Clay to locally isolate the sub-surface road from the groundwater. This would permit construction of taxiway bridges above the de-watered sub-surface road.

In all instances care will need to be taken to ensure that groundwater migration across the site is maintained.

6.8.4 Utilities

6.8.4.1 Requirements for the Proposal

Heathrow is well-served by all major utilities: High Voltage electricity, gas, potable water, sewerage, surface water drainage, waste treatment, telecommunications, and aviation fuel. There is planned resilience built into current supplies to the existing airport, as demonstrated by the airport's ability to respond satisfactorily to the Buncfield fire which temporarily removed part of the airport's aviation fuel supply.

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In addition to external supplies, Heathrow also has a degree of on-site energy generation capability and it supplies waste material to the existing energy from waste plant located to the northwest of the existing airport. Further information about Heathrow's energy, water and waste provision and strategies are to be found in Part 5. At a headline level the impacts upon the utilities requirements are:

- Energy usage is anticipated to change the GWh demand for electricity and natural gas from the grid through using a range of carbon reduction programmes. The net effect of this will be to reduce CO₂ emissions from 316,722t in 2010 to less than 100,000t in 2040
- Water extraction is expected to reduce in total from 2.3 million m³ in 2010 to around 2.0 million m³ in 2040
- Waste is expected to grow from 26,860t in 2010 to 35,260t in 2030 and 45,500t in 2040

6.8.4.2 Measures to Address Utilities Shortfall

Heathrow's focus has been on mitigating increases in demand as a result of development of a new third runway. More detailed commentary on this matter is set out in Part 5. These strategies include measures such as grey-water capture and recycling to limit potable water demand, provision of extensive photovoltaic solar farms to generate electricity, provision for redevelopment of the energy from waste plant to handle airport waste and to generate electricity for the airport.

These Mitigation Strategies set out a core series of proposals but engineering planning is still at a very early stage. Heathrow does not rule out the possibility of incorporating further measures to mitigate demand. For instance, should additional mitigation be required in potable water demand, one further initiative might be the creation of an airport sewage treatment works incorporating extended reed beds on the Mayfield Farm site. These reed beds are currently used for glycol treatment in the winter months and this would give them year round beneficial use. The sewage treatment works would generate grey-water effluent which can be recycled back into the grey-water system on-airport to mitigate further the demand for potable water as well as reducing airport outflows to the existing sewerage system.

To the extent that increased demand associated with development of a third runway at Heathrow cannot be mitigated fully, responsibility for the provision of additional supplies to the airport lies ultimately with the utilities companies serving the airport. At this early stage in the planning of Heathrow, where our focus has been on mitigation, Heathrow has not entered into consultation with these providers regarding their potential response to meeting any increased demand at the airport.

6.8.4.3 Utilities Fail Safe and Emergency Systems

Heathrow maintains resilient supplies and/or on-site generation or storage in order to cope with any unplanned interruptions to supply or untoward incidents. Emergency systems are designed in accordance with CAA, EASA and ICAO aviation regulations as well as meeting all BS and EN product standards. We see the construction of a new third runway as an opportunity either to maintain or to improve our resilience in this regard.

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6.8.5 M25 Infrastructure Proposals

Our proposals require placing the M25 motorway into a 600m cut and cover tunnel to allow our new runway to be constructed above. We have developed our proposals from a range of initial concepts discussed with the Highways Agency (HA) which, in light of their comments and suggestions, have been refined into a preferred arrangement.

6.8.5.1 Design Principles

The design principles adopted for the development of the new access proposals reflect the dialogue with the Highways Agency with the following key components:

- A simplified one-way arrangement for M25 access and egress replacing the current two junction arrangement (J14 and J14A) to simplify way finding and reduce the number of mainline merges and diverges
- Maintaining a hierarchy of importance: M25, motorway link roads to M4, link roads to airport, local roads to protect capacity and flow of through traffic
- No merging and diverging in tunnel sections
- Focus weaving areas away from mainline M25 onto collector/distributor link roads
- Enable main construction works to be conducted off-line to minimise impacts to short term tie-in sections
- Minimise construction impact on M25/M4 junction
- Maintain M25 capacity and airport access via the M25 throughout the construction phases
- Design to Design Manual for Roads and Bridges guidance minimising any departures from standard.

6.8.5.2 Proposed alignment

The main features of the our M25 proposals are:

- A new tunnelled section of the M25 to the west of the current alignment to allow the tunnel to be constructed without impact on the general traffic flows. In addition parallel but segregated tunnels would carry collector/distributor roads between M25 clockwise to M4 and M4 to M25 anti-clockwise. The M25 mainline section would be constructed to dual four motorway standard in segregated tunnels to minimise the impact of traffic incidents. The collector/distributor roads would each be three lanes with hard shoulders
- The vertical and horizontal alignments of the M25 mainline and the M25/M4 link roads are maintained through the northern sections of the M4/M25 interchange so that no major structures require alteration. At the southern end of the interchange the alignment of mainline and links are altered to divert eastwards and lowered to meet the grade requirements of the new tunnels. This arrangement means that the tie-in between existing and proposed roads will be limited to relatively minor earthworks and surfacing works not major structures
- South of the new tunnels, the M25 and link roads remain segregated with the M25 tying back into the existing alignment midway between the tunnel portal and the existing Junction 14A overbridge. Again this tie-in will be confined to earthworks and surfacing. South of the tunnel the exit diverge M25 anti-clockwise to airport and entry merge airport to M25 clockwise occur so that these movements take place outside the tunnel
- The M25 clockwise to M4 (east & west) link road is aligned to the west of Junction 14 and Junction 14A to enable construction with minimal disruption
- The M4 (east & west) to M25 anticlockwise link road is aligned parallel to the M25 passing under the existing Junction 14A and Junction 14 overbridges (retention of the existing structures is subject to detailed assessment)
- The main exit from T5/T6 will be via the existing J14A spur
- The main exit from T4 and the CTA (via new southern road tunnel) will be via a realigned A3113 to the existing J14 roundabout
- The main entry into the airport will be via the realigned A3113 including a free flow ramp from M25 clockwise over the existing J14 roundabout.

General arrangement drawings illustrating the alignment, sections, radii and distances between merges and diverges are included in Appendix 15.

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6.8.5.3 Adherence to Design Standards

The outline design has been developed in accordance with the Design Manual for Roads and Bridges (DMRB) standards in particular TD 9_93 Highway Link Design and TD 22_06 Layout of Grade Separated Junctions. The overall concept has followed the guidance of Figure 5/6 and para 5.23 (TD 22_06) for closely spaced junctions by segregating the weaving sections from the mainline. There is only a single entry and exit with the M25 with all the other merge/diverge and weaving taking place on the connector roads.

In line with the guidance, designs speeds adopted for the various elements are:

- Mainline – 120kph
- Link roads -100 kph
- Interchange links 85 kph

In general the design provides for the desirable levels or one step below.

6.8.5.4 Construction Sequencing

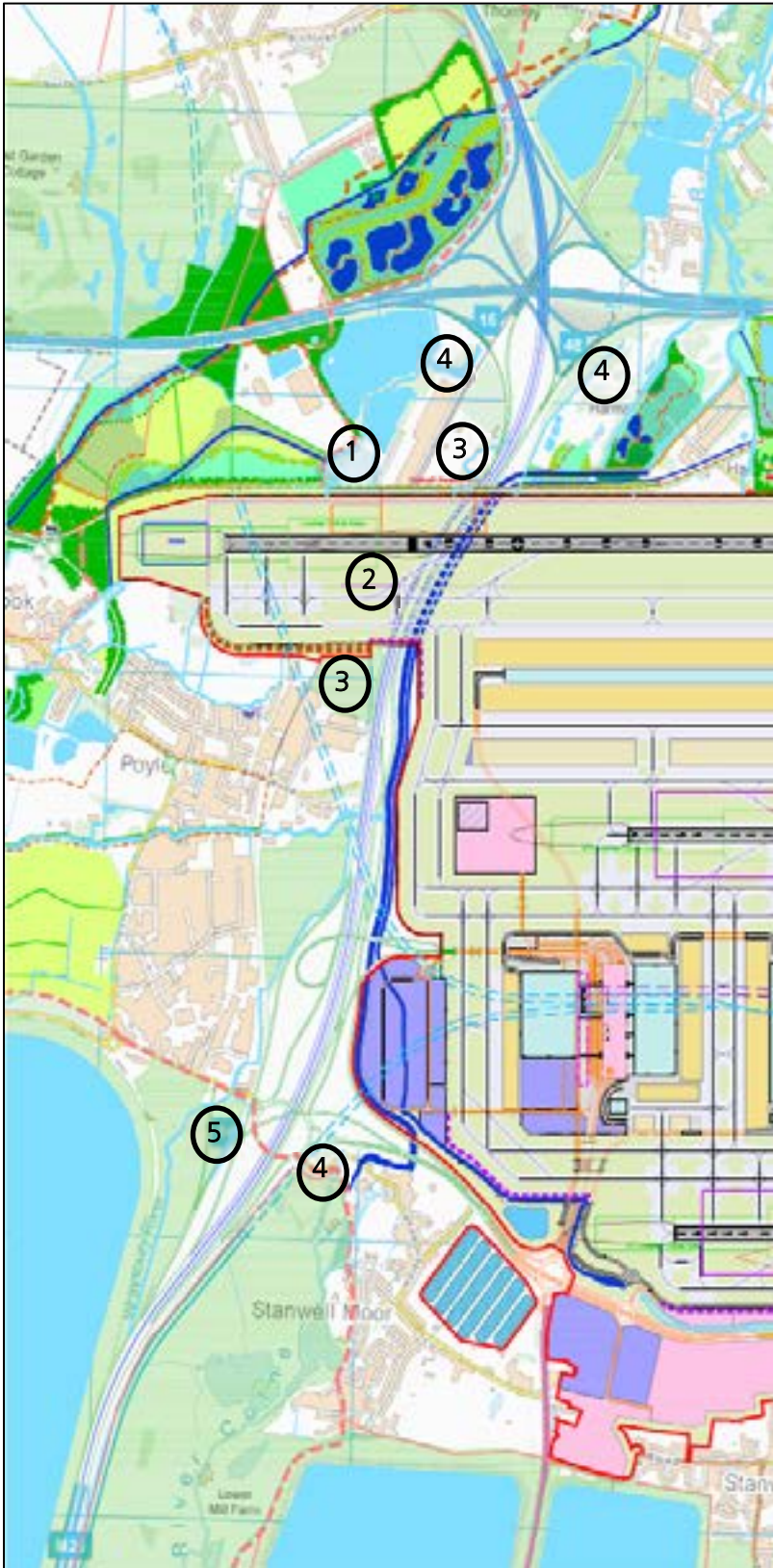
The design has been developed to minimise construction impacts on existing users with both the M25 and M4 remaining open and operational throughout the construction works. The following main construction phases are show in Figure 6.31 and referenced on Figure 6.32 below:

Figure 6.31: M25 Construction sequence

Phase	Activity
1	Construct A4 new bridge over M25 near J15 and divert A4 Removal of old Bath Road bridge
2	Construct tunnel section east of the existing M25 alignment. Tunnel length of approximately 650m comprising central portals for mainline (D3 or 4 plus hardshoulders) and side portals for north and south bound connector roads (3 lane plus hardshoulder) Construct connector link M25 to M4 from south J14 to tunnel Construct new links parallel but south of A3113 including new grade separated junction with SPR Construct new ramp from M25 northbound over J14 to new A3113
3	Tie-in M25 tunnel section realignment with J15 mainline and ramps Tie-in M25 tunnel section realignment with mainline north of J14A
4	Complete the connector roads east of M25 (M4 to airport and M25). Note this may require reconstruction of J14A overbridge Complete connector roads west of M25
5	Complete remaining tie-ins Remove redundant sections including off ramps from M25 clockwise to J14 and J14A

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Figure 6.32: Indicative M25 Re-alignment Construction Phasing Sequence



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6.8.5.5 Summary

The outline design generally achieves the design principles set out for the M25 above. In particular:

- There is only a single entry/exit for the airport from/to M25
- The major merge, diverge and weaving movements take place off the M25 but not within tunnelled sections
- Downstream of the tunnelled sections there are long free flow sections so queues would have to be very long before reaching back to the tunnelled section
- High capacity is maintained with provision of dual 4 lane motorway standard road on the main carriageway
- The major structures can be constructed off line leaving the tie-in works limited to relatively minor earthworks and surfacing
- The design generally meets DMRB standards with a limited number of relaxations or departures
- Work is ongoing to further reduce the departures and assess weaving lengths and merge/diverge arrangements using forecast traffic flows.

6.8.6 Other Engineering Requirements

Other engineering requirements such as demolitions, land clearance, site drainage waste management and foul water are dealt with in our Part 5.

6.8.7 Cost Plan

6.8.7.1 Cost plan methodology

Benchmark data has been used which builds upon the knowledge gathered during the capital efficiency work stream for the Q6 regulatory settlement and incorporates current data from Terminal 2 and works on the eastern campus. Where possible, contemporaneous data has been obtained from other UK infrastructure projects has been used to ensure accurate cost estimates for works to highways and environment infrastructure. 90% of the base construction cost of airport and surface access infrastructure has been benchmarked against comparable schemes.

Our cost plan is built on a number of assumptions which are set out below:

- Environmental costs have been benchmarked against a number of different large scale projects completed for the Environment Agency and Essex and Suffolk Water.
- Community costs such as: land purchase, property compulsory purchase orders (CPO) residential and commercial, noise compensation have been compiled by specialist consultants.
- Highways and motorways have been estimated at facility level where appropriate and benchmarked against current schemes using the Highways Agency cost database.
- Rail has been estimated at facility level where appropriate and benchmarked against High Speed 2 costs.
- Airport infrastructure and building costs are at facility level and have been benchmarked in line with the Q6 Capex efficiency work stream where like for like facilities are available.
- Airport facility benchmarks have been used which reflect the quality of construction and finish comparable to the current Heathrow environment.
- All costs have tabulated and been priced as a single point estimate.
- On-costs and Heathrow management costs have been included as percentage levels in line with the Q6 cost reporting methodology.
- For the comparative nature of this study, risk has been added to all items at 15%.
- The base date for estimates is Q1 2013.
- Inflation is excluded as it is adjusted within the Business Case Model.
- The start point for works has been assumed as the beginning of Q7.

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Project Specifics

A 10% allowance has been made for project specifics. This includes a 1% specific allowance for logistics. This has been added to the base construction costs, prelims and overheads & profit to allow for the complexities of construction and implementation within the airport environment and the uplifts to base costs which are incurred during project delivery for night working, phasing and schedule prolongation. This has been applied as an average as there are opportunities which may be afforded by constructing elements of airside infrastructure in a green field site and away from live operations.

On-Costs

On costs have been applied to the airport infrastructure and buildings, highways, motorways and rail at 15% of the total base construction cost plus project specifics. This allowance has been made for all internal and external design, management and supervision costs. At the current stage of design it is prudent to allow such a benchmark rate, which is typical across a broad spectrum of similar projects with wide ranging facility types, systems and components.

Logistics and Security

A 3% allowance is applied to all costs to cover for a central logistics facility, additional security posts, any provision of utilities by Heathrow which is not included within the preliminaries benchmarked allowances and Heathrow site accommodation required during the construction programme.

This has not been applied to the Environmental Costs as these are outside of the Heathrow boundary.

6.8.7.2 Cost breakdown structure

We have adopted the following cost break down structure:

- Environmental
 - Ecology
 - Landscape
 - Surface Water Flood Mitigation
 - Listed Building Decants / Relocations
 - Energy / Water / Waste (sustainability)
- Community
- Surface Access
 - Roads / Highways
 - Motorways
 - Rail
- Airport Infrastructure and Buildings
 - Works within existing Heathrow boundary
 - Decants / Demolitions
 - Enabling Works
 - Terminals and Satellites
 - Baggage and TTS
 - Airfield
 - Landside Infrastructure
 - Heathrow direct costs

6.8.7.3 Scope Assumptions

Allowances have been quantified where possible and included for all aspects which we anticipate would be required to purchase land and develop additional runway capacity at Heathrow. We have not made any

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allowances for asset replacement costs (REPEX) and refurbishment of the existing Heathrow facilities with the exception of areas which are displaced, demolished or reconfigured. The asset replacement costs do appear in the overall funding model.

6.8.7.4 Environmental Costs

Ecology

Re-provision of wildlife habitat for wildlife displaced from the water bodies will involve the capture and translocation of animals and/or creation of places of shelter/roost. Off-site receptor sites would need to be prepared (habitat creation) and allowed to mature in advance of trapping and translocation. Estimates have been benchmarked against previous projects for the Environment Agency and Essex and Suffolk Water.

Surface Water Flood Mitigation

It is assumed that natural flood storage areas and earth bunds can be built using excavations arising from the site without the need for any imported material.

Excavation through landfill sites has been assessed as 60% hazardous and 40% non-hazardous. Of the hazardous materials we have assumed that 50% will be treated on site and re used and 50% will be removed from site.

Sustainability

Sustainability allowances have been included for a package of measures to reduce the use of energy and water and to reduce the production of waste.

6.8.7.5 Community costs

Residential property compulsory purchase

Average values for residential properties in the areas affected by compulsory purchase have been established through market analysis. All costs involved have been allowed including legal fees, removal costs, stamp duty and a disturbance payment. Risk allowance has been made for currently unidentified multiple-dwelling properties and for an increase in affected house numbers through scheme design development. Costs involved for acquisition due to surface access schemes have been allowed for as a risk item.

Commercial property compulsory purchase

A desktop study has been undertaken to establish a list of affected properties. Valuations have been based on the Compensation Code principles and allowances made for severance, disturbance, professional fees, equivalent reinstatements where appropriate, VAT and stamp duty.

Noise insulation / compensation provisions

Allowance has been made for a package of measures covering noise insulation to residential properties and schemes to assist residents' relocation or offers to buy in very high noise areas. The details of the cost distribution between these elements will be the subject of a consultation held during Summer 2014.

Community infrastructure levies

Allowance has been made for payments on net increase in appropriate development area at a rate of £35/m² to both Local Authority and Mayoral funds.

Land purchase

Rates for various land uses, including agricultural, woodland etc. have been assumed at an average value per hectare based on evidence from recent land transactions.

Other community

An allowance has been made for other interventions required to mitigate community impacts. At this stage this is based on an allowance only and not a detailed schedule of works. This can only be determined more specifically at a future point in the development process once a full consultation process is complete.

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6.8.7.6 Surface Access

Motorways, Roads and Highways

Benchmarks have been used from the 'Highways Agency, Highways Network Valuation Rate Report dated 2010 Q4'. A combination of the 'Resource Cost Index of Road Construction' (ROCOS) and 'Road Construction Tender Price Index' (RCTPI) indices has been used to update the costs to Q1 2013.

For highways works, the current Heathrow road network has been replicated and rates for D2MU roads have generally been used, assuming urban two lane dual carriageways will be constructed. For minor road amendments, where options dictate an S2AU rate has been used, for single carriageways.

Tunnels have been estimated based upon previous airport project benchmarks and additional item allowances have been made for elements which require far more design detail, for example, roundabouts, junctions and bridges. For motorway works where new construction is required a D4MU rate has been used. Additional allowances have been made for temporary works, including temporary motorway provision as necessary with allowances also made for raised junctions and intersections.

6.8.7.7 Airport Infrastructure and Buildings

Decants / Demolitions

Benchmark rates have been used for demolition based upon building type, with varying rates per cubic metre of demolition, with hotels deemed more complex than residential and commercial buildings. Due to the nature of the scope, building volumes have been estimated, based upon their area and an assumed number of storeys.

Enabling Works

General allowances have been made for enabling works based upon site clearance and levelling.

Terminals and Piers

Terminal and satellite benchmarks for this study have been used which reflect the anticipated cost of constructing at Heathrow with the specifications and constraints which are in place today. The Benchmark costs used have been reviewed for similar programmes of work and rates and adjusted to reflect the environment in which this development will occur.

Baggage and TTS

The benchmarks for tunnelling have been derived from a benchmarking study of various tunnels previously constructed at Heathrow for both cut and cover and bored solutions. The overall baggage system for each terminal has been assessed on an area basis benchmarked against Terminal 2 and Terminal 5 to ensure the baggage requirements are met in terms of scope and quality. Baggage equipment in tunnels has been estimated based upon rates used in the eastern campus study.

Airfield

Runway and taxiway benchmarks have been compiled from a wide range of projects and a rate close to the mean has been used. Aircraft stands have been quantified based upon the linear frontage of terminal and satellite to which we have applied a composite benchmark. The benchmark for pavement and apron has been used which is just above the mean and suitable for Heathrow.

Balancing pond costs have then been built up using data provided by projects being undertaken by Essex and Suffolk Water. Allowances have been made for the construction of new pumping stations, and pipework connections in to existing water courses.

Land Use Plan – Ancillary Facilities

Costs have been applied for site preparation only for the construction of ancillary facilities such as cargo, offices and hotels, industrial, warehouse facilities and catering – allowances have been made for site preparation only relating to industrial and warehouse facilities. Catering facilities have been estimated based upon single storey industrial facilities using a national range of benchmarks for this type of building.

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Landside Infrastructure

Benchmarks for car parking have been used from previous HAL projects and other UK airports to ensure airport specific cost factors have been included. The rate used for this exercise is significantly above the mean for projects undertaken off airport, but below the level for the recent Terminal 2 multi-storey car park. This is a particular area where airport specific factors in car parks have a large effect on base cost.

6.8.7.8 Heathrow direct costs

Allowances have been made for planning approvals, Operational Readiness, opening day activities and alterations to the aerodrome manual.

6.8.7.9 Risk

The familiar model of project risk apportionment is shown below where projects begin at RIBA stage 1 and risk will typically comprise 20-30% of the total budget estimate. The purpose of this risk allowance is to provide a workable budget within which to deliver a project. A 30% risk allowance at explore stage contains significant allowances for scope definition and development.

As a project progresses these allowances as well as those risks which arise for schedule, cost and delivery are mitigated and become zero or are incorporated within the base cost and budget. This has the effect of reducing any risk allowance to zero over the lifetime of a project.

At infrastructure planning level, scopes of work are not defined. However, the application of 20-30% risk would be inappropriate. Through the use of facility level benchmarks taken from out-turn project costs, a level of inherent construction risk is already present in the rates used. Therefore the application of 15% as an addition to the base cost becomes a reasonable assumption for "unknown, unknowns" which may arise during the development of scope and delivery of projects and the undertaking of unfamiliar works such as motorway diversions.

For the elements of this study a flat risk percentage of 15% has been applied to all elements (base cost, project specifics and on cost).

This is felt to provide an adequate risk allowance based upon the scope assumptions which have been made to date and the level of information provided.

6.8.7.10 Exclusions

The following generic assumptions and exclusions have been made within the estimate.

- No allowances have been made for concessionaire or tenant fit out within terminals
- No allowances have been made for loss of income to HAL or third parties due to closure or disruption during the works, except for limited levels of risk allowances for business extinguishment due to compulsory purchase
- No allowances have been made for delay and disruption caused by public consultation or planning issues
- No allowances have been made for disruption or delay caused by archaeological issues, ecological issues or local wildlife, although these have been factored into the construction schedule
- No allowances have been made for modifications to off-site statutory infrastructure
- No allowances have been made for ancillary facilities (cargo, offices, hotels, warehousing) other than for site preparation only

6.8 Engineering plans

6.8.7.11 Cost plan summary

The following table summarises our cost plan.

Figure 6.33: Cost Plan

Description	£ (000)
Environmental	679,000
Ecology	13,700
Landscape	154,800
Surface Water flood mitigation	305,100
Listed building decants	51,000
Energy / Water / Waste (Sustainability)	43,900
Noise Mitigation	110,500
Community	2,883,700
Residential Property Compulsory Purchase	300,000
Commercial Property Compulsory Purchase	1,740,000
Noise Insulation provisions	250,000
Noise compensation provisions	Incl above
Community Infrastructure Levy	59,700
Land purchase	455,000
Other community	79,000
Surface Access	891,550
Roads / Highways	350,8000
Motorways	480,000
Rail Scheme contributions	60,750
Airport infrastructure	11,138,000
Decants / Demolitions	341,000
Enabling works	221,000
Terminals and satellites	4,663,000
Baggage and TTS	2,617,000
Airfield	1,979,000
Landside infrastructure	1,112,000
Development process costs	205,000
Total	15,592,000

The variance is £1.34 billion downward. There has been little change in the airport infrastructure costs, the figures showing an uplift of £86m or 0.7%. This due to a general balancing of cost uplifts and decreases which have emerged as the next level of detail has been examined.

The principle changes are driven by factors elsewhere. The largest of these are:-

- Land purchase costs - £200 m
- Environmental mitigation, particularly river diversions and flood defences +£200 m
- Surface access costs - £1,292 m

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In general in the UK upgrades to public transport infrastructure have been funded by public means. A number of major rail schemes at Heathrow have already been committed to by Government. We have therefore assumed that a large part of surface access costs will be funded by mechanisms other than the airport charge. These include part of the cost of motorway improvements and all rail scheme contributions. Many options exist for publicly financing these elements. These could include hypothecating proceeds from a Heathrow congestion charging zone of the kind that we are proposing as part of our future traffic demand management measures.

Further detail of the cost plan is contained in Appendix 14.



6.9 Our procurement approach

Heathrow expansion will be the UK's largest privately-funded construction project, employing tens of thousands of people. Creating jobs in the UK and investing in the skills and training of those who perform them is an amazing opportunity. It is also a responsibility we take seriously. Heathrow has a track record of working with our supply chain to ensure that the benefits of major construction accrue to the whole of the UK. As with the Terminal 2 and Terminal 5 programmes, firms from every region would be involved and feel benefits. In many cases, the project will have a lasting impact on businesses thanks to new investment in staff, skills, knowledge and equipment. Heathrow expansion would support the engineering and construction industry across the UK.

6.9.1 Our track record

Heathrow is a market leader in construction procurement and leads the way in developing best practice. Our journey began in the early 90s when Heathrow first embraced the ethos of partnering, procuring circa 50 construction and consultancy frameworks agreements. These first generation framework agreements were structured in a manner different to that of standard construction contracts. Suppliers were expected to work in integrated teams and display behaviours and values similar to as if they were partnering. Since then Heathrow has been a leader in this thinking and has done so by adopting the New Engineering Contract (NEC) suite to support and drive this approach.

6.9.2 The T5 Agreement

9.2.1 Learning from the past

Before embarking on the £4.3 billion Terminal 5 programme of works, Heathrow researched a number of the UK's major construction projects to ascertain the lessons learnt historically. In particular we sought to understand why some of them had gone wrong and how this might influence Heathrow's approach. From this research it was clear that we had to consider significant potential impacts such as risk, industrial relations, resources, interfaces and multiple suppliers. Change was something that also needed to be well managed, as well as having a flexible construction solution. History had told us that traditional procurement thinking should be revisited and that a move to the active management of the cause of risk and not the effect of risk was the way forward. Heathrow decided that it had to have a contract that could deal with an adaptable approach, dealing with the unknown and embracing integrated teams, and so developed its own bespoke contract, the 'T5 Agreement'. This was based on NEC thinking and underpinned our overall strategy during delivery of Terminal 5. This was a first in UK construction history involving a mega project.

As part of Heathrow's research into historic projects, we looked at process, organisation and the behaviour of people. Heathrow wanted to promote and motivate success through highly performing integrated teams and individuals. Our research told us that successful delivery was about project culture and the commercial environment. Unfortunately traditional thinking and, specifically behaviours, good or bad, were mainly driven by the contract and supplier margin, not a common purpose. We achieved a common purpose achieved on Terminal 5 by common terms and team planning led by Heathrow. We have continued to adopt this approach to mega projects in the last five years with our Terminal 2 project.

9.2.2 Focus on leadership

Leadership was also important, especially in a changing environment. The T5 Agreement asked all key audiences in the team to demonstrate commitment, trust and team work. For Heathrow it has proved to be an enabler for

6.9 Our procurement approach

exceptional performance. The airport held all the risk all of the time – again a first for a client. It gives the suppliers an opportunity to create competitive advantage for their business, using Heathrow as a showcase. It also enables a step change in performance. To the teams it means working in highly effective integrated teams that are committed to achieving milestones. It is about supplier teams and Heathrow staff trusting each other and relying on each other to work together as one team. Heathrow took the leading role in all aspects of implementation and delivery.

9.2.3 Tackling risk proactively

Central to the T5 Agreement was a proactive approach to risk management. We recognised that transfer of pricing risk under a traditional model was unworkable on a programme of this scale. Heathrow's approach to insuring against the impact of risks was very innovative at the time, but potentially only suitable for a programme of work of a similar scale. In taking out the insurance policy and taking ownership of all the insurable risks, Heathrow had effectively regulated the project environment itself, breaking the cycle of risk transfer.

Heathrow realised there was no book on the shelf that addressed how to successfully deliver the scale of the programme it contemplated in the late 90s. So we took a brave decision to adopt a contract strategy that enabled suppliers to focus on delivery – the T5 Agreement and commercial policy being the enabler. This basic approach represents a serious alternative procurement route for major programmes of work.

9.2.4 Building on the Terminal 5 experience

Since the construction of Terminal 5, Heathrow has continued its journey with construction framework agreements based on the NEC form of contract that favour a target cost approach. These third generation framework agreements, entitled 'Value in Partnering', were used to select contractors for Heathrow's recent redevelopment of Terminals 3 and 4, and the build of Terminal 2. They have supported our ethos of becoming an 'intelligent client'.

In 2014 Heathrow will launch its fourth generation of long-term agreements to focus on the next regulatory period to 2018, again progressing Heathrow's intelligent client ethos and building on the learning from third generation agreements. These new agreements support Heathrow's capital investment plan and have been structured to enable and promote professional collaboration through a more integrated delivery model. Scope has been defined on the basis of geographic assets rather than individual projects to offer large scale, attractive tender packages to the marketplace. This also maximises the opportunity to get the best schedule. We can coordinate delivery and efficiency in an asset-replacement dominated plan.

We will drive performance improvement in the supply chain by creating an integrated and collaborative environment. This will enhance performance management of the supply chain at supplier level rather than purely at project level and provide appropriate risk and reward balance. This will also allow the supply chain to develop their capability and encourage greater innovation.

6.9.3 Terminal 2 – a national asset

9.3.1 Creating high-quality jobs UK-wide

Our Terminal 2 project has demonstrated the important role of private sector employers such as Heathrow in creating UK jobs. The project has fostered strong relationships with the supply chain, encouraging an integrated team of over 140 local and UK contractors. By the time Terminal 2 opens, its design and construction will have directly and indirectly supported 35,000 jobs right across the country. From the 77-tonne, 70-metre 'Slipstream' sculpture fabricated in Hull, which will dominate the main entrance gallery, to the direction signs manufactured in Exeter, firms from every region have been closely involved in the new Terminal 2. In many cases, the project will have a lasting impact on their business because of the new investment in staff, skills, knowledge and equipment it has supported. As highlighted in a number of Terminal 2 case studies, large infrastructure projects provide a valuable opportunity for people to learn new skills and to bring through new talent.

Investing in the skills and training of people is as vital now as it has ever been. Heathrow plays a unique role in the mix and range of high-quality jobs, training and career opportunities it creates locally and nationally. This is a responsibility we take seriously, and one that applies equally across our supply chain. Through working with our main contractors on projects such as Terminal 2, we have been able to benefit from the quality and expertise that is available across the UK.

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The delivery of the Terminal 2 project has demonstrated the wealth of expertise, skill and talent available across the country. The UK remains extremely competitive both on price and product quality. There are also obvious logistical advantages to buying locally or in-country. All of these factors helped our contractors to deliver to specification and to the required timescale.

9.3.2 Collaborating for mutual benefit

The experience of working with our suppliers on Terminal 2 has also highlighted a number of areas where collaboration between contractors, suppliers and, where applicable, public authorities, can bring about mutually beneficial results:

- **Focusing on best value, not the cheapest**
Unit cost should not be the only determining factor for procurement decisions. Ultimate value for money is also determined by, amongst other things, the quality, reliability and longevity of the product, as well as the ability of the supplier to meet deadlines
- **Training, up-skilling and apprenticeships**
As highlighted in a number of cases, big infrastructure projects provide a valuable opportunity for people to learn new skills and to bring through new talent. All parties involved in construction projects should ensure that these opportunities are exploited fully
- **Prompt payment**
Cash flow problems can hinder the growth of small- and medium-sized businesses – a number of Terminal 2 suppliers referred to the importance of prompt payment. Large businesses should show leadership by committing to fair and reasonable payment terms, and by paying suppliers on time.

9.3.3 Highlighting the importance of infrastructure for the country

Most importantly of all, we believe the experience of Terminal 2 shows how important investment in national infrastructure is for the whole country. Big infrastructure projects have the potential to make a significant contribution to economic growth and to improve people's lives. The UK must remain competitive as a destination for private investment if this potential is to be fully realised.

6.9.4 Procurement strategy

9.4.1 Placing sustainability centre stage

Heathrow is committed to enhancing the economic and social benefits of the airport while preventing or reducing its effects on the environment and local communities. This commitment is delivered through Heathrow's sustainability strategy, which sets out a clear vision of where we want to be by 2020, supported by targets and action plans. It is strongly embedded in our corporate strategy, reflected by the strategic objective 'to run our airport responsibly, safely and securely'. The procurement decisions we make directly impact our ability to achieve this objective.

9.4.2 Taking market conditions into account

It is very early for Heathrow to commit to a specific procurement strategy, as it is important that any strategy is aligned with the prevailing economic and market conditions at the time. Our risk appetite will align to the unique circumstances of the project, as this will be a significant factor in procurement strategy selection. We will procure in a responsible manner so as to demonstrate cost efficiencies to the airline community and other third-party stakeholders. We are a private company and our ability to raise the money will depend on that maturity, security of funding and the economy at the time of commitment. Our route to market will depend heavily on this environment.

9.4.3 Working together for success

A project of this size demands effective governance, accountability and decision making together. These come from clearly articulated sponsor requirements adopting whole life costing principles linked to service outcomes that

6.9 Our procurement approach

define the project or programme requirements. Heathrow is committed to working with the local and UK supply chain, and understands the importance of providing early visibility and commitment to its pipeline of programme opportunities for specific projects. To support this, we will continue to demonstrate our commitment to paying the supply chain on time as cash flow problems can hinder the growth of small- and medium-sized businesses.

6.9.5 Supply chain management

9.5.1 Putting responsibility first

Responsible supply chain management has been an embedded ethos at Heathrow since the mid 90s. Early engagement of the supply chain at all tiers has been a critical success factor at Heathrow, especially when procuring major projects. Pre-procurement engagement in raising interest in market technical requirements defined through open dialogue will also be part of this. Heathrow's Supplier Relationship Management process ensures that appropriate dialogue is active throughout the supply chain so as to align risk, reward and behaviours, thus engendering an integrated supply chain approach. As demonstrated on Terminal 5, back-to-back contracts do foster greater collaboration and supply chain integration. We would replicate this ethos in delivering expansion.

As an intelligent client we strive to understand the capacity of the supply chain and the impact our projects may have on it to avoid overloading the market. 'Buy clubs', again as proved on Terminal 5, can generate savings of up to 30% on component items bought collaboratively by the supply chain. Likewise Heathrow has operated such agreements with other infrastructure clients involved in the same project – for example, the recent M25 works associated with Terminal 5.

9.5.2 Driving efficiency through innovation

Heathrow's history in delivering large programmes of work, containing multiple projects, has encouraged innovative cost model thinking to drive efficiencies. As a client we create an environment that encourages innovation and a whole life approach, with safety in use just as important as safety in design and in construction. Heathrow is currently embarking on creating a series of engagement models, which balances the outputs required of a project/programme. These models focus on attributes such as cost certainty and cost transparency, and are supported by intelligent benchmarking and appropriate verification/audit. These models are then played off against inputs into the environment within which the project will be delivered – for example, scope maturity and client capability. It is the balancing of these factors that enables the right engagement model to be chosen. This will vary from project to project within our overall expansion programme. We would combine these models to help create our overarching procurement strategy our overall delivery programme.

9.5.3 Thinking ahead

Heathrow is a construction client leader and a strong advocate of the Government's construction strategy and its vision for construction in 2025. Our commitment to this strategy is both active and visual demonstrated by our continual drive towards excellence. Our support for industry is further demonstrated by our continued involvement with and commitment to IUK and Constructing Excellence. At Heathrow we continue to strive for 'Exceptional Performance' from ourselves and our supply chain. This will be demonstrated by continuing to evolve innovative procurement/construction thinking and in collaboration with the industry.

As an infrastructure sector client expert, Heathrow has demonstrated in the past that it is not afraid to embark on industry-leading procurement solutions. A delivery programme of this magnitude will demonstrate this philosophy in action once again.

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Heathrow is a leading UK construction industry client. We have delivered world leading construction projects over the last 12 years all within a busy operational environment. We will apply similar strategies to the build phase of delivery of an expanded airport. All the construction activity foreseen in our delivery programme is similar in nature and scale to what we have undertaken already. Heathrow takes seriously its responsibilities towards its neighbours and the environment during construction. We will develop a comprehensive Construction Environmental Management Plan in conjunction with local authorities and our communities, minimising the impacts of our works.

6.10.1 Heathrow's track record

Heathrow has demonstrated its capability to successfully deliver large-scale construction projects while maintaining full airport operations. Over the last 12 years the airport has been transformed through the construction of Terminal 5 and Terminal 2 – the first big moves towards the 'toast rack' layout. Both are world-leading terminals, and world-leading construction and design projects.



As our airline passengers' needs are constantly evolving, Heathrow faces a constantly changing construction and delivery challenge. Our team is experienced in developing not only its own capabilities to meet this challenge, but also those of our supply chain. These capabilities extend beyond building and involve financing, working with operation and delivery, and careful innovation to provide a successful airport solution.

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We have invested £11 billion over the last decade to deliver complex infrastructure within a busy operational environment. We have a proven track record of cost efficiency, airline customer engagement and industry-leading safety performance and have delivered:

- 1998: The award-winning Heathrow Express railway
- 2000: Hold baggage screening across Heathrow
- 2006: Works required for the first A380 aircraft
- 2007: The Heathrow Air Traffic Control Tower
- 2008: Terminal 5A and Terminal 5B (including the HEX and London Underground extensions to T5 and M25 motorway junctions)
- 2012: Terminal 5C satellite terminal
- 2014: Terminal 2A and Terminal 2B

6.10.2 Heathrow's construction strategy today

For a number of years, Heathrow has organised its capital investment into benefits led strategic programmes. These focus efforts on the value of the investment in the widest sense. They use operational experience, as well as IT and construction knowledge, to maximise the benefits of any given investment for the passenger, the airlines, the local community and Heathrow. Benefits Management seeks to optimise the benefits whilst keeping the time and cost affordable and risks acceptable

For the current five-year investment plan, our strategy for delivery is to continue to build on this strong programme structure. Each programme is supported by delivery teams populated by the appropriate supply chain, who are engaged in a long-term 'professional collaboration' to maximise the value delivered. We would adopt a similar approach on a similar scale for expansion works.

We are recognised as a leader in safe airport operation and construction. More than 4 million hours were worked on T2 without a reportable accident making it the safest site in the UK.

10.2.1 Our approach to design

The programme teams own the investment business case, which incorporates whole life cost and value. We ensure the design team explores the most innovative options and delivers appropriate high-quality solutions. These teams are supported by programme designers who, as multi-disciplinary design teams, bring approved support consultants to the design. Heathrow's focus on long-term relationships with both first and second tier designers ensures we have a virtual design community who are continually developing their support offering with high-quality designs and outcomes. Rather than 'one-off' innovations from a single architect, our approach ensures the full spectrum of worldwide innovation is employed for every project.

10.2.2 Our approach to logistics

In order to continually improve safety, minimise impact and drive down cost, Heathrow will continue to provide logistics support to facilitate movement of people, materials and vehicles across the airfield. We use a logistics depot and railhead to the west of the airport where all construction deliveries are marshalled. There we security screen deliveries before escorting them to the designated construction site. This is all coordinated to minimise impacts on airport users and the local community.

10.2.3 Our connection to the local community

Heathrow's place in the local community is key. Almost half of our employees live nearby. We encourage companies operating at the airport to recruit local people and to help them gain qualifications. Working with local schools enables us to raise awareness about airport careers, and we also provide access to career-building apprenticeships and in-house academies. We support award-winning programmes to help unemployed local people consider opportunities at Heathrow. Development on the scale proposed for expansion will create jobs for people across our community over the next five years as construction begins.

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10.2.4 Future capability for expansion

The current delivery strategy, although developed for Heathrow's current planned investment, has also considered the potential of increased investment in an additional runway, terminal and associated infrastructure. The programme teams will continue to develop a team of individuals and suppliers to deliver high-quality design solutions that would support a future three-runway project. Similarly the current strategy retains two 'delivery integrators' (contractors) working in the terminals and in the specialist area of baggage, and a further two in aircraft pavements and associated airfield infrastructure. This protects capability within the infrastructure supply chain and safeguards for potential mobilisation of further resources at Heathrow. This preparation will also allow a 'fast start' to the runway construction and enable the delivery to be accelerated, as the Heathrow team will be in place and ready.

6.10.3 Our future construction strategy

The construction strategy for expansion will be developed to meet the following objectives:

- Provide world-class safety and quality leadership
- Meet the requirements of all relevant statutory legislation, codes of practice, and Heathrow's corporate policies, including Heathrow's requirements for safety and security and those of the CAA
- Ensure the existing airport operations are not affected by construction activities
- Achieve a "fast start" by delivery enabling works early
- Carry out design, procurement and construction at an accelerated pace while ensuring best practice infrastructure delivery at all times
- Work with the local community to find optimal solutions
- Accelerate delivery through the use Business Information Modelling (BIM), soft landings and other innovative techniques
- Maximise off-site manufacturing, Heathrow knowledge and innovative design and construction techniques to deliver the early opening of the runway and associated infrastructure
- Deliver infrastructure as the demand requires.

These objectives will be met in a number of ways. The best individual or organisation will be used to deliver the infrastructure and manage the risk on packages of work. The Highways Agency, Thames Water and others will be invited to collaborate as part of the team. We demonstrated this approach successfully on the construction of Terminal 5.

Heathrow's experience as airport operator will inform the sequencing of infrastructure to deliver the vital assets for the operation of the third runway. Runway and stand capacity will therefore be available in 2025. Terminal capacity, starting in the west, will be delivered in a staged process as demand materialises. This will maximise the economic benefit to the passengers, airlines and wider UK businesses.

All aspects of phasing – from the initial site possession, service diversions, third-party works and archaeology, to construction and operational readiness – will be informed by how early benefits could be realised. Design will be informed by asset management principles that will ensure optimisation of the whole life of assets.

We will produce and publish a Code of Construction Practice. This will establish an Environmental Management Framework with measures for various categories including air quality, ground noise, transport, water and stakeholder relations. Techniques to minimise the impact on the local community will include offsite manufacture, the use of a local railhead, a 'just in time' delivery strategy and the use of a central logistics centre.

6.10.4 Nature of construction challenge

Our delivery plans require us to construct motorways, roads, airfield and runway infrastructure, stands and taxiways, terminals and satellite terminals, a control tower, track transit systems, integrated baggage systems, car parks and railway station infrastructure. We have built every single one of these in the last 10-15 years. The range and scale

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of construction is also similar to what we have sustained for a number of years. We foresee no insurmountable challenges in this programme for us or our UK supply chain. There is much detailed work still to do on structures, contracts and programmes, but we can build this programme with confidence.

6.10.5 Construction Environmental Management Plan (CEMP)

The CEMP would govern our undertaking of the construction works associated with Heathrow's expansion. The plan will provide guidance on measures to be taken into account to ensure that Heathrow's environmental legislative obligations and best practice measures will be met during the project's construction phase.

The Plan will be prepared in consultation with our Local Authorities, the Environment Agency and our local communities. It will set out how we will comply with the relevant Legislative and policy framework associated with our proposed construction. It will ensure that all consents, permits or licenses required for all works are obtained and that our environmental policy is shared amongst all our contractors working on the project.

The CEMP will also detail how we will comply with our environmental policy for activities at Heathrow Airport. We are committed to ensuring that the policy is upheld and in operation throughout all construction activities. A number of specific areas would be addressed as follows:

- Suitably designed measures for the mitigation of noise and vibration impacts resulting from construction activity would be captured within the CEMP, reflecting adequate measures for different types of works. These measures would be in line with BS 5228²¹ to minimise effects on staff, residents and the surrounding environment. Similarly, the CEMP would also include measures to minimise exhaust emissions from construction plant and surface access.
- There are several areas of potentially contaminated land surrounding the airport, mainly associated with landfill sites. Control and mitigation measures would be applied as part of preliminary works and during the construction phase to manage risks to human health and sensitive environmental resources as part of the CEMP.
- Archaeological investigation would take place as part of preliminary works and throughout the construction phase. This would include archaeological excavation and recording on-site, followed by post-excavation analysis. The scope of the archaeological excavation and recording, in advance of, and during construction operations would be agreed with relevant stakeholders and would be reflected in the CEMP.
- Measures included within the CEMP would be designed to avoid contravention of domestic and European regulatory controls such as *The Conservation of Habitats and Species Regulations 2010* (SI 2010/490) and the *Wildlife and Countryside Act 1981* (as amended) that relate to the protection of species.
- Specific measures to prevent adverse effects on water quality on surrounding water bodies during construction would be agreed with the Environment Agency prior to any construction activity commencing. Environmental control measures would reflect relevant guidelines such as the Agency's Pollution Prevention Guidelines (PPG5),²² as well as good practice and procedures to minimise risks. The CEMP would also outline measures to ensure the sustainable and efficient use of water and other resources.
- A Site Waste Management Plan (SWMP) would be produced for the development. In accordance with our Sustainability Action Plan²³ the SWMP would seek to minimise the amount of waste disposed of to landfills and increase recycling rates of materials generated during the construction phase.
- The CEMP would include measures that would be taken forward in order to reduce carbon emissions during construction. A detailed Construction Transport Management Plan (CTMP) would be produced in consultation the Local Authority and the Highway Authority prior to works commencing. The Plan would be aimed at minimising the number of vehicle movements generated by the construction and its potential adverse effects on users of the local road network. The requirements of the CTMP would be reflected in the CEMP and are expected to include measures to reduce the use of minor local roads by utilising main roads and motorways where possible, and encouraging the use of public transport by construction staff.

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6.10.6 Innovation in construction

Construction is a sector where Britain has a strong competitive edge. Heathrow has considerable expertise in delivering world class architecture, design and engineering. British companies are leading the way in sustainable construction solutions. It is also a sector with considerable growth opportunities, with the global construction market forecast to grow by over 70% by 2025.

In response to this the UK Government has sponsored the publication of paper by the Construction Leadership Council, which aspires to a 50% reduction in the overall time from inception to completion for new build and refurbished assets.

There is considerable research activity in the field of smart construction and digital engineering. Between 2016 and 2025 it is expected that the UK Government and industry will move to Level 3 Building Information Modelling (BIM), which is deeply embedded in the wider digital economy. This will require the further development of technologies and commercial models, and promises enormous benefits through delivering fully transparent data sharing capabilities across the supply chain. Industry and Government must commit to the Level 3 agenda in order to fully realise BIM's potential. Heathrow's programme is an ideal opportunity to make this happen.

Availability of digital information will also enable more effective design for manufacture and assembly. This will make offsite construction solutions, which are often precluded by current procurement practices, more readily applicable in the future. As demand for low carbon and sustainable construction continues to increase, the potential of offsite construction to deliver assets with half the waste and 25% less energy in use will make it an ever more attractive option.

Other benefits of offsite construction can include greater precision and quality, reduced overall manufacture/assembly time, and safer and cleaner working conditions. It is crucial that all construction options are considered on a level playing field to ensure assets are built in the most efficient way.

Recycling rates for Heathrow's construction projects are high. However our approach to managing construction waste is increasingly focused on waste prevention.

We encourage suppliers to innovate by considering opportunities for modular design and off site fabrication. This helps us to influence the amount of waste produced through improved product quality and uniformity, dimensional standardisations and manufacturing in controlled environments



6.11 Britain's choice

The key to delivery is sustaining support for our plans. We have laid out an overall approach for how we can deliver hub capacity for the UK. There is much still to work through, which will take years in itself. It is right that we should not be definitive in every detail for two reasons. The first is that the Airports Commission's remit is to resolve the policy question of the needs, location and policy conditions for any new airport capacity. It is not to approve a fully formed airport design or delivery programme. That work will be undertaken through the planning consent process, working with relevant authorities on questions such as airspace design, and consultation with our airline customers, stakeholders and regulators. The second reason is even more fundamental: we need to debate plans progressively with a wide range of people to improve them. Submissions and announcements from a promoter alone will not suffice. That approach is crucial not only to winning permission to deliver capacity, but also to ensure it is the capacity that will take Britain the furthest.

In 2010 all three major party leaders rejected plans for a third runway at Heathrow. We have been clear from the very beginning of the Airports Commission process that any new plans needed to be significantly different from what was previously rejected. We believe this plan is different. A remaining question is whether the plans can win the public support that was missing in 2010. We believe they can, and the evidence shows that expansion at Heathrow is politically deliverable.

6.11.1 National support

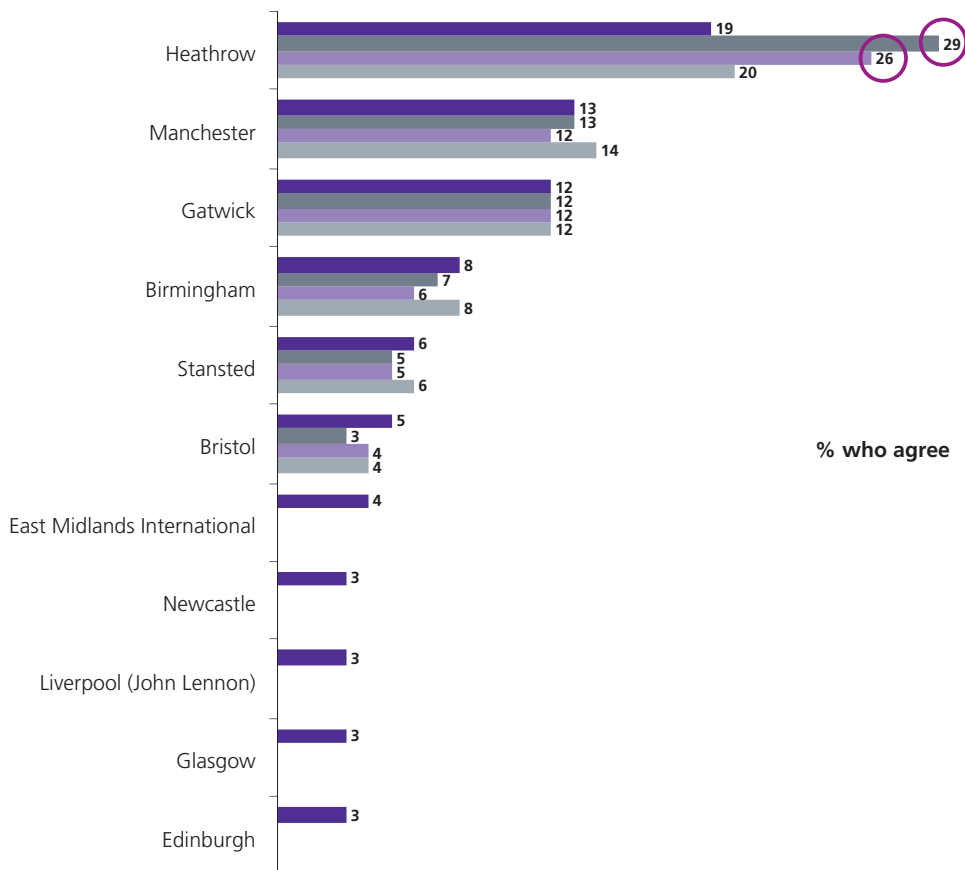
Heathrow is viewed positively across the UK. It is the preferred airport to fly from within the UK. When asked to rank their preferences for airport expansion in the south east, the UK public was clearly in favour of expansion at Heathrow. Recent research²⁴ highlights the UK's population recognition of and appreciation for Heathrow in terms of economic growth.

Heathrow remains the most preferred airport to fly from within the UK. 19% of the UK population identifying Heathrow is their first choice. This is followed by Manchester and then Gatwick, with 13% and 12% respectively, as shown in Figure 6.34.

Two passenger groups we serve particularly well and are associated with, 'business travellers' and those 'visiting friends and relatives' recognise the advantages of flying through Heathrow. Their preference scores are considerably higher than the UK average at 29% and 26% respectively.

6.11 Britain's choice

Figure 6.34: Preference levels for UK airports



Q: Based on your experience, or what you have heard, which of the following UK airports would be your preferred choice to fly from?

■ All passengers ■ Business ■ Visiting friends and relatives ■ Any other leisure

Source: HPI 'Making Every Journey Better' research, April 2014

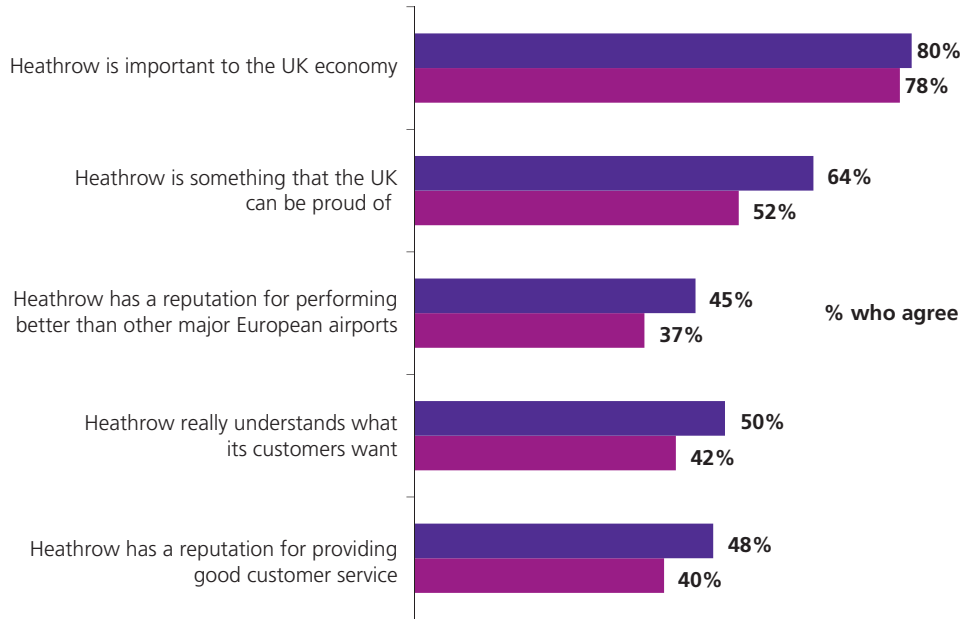
Furthermore,

- Preference increases to 41% amongst those who have flown from Heathrow within the past 24 months - evidence that the actual experience of flying through Heathrow is a positive one.
- At a regional level, high scores are achieved in areas in close proximity to Heathrow. It is also high in regions as diverse as East of England, South East of England, Wales, East Midlands and Northern Ireland.
- Heathrow receives the highest relative preference scores among 18-24 and 25-34 year olds; groups that will form our passengers and business travellers of the future.

The following graph highlights general attitudes towards Heathrow and demonstrates the increasingly positive feeling towards the airport. Of particular note are those who feel Heathrow is something the UK can be proud of and recognition of its good customer service. There has also been an encouraging increase in those who believe Heathrow is performing better than other major European airports, in line with actual satisfaction results from passenger surveys.

6.11 Britain's choice

Figure 6.35: Attitudes towards Heathrow



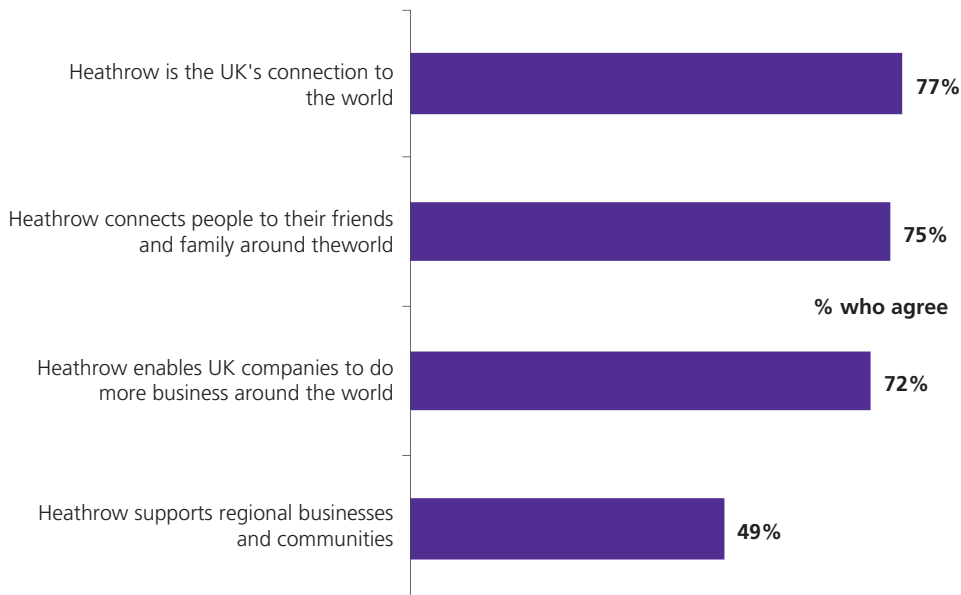
Q: How much do you agree or disagree with the following statements about Heathrow?

■ 2014 ■ 2011

Source: HPI 'Making Every Journey Better' research, April 2014

Further analysis indicates there is a widespread acknowledgement and appreciation of the role that Heathrow plays in connecting the UK to the world and facilitating economic growth. In all instances, those with a relationship with Heathrow (ie have flown at least once through Heathrow) are more positive about Heathrow's contribution.

Figure 6.36: Attitudes towards the benefits Heathrow brings



Q: How much do you agree or disagree with the following statements about Heathrow?

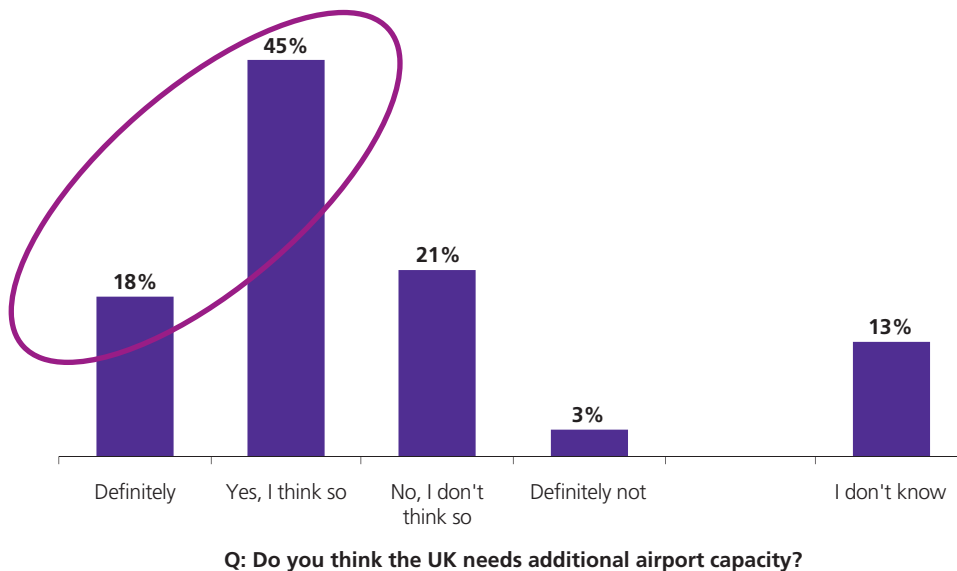
Source: HPI 'Making Every Journey Better' research, April 2014

6.11 Britain's choice

Approximately half of all people (47%) would recommend Heathrow, irrespective of usage. This increases to 60% of those who have flown through Heathrow in the past and 86% who have stated Heathrow is their preferred airport.

Sixty-three per cent of the UK public agree that the UK requires additional airport capacity. This figure should be viewed within context. Those who have not flown recently (ie more than 2 years ago) or never flown at all are less supportive. Only 49% and 35% agree airport capacity should be increased respectively bringing down the overall figure. Conversely, 77% of business travellers agree airport capacity should be increased.

Figure 6.37: Public opinion on increasing UK airport capacity



Source: HPI 'Making Every Journey Better' research, April 2014

The public is aware of the benefits airport expansion will bring; around seven in ten understand the potential economic advantages.

Figure 6.38: Attitudes towards the benefits of additional airport capacity in the UK

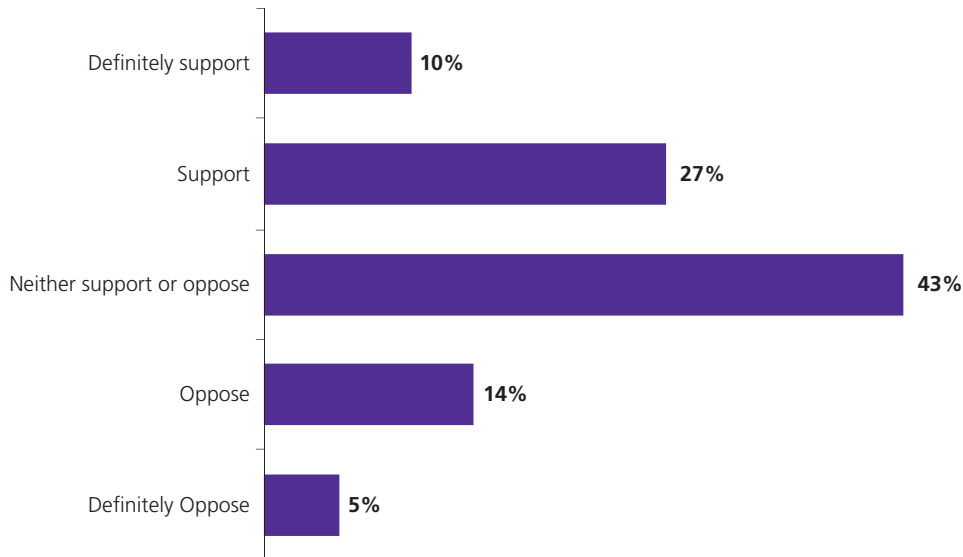


Q: How much do you agree or disagree with the following statements about Heathrow?

6.11 Britain's choice

Support for expansion at Heathrow is at 37%. 43% are ambivalent. Only 20% oppose outright. Interestingly, support is widespread and is not limited to regions in closest proximity to Heathrow.

Figure 6.39: Levels of support for building extra capacity at Heathrow

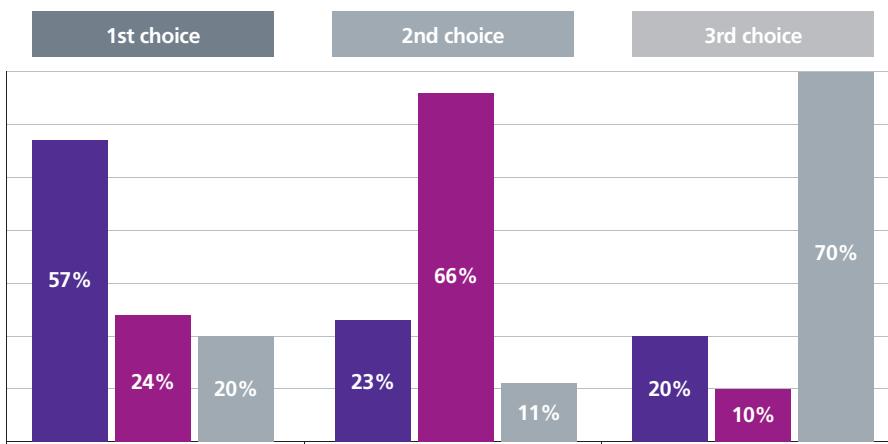


Q: Taking everything into account, would you support or oppose building extra capacity at Heathrow?

Source: HPI 'Making Every Journey Better' research, April 2014

When asked to rank their preferences for airport expansion within the South East, the UK public was clearly in favour of expansion at Heathrow.

Figure 6.40: Airport preference for expansion in the south east



Q: Taking everything into account, would you support or oppose building extra capacity at Heathrow/Gatwick/Isle of Grain?

■ Heathrow ■ Gatwick ■ Isle of Grain

Source: HPI 'Making Every Journey Better' research, April 2014

Heathrow is the preferred option for airport expansion in all regions bar South East where unsurprisingly opinions remain divided.

6.11 Britain's choice

6.11.2 Local support

Views amongst those people most directly affected by any expansion at Heathrow are important. We described in Section 2 the extent of our engagement with our local communities. We have also undertaken extensive research to understand overall levels of support or opposition. The research suggests that there is a local majority in support of expansion and that fewer people are opposed to growth over time.

From 2011 we have commissioned Populus to conduct research among local residents on our behalf. Our aim has been to provide further insight into their perception of Heathrow. Since then Populus have conducted more than 28,000 interviews with local residents as part of seven waves of research.

The first four waves of research were conducted with residents local to Heathrow between autumn 2011 and autumn 2012. A total of 8,027 interviews were conducted, with approximately 2,000 conducted in each wave. In each wave, residents were divided into three different noise boundaries (high, moderate or low noise bands).

The three most recent waves of research were conducted between February 2013 and February 2014.

- In February – May 2013 we interviewed 6,000 residents across five constituencies and one London Borough local to Heathrow (1,000 interviews in each of Spelthorne, Feltham and Heston, Brentford and Isleworth, Richmond Park, Windsor, and the London Borough of Hillingdon)
- In November 2013 we interviewed 7,000 residents across the constituencies and borough above as well conducting an additional 1,000 interviews in Ealing Central and Acton constituency.
- In March 2014 we conducted 7,000 interviews across seven local authorities (1,000 interviews in each of Hounslow, Spelthorne, Richmond-upon-Thames, Kingston-upon-Thames, Ealing, Windsor and Maidenhead and Hillingdon)

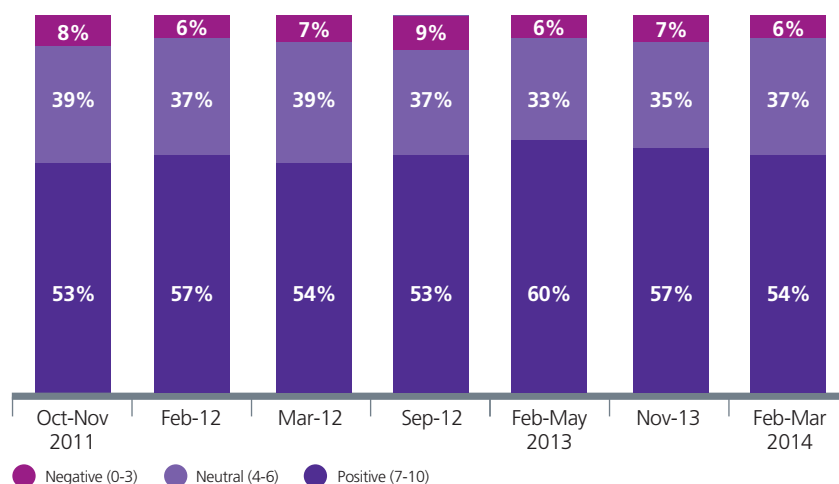
All interviews were conducted by telephone. Demographic quotas and weighting were used to ensure that each survey was representative of the adult population in that area.

6.11.3 Overall attitudes towards Heathrow

Throughout all seven waves of research residents were asked how positive they felt towards Heathrow Airport on a scale of 0-10, with 0 meant very negative, 10 very positive, and 5 was neutral.

In each wave more than half of local residents were positive towards the airport (ranging from 53% to 60%). Between one-third and two-fifths of residents were neutral and less than 10% of local residents were negative towards the airport.

Figure 6.41: Overall attitudes towards Heathrow



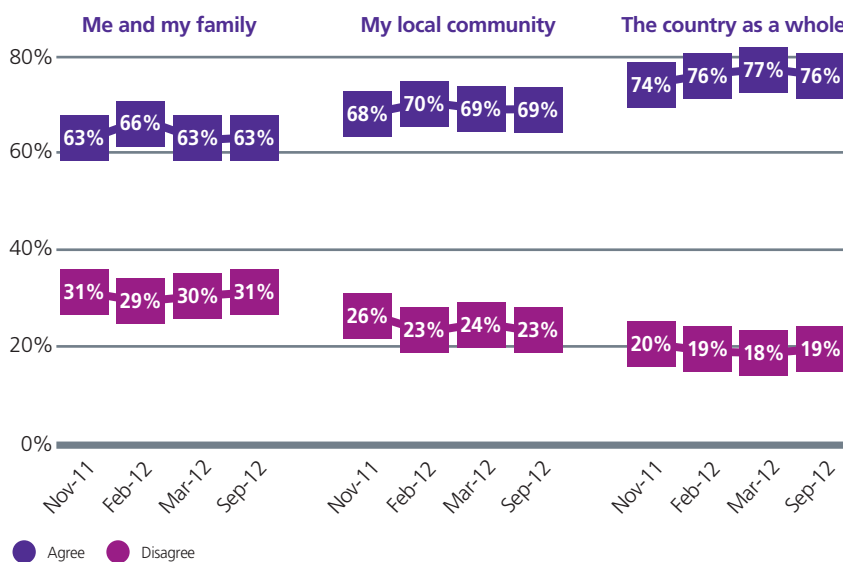
6.11 Britain's choice

6.11.4 Perceptions of the benefits of Heathrow

Throughout the first four waves residents were asked about the perceived balance between the benefits and disadvantages of Heathrow.

In all four waves, more than three-in-five local residents agreed that the benefits of Heathrow outweighed the disadvantages for them and their family. Similarly, more than two-thirds agreed the benefits outweighed the disadvantages for their local community, and three-quarters agreed that the benefits outweighed the disadvantages for the country as a whole.

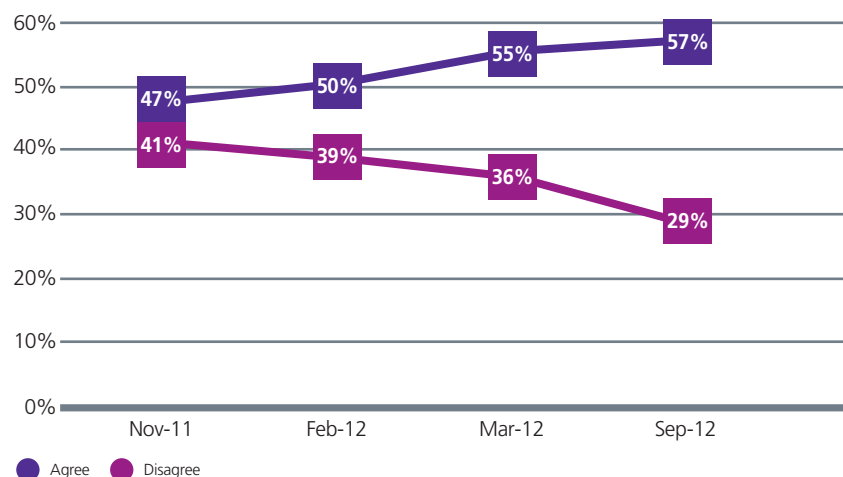
Figure 6.42: Perceptions of the benefits of Heathrow



Populus also asked residents whether they agreed that Heathrow “does all it can to manage the environmental and noise impacts of the airport”.

Between November 2011 and September 2012 the proportion of residents agreeing with this statement increased from just under half (47%) to almost three-fifths (57%).

Figure 6.43: Is Heathrow working to keep the noise impacts to a minimum



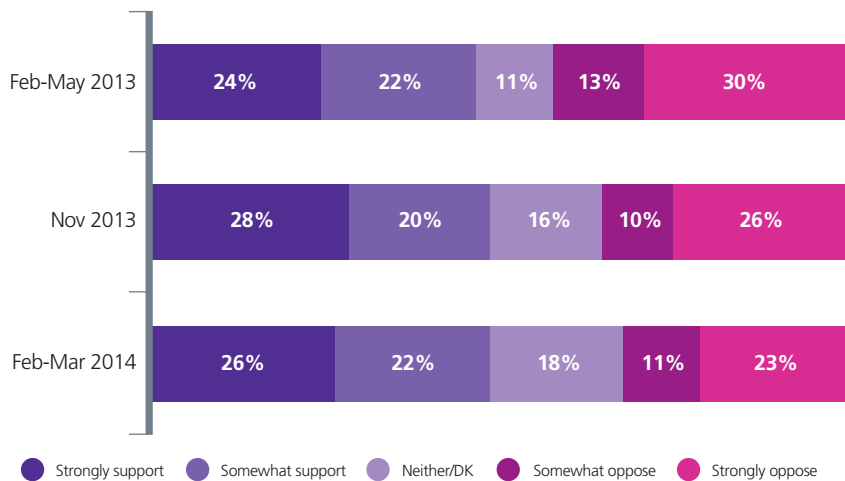
6.11 Britain's choice

6.11.5 Local residents' views of expansion

In the three most recent waves of research conducted in local constituencies and boroughs, Populus has asked residents whether they support or oppose expanding Heathrow.

In each wave, just under half of residents have supported expanding Heathrow. In Feb-May 2013 43% of residents opposed Heathrow, but this fell to 36% of residents in November 2013 and 34% of residents in Feb-March 2014.

Figure 6.44: Local residents' views of expansion



The research covered a statistically representative sample of those who stand to be most affected by Heathrow expansion, who have traditionally been seen as opposed to growth. It confirms that a silent majority of people in local boroughs support the airport and its plans for a third runway.

The research suggests that far from being politically impossible, a third runway at Heathrow could garner positive support. 48% of residents said they supported expanding Heathrow, while 36% were opposed. 57% of voters said they feel positive towards Heathrow, while 35% feel neutral and just 7% feel negative towards the airport.

6.11 Britain's choice

6.11.6 Our commitments to Britain

We have made ten commitments that set out what Britain can expect from a third runway at Heathrow and which show the difference between our proposal today and the proposals of the past. **If Government supports a third runway at Heathrow, we will:**

Figure 6.45: Our commitments

	Our commitments	Our approach
1	Connect Britain to economic growth	by enabling airlines to add new long-haul flights to fast-growing markets
2	Connect UK nations and regions to global markets	by working with airlines and Government to deliver better air and rail links between UK regions and Heathrow
3	Protect more than 100,000 existing local jobs and create more than 100,000 new jobs nationwide	by developing our local employment, apprenticeships and skills programmes and supporting a supply chain throughout the UK, including during construction
4	Connect exporters to global markets	by doubling Heathrow's freight handling capacity
5	Build more quickly and at lower cost for taxpayers than building a new airport	by building on the strength the UK already has at Heathrow
6	Reduce aircraft noise and lessen noise impacts for people under flight paths	by encouraging the world's quietest aircraft to use Heathrow, routing aircraft higher over London, delivering periods with no aircraft overhead and allocating £250m to provide noise insulation
7	Treat those most affected by a third runway fairly	by proposing compensation of 25% above market value, all legal fees, and stamp duty costs for a new home for anyone whose home needs to be purchased
8	Increase the proportion of passengers using public transport to access Heathrow to more than 50%	by supporting new rail, bus and coach schemes to improve public transport to Heathrow and considering the case for a congestion charge
9	Keep CO ₂ emissions within UK climate change targets and play our part in staying within local air quality limits	by incentivising cleaner aircraft, supporting global carbon trading, and increasing public transport use
10	Reduce delays and disruption	by eliminating the routine use of aircraft stacks and further improving Heathrow's resilience to weather and unforeseen events

6.11 Britain's choice

6.11.7 The choice for Britain

We are confident our plan will deliver the key capacity the UK needs to maintain its status as a global aviation hub. That capacity will deliver the global connections Britain needs to support a thriving economy in 21st century. We can deliver a plan that takes Britain further.

We called our submission to the Airports Commission last July "A New Approach". It was a very consciously chosen title. Compared with the 2009 proposal, our new plans deliver greater benefits with fewer impacts. The scheme laid out in this report builds further on that. Our latest plans will generate more jobs, have more capacity for freight exports, and link every region of the UK to growth while seeing fewer people affected by noise, fewer homes demolished, and providing new green space and flood protection for local residents. There will be further improvements that can still be made and we are committed to continuing to listen to those with an interest in our plans. As outlined above lack of public support is no argument to dismiss these plans. Expansion can win public and political support.

Britain faces a choice. We have one of the world's most successful hub airports in Heathrow. We can decide to build on this strength or we can start again from scratch. Building on our existing strength at Heathrow will connect the whole of the UK to growth, keep Britain as an ambitious global nation and help the UK win the global race. Starting from scratch will see the UK fall behind. Heathrow takes Britain further

Now more than ever Britain needs to be connected. Instead, with each passing year we are cutting ourselves off from jobs and growth.

It's time to have the vision and the courage to connect Britain to the growth it needs.

It's time for a third runway at Heathrow.



References

¹ Airports Commission Interim Report, 17 December 2013, Para 5.125

² Airports Commission Interim Report, 17 December 2013, Para 7.36

³ This is especially the case if, for operational reasons, the new capacity will not all be available immediately, or it takes time for new demand to fill the available capacity.

⁴ Subject to discounting for the time value of money.

⁵ See paragraph 7.27.

⁶ Economic regulation at Heathrow from April 2014: Notice granting licence, pp261, paragraph E103

⁷ Economic regulation at Heathrow from April 2014: Notice granting licence, pp253, paragraph E72

⁸ Note that this does not necessarily imply five year price control periods.

⁹ More precisely, the average aeronautical revenue per departing and arriving passenger.

¹⁰ See work by Frontier Economics, "Impact of airport expansion options on competition and choice".

¹¹ APD is paid by departing non-transfer passengers only.

¹² The Future of Air Transport White Paper, Department for Transport, December 2003

¹³ Aviation Policy Framework, Department for Transport, March 2013

¹⁴ National Planning Policy Framework, Department for Communities & Local Government, March 2012

¹⁵ The London Plan, Mayor of London/Greater London Authority, July 2011

¹⁶ Strategic Economic Plan 2015/16 – 2020/21, Thames Valley Berkshire Local Enterprise Partnership, March 2014

¹⁷ http://thamesvalleyberkshire.co.uk/About_The_LEP

¹⁸ Strategy for Growth, Enterprise M3 LEP, May 2013

¹⁹ The Enterprise M3 Strategic Economic Plan 2014 – 2020, Enterprise M3 Local Enterprise Partnership, March 2014

²⁰ London Heathrow Economic Impact Study, Sep 2013, Regeneris Consulting

²¹ The British Standards Institution 2014 Code of practice for noise and vibration control on construction and open sites – Part: 1 Noise and Part 2: Vibration BS 5228-1:2009+A1:2014

²² Environment Agency (2007) Pollution Prevent Guidelines: Works and maintenance in or near water: PPG5.

²³ Heathrow Airport Limited Towards a sustainable Heathrow – Sustainability Action Plan Review 2011 (http://www.heathrowairport.com/static/HeathrowAboutUs/Downloads/PDF/Sustainability/Sustainability_Action_Plan_Review_2011.pdf)

²⁴ We recently undertook research among a nationally representative sample of 2000 UK adults, boosted with 500 Heathrow users to understand current perceptions of Heathrow. The survey was undertaken by HPI during 1-8 April 2014.

Part 7

Glossary of terms



7.1 Glossary of terms

ACDM	Airport Collaborative Decision Making (ACDM) project at Heathrow Airport Limited is a joint initiative between all airport partners- Aircraft Operators, Ground Handlers, Air Traffic Control, NATS and Heathrow. The key aim of ACDM is to facilitate the sharing of operational data to allow better informed decisions to be made.
ACL	Airport Coordination Limited
AEF	Aviation Environment Federation
AOC	Airline Operators Committee – represents airline interests at airports.
Aero revenue	That part of an airport’s revenue derived from a number of charges levied on airlines using the airport
ANCON	The UK Civil Aircraft Noise Contour Model (ANCON) is the mathematical model used by the CAA to produce annual aircraft noise contours depicting the magnitude and extent of the aircraft noise around Heathrow, Gatwick and Stansted. It is also used to produce noise exposure forecasts for use in airport planning
AONB	Areas of Outstanding Natural Beauty
ATET	Around the End Taxiways
ATC	Air Traffic Control
ATMs	Air Transport Movements. Landings or take offs of aircraft engaged in the transport of passengers or freight on commercial terms
BA	British Airways
BCC	British Chamber of Commerce
Belly hold freight	Refers to cargo on passenger services
Bilateral agreements	An agreement which two nations sign to allow international commercial air transport services between their territories on a reciprocal basis
CAA	Civil Aviation Authority
Capacity constrained forecast	Future passenger and ATM demand is limited to airport capacity where no significant additional runway or terminal capacity added
Capacity unconstrained forecast	Passenger and ATM demand is not limited by runway or terminal capacity
Carbon capped forecast	Modelling scenarios where CO2 emissions in 2050 are limited to 2005 levels through higher carbon prices
Carbon traded forecast	Modelling scenario where CO2 emissions are part of an ETS, but not limited to any target
CCC	UK Committee on Climate Change
CDG	Paris Roissy-Charles de Gaulle Airport (IATA code)
CGE	Computable General Equilibrium modelling
Charter airlines	These airlines provide charter aircraft specifically for the holidays they sell and/or respond to ad-hoc demand as opposed to providing a year round schedule
CIVET	Grouping acronym that refers to the countries of Colombia, Indonesia, Vietnam, Egypt, Turkey and South Africa

7.1 Glossary of terms

Cranford Agreement	A verbal agreement made in the 1950s to avoid use of Heathrow northern runway for take-offs in an easterly direction over the village of Cranford.
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
DfT	Department for Transport
DPI	Departure Planning Information
DXB	Dubai International Airport
EC	European Commission
EEA	European Economic Area
EILS	Enhanced Instrument Landing System
ERCD	The Environmental Research and Consultancy of the CAA estimates the noise exposures around London airports (Heathrow, Gatwick and Stansted) on behalf of the Department for Transport
EU	European Union
EU ETS	EU Emissions Trading System
European airports	Classified as the airports located in the European Economic Area (EEA), including for this purpose Croatia, Switzerland and the dependent territories of EEA States
FAS	Future Airspace Strategy
FDI	Foreign Direct Investment
Feeder traffic	Feeder traffic comprises connections at particular airports which 'feed' or connect passengers onto ongoing flights. These ongoing flights are therefore supported by higher passenger volumes than otherwise would be the case
FERA	Food and Environment Research Agency
Fifth freedoms	Fifth freedoms allow an airline permitted to operate a service between that airline's home country and the UK, also to pick up passengers on the arrival of that service in the UK and carry them on to a third country (and on returning from that third country to drop off passengers whose destination is the UK before continuing on back to its home country). An example might be a flight which originated in Dubai, stopped at Manchester to pick up and drop off passengers and then continued to New York
FRA	Frankfurt Airport (IATA code)
Freight forwarders	Freight forwarders provide a link between freight customers and those with air freight capacity, typically full service scheduled airlines which provide cargo capacity on passenger services, known as 'belly hold'
Freighters	Also known as integrated air freighters

7.1 Glossary of terms

Fully independent operations	Fully independent operations occur when there is no interdependence between the use of runways at an airport with more than one runway
GBAs	Ground Based Augmentation system
GDP	Gross Domestic Product (National Income)
General aviation	General aviation (GA) can be defined as a civil aircraft operation that is not a commercial air transport flight operating to a schedule. General aviation flights range from gliders and powered parachutes to corporate jet flights
GHG	Greenhouse gas emissions
Grandfather rights	Grandfather rights refer to the rights of an airline to retain a series of airport slots on the basis of historic precedence. This historic precedence is determined if the slots have been operated at least 80% of the time during the period allocated in the previous equivalent season. Historic slots may not be withdrawn from an airline to accommodate new entrants or any other category of aircraft operator. Confiscation of slots for any reason other than proven intentional slot misuse is not permitted
GTP	Global Temperature-change Potential
GVA	Gross Value Added
HAL	Heathrow Airport Limited
Heathrow Q6	Heathrow Q6 relates to the sixth review that the CAA is undertaking of the economic regulation of operators of airports in the UK. Q6 relates to the period 2014-2019
HMRC	Her Majesty's Revenue and Customs
Holding stacks	A holding stack is a fixed circling pattern in which aircraft fly whilst they wait to land. When airports are busy, there can be a build up of aeroplanes waiting to land. Aircraft will sometimes circle around in the stack until air traffic controllers are able to fit them into the landing pattern
HS1	High Speed 1 (HS1) is a 108 kilometre high-speed railway between London and the United Kingdom end of Channel Tunnel, through Kent.
HS2	High Speed 2 (HS2) is a planned high - speed railway between London Euston, the English Midlands, North West England and the Central Belt of Scotland.
HSSE	Health Safety and Security Executive
IAG	International Airlines Group. IAG is the holding company of British Airways and Iberia
IATA	International Air Transport Association (airline trade body)
ICAO	International Civil Aviation Organisation
I-I	International to International interliners i.e. passengers who are transferring via a UK airport with their origin and destination outside the UK
ILS	The Instrument Landing System (ILS) is a standard system for navigation of aircraft upon the final approach for landing
IMF	International Monetary Fund

7.1 Glossary of terms

INM	The Integrated Noise Model (INM) is a computer model that evaluates aircraft noise impacts in the vicinity of airports. The INM can output either noise contours for an area or noise level at pre-selected locations. The noise output can be either exposure-based, maximum-level-based, or time-based
Integrated air freighters	Integrated air freight companies are dedicated logistics companies, such as FedEx, DHL, and UPS, that offer a complete end-to-end express delivery service and typically control the entire logistics chain from collection to delivery
IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative reasons of overriding public interest
Isochrone	An isochrone is a line on a map or diagram connecting places from which it takes the same time to travel to a certain point
JFK	John F Kennedy Airport – New York (IATA code)
LAeq	Leq is the noise measure used to describe the average sound level experienced over a period of time resulting in a single decibel value. This approach is used beyond aviation to measure most environmental noise exposure. Leq is most commonly used with the A-weighted scale, expressed as LAeq. The A-weighted sound level is the most widely used to quantify sound from all modes of transport. When considering LAeq, it is always necessary to quote the time period over which the LAeq applies. UK airports produce noise contours showing locations of equal noise exposure over 16 hours (LAeq16H) in effect presenting the average sound level experienced within certain areas around the airport between the hours of 07:00 and 23:00. Historically, UK policy has been to use 57 LAeq16H as the level of daytime noise marking the approximate onset of significant community annoyance and this value has influenced the production of annual contour maps at many airports. Measurements are always in decibels (dB), though these are not stated.
LAMP	London Airspace Management Programme
Landside	Landside means all areas of an airport located before the security checkpoint, including all publicly accessible areas, car parks, check-in zones, arrivals hall and surface access facilities
LCC	Low-Cost Carrier
LCY	London City Airport (IATA code)
LDEN	LDEN is the 24-hr Leq calculated for an annual period, but with a 5 decibel weighting for evening and a 10 decibel weighting for night to reflect people's greater sensitivity to noise within these periods
Legacy carriers	The legacy carrier business model is based on sustaining global route networks. As such, legacy carriers are based at one or more hub airports where their passengers can connect between a variety of flights. Traditionally legacy carriers were national carriers. Most of them are members of one of the three global airline alliances. Legacy carriers are also known as network airlines and full service carriers in this report
LHR	Heathrow Airport (IATA code)
Long-haul	Long-haul depicts a destination (or route) to or from a country that is not listed in the group of countries as part of the group of countries defined

7.1 Glossary of terms

	as 'Western Europe' (or 'short-haul')
Low-cost carrier	Low-cost carriers apply a business model that relies on reducing operating costs to provide passengers with relatively cheap tickets. The model has so far been very successful on short-haul routes
LTMA	London Terminal Manoeuvring Area. This airspace contains the arrival and departure routes for the five major civil airports in the London area: Heathrow, Gatwick, Stansted, Luton and London City
MARS	Multi- Aircraft Ramp System
MCT	Minimum Connecting Time. The minimum time needed to transfer passengers from one flight to another
Medium-term options	Medium-term options are those which do not require the provision of additional runways or terminals, but which may need more than five years to deliver (for example, measures requiring significant planning approvals to be obtained or improvements in surface access infrastructure serving an existing airport)
Mixed mode	Mixed mode operations would allow runways to be used for scheduled arrivals and departures at the same time
MLS	The Microwave Landing System (MLS) is an all-weather precision guidance system making aircraft landings possible at more locations and providing flexibility in approach paths
Mppa	Million passengers per annum
NAPAM	The DfT's National Air Passenger Allocation Model
NAPDM	The DfT's National Air Passenger Demand Model
Narrow bodied jets	A narrow-body aircraft has a typical aircraft cabin width of 3 to 4 metres allowing for between 2 and 6 passengers to sit side by side. Narrow-body aircraft are commonly used for short-haul flights as their range will not allow transatlantic or transcontinental flights
NATS	National Air Traffic Services
Natura 2000 network	Natura 2000 is an EU wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs)
NCEs	Non-CO ₂ emissions
NCIS	Noise Complaints and Information Service
Net additional capacity	Additional runway capacity over and above the level of runway capacity available today
Network airlines	The network airline business model is based on sustaining global route networks. As such, network airlines are based at one or more hub airports where their passengers can connect between a variety of flights. Traditionally network airlines were national carriers. Most of them are members of one of the three global airline alliances. Network airlines are also known as legacy carriers and full service carriers in this report
NIC	Newly Industrialised Country

7.1 Glossary of terms

Night noise regime	The Government has historically set restrictions on the operation of aircraft at night at Heathrow, Gatwick and Stansted. The restrictions are collectively known as the 'night flying regime' and have been based on: setting a limit on the overall number of night flights; placing restrictions on the noisiest aircraft types; and setting noise quotas which cap the amount of noise energy which can be emitted at night over the course of the regime
Noise contours	Noise contours are lines on a map showing where equal levels of noise are experienced
Noise envelopes	The concept of a 'noise envelope' is one which would create a balance between aviation growth and noise reduction with the objective of incentivising airlines to introduce quieter aircraft whilst giving local communities more certainty about the levels of noise they may expect in the future. A noise envelope can be created through the introduction of a movement cap, a quota count system or by setting passenger number limits
Noise quota	Noise quotas form part of the Government's night noise regime. The noise quota caps the amount of noise energy which can be emitted at night over the course of the regime
Noise respite	The principle of noise respite is to provide defined periods of noise relief to people living directly under the flight path
nmi	Nautical mile
NOx	Nitrogen oxides
NPRs	Noise Preferential Routes. Paths known as Noise Preferential Routes (NPRs) are followed by aircraft departing airports in the London area. NPRs were set by the Department for Transport (DfT) in the 1960s and were designed to avoid overflight of built-up areas where possible
NPS	National Policy Statement
NSIPs	Nationally Significant Infrastructure Projects
Obstacle limitation surfaces	This refers to the definition of airspace around airports which must be maintained free from obstacles in order to ensure safe airport operations
OD market	Origin and destination markets are characterised by passenger demand for travelling to/from the city in which their air journey starts (the origin "O") and the city in which it ends (the destination "D")
Passenger	Passenger throughput is the number of passengers forecast to pass through the airport in any given year.
Parking stand	Parking stand (also "stand) means the area of an apron on which an aircraft is parked, refuelled, loaded and unloaded.
Pier	Pier is a building providing passenger access to the aircraft parked around it
Point-to-point connection	A point-to-point connection means a direct connection between two destinations
Predict and provide approach	An approach based on forecasting future demand and then meeting that demand no matter the cost
PSO	Public Service Obligation. In order to maintain appropriate scheduled air services on routes which are vital for the economic development of the region they serve, European Member States may impose PSOs on these

7.1 Glossary of terms

	routes
PSZ	Public Safety Zones
Quota count	At Heathrow, Gatwick and Stansted, aircraft operating at night are classified according to a Quota Count (QC) classification system for landing and taking off. The QC classification system is based on the noise emitted by aircraft type and aircraft are given a QC value according to the noise they emit. Airports operating the system have a fixed quota for each of the summer and winter seasons which incentivises airlines to invest in quieter aircraft
RAB	Regulated Asset Base is the historic efficient investment in regulated assets by the company, against which the company is allowed to earn a return
Ramsar designations	Ramsar sites are wetlands of international importance, designated under the Ramsar Convention
Regional airports	For the purposes of this report, 'regional airports' refers to the following airports: Southampton, Norwich, Southend, Bristol, Cardiff, Bournemouth, Birmingham, East Midlands, Coventry, Manchester, Newcastle, Liverpool, Leeds, Bradford, Durham Tees Valley, Doncaster – Sheffield, Humberside, Blackpool, Glasgow, Edinburgh, Aberdeen, Prestwick, Inverness, Belfast International and Belfast City. This is consistent with the approach taken by the DfT aviation forecasts
Reliever airports	The 'reliever airport' concept would see smaller airports and airfields in the vicinity of congested airports are designated to handle specific types of traffic, with a particular emphasis on business and general aviation, as well as smaller aircraft flying scheduled services
Resilience	Resilience refers to the ability of an airport to be able to anticipate, absorb or recover from unforeseen events, whether they arise from late passengers or aircraft, or from extraneous events such as fog, low visibility, or strong winds
Respite	Respite means a period of relief from noise from aircraft flying overhead. Respite can be provided by runway alternation or by reducing the frequency of movements
Runway alternation	Runway alternation refers to the practice whereby the designated landing runway is changed at 15:00 (so that the designated departure runway becomes the landing one) when the airport is operating during westerly operations providing predictable periods of relief from the noise of landing aircraft for communities under the final approach tracks to the east of the airport
Runway capacity	Runway capacity is the theoretical maximum number of ATMs possible per annum for a given movement rate taking account of restrictions on night flights
SAS	Scandinavian Airlines
RNAV	Area navigation (RNAV) is a method of instrument flight rules (IFR) navigation that allows an aircraft to choose any course within a network of navigation beacons, rather than navigating directly to and from the beacons. This can conserve flight distance, reduce congestion, and allow flights into airports without beacons. Area navigation used to be called "random navigation", hence the acronym RNAV

7.1 Glossary of terms

Scheduled monuments	'Scheduling' is shorthand for the process through which nationally important sites and monuments are given legal protection by being placed on a list, or 'schedule'. English Heritage takes the lead in identifying sites in England which should be placed on the schedule by the Secretary of State for Culture, Media and Sport
SEA	Strategic Environmental Assessment. The SEA identifies the significant environmental effects that are likely to result from the implementation of the plan or alternative approaches to the plan
Segregated mode	Under this model of airport operations, one runway is used for arrivals and the other for departures. Heathrow airport operates under segregated mode
Self connecting	Customers may decide to 'self connect' from one flight to another in the absence of airlines facilitating such connections
SERAS	South East of England Regional Air Services Study
SES	Single European Sky
Shadow cost	The extra cost of flying required to reduce passenger demand from above an airport's runway or terminal capacity, to a level that is back within capacity
Short-term options	Short-term options are those which could be delivered without the provision of additional runways or terminals, within 5 years of the publication of our interim report in December 2013
Short- Haul	For the purposes of this report, 'short-haul' has been defined in the same way as 'Western Europe' and comprises the following group of countries: Andorra; Austria; Belgium; Bosnia Herzegovina; Cape Verde; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Faroe Islands; Finland; France; Germany; Gibraltar; Greece; Greenland; Hungary; Iceland; Ireland; Italy; Latvia; Lithuania; Luxembourg; Macedonia; Malta; Republic of Moldova; Monaco; Montenegro; Netherlands; Norway; Poland; Portugal; San Marino; Serbia; Slovakia; Slovenia; Spain; Sweden; Switzerland; Turkey; United Kingdom. This is consistent with the DfT's definition of 'Western Europe' as used in their aviation demand modelling
SIDs	Standard Instrument Departure routes – the planned departure routes within the noise preferential routes
Slots	Airport slots are rights allocated to allow airlines and other aircraft operators to schedule a landing or departure at an airport during a specific time period. Slots are allocated at 'Level 3 – Coordinated Airports' which are defined as those where demand for airport infrastructure significantly exceed the airport's capacity
SPA	A Special Protection Area (SPA) is an area of land, water or sea which has been identified as being of international importance for the breeding, feeding, wintering or the migration of rare and vulnerable species of birds found within the European Union
Special Area of Conservation	Special Areas of Conservation (SACs) are strictly protected sites designated under the EC Habitats Directive
STARs	Standard Tactical Arrivals routes- the planned arriving routes for aircraft.
Stand	Aircraft parking area

7.1 Glossary of terms

Taxiway	Route used by aircraft moving to and from the runway to their allocated parking stand.
Taxiway strip and graded area	A designated area clear of potential obstructions on either side of a taxiway.
TDRs	Traffic Distribution Rules
TEAM	Tactically Enhanced Arrival Management. This is a practice seen at Heathrow where both runways are used to land aircraft when a set of trigger points have been reached, namely related to the level of delay experienced on arrival
Theoretical maximum capacity	The maximum number of ATMs that can be scheduled safely
UCAS	Uncontrolled Airspace
US	United States
VCR	Visual Control Room
Vectoring	Aircraft departing from airports are required to follow specific paths called Noise Preferential Routes (NPRs) up to an altitude of 4,000ft, unless directed otherwise by air traffic control. Vectoring is the practice whereby air traffic control turn aircraft off the NPR route once the aircraft has reached 4,000ft at any point along the NPR, or below 4,000 for safety reasons
VFR	Visiting friends and relatives
Westerly operations	When aircraft arriving at Heathrow make their final approach over London. The direction in which the airport operates is dictated by the wind direction and the westerly preference policy
Westerly preference	Heathrow airport operates a 'westerly preference' which means that when there is a westerly wind arriving aircraft make their final approach over London and departing aircraft depart over west London. During periods of light easterly winds (up to 5kts), aircraft will often continue to land in a westerly direction making their final approach over London. The westerly preference was introduced in the 1960s to reduce numbers of aircraft taking off in an easterly direction over London, i.e. over the most heavily populated side of the airport
Western Europe	For the purposes of this report, 'Western Europe' has been defined in the same way as 'short-haul' and comprises the following group of countries: Andorra; Austria; Belgium; Bosnia Herzegovina; Cape Verde; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Faroe Islands; Finland; France; Germany; Gibraltar; Greece; Greenland; Hungary; Iceland; Ireland; Italy; Latvia; Lithuania; Luxembourg; Macedonia; Malta; Republic of Moldova; Monaco; Montenegro; Netherlands; Norway; Poland; Portugal; San Marino; Serbia; Slovakia; Slovenia; Spain; Sweden; Switzerland; Turkey; United Kingdom. This is consistent with the DfT's definition of 'Western Europe' as used in their aviation demand modelling
Wide bodied jets	A wide-body aircraft has a typical aircraft cabin width of 5-6 metres allowing for between 7 and 10 passengers to sit side by side. The total capacity of a wide body aircraft can be between 200 to 850 passengers.

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Part 8

**Components
reference
guide**



Components reference guide to Airports Commission's Appendix B: suggested elements of scheme design

Para Ref:	AIRPORTS COMMISSION APPRAISAL FRAMEWORK OBJECTIVE	Part	Chapter
STRATEGIC ARGUMENT			
4	Provide additional capacity that facilitates connectivity	Connecting for growth Our vision for a world class hub Connecting all of the UK	1.1 to 1.8 3.1 to 3.11 4.1 to 4.5
4	Improve the experience of passengers	Connecting for growth Our vision for a world class hub	1.6 3.1 to 3.11
4	Improve the experience of other users of aviation	Connecting for growth Our vision for a world class hub	1.6 3.6
4	Maximise the benefits of competition to aviation users	Connecting for growth	1,6
4	Maximise the benefits of competition to the broader economy	Connecting for growth	1.6 1.7
4	Maximise benefits in line with relevant long-term strategies for economic development	Connecting for growth Connecting all of the UK	1.7 4.3
4	Maximise benefits in line with relevant long-term strategies for spatial development	Connecting for growth	1.7.1.2
4	Maximise economic benefits and support the competitiveness of the UK economy	Connecting for growth Connecting all of the UK	1.1 to 1.8 4.1 to 4.5
4	Promote economic growth in the local area and surrounding region	Connecting for growth	1.6, 1.7
4	Promote employment in the local area and surrounding region	Connecting for growth	1.5, 1.6, 1.7
6	Alignment with Commissions assessment of need	Connecting for growth	1.6, 1.7, 1.8
7	Flexibility of proposals to cope with future changes in aviation	Connecting for growth Our vision for a world class hub	1.2 to 1.6 3.11
8	Consideration of proposals relative to UK, European and International airports	Connecting for growth	1.2 to 1.6
9	Outline how plans for scheme delivery perform in relation to the Commission's requirement to advise Government on how to meet its assessment of the UK's connectivity needs 'as expeditiously as practicable within the required timeframe'	The deliverable solution	6.1 to 6.11
10	Consideration of future global development of the national and international aviation sector	Connecting for growth	1.3, 1.4, 1.5
11	Socio-economic development of regional and UK	Connecting for growth Connecting all of the UK	1.5, 1.7 4.1, 4.3
12	Strategic benefits (locally, nationally & internationally)	Connecting for growth Connecting all of the UK	1.1 to 1.8 4.3
13	Performance of scheme against entire range of Commission's objectives	Connecting for growth The deliverable solution Our vision for a world class hub	1.8 6.1 to 6.11 3.1 to 3.11

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AIRPORT MASTER PLAN			
14	Providing additional capacity that facilitates connectivity in line with the assessment of need	Our vision for a world class hub	3.1. to 3.11
14	Improving the experience of passengers and other users of aviation	Our vision for a world class hub	3.6, 3.7
14	Maximising benefits in line with relevant long term strategies for economic and spatial development.	Our vision for a world class hub	3.1. to 3.11
14	Producing positive outcomes for local communities and local economy from any surface access that may be required to support the proposal	Our vision for a world class hub Connecting all of the UK	3.8 4.1 to 4.5
14	Minimising and where possible reduce noise impacts	Our vision for a world class hub A new approach to sustainability	3.3 to 3.5 5.2
14	Improving air quality consistent with EU standards and local planning policy requirements	Our vision for a world class hub A new approach to sustainability	3.3 to 3.5 5.3
14	Protecting and maintain natural habitats and biodiversity	Our vision for a world class hub A new approach to sustainability	3.3 5.5
14	Minimising carbon emissions in airport construction and operation	A new approach to sustainability The deliverable solution	5.7 6.10
14	Minimising impacts on existing landscape character and heritage assets	Our vision for a world class hub A new approach to sustainability	3.3 5.6
14	Maintain and where possible improve the quality of life for local residents and the wider population	Our vision for a world class hub A new approach to sustainability	3.3 5.4
14	Manage and reduce the effects of housing loss on local communities	Our vision for a world class hub A new approach to sustainability	3.3 5.4
14	Enhancing individual airport and airports system resilience	Our vision for a world class hub	3.4
14	Ensuring individual airport and airports system efficiency	Our vision for a world class hub	3.3 to 3.9
14	Building flexibility into scheme designs	Our vision for a world class hub	3.6, 3.11
14	Meeting present industry safety and security standards	The deliverable solution	6.8
14	Maintain and where possible enhance current safety performance with a view to future changes and potential improvements in standards	Our vision for a world class hub	3.4, 3.5
15	"Proposed layouts including land take, location and grade of land"	Our vision for a world class hub The deliverable solution	3.9 6.8
16	Modes of operation of airfield including most beneficial and scenarios	Our vision for a world class hub	3.5
17	Viability, risks and impacts associated with modes of operation	Our vision for a world class hub	3.5
18	Forecasts (ATM's, O& D Passengers, Transfer Passengers, Freight, Airside & Landside Surface Access, "	Our vision for a world class hub	3.2
19	Modelling assumptions and methodologies	Our vision for a world class hub	3.2
ENGINEERING PLANS			
21	Engineering requirements, constraints and impacts of proposals	The deliverable solution	6.8
22	Cost plans including engineering, construction & maintenance costs	The deliverable solution	6.2, 6.8, 6.10
24	Energy & utility requirements measured against current provision	A new approach to sustainability	5.8

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	identifying any shortfall	The deliverable solution	6.8
25	Measures to address any energy & utility shortfall	A new approach to sustainability The deliverable solution	5.8 6.8
26	Energy & utility Fail safe and emergency systems and associated costs	The deliverable solution	6.8
27	Desk based ground condition assessment identifying constraints and requirements (including costs)	The deliverable solution	6.8
28	Ground contamination	A new approach to sustainability The deliverable solution	5.10 6.8
28	Flood risk	A new approach to sustainability The deliverable solution	5.5,5.9 6.8
28	Specialist engineering work	The deliverable solution	6.8
29	Compliance statement against CAA & other Aviation requirements and potential future scalability	The deliverable solution	6.8
30	Airport boundary including zone of influence	Our vision for a world class hub	3.3
30	Engineering requirements: Demolitions & land clearance	The deliverable solution	6.8
30	Engineering requirements: Site drainage	A new approach to sustainability The deliverable solution	5.9 6.8
30	Engineering requirements: Runway & ancillary construction	The deliverable solution	6.8
30	Engineering requirements: Terminal & ancillary buildings	Our vision for a world class hub The deliverable solution	3.6 6.8
30	Engineering requirements: Waste management & foul water treatment	A new approach to sustainability	5.8
30	Engineering requirements: Safety works	The deliverable solution	6.8
30	Engineering requirements: Carbon footprint	A new approach to sustainability The deliverable solution	5.7 6.8
MITIGATION STRATEGIES			
31	Enable access to the airport from a wide catchment area	Our vision for a world class hub Connecting all the UK to growth	3.8 4.1 to 4.5
31	Maximise the number of passengers and workforce accessing the airport via sustainable modes of transport	Our vision for a world class hub Connecting all the UK to growth	3.8 4.1 to 4.5
31	Accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight	Our vision for a world class airport Connecting all the UK to growth	3.8 4.1 to 4.5
32	Harmful impacts on local residents, communities or environment & what measures will be put in place to limit these impacts or risks	A new approach to sustainability	5.1 to 5.10
32	Measures to enhance or improve the local environment or local communities	A new approach to sustainability	5.4, 5.5
36	Noise mitigation and compensation measures	A new approach to sustainability	5.2
37	Noise management plans	A new approach to sustainability	5.2
38	Air quality action plans	A new approach to sustainability	5.3

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39	Efforts to mitigate visual impacts	A new approach to sustainability	5.5
39	Efforts to preserve, relocate or rebuild heritage pieces	A new approach to sustainability	5.6
39	Efforts to mitigate impacts on landscape, townscape etc	A new approach to sustainability	5.5
40	Proposals to mitigate biodiversity impacts	A new approach to sustainability	5.5
41	Proposals to impact on water quality and quantity including use of sustainable water resources	A new approach to sustainability	5.5
42	Proposals to integrate airports water use into existing needs and demands of the local environment	A new approach to sustainability	5.8, 5.9
43	Proposals to preserve & enhance integrity or prosperity of the local community	A new approach to sustainability	5.4
44	Effect of demolishing homes and community facilities	A new approach to sustainability	5.4
45	Proposals to stimulate and engage with the local community in airport decision making	The deliverable solution	6.5
46	Modelling assumptions and methodologies when assessing environmental impacts	A new approach to sustainability	5.1
DEVELOPMENT STRATEGIES			
47	Promote employment and economic growth in the local area and surrounding region	Connecting for growth The deliverable solution	1.6, 1.7 6.2, 6.4
47	Make efficient use of public funds , where they are required and ensure that the benefits of schemes clearly outweigh the costs, taking account of social, environmental and economic costs and benefits	The deliverable solution	6.1, 6.2 6.8 to 6.10
47	To be affordable and financeable , including any public expenditure that may be required and taking account of the needs of airport users	The deliverable solution	6.1, 6.2 6.6 to 6.9
47	To have the equivalent overall capacity of one new runway operational by 2030	The deliverable solution	6.1, 6.3, 6.6, 6.10
47	To actively engage local groups in scheme progression , design and management	The deliverable solution	6.1 to 6.11
47	Overall cost of the proposal	The deliverable solution	6.1 to 6.3 6.6 to 6.8
48	Financing strategy: Public sector support requirements	The deliverable solution	6.1, 6.2, 6.8
48	Financing strategy: Govt support requirements	The deliverable solution	6.1, 6.2, 6.8
48	Financing strategy: Credibility of underpinning assumptions (airline charges & single till)	The deliverable solution	6.2
48	Financing strategy: Level of uncertainty over time	The deliverable solution	6.2
48	Financing strategy: Outline financial model including integrated P&L, cash flow, balance sheet & assumptions	The deliverable solution	6.2
48	Financing strategy: Prospective investors	The deliverable solution	6.2
48	Financing strategy: Risks of commercial viability	The deliverable solution	6.1, 6.2
48	Financing strategy: Modelling assumptions & methodologies	The deliverable solution	6.2

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49, 50	Construction timetable and risk profile	The deliverable solution	6.2, 6.3, 6.6, 6.8
51	Transition strategy	The deliverable solution	6.6
52	Assumptions	The deliverable solution	6.1, 6.8
53	Integration with local, regional and national planning strategies	The deliverable solution	6.3, 6.4
54	Risks to gaining planning permission and mitigation strategy	The deliverable solution	6.4
55	Details of any future plans for stakeholder engagement	What our stakeholders say The deliverable solution	2.2 to 2.7 6.1, 6.3, 6.4 to 6.6, 6.10, 6.11
55	Extent to which stakeholders views have been accounted for in the evolution of scheme design	What our stakeholders say The deliverable solution	2.1 to 2.8 6.4, 6.5
55	Engagement with local stakeholders, communities and future engagement	The deliverable solution	6.1, 6.3, 6.4 to 6.6, 6.10, 6.11

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