

HEATHROW'S INITIAL BUSINESS PLAN DETAILED PLAN

December 2019

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Chapters

No	Title	Page No
	Introduction	3
1	Setting the Scene	8
2	Consumer engagement driving our business plan	25
3	Our H7 plans & choices	68
4	Sustainable Growth	88
5	Resilience	104
6	Measures, Targets & Incentives	123
7	Passenger Forecasting	141
8	Capital Investment	165
9	Operating Expenditure	200
10	Commercial Revenues	241
11	Other Charges	273
12	WACC	283
13	Financing	330
14	Regulatory Framework	347
15	Governance & Assurance	372
	List of Annexes & Appendices	392
	Glossary	394

INTRODUCTION

Overview

- We have built an ambitious, balanced plan for the years from 2022-2036 of which the centrepiece is the opportunity for Heathrow to expand
- The plan is structured around consumer and stakeholder outcomes and providing the supporting evidence for our regulatory building blocks
- Our plan consists of a summary plan, describing overall outcomes, a detailed plan summarising our thinking in each area, and supporting documents and annexes
- We welcome feedback, particularly on key questions we pose, on this Initial Business Plan which will be updated over the course of 2020

Heathrow's plan for 2022 to 2036

Heathrow expansion will connect all of Britain to global growth, putting it at the heart of the global economy for generations to come. We will be the best-connected country in the world, with regular direct flights to all the major cities in the United States, China and India, the great economies of the 21st century. Regular flights to every corner of the UK and rail links to North, South, East and West will spread the benefits of growth to every nation and region of our country.

This Initial Business Plan shows how we will deliver the global connections that Britain needs in a way that is sustainable, affordable, deliverable and financeable.

We will meet all the requirements of the Airport National Policy Statement (ANPS), which received the overwhelming support of MPs. Since the ANPS vote, we have committed to doing all we can to reach net zero flying by 2050. For Heathrow's own operations at the airport we will be carbon neutral from next year and in 2020 we will set out our plan to be net zero as soon as possible. IAG, our largest airline customer, has committed to net zero carbon for flight by 2050. We are working with them and others to make this the standard in global aviation, to take the carbon out of flying and remove any competitive distortions.

This plan delivers on the affordability challenge. This is an incredible achievement, given the increases in charges that have been required to expand other major hubs. We want to deliver expansion as cost efficiently as possible and have worked closely with our airline customers to minimise capital spend. We are also providing a comprehensive package of measures to minimise the negative impacts of growth on local communities and maximise the benefits they receive.

None of this is easy, but our enviable track record in delivering complex infrastructure projects on time and on budget, and our strong, predominantly UK supply chain mean that we can be trusted to deliver.

Heathrow expansion will be one of the largest privately financed infrastructure projects in the world. The current regulatory framework, with a Regulated Asset Base and single till, have proven the most efficient way to finance large, long term projects. This plan ensures the

necessary cashflows to support global debt financing at an investment grade, while maintaining a sufficient return to attract equity investment to support the expansion programme through any shocks or the economic cycle.

The big prize for consumers is through lower airfares. While we have been constrained by runway capacity, only around 50% of routes have faced competition between airlines, making airfares higher than they could be. The introduction of more competition and choice between airlines will reduce passenger fares by tens or even hundreds of pounds a ticket. This value could potentially support the shift to zero carbon flights.

We do face some real choices over the speed, service, connectivity and resilience that we plan for over the next 15 years. We have reflected these in two options, both of which meet the challenge of being sustainable, affordable, deliverable and financeable.

This Initial Business Plan is the start of a conversation with consumers, airlines and other stakeholders. Your feedback will be reflected in our Final Business Plan in 2020.

Heathrow expansion will connect all of Britain to global growth, allowing future generations to enjoy the benefits of aviation that we enjoy today, in a world without carbon.



John Holland-Kaye
Chief Executive, Heathrow

Heathrow's Initial Business Plan

Welcome to the detailed version of Heathrow's H7 Initial Business Plan (IBP). In this section we outline the purpose of the document, how to navigate it, and feedback we seek.

Purpose

The H7 regulatory period is a critical time for Heathrow. The CAA's regulatory settlement will determine much of how we serve the 80 million passengers and third of UK cargo that already travels through the airport each year. We deliberately frame it throughout as a 15-year plan. This matches the reality for consumers, investors and others – that choices made now only make sense on that time horizon. Throughout, we describe "H7" in that 15-year framework. It will decide whether and how we invest in new capacity, including in a third runway. The runway can be open before 2030 as set by the ANPS. But the full programme of expansion will take until the mid-2030s. Heathrow has operated at capacity for over 15 years. The next 15 years when we increase capacity by 50% will be the biggest period of change since our airport was built 72 years ago.

Expansion will transform consumer experience. Consumers will benefit from lower airfares and more choice of destinations and airlines. We will have two world class terminals, Terminal 5 in the west and Terminal 2 in the east, as well as Terminal 4. Passengers will enjoy easier access to the airport and easier connections between flights. Heathrow will be one of the best multimodal interchanges in the world, making it easy to get to by public transport from across the country. We will be a carbon neutral airport, with predominantly electric vehicles, powered by solar panels and wind. Heathrow will not only be transformed, physically. We will have more interesting, versatile and skilled jobs for local people, more routine processes will be automated, creating a safer working environment.

A major investment programme will also affect our economics, financing and airport charge well into the 2030s. Importantly, Heathrow expansion necessitates significant new funding by debt markets and our shareholders. This increases both the risk of their investment and the timeframe to recover it compared with Q6, demanding some new thinking about regulation, complicating comparisons to Q6 and other regulated companies generally.

There are choices and trade-offs. We are proposing an IBP which seizes the opportunities for Heathrow in 2022 to 2036 while balancing those choices. It starts by identifying what consumers gain from and are looking for from the airport. These outcomes are described in our summary plan. The detailed plan goes into more depth on these outcomes and how we might measure progress against them. It also then describes how the activities, investments and other choices we make in delivering them flow through into the regulatory building blocks. We summarise the evidence that demonstrates our forecasts are reasonable and robust.

This detailed plan builds on the feedback from consumers, our public consultations, our detailed engagement on the masterplan with airlines at the M4 and M5 gateways¹, our annual accounts and our other plans, proposals and reports. Each of these serves different purposes. By necessity therefore this detailed plan focuses on some aspects and abbreviates or assumes other elements dealt with elsewhere. These parallel processes continue to evolve in many cases. For consistency, we have fixed assumptions at a particular point in time. We make these explicit where relevant - for example the capital plans are all based on the M4 Exit plan even though we anticipate further refinement in 2020 at the M5 masterplan gateway. The IBP primarily presents our thinking through the lens of our outcomes, and the regulatory framework and building blocks.

¹ M4 and M5 are Heathrow/Airline gateways in the masterplan development process that lead to the DCO submission

The plan has been created with reference to CAA and government guidance. It has been developed from listening to consumer feedback and we have tested the choices with consumers. We are very grateful to the feedback from the Consumer Challenge Board (CCB). It reflects the views of all our stakeholders; consumers, the local community, airlines, colleagues and investors. Sustainable growth is central to the plan as expansion cannot come at any cost to local communities and the environment.

The IBP is not a final answer. It is designed to offer some choices and seek feedback. In some areas we have only reached initial conclusions. We will produce a Final Business Plan in 2020 taking into account the feedback we receive. We will also be submitting our Development Consent Order (DCO) application to the Planning Inspectorate in the second half of 2020. There are likely to be modifications to the masterplan as we go through the DCO examination process and these are likely to impact the final regulatory settlement.

How to navigate the plans

We present Heathrow's Initial Business Plan at three levels. The summary plan outlines the key outcomes and headline financials of our proposals. It is intended for general readers and those wishing to understand the overall context of the plan. This detailed plan provides an overview of the evidence, proposals and relationships between each element of the IBP. It provides more detail on the consumer and financial outcomes and assumptions from 2022 to 2036. It is intended for those more closely involved in shaping our plans to be an accessible way to understand the various regulatory building blocks. The detailed plan is supported in turn by over 65 supporting documents and annexes. These provide more of the underlying evidence base, input or analysis that has gone into the IBP. These annexes are most likely to be useful for experts seeking to test and understand assumptions.

This detailed plan consists of 15 chapters which are most easily reviewed in sequence. It starts with overall context. First, we set the scene, describing progress and challenges leading up to 2022 when H7 starts. We summarise how we have engaged with consumers and defined our outcomes. We then present the high-level choices we are grappling with. We set our plans for sustainability and resilience and discuss an incentive regime built around the outcomes. The detailed plan then describes the implications of our plan in more depth in terms of passenger forecasts, costs, revenues and investment. Finally, we review how we can privately finance the plan and the implications for the cost of capital and interactions with the regulatory framework. Assembling all these elements allows us to produce summary financials which are shown in the summary plan and in Chapter 3 Plans and Choices.

When reviewing individual topics, readers may benefit from referring to detailed evidence in supporting documents and annexes or context from the summary plan. The detailed plan sections should provide a stand-alone view of each topic, but it is impractical to include all information in a plan of manageable length. A full list of the supporting documents and annexes is provided.

Feedback on this plan

We are keen to have feedback on this initial plan from consumers, airlines, other stakeholders and the CAA. Much of this we will proactively seek out in consumer engagement sessions, Constructive Engagement with airlines and through other methods. We also welcome written feedback in any form. To submit that feedback please write to regulation@heathrow.com. Submissions received by 31 March 2020 will be certain to be considered in developing our Final Business Plan.

We are particularly keen to have feedback on questions including:

- Have we identified the right consumer and stakeholder outcomes?
- Are there areas which would benefit from further consumer engagement?
- Are our plans adequate to meet our outcomes?
- Have we judged the resilience and sustainability impacts of our plan appropriately?
- Have we identified the key trade-offs – for example between consumer benefit, service levels, affordability, financing and sustainability?
- Have we adequately reflected the needs of airline customers, local communities and the environment?
- Are our measures, targets and incentives for outcomes appropriately balanced?
- Are there changes, initiatives or investments that we have missed or should remove?
- Are our forecasts of financial impacts clear? Have we made the right choices?
- What further evidence would help improve our financial projections?

1 - SETTING THE SCENE

Overview

- Heathrow's performance and lessons from Q6 and iH7 are a starting point for future plans
- The airport has made real progress – 82% of passengers rate us as excellent or very good up from 40% a decade or so ago. This has come from a focus on more consistent basics, service through people and an end-to-end approach
- Costs have also fallen at the same time – with cost per passenger down 16%, commercial revenues per passenger up 7% and the airport charge having reduced by 14%
- We have invested over £3billion in improvements and increasingly focused on sustainability and expansion, setting the platform for new capacity from 2022

1. Introduction

Heathrow is a consumer service business, not just an infrastructure asset. The better the service we can provide, the more consumers will choose to fly through Heathrow, boosting revenues for all 400 businesses operating at the airport. Since the snow crisis of 2010, we have taken responsibility for the end to end consumer journey at Heathrow and have sought to create a common culture and approach for Team Heathrow. We work closely with our airline customers as a service provider and business partner. We have a complex range of stakeholders – not just consumers and airline customers, but also colleagues, local communities, Government, business and unions.

The airport takes the lead in engaging with local communities and Government to earn our “licence to operate and grow.” We have a complex relationship with local communities, where we provide jobs for 1 in 4 households, and are a catalyst for high quality employment in the area, but also generate aircraft noise (the biggest single issue for local people), and cars coming to the airport have an impact on air quality and congestion. We meet regularly with local councils and community groups to understand their concerns and seek to address them where possible. We are a responsible employer and aim to provide high quality careers, not just jobs.

We also take the lead in growing our catchment area, so that it is easier for consumers to access the airport and for airlines to increase their passenger numbers. We have worked closely with airlines to improve domestic and long-haul connections to support the UK economy. We have also provided marketing support, promotions and incentives to airlines to fill some of the 20m empty seats flown to and from Heathrow each year. This has led to the innovative iH7 commercial agreement with airlines, which provides a significant financial incentive to grow passenger numbers.

We have to be very efficient, and throughout Q6 we have delivered better service at lower

cost. We started Q6 with a challenging regulatory settlement which required us to save £600m of costs and increase commercial income by a further £100m.

We developed an ambitious new vision for Heathrow “to give passengers the best airport service in the world” and set out four priorities for the business, which represents a balanced scorecard; mojo, transforming customer service, beat the plan and sustainable growth.

The entire business has been aligned behind delivering these four priorities, which are built into the Board and Executive Committee agendas, personal business objectives and company incentive plans, including ‘Share in Success’ bonus schemes for all colleagues.

2. Mojo

In a global hub airport, with the most diverse consumers on the planet, service has to be delivered by people. External research² clearly shows that engaged colleagues are more likely to deliver better service, higher productivity and sharper financial performance. Our ambition is to make Heathrow a great place to work, with colleagues who are empowered, enthused and service focused.

We have therefore invested in the skills of our people and promoted diversity to reflect our consumer base. We have doubled our training and development budget and provided courses to help front line colleagues to develop their careers. Almost all front-line managers are promoted from within, and around 400 colleagues in total are promoted internally each year.

This approach has significantly improved our diversity and we have a pipeline of diverse talent coming up through our management team. We have launched diversity groups for BAME, gender, disability and LGBT+ to find out how to remove any barriers to progression. In 2018, we have reduced our gender pay gap. We have become an LGBT+ employer of choice but have more to do on ethnic diversity. In 2017 we were named one of the top 30 best large employers in the UK.

3. Transform customer service

Passengers now consistently rate service at Heathrow among the best airports in the world. In 2019, our overall Airport Service Quality (ASQ) scores reached 4.16, compared to 3.97 before Q6. 82% of passengers rate the service at Heathrow as ‘very good’ or ‘excellent’. That is the highest rating of any of the major European hubs and amongst the highest of any European airport.

² Gallup study (2006) of 89 organisations showing that earnings per share (EPS) growth of those in the top quartile was 2.6 times that of those with below average engagement scores.

ASQ trend over time

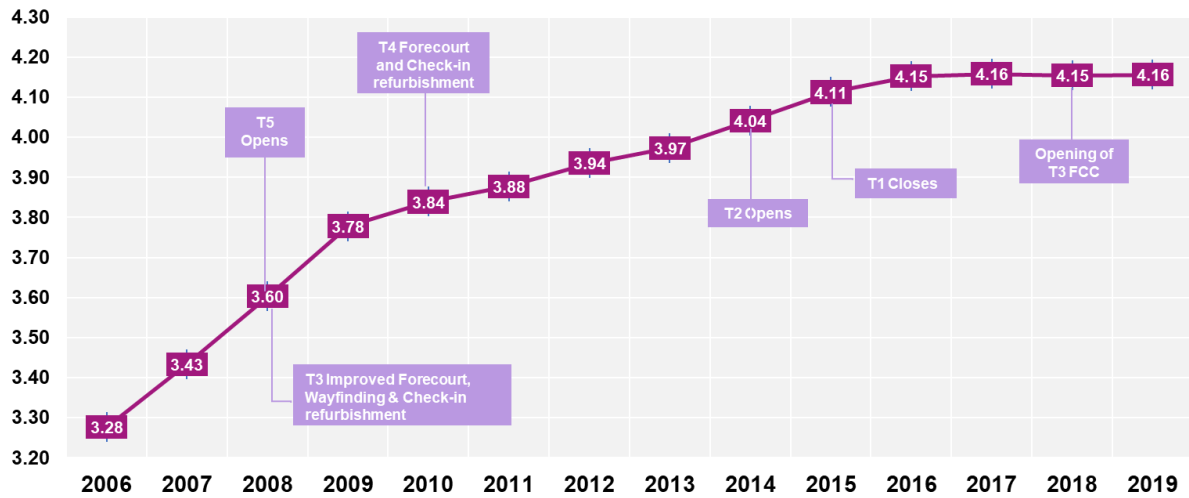


Figure 1: ASQ performance at Heathrow 2006-2019

Improving airport service has also been recognised by winning multiple passenger awards. Terminal 5 was voted in the global Skytrax survey as the best airport terminal in the world in 2014, 2015, 2016 and 2019, and Terminal 2 rated as best terminal in 2018. Since 2014, Heathrow has consistently been voted by passengers, through Skytrax, as one of the world's top 10 airports.

Consumer insight has helped us to improve service. Even though our insights have recently become more sophisticated, we have long used survey feedback, customer complaints, social media and detailed research to focus on critical areas. The importance of in-depth inquiry into what consumers want has been an enduring Q6 lesson. We have radically improved our consumer engagement strategy for H7.

Three particularly successful approaches emerged from insight. First was better service through our people. Second was improving basic, service aspects within our control including resilience, security and cleanliness. Thirdly was focusing on end-to-end service, including processes that are not wholly within our control such as immigration and baggage. Underpinning all these improvements was sustained investment in better facilities and infrastructure.

3.1 Service through people - Service Signatures

Consumer service is ultimately delivered by people. Since 2014 Heathrow has focused on sharpening our service culture. We looked at leading service companies, listened to our passengers, mapped their journey and reviewed all our feedback on how we acted toward our passengers. Based on this we have been on a multi-year effort to train and guide our colleagues towards thinking about service first. For example, over 25% of our operational colleagues in security and other teams have been involved in a 'Making Every Journey Better' project linked to frontline service since 2014. Our passenger feedback for courtesy and helpfulness has mirrored our overall trend.

Heathrow 'Service Signatures'



Figure 2: Heathrow's Service Signatures

In October 2018 we launched our Service Signatures. These were created by listening to our consumers and colleagues, and then working together to uncover Heathrow's unique way of giving service.

Our consumer research now shows that where customers notice the service signatures they rate their experience more highly.

Overall experience satisfaction:

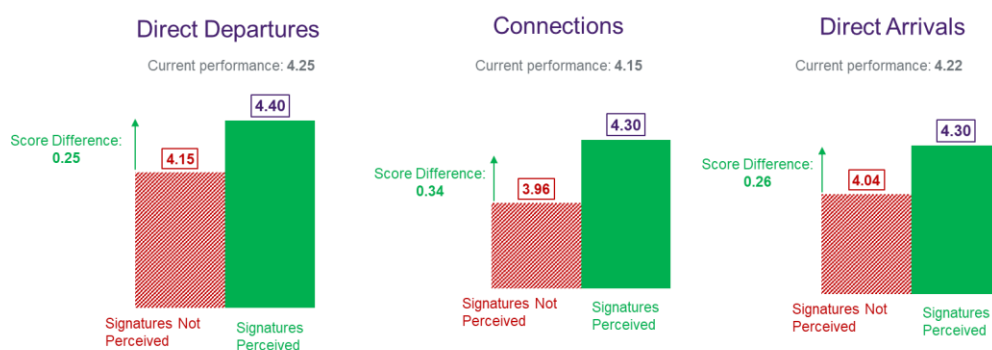


Figure 3: Service signatures help close the experience gap between connecting and departing passengers

By 2020 over 4,000 colleagues will have undergone a full formal programme in Service Signatures training as we seek to build this approach into all aspects of how we operate.

3.2. Service basics – resilience, security, cleanliness

Q6 has seen better service through improving basic service aspects within Heathrow's control including resilience, security and cleanliness.

Heathrow's resilience has improved since 2014. Punctuality and working to a plan are at the heart of consumer satisfaction and operational efficiency. We aim to reduce the likelihood of disruptive events and minimise the impact when events do happen. We have worked with Team Heathrow partners to create a complete view of airport operations in our Airport Operations Centre (APOC). We have standardised processes and systems to increase resilience. This has also reduced operating costs and improved efficiency and service. The

number of “Gold” incidents has fallen significantly and we were the only airport in Europe to remain open through a week of snow in early 2018.

Our strategic airport resilience investment programme has led much of this change. APOC brings together airport operations, airlines, the Metropolitan Police, and other agencies to improve dynamic decision making and co-ordinate response to disruptive events. Implementing ‘operating to plan’ procedures and Airport Collaborative Decision Making (A-CDM) has also helped significantly. A regularly exercised command-and-control structure, similar to that used by the emergency services, and a programme of trained ‘Here to Help’ colleagues support passengers and accelerate recovery when things go wrong. For example, in 2019 this approach was successfully used to manage the impact of the British Airways IT systems issues and potential industrial action. After events we have systematically investigated causes and responses, for example with the Baggage Resilience Review and worked with partners to learn and improve. These reviews have led to further investment in baggage recovery facilities, utilities resilience, strengthening our perimeter and landside protection, anti-drone technology and cyber security systems and infrastructure.

Two other basic aspects of service for passengers that have improved are the security screening process and cleanliness. While both are captured to some degree in the Q6 Service Quality Rebates and Bonuses (SQRB) scheme, we have focused more broadly on increasing satisfaction for both beyond the minimum performance standard required. Operational focus, reallocated resources and targeted investment have underpinned these sustained improvements.

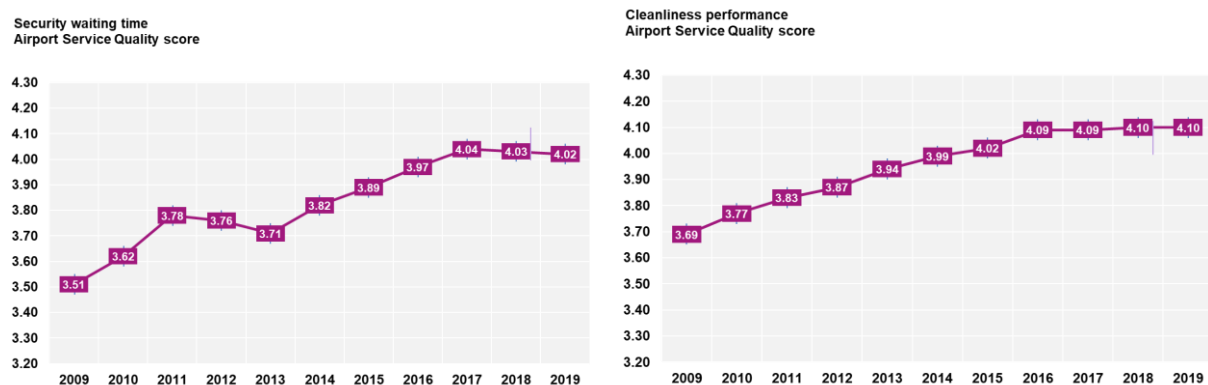


Figure 4: Heathrow Security Waiting Time and Cleanliness Satisfaction Scores since 2009

3.3 End-to-end service – immigration and baggage

Another key Q6 lesson has been that travelling consumers do not distinguish between which organisation delivers what part of the process. Passengers just want a good service. Since 2014 this has led us to increase our efforts on shared processes like immigration and baggage handling. For example, we responded to customer complaints about long queues at border control for non-EEA passengers by working with Government and UK Border Force. In May 2019, this led to E-gates being available for passengers from seven countries, including the USA and Japan. This alone has uplifted passenger satisfaction at immigration from 4.27 in April 2019 to 4.50 in June³. A similar example is the improvements in baggage connection rates which have improved from 98.1% in 2014 to 98.7% in 2018, and currently 99%. The airport has worked collaboratively with handlers and airlines to streamline and integrate processes, upgrade our entire baggage screening standard to HBS 3 and most recently consolidate all hold baggage screening with passenger screening as part of the airport

³ Heathrow QSM scores for immigration waiting time

operation. Fewer missed passenger bags has led to a cost avoidance value for airlines of around £64m over Q6. While there are still myriad opportunities to improve both immigration and baggage to the world’s very best levels of service, Q6 shows what an end-to-end approach can deliver.

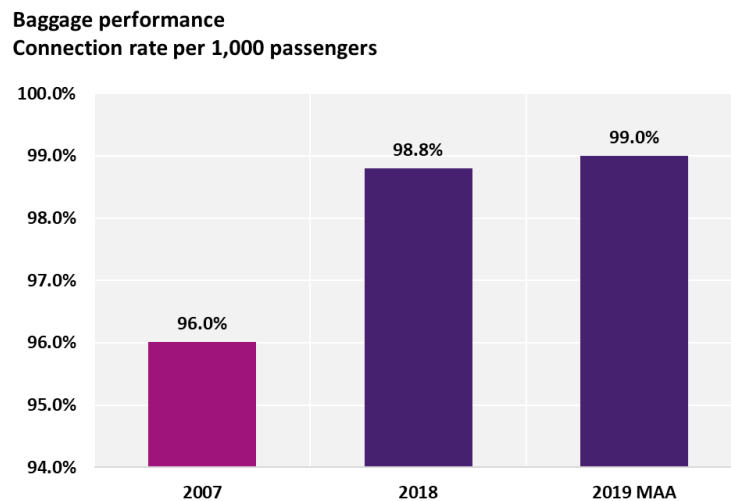


Figure 4: Baggage Connection Rate Performance 2007-2019

4. Beat the Plan

We have systematically reduced costs to operate at Heathrow since 2014 – our own and those of airlines. We have renegotiated all contracts and introduced new terms and conditions. This has been extremely challenging, but we have managed to avoid strike action.

Heathrow’s Q6 settlement set very challenging efficiency targets. We were tasked with saving £600m to reach the ‘efficient’ frontier on our operating costs while maintaining the highest per passenger commercial income of any airport in the world and improving service.

Through our “beat the plan” focus, we have beaten those targets. Our operating costs, on a year-by-year, real per passenger run rate are lower than the Q6 targets, once adjusted for expansion costs which were not allowed for in the settlement. Our commercial revenues have also exceeded the settlement target.

Some targets have been particularly challenging, such as people cost savings, where despite real progress we have prioritised service, resilience and skills. In other areas we have pushed further to exploit market opportunities, such as additional utilities savings.

We have invested over £3 billion very efficiently – getting better outcomes than the Q6 regulatory settlement, from lower capital investment. We have delivered this while opening T2, shutting T1 and serving more passengers than forecast.

These efficiencies have been delivered by catching up from a position where Heathrow was not as efficient as other airports to one today where it is at the efficiency frontier (see Chapter 9 Opex). This means that the scope to deliver efficiency improvements in the future is much less. Future cost savings will be more difficult to achieve and are likely to come from complete process re-engineering and looking across the value chain.

4.1 Operating costs per passenger

Since 2014 our operating costs per passenger have reduced by 16% from £16.79 to £14.12 in 2018 prices. This means we have also delivered total savings of over £600m.

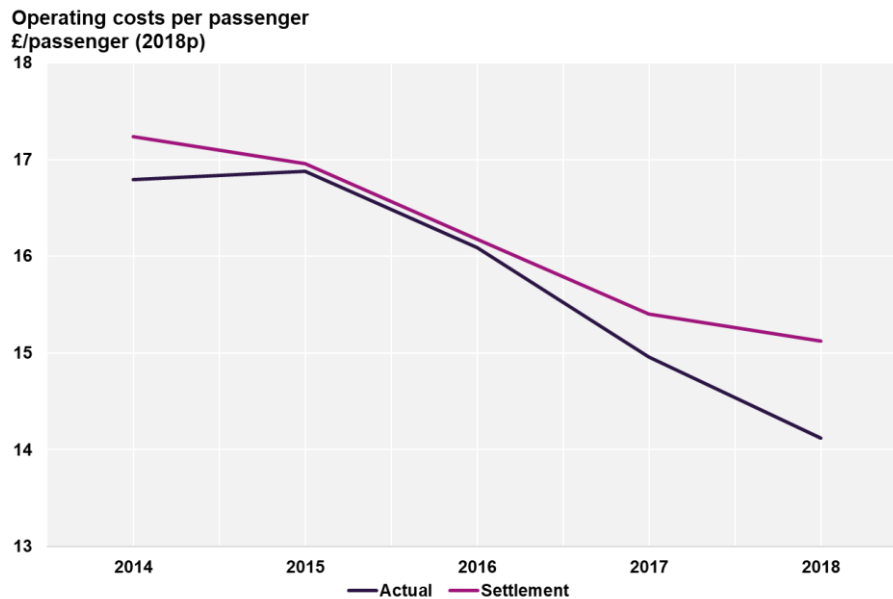


Figure 5: Heathrow Operating Costs per Passenger 2014-2018

Savings have exceeded the targets set by the CAA in 2014 based on Heathrow achieving the 'efficiency frontier' for similar airport operations. The mix of savings has differed by category and over time from CAA forecasts, as illustrated below.

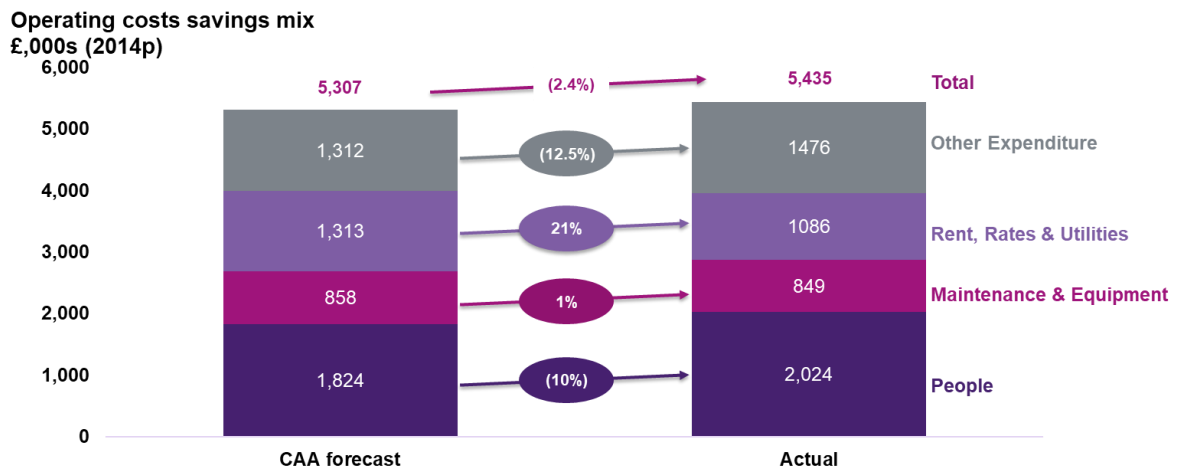


Figure 8: Heathrow Operating Cost Performance against the CAA Settlement forecast (2014 prices)

4.2 People cost efficiencies

People costs are both Heathrow's largest single cost category, and one of the most challenging to drive efficiencies. We achieved £306m in workforce efficiency savings in Q6. People costs per passenger thus fell 13% over the course of Q6. The CAA forecast total people costs to be £363m whereas our actual costs were £432m. This gap mainly reflects a CAA target for people costs that was not well founded, however the gap was increased due to (i) higher than forecast passenger numbers (ii) unforeseen external factors such as the Apprenticeship Levy and increased employer National Insurance contributions and (iii)

deliberate choices to invest more in training and some aspects of service such as landside patrolling.

In Q6 we have taken a long-term and balanced approach to people change. Heathrow of course is also highly unionised. People efficiencies can therefore take longer and requires care to manage the risk of industrial action. This is shown by repeated strike ballots at Heathrow in 2017 and 2019 despite us avoiding a formal strike. We also need to balance passenger service spend and our desire to engage colleagues with a great place to work. The chart and description below outlines some of the savings made.

Table 1: Heathrow Q6 People Efficiencies (£m, 2018 prices)

£m, 2018p	2014	2015	2016	2017	2018	Total over Q6 period
Organisational re-design	(0.1)	3.4	16.9	25.3	25.0	70.5
Wage efficiencies	7.4	10.5	11.6	17.6	19.4	66.4
Resource level efficiencies	1.3	4.2	7.1	8.0	10.2	30.9
Operational changes	4.3	15.1	8.5	11.4	13.2	52.5
Severance	-	-	-	-	0.7	0.7
Total people efficiencies	14.9	37.9	59.9	92.5	101.2	306.4

Organisational design and broad banding

We implemented two Heathrow-wide organisational re-designs in Q6. The first simplified layers in the organisation and reduced senior roles. The second better aligned our strategy, target operating model and organisational processes and systems. These changes saved £69.7m over Q6 net of change and redundancy costs.

In 2015, we also introduced a job grading based on a broad-band structure using the Willis Towers Watson Global Grade methodology. Broad-banding groups jobs with similar responsibilities and skills. It helps to deliver cost savings, improved transparency and credibility of grading decisions and ensures robust benchmarking against market data. All roles, and new hires, are now assessed annually against market median pay rates using Willis Towers Watson benchmarking data. This is producing ongoing cost savings over time and ensures we are systematically aligned with market people costs across our team.

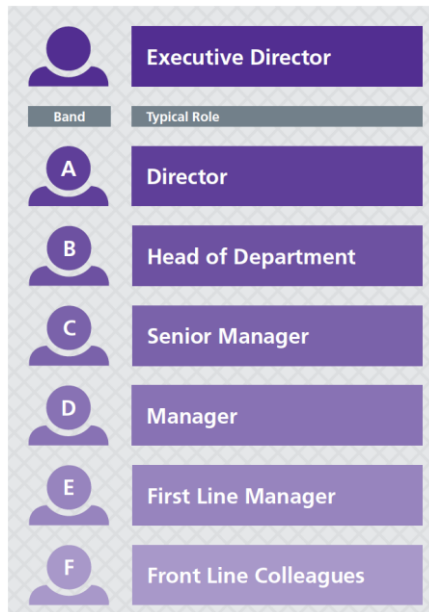


Figure 6: Heathrow Broadbands

Security

Security is by far Heathrow’s largest team and consequently security people costs are one of our largest operating costs. By 2018 we had saved at least ██████ in people costs from security specific initiatives alone. New starter rates for security colleagues delivered the largest saving in security people costs of ██████. New starter rates and pay ranges that were around ██████ lower were introduced across all management and operative grades beginning with security officers, our largest group of colleagues.

Manning levels and fixed posts have also been cut since 2014 with new technology (enhanced search lanes, anti-back track doors) or through the design of new processes (APOC, Terminal 1/Control Post 14 closure). This delivered ██████ of cost efficiencies.

Pay deals and Pensions

70% of Heathrow colleagues are trade union members. Heathrow negotiates changes to pay and allowances for our colleagues on negotiated grade contracts with the trade unions. Heathrow negotiated a two year pay deal with the unions in 2014 set at -0.5% below forecast RPI. In 2016 we negotiated a further three-year deal. These deals saved £18m over Q6.

Pensions are another key element of our reward package. Heathrow operates two pension schemes – a legacy defined benefit (DB) scheme (closed to new entrants since 2008) and a defined contribution (DC) scheme. Heathrow has consciously taken a responsible approach to funding the plans to make sure they are in a financially healthy position. The DB scheme is challenging to fund largely driven by macro-economic and demographic factors outside Heathrow’s control. These saw company contributions rise from an average of 20.6% of pensionable pay in 2004 to 33.3% in 2013. The CAA challenged Heathrow to reduce company contributions in the Q6 Settlement to 23% of pensionable pay. We introduced changes to the DB scheme benefits in 2015 after agreeing the pay deal with our unions after extensive union and member consultation. The changes reflected broader market standards. These reduced the future service charge from 33% to 23% the past service deficit to ██████ from in excess of ██████. These changes have saved initially around ██████ per annum.

4.3 Savings in suppliers and facilities operations

Our contract negotiations with suppliers led to savings in baggage, engineering and trolley operations. For example, we changed the terms of our engineering contract to include multi-skill cleaning staff. This allowed them to take on additional smaller tasks such as changing lightbulbs, eliminating the costs of sending additional maintenance workers for the job. Similarly, the contract for the team which collects and redistributes trolleys was terminated and brought in-house to save costs. We renegotiated our long-term contract for high voltage power with UKPNs. We have repeatedly market tested all our contract areas, seeking the best long-term value rather than an overall policy of insource or outsourced provision. Closing Terminal 1 early also reduced contractor costs and other related facilities cost. Overall these charges have delivered over £150m in savings over Q6.

4.4 Reduced utilities costs

During Q6 we invested £35m in energy demand management projects. These have saved £30.1m in total. In addition to lower energy bills, they have cut carbon emissions and mitigate the risk to Heathrow's overall grid capacity. Projects included installing LED lighting, more efficient motors and automatic meter reading technology across Heathrow. We became the first European hub airport to install LED lighting on all aircraft stands and have installed solar panels on Terminal 2 and the Compass Centre. Since April 2017 Heathrow has sourced 100% renewable electricity, with an increased proportion coming from on-site generation. Since 2014 over 200 GWh will have been saved in total - equivalent to closing Terminal 5 for 2 years. Overall consumption per passenger has dropped from 7.5 to 6.2 kWh.

4.5 Delivering end-to-end efficient service with our partners

We have invested in infrastructure that has improved passenger service and resilience while helping airline customers reduce their costs. For example, we worked with airlines to automate steps in the passenger journey with e-boarding gates and self-serve bag drops. Likewise, at times in Q6 we have incurred additional unanticipated costs to maintain passenger service and overall efficiency. For example, by funding passenger ambassadors where airlines and Border Force removed their passenger facing support roles. This has increased our operating costs by £7m per year.

4.6 Heathrow's commercial revenues

Heathrow is the global leader in airport commercial revenue. This was confirmed by the Steer Group report commissioned by the CAA in 2017. Commercial revenue is an important factor in the single till supporting a lower airport charge. Our commercial offer ranges from car parking to telecoms and lounges to retail stores and is also an important consumer amenity.

The CAA set us a Q6 target to grow commercial revenues by 3.23% per year. We have exceeded that target. Total retail revenues have grown by 5.9% since the start of Q6. Retail revenue per passenger increasing over the period from £7.94 in 2014 to £10.19 in 2018 in real terms. The success of our commercial offering has also been recognised by passengers. We have taken great care to safeguard our operational needs and meet passenger expectations. Passengers have voted us the Skytrax "World's Best for Airport Shopping" award for the 8th consecutive year.

This contrasts with a decline in non-aeronautical income per passenger at other airports across North America and Europe in the period.⁴ Heathrow has had to be more creative to grow our commercial revenues since 2014. Our performance is mostly driven by management initiatives looking at what passengers want and how best to deliver it. However, radical changes in the retail and transport markets are among the external factors that have adversely affected commercial revenues in Q6. These commercial headwinds are set out below and will make delivering growth in future revenues more difficult.

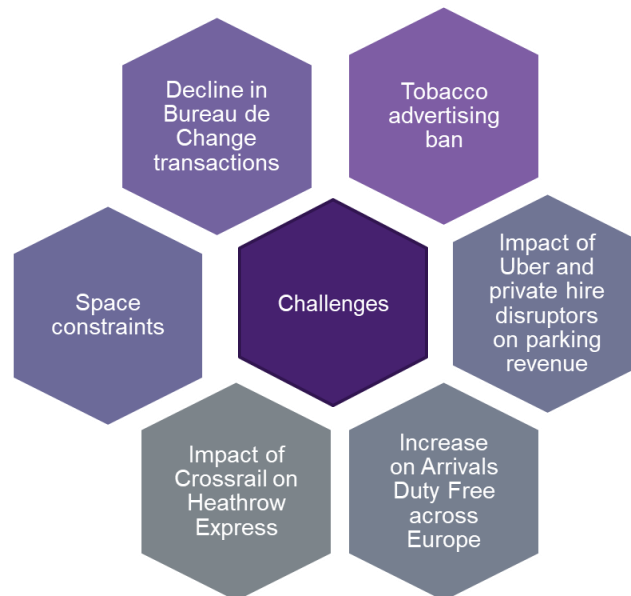


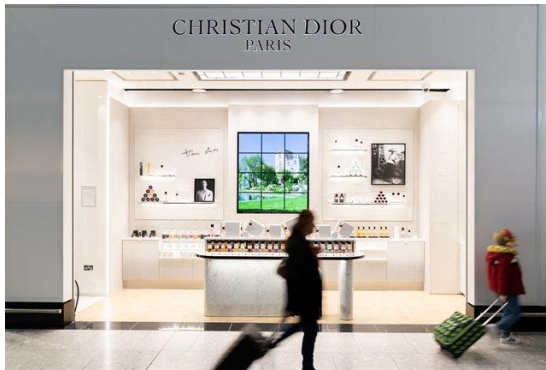
Figure 7: Challenges to Heathrow commercial revenues

Our focus on passenger needs is guided by consumer research. Outputs from customer satisfaction surveys, profiler demographics analysis and schemes like our Heathrow Rewards loyalty programme are vital to our commercial decisions. Insights inform decisions around the best use of space, new services, or the most appropriate product mix in the terminals. Four themes have driven our performance initiatives.

Physical enhancements to our products and services

Opening Terminal 2 in June 2014, and associated airline moves, freed up space in existing terminals. We have used that space to introduce new products, such as business centres, lounges and fitness suites, in spaces previously unusable for commercial activity. Likewise, a completely redeveloped luxury retail space in Terminal 5 opened in late 2014 introducing Louis Vuitton, Cartier, Rolex, Fortnum & Mason and Bottega Veneta amongst other brands. Less dramatically, redeveloped World Duty Free stores and changes to the departure lounge (IDL) retail mix in Terminals 4 and Terminal 3 offer passengers a greater choice.

⁴ [REDACTED]



Redevelopment of Terminal 5 luxury retail space



Refurbishment of World Duty Free in Terminals 4 and 5

Beyond the terminals, we have opened five new hotels adjacent to Terminals 2, 3 and 4. These give passengers simple and direct access from the hotel to the terminal. In our car parks we created a more affordable valet service (Meet & Greet). We have also restructured our time band prices for short stay parking thus helping to generate greater yields per space. We won the British Parking Association Award for Innovation with a new authorised vehicle area in June 2016. It provides an area for private hire drivers to wait for their next job rather than causing congestion and other impact on local residential roads. The area was created by repurposing 800 business parking spaces and has had a huge benefit on the local community as well as accommodating the large consumer shift to private hire travel seen with the rise of Uber and other ride apps.

Digital service

Consumers have increasingly moved online over Q6. We received 390,000 direct consumer contacts via social media in 2018. We launched unlimited free Wi-Fi in all Terminals in April 2019. This responded to consumer research making clear that reliable, fast and unlimited Wi-Fi is now a basic consumer requirement and no longer a commercial revenue opportunity. We also re-launched our upgraded web platform, Heathrow.com in November 2019. 60% of users now access Heathrow.com on a mobile device. The platform has therefore been upgraded to be mobile responsive and provides real time flight information, terminal maps with blue-dot technology to help wayfinding and raise awareness of our products and services. Users can purchase flights through our own online ticket distribution product - Go Heathrow - and browse and reserve products from our retail stores online and through our Heathrow Boutique and Reserve and Collect services. The majority of car parking and train ticket sales also moved online in Q6.

Maximising our brand

Heathrow's marketing campaigns have developed over Q6 from focusing solely on the retail proposition to building wider consumer loyalty and trust. We have learnt that a more holistic and emotional Heathrow brand encourages consumers to choose Heathrow and engage with our service proposition. Heathrow's 2016 Home for Christmas advert epitomised this approach. It had a soft online launch with minimal investment. It quickly went viral to generate over 100 million individual online views and win a number of industry awards:

- The Creative Circle: Gold for Best Animation
- The Creative Circle: Best FX/CGI
- The Creative Circle: Best Use of Music

- British Arrows Award: Best new advertiser

Closer growth collaboration with airlines

Airlines and airports grow and succeed together. We have improved our collaboration with many airlines to grow their passenger numbers and profitability. We have created new incentives in our charges for connecting and domestic passengers, to use all available slots efficiently and more recently to support seasonal flying. We have also collaborated with airlines and destination marketing organisations to jointly market routes. Working together with partners, our route network has grown with additional routes to China and new services to Santiago, Portland, San Jose and Jakarta amongst others. Domestic connectivity has also improved with new services to Newquay, Guernsey and Inverness. Load factors have risen from 75.6% in 2014 to 78.4% in 2018. We also worked together to optimise operational processes, such as “call to gate”. This helps departure punctuality as well as reducing time waiting at gates in line with passenger preferences. It also increases the time passengers have to shop supporting our commercial revenues at the same time.

4.7 Efficient capital investment

In Q6 we invested over £3bn across multiple projects to maintain and improve the airport and passenger service. At the same time, we increased capital cost certainty and efficiency. This required a different operating model to Q4 and Q5, which had significant ‘new build’ terminal investments constructing Terminal 5 and Terminal 2. Q6 was instead framed by Strategic Programmes, targeting passenger experience, baggage, resilience and hub capacity. Below are examples of projects delivered within each of the Q6 Strategic Programmes.

Our Q6 Investment Programme

Resilience (£710m)

Sierra A Taxiway



The Resilience Programme has invested in core infrastructure on the airfield to create more capacity and increase asset reliability. In 2016, we completed the reconfiguration of key

taxiways (Sierra A & C), extending their asset life and allowing for larger remote aircraft stands and reduced taxi time between the runways and terminals.

We also reconfigured stands and widened aprons across the airfield to accommodate the new generation of wide body aircraft. Key airfield and airspace technology such as ILS and lighting systems have been replaced or upgraded.

Baggage (£674m)

Baggage system upgrades



The largest single investments in our baggage systems have been to upgrade hand baggage screening security to the Government's 'HBS 3' requirements, improve the baggage connect rate, and simplify and consolidate processes to deliver efficiencies for airlines and handlers. We have also invested in baggage resilience and recovery. We constructed a new Terminal 5 baggage recovery facility, increased the storage capacity, and processing capability of the Terminal 5 early bag store. We removed the out-of-gauge facility from the existing Terminal 1 baggage hall and invested continually to maintain the Terminal 1 system that provides baggage support to Terminal 2. In the iH7 period we are also investing £200m in T2 Futures, providing new baggage facilities for T2 to improve both service and resilience.

Asset management (£1.04bn)

The asset management programme invested in facilities across the airport to deliver passenger amenity, reliability and safety. Key projects included replacing the Pier 7 roof in Terminal 3 to prevent leaks, ensure safe and efficient support structure and improve temperature controls in the terminal. 12 airbridges in Terminal 3 were also replaced to improve passenger experience and make maintenance easier. Busy passenger walkways, including those connecting the stations and terminals were refreshed and repaired. Crucial tunnels connecting passengers and cargo around the airport are being fully refurbished projects that have been challenging in terms of safety, engineering and schedule.

Transforming the passenger journey (£525m)

The Passenger Experience programme has delivered many of changes in the airport most visible to passengers. We created a new escalator route and new security lanes in Terminal

5 for a more pleasant, faster transfer journey and to accommodate growth across the terminal. This project completed in 2016, three months ahead of schedule and without any disruption to passengers.

Other enhancements include additional Terminal 5 Fast Track capacity and our new Terminal 3 Flight Connection Centre. The Flight Connection Centre was awarded Best Infrastructure Award, ICE Awards 2019. It increased our capacity for connecting passengers and created new space in the IDL for retail and passenger space. The Fast Track enhancements increased passenger usage by around 20% in July 2019 compared to June 2014.

Other investments

Two other large areas of investment have grown over the course of Q6. The first is to drive our Heathrow 2.0 sustainability strategy, covered further in section 5. Sustainability is an increasingly significant factor in our capital investment decisions, as we design and retrofit for reduced energy demand, eliminating waste and managing our inputs such as water. For example, we invested in efficient street lights, which will result in carbon savings of 113 tonnes. Another example is our Data Centre Network, which implemented a simplified and secure architecture to enable the efficient deployment of solutions and services to meet future operational and business demands. Not only did this improve its resilience to cyber threats, it is now much more energy efficient, leading to a [REDACTED] and a reduction of CO2 emissions of c.267 tonnes.

The second area of increased investment has been in hub capacity and expansion. As of the end of 2019 we have invested approximately £500m in Category A, B and pre-Development Consent Order (DCO) Category C costs. This investment has allowed us to develop a single preferred masterplan, hold two full-scale public consultations, begin early works and surveys and progressed our DCO application to be ready to submit in 2020.

Managing investments differently

The Development and Core capital framework was a fundamental change in Q6. This successful change has created a more flexible and adaptable capital portfolio which we can better manage collaboratively with airlines. Equally successful has been the related setting of milestone triggers in the G3 investment decision gateways. These triggers are designed to encourage the timely and efficient delivery of key projects⁵ through incentivised schedule and cost performance ex-ante, once projects are adequately scoped and estimated. 15 of the 19 Q6 triggers have been achieved, with those not delivered subject to ongoing review by airlines and airport.

During Q6 Constructive Engagement, the airlines proposed an Independent Fund Surveyor (IFS). The agreed objective of the IFS was to provide an ongoing assessment of the reasonableness of key decisions and ensure that capital is used effectively to deliver the outcomes determined by the project business case. During Q6 the IFS engaged on most triggered projects such as the T3IB rollover and taxiway projects. The IFS has produced over 700 reports. IFS involvement has fostered continuous improvement and corrective action on projects, as well as influencing the regular update of processes and guidelines throughout Q6. This has all made Heathrow's capital delivery more efficient.

Collaboration, co-operation and engagement with the airlines on investment projects improved during Q6. As at December 2018, the Capital Portfolio Board (CPB) had approved 668 decisions moving investment from Development to Core. Most decisions were pre-approved at stakeholder boards before reaching the CPB. Closer collaboration and the IFS - along with

⁵ Q6 Capital Investment Triggers Handbook (March 2015) – CAA website

existing ex-post evaluations of efficiency and greater use of consumer insights meant we found the right solutions more often in Q6.

5. Sustainable growth

In 2017, after extensive consultation with local communities, Government, technical experts, NGOs and Team Heathrow partners, we launched Heathrow 2.0, our blueprint for sustainable growth (see chapter 4 – Sustainable Growth for how this fits within our H7 plans). This laid out an ambitious agenda for Heathrow to be a leader in sustainability at a local, national and global level. This was signed off by our Board and by the Heathrow Sustainability Partnership. We have since been implementing this plan.

We have created 1,813 apprenticeships since 2014. We have reduced our carbon emissions from the airport by 93% since 1990. In 2015, we launched the Heathrow Community Noise Forum to work on local concerns over airspace and aircraft noise. The forum has representatives from local authorities, NATS, British Airways, Department for Transport (DfT), CAA and Heathrow. We invested £3.8m in noise compliance, established our Fly Quiet League ranking airlines based on their noise impact and introduced sharper incentives in our landing charges for quieter planes. We are on track for all of the noisiest Chapter 3 aircraft to have disappeared from Heathrow by the end of 2020, and currently two-thirds of planes operating out of Heathrow are the quietest Chapter 14 planes.

We have cut late night flights from around 500 in 2012 to 268 in 2018. We are implementing an Ultra Low Emissions zone airside and we are on track for all of our vehicle fleet to be converted to electric or plug in hybrid by the end of 2020. We have also installed 100 electric charging points across the airport for public use.

We have invested £77m to bring the Elizabeth Line to Heathrow, achieved a deal to extend and refresh the Heathrow Express service and funded new express coach services such as the Guildford RailAir route. These new services will not only encourage more sustainable travel but offer a growing range of direct, affordable access options to consumers in line with what they tell us they are seeking.

Our progress was recognised when we were named “Sustainable Business of the Year” at the prestigious edie Awards.⁶

In 2015 Heathrow’s North West runway was recommended by the independent Airports Commission as the best way to maintain the UK’s status as an international hub for aviation. In 2018, the UK parliament voted to back the Airports National Policy Statement (ANPS) approving Heathrow’s North West runway plan with a majority of almost 4 to 1, with cross party support. The ANPS then allows the Development Consent Order process to provide the planning consent and powers needed for expansion. We have made excellent progress in consulting on the masterplan and airspace changes and will submit our DCO planning application in the second half of 2020.

These consultations have had over 36,000 separate pieces of feedback. The requirements of the ANPS, the planning process and the feedback provided have shaped our masterplan and wider plans as outlined in this business plan. We can only deliver what consumers want – including the £69 billion in fare savings and the more choice of flights and destinations – on the back of this formal legal and policy support.

⁶ <https://event.edie.net/awards/2019-winners/>

Through our masterplan and IBP we will meet all the requirements of the ANPS. The next challenge is to decarbonise flight so that future generations can enjoy the benefits of aviation in a world without carbon. Since the ANPS vote, we have committed to being carbon neutral by 2050, as has IAG, our largest airline customer. We are now working to make this target the standard in global aviation, to take the carbon out of flying and remove any competitive distortions.

Political and policy support comes from the strength of the economic and social case for expansion. We have built the coalition of support throughout Q6. We have engaged with consumers in the airport and online on the benefits of expansion. We have listened carefully to local residents on their concerns and the opportunities for them in a growing Heathrow. We have involved the wider airport community, airline customers, our supply chain and local businesses and representatives across all the UK nations and regions. The TUC, CBI and Chambers of Commerce along with unions, business groups, MPs, regional and devolved Governments have all supported expansion. We have agreed frameworks with many local boroughs and established the Heathrow Strategic Planning Group (HSPG) to integrate our plans with local authorities' priorities. We also supported the independent Heathrow Community Engagement Board as recommended in the ANPS. Heathrow sought expertise from the Skills Taskforce led by David Blunkett, and the wider infrastructure industry through Project 13 and our Advisors Board. We have engaged with the supply chain to seek innovation and efficiency via 4 Logistics Hubs across the UK and the Innovation Partners initiative.

This Initial Business Plan is based on our M4 gateway masterplan, consulted on at our Airport Expansion Consultation, and presents several choices based around speed and service. The new runway can be operational at some point between 2027 and 2029, depending among other things on which choices we make.

2 - CONSUMER ENGAGEMENT DRIVING OUR BUSINESS PLAN

Overview

- We have revamped our consumer engagement strategy ahead of H7, improved by the challenge and insight from the Heathrow Consumer Challenge Board (CCB)
- Our thinking has been informed by over 200 individual consumer insight reports increasingly supplemented by more interactive co-development we have engaged with over 350,000 consumers over 70,000 hours in 2019 alone
- We've heard that consumers genuinely value good service on a few dimensions and may be willing to pay up to █████ extra for improvements to the services the value when travelling
- We have developed six consumer outcomes based on our consumer insight.
- Consumers do want more flights and destinations which only expansion can deliver. They also want improvements within the journey such as predictability and reliability, basic comforts and to feel cared for
- To deliver for consumers we need to deliver something for all stakeholders and so we have also defined four stakeholder outcomes
- We have built our plan around these outcomes where they have already led to
- significant changes to our masterplan, surface access and operational plans
- We have followed a robust and iterative approach using established methodologies to develop our insights

1. Introduction

All businesses plan based on their understanding of both their customers and consumers more widely. Heathrow has revamped its approach to consumer engagement ahead of H7 and as we plan for expansion. This chapter briefly describes the background for this shift and the emerging consumer engagement strategy that we have developed as a result. It then summarises the research and engagement we have done and some of the headline consumer engagement work packages and their findings. We discuss how our consumer engagement has informed the definition of our consumer outcomes, we detail our other stakeholder outcomes. We also set out how some examples of how consumer insights have directly influenced our plans to deliver better on our consumer outcomes. Chapter 3 H7 Plans & Choices then describes where we see strategic options against our outcomes and the choices research package on consumer preferences that has informed these options.

2. Focus on consumers

In 2015 Heathrow created our vision “to give passengers the best airport service in the world.” This created a step change in our business. By focusing on the passenger, we centred on a common goal we shared with others in the industry. This vision is at the centre of our business decisions. Our vision drives us to get the basics right, focusing on efficiency and specific service improvements. Passengers have recognised the efforts we have made to date,

measured by the improvements in our ratings under the Airport Service Quality (ASQ) over the last 12 years. We have gone from being one of the worst performing airports for passenger satisfaction to one of the best in the world.

All companies have to constantly strive harder to keep meeting consumers expectations. The imperative to better understanding and then meet continually rising consumer expectations is not unique to airports or aviation. Businesses know that if they are unable to satisfy the consumer expectations in terms of experience, consumers will take their business elsewhere. Technology breakthroughs have made the process of comparing, switching and providing feedback even easier for consumers. Heathrow can be no exception.

Leading consumer companies not only focus on their customers, they go to great lengths to understand, engage and even develop their products and services with consumers. Heathrow undertook an in-depth investigation into the best service practices in 2015-16 (which we titled 'Transforming Heathrow through Service'). This review particularly highlighted intensive and varied consumer engagement as one of the hallmarks of competitive and transformative service.

Regulatory practice has developed in a similar direction. Fair pricing and compliance with service targets have always been expected from a regulated business. But the landscape has now evolved. Outcomes-based regulation has fostered a move away from reliance on detailed prescriptive rules to achieving high-level, broadly stated outcomes. Both Ofwat and Ofgem, whilst having slightly different approaches, have developed to consider outcome-based regulation. Heathrow's regulator, the CAA, has now followed a similar path, encouraging our transition from an input-based business to one that links different components of our plans and activities to wider consumer outcomes.

Part of Heathrow's challenge for H7 and this business plan therefore has been to look again at how we engage consumers to understand their needs and wants. This has been an ongoing process of development and iteration, which we have not always got right first time. We have also been helped in refining our approach to consumer engagement by an ongoing dialogue and input from the Consumer Challenge Board (CCB), whose role we outline both below and in our CCB annex – Annex 36.

3. Headline Engagement Projects

Since 2017 we have engaged with over 1 million consumers to inform our business plan. We have also engaged extensively with other internal and external stakeholders. Details of our engagement with airlines can be found in Annex 39 - Airline Engagement.

There are three key consumer engagement projects we have undertaken that have shaped our IBP. These reveal what passengers truly value, the outcomes they prefer and how preference between presented packages. Between the Initial and Final Business Plan we will run further research to hone our plans and ensure that they are acceptable to consumers.

Table 2: Headline engagement projects to shape the Business Plan

Phase	Timing	Objective
Defining Outcomes – Synthesis of Insights	Q3/4 2018	To identify key consumer outcomes from over 100 Heathrow external reports
Understanding relative needs – Willingness to Pay Research	Q1 2018	To understand how consumers prioritise options and actions we could take to deliver these outcomes. To understand consumers valuation of a range of service improvements.
Understanding preferences – Choices Research	Q3 2019	To understand consumers most desirable service package, based on choices related to expansion and the current operations.
Review of proposals – Plan Acceptability*	Q2 2020	<i>To be completed between Initial and Final Business Plan</i>

We describe the findings of the completed work packages in the rest of this chapter and in Chapter 3.

3.1 Synthesis of Insights

We have six consumer outcomes built from the five themes that emerged from our consumer engagement. We are using these outcomes as a basis for our future plans and strategies. We outline below how we arrived at these outcomes based on a comprehensive synthesis of our findings to date.

In order to understand what consumers need from their airport journey, we needed to integrate the large volume of insight emerging from our consumer engagement into a manageable and practical guiding framework. We used an independent social research agency, Blue Marble, to undertake an insight synthesis, by analysing over 150 individual consumer research and insight reports.⁷ This has been undertaken twice. The second iteration validated our findings from the first. We will be undertaking a third synthesis in 2020 to incorporate our latest research and insights. These included Heathrow internal research reports as well as a wide range of external sources such as airline passenger insights and reports from the CAA and IATA.

Blue Marble carried out an iterative process to establish these key areas of consumer need. This culminated in the five themes presented below.

⁷ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019

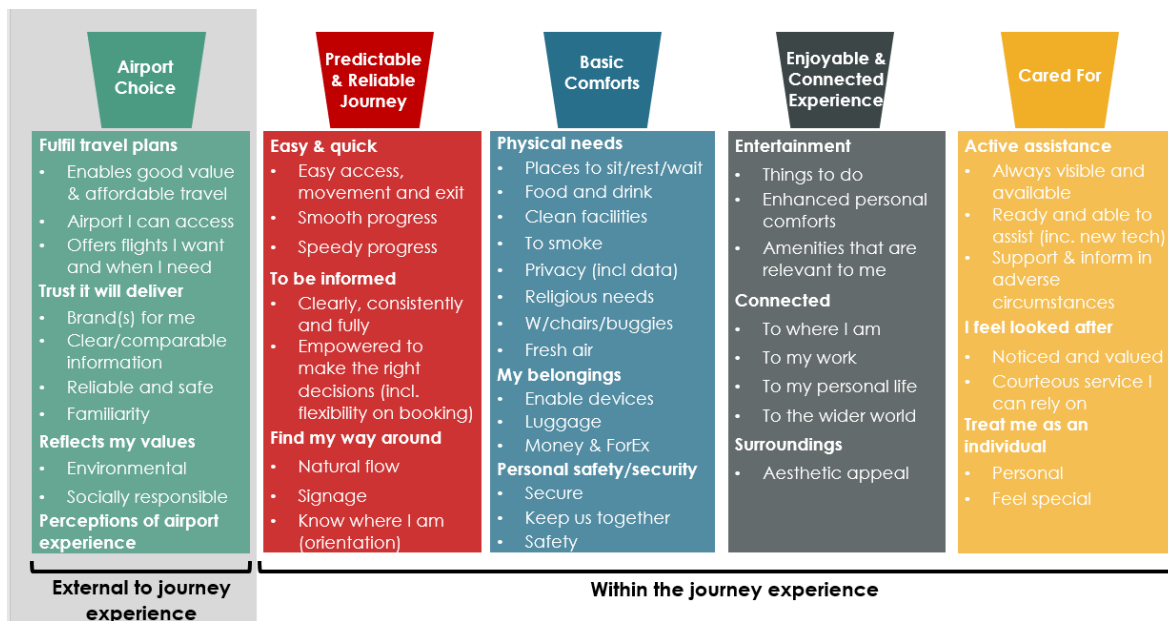


Figure 8: Consumer need areas

The five themes that emerged from our passenger synthesis were:

Airport Choice

Consumers want good value and affordable travel. Consumers' needs here are mostly practical, needing an airport that flies to the destination they want to go to, at the right time and for the right price. They need to know that they can access the airport and they need to trust that they will be able to complete their journey without delays or cancellations.

Predictable & Reliable Journey

This centres round consumers' need to be in control of their journey. Consumers need to be confident that their journey will run to plan, in line with their expectations, and that the service will be reliable. An airport service that is predictable and reliable will alleviate key stress points for consumers.

Basic Comforts

This reflects the services and facilities that consumers are most likely to need when they travel through the airport. These needs are mainly practical and include things like cleanliness and places to eat and drink. However, it also reflects consumers' needs to have their belongings around them and feel safe and secure at their airport.

Enjoyable & Connected Experience

This theme reflects a higher emotional need for passengers and relates mainly to the environment and facilities provided within the terminal. Consumers want to personalise their experience and want to feel connected to their everyday lives and the outside world.

Cared For

This theme reflects another higher emotional need. It centres around consumers' need to feel looked after, valued and supported through their journey. This includes in unexpected circumstances. It is a mixture of both emotional and physical needs and often related to interactions consumer experience through the journey.

3.2 Consumer outcomes

We then developed our consumer outcomes from the passenger synthesis based on the following criteria:

- Be simple and easy to understand
- Remain consistent with existing language
- Be able to be meaningfully measured; and
- Reflect the evidence base.

From our research six consumer outcomes emerge (see figure 2 below).



Figure 9: Consumer outcomes

“I have more choice of flights and destinations”

Consumers want the airport to offer more destinations served more widely by airlines, at more convenient times and more competitive prices. They want to be able to trust Heathrow will deliver this wider offer.

New capacity is the only way we can materially expand choice of flights and destinations. Therefore, central to our plan for the next 15 years therefore is expanding our capacity to add at least 260,000 more flights a year. This new capacity could allow us to serve 6 million more

passengers per year by 2028 and an additional 30 million more by 2036. Airfares could be £20 to £140 a ticket cheaper.⁸ We could serve up to 100 new destinations, including 40 long-haul destinations. Many more routes could have new airlines serving them, better timings and new connections across the network.

So significant is this once in a generation opportunity to create new capacity at Heathrow for delivering on this consumer outcome, and so material are the potential consumer savings, this outcome drives much of the economics over the 15 years of our plan.

“I am confident I can get to and from the airport”

A consumer’s physical journey begins from the moment they leave their home, office or hotel. Therefore, getting to, from and around Heathrow matters to airport experience and airport choice. Consumers want to do so quickly, easily and in a way they trust. Perception, research and relative value for money all affect airport and mode choice.

By 2040 we can expand the range and resilience of rail and road links, closing gaps in our access to the west and south and bringing 90% more people within an hour by public transport than there are today. Lower public transport fares combined with new vehicle charging at the airport will incentivise more sustainable access. Raising public transport mode share to 50% will also cut congestion and delay for all consumers.

Simpler, intuitive passenger journeys to all parts of the airport will improve the experience for all and create a further positive incentive for sustainable choices. We could invest to improve wayfinding across the airport too.

“I have a predictable and reliable journey”

When using the airport, consumers need to have confidence that their journey will run to plan. They are looking for quick and easy progress through the airport with clear and accurate information and no surprises. There can be extra needs for this outcome for certain consumers, such as families or vulnerable passengers. This outcome is also very important for many business travellers who prioritise a speedy, no hassle and reliable service.

By the 2030s we can sustain some of the best hub airport punctuality in Europe, cut waiting in the air and on the airfield and increase the number of passengers with a short connection. We are not directly responsible for key parts of the journey such as check-in, boarding, immigration and baggage delivery. We will work with Team Heathrow partners to achieve a consistent and fast passenger journey. We can simplify security and could cut arrivals queues as well. Automation enables multi-tasking between airport, airlines and handlers and gives us an extra level of resilience.

“I feel comfortable and secure at the airport”

All consumers travelling through Heathrow require a basic set of facilities and services for their journey. These needs are mainly practical such as food and drink, rest and sanitation. Consumers want to know their belongings are safe and secure. These needs may be accentuated for some passengers requiring extra support. Consumers expect Heathrow to provide many of these outcomes as a basic minimum and their requirements will change as our consumer mix changes.

⁸ Taken from a Heathrow internal calculation based on the model created by Frontier Economics, assuming a passenger price elasticity of -0.7

Today Heathrow meets many of these needs as well as most airports in Europe. Despite the challenges of more passengers and extensive construction we will continue to deliver at least this level of satisfaction. Our process changes will provide an upgraded security experience and reassure passengers their belongings are safe by utilising self-service and automation. We expect to get these basics right and with extra investment we could upgrade core facilities and spaces. We will also take greater ownership of care for vulnerable passengers.

“I am cared for and supported”

When travelling through Heathrow, in addition to the basic expected levels of service, consumers want to feel looked after, valued and supported in all situations. This encompasses both emotional and physical needs for passengers. These needs vary by different passenger groups and stages of travel. Feeling cared for is particularly important in times of disruption or other unexpected situations where passengers are under more stress.

We have come a long way to minimise the likelihood and impact of disruption and have learnt from key incidents, such as major snow events. Our established resilience strategy and the ongoing investments this plan support are designed to evolve, continually learning and adapting to new or changing threats. We have also proposed continues investment in service both through colleagues and digital interfaces to deliver a personalised service.

“I have an enjoyable experience at the airport”

An airport journey can be elevated to a fantastic consumer experience, that is memorable for all the right reasons. Once travel basics are met, consumers say they would love Heathrow to give them a personalised connection to the world outside the airport process. This experience can start even before entering the airport. We can also make a difference to a passenger’s journey by providing moments of unexpected joy, surprise and new discoveries.

As a global hub airport, Heathrow must attract more connecting passengers. The elevated airport experience can be part of that proposition. We are learning from world leaders like Changi and Hong Kong who have developed the experience to where it no longer feels like just a functional airport to the passenger. The airport experience has become memorable, with world-class retail, dining and entertainment. Heathrow needs to create such experiences on a commercial basis. We therefore see opportunities to build new enjoyable experiences for consumers through redesigned, greener spaces, iconic technology, online and reserved shopping, chances to treat themselves in stores, restaurants, lounges or new experiential offers.

We tested these 6 outcomes with the CCB and airline community. This led to a series of iterations, principally splitting out “cared for & supported” and “an enjoyable experience” following challenge from the CCB to ensure that the outcomes fully represent the language used by consumers. We then tested the outcomes further with the Horizon community and finalised our outcomes wording following their feedback. The wording above represents our final outcomes.

These outcomes and the insight that has built them has been shared internally with business planning leads across Heathrow. The insight and outcomes have been shared through formal insights sharing sessions following the publication of the insights synthesis, regular lunch and learn sessions held by our internal Insights team and continuous communication through an insight reporting platform. The Heathrow Executive Committee and Heathrow Board have reviewed and fed back on our outcomes before approving the final set for this IBP.

In addition to insight increasingly informing our future plans as they are created, we have also validated our future plans against these outcomes and consumer insights. This helps to ensure

that our proposals meet the needs of consumers and will help us to deliver the outcomes. This triangulation process of testing our plans back against consumer research has been particularly important to ensure that we are still attempting to optimise plans for consumers after other considerations and constraints have been included in our thinking.

3.3 Understanding relative needs - Willingness to Pay (WTP)

Heathrow also needed to understand how consumers valued different priority aspects of their journey as a base for business planning. WTP research was identified as the standard best practice method to do so.

Phase 1 – Qualitative unconstrained improvements

The first phase of primary research was qualitative in nature.⁹ Passengers were invited to suggest potential future service improvements at Heathrow based on their current experiences at Heathrow and other airports across the globe.

The insight suggested that, when considering an airport, passenger choice is heavily based on the cost, accessibility, flight options and the punctuality of flights. Passengers want a smooth, stress-free journey that flows well and gets them to their gate quickly and efficiently. Wider consumer experiences have raised consumer expectations. Passengers welcome an airport experience that induces a sense of emotional well-being as well as meeting their practical needs. What they remember about great airport experiences are the things that make it stand out from the crowd. Four high level categories emerged from this qualitative research where consumers identified areas of improvement. These are:

- Control and predictability
- Ease
- Wellbeing
- Customer care

This led to 40 broad service areas being put forward for potential improvement. The work also began to explore overall cost and service priorities. It found that while price is always an influencing factor on where consumers fly from, price means more than the ticket price. Consumers will weigh up the ticket price, alongside efficiency, other direct costs (e.g. surface access) and the 'cost' of stress.

Control and predictability

Passengers want to have a good sense of flow and direction to navigate the airport, to feel empowered to make the right preparations and decisions and to feel confident the journey will run to plan. Practical examples include:

- Simpler check-in/ bag drop steps – *“I still don’t understand self-check-in because after the self-check-in, you still have to do a bag check-in. The fast check-in is still a double check-in – and you have to check-in and then have to go up to the desk for your bags.” (Business, Short-Haul)*
- Smoother security search process – *“I want to get there [to my flight on time and that we don’t have any delays...no security check queue. Just getting through quickly.” (Non-EU, Leisure, Long Haul)*

⁹ Caroline Thompson Associates, *Willingness to Pay: Qualitative Research Findings*, November 2017

- Reducing the real, and perceived, time to pass through Immigration – *“You can see masses of people [in the queues] when you arrive but it’s ok as long as you’re moving. It’s when you’re standing still [that] it makes you anxious.”* (Premium, Business, UK)
- Information on arrival about onward travel status – *“could they not so say like Transport for London do, the status updates? What’s working well. ‘The district Line is good service,’ or ‘severe delays on the Bakerloo,’ so you know before you leave the airport and you can reschedule. Straight after you come out with the bags. There might be an interactive screen.”* (Leisure, Shortbreakers)
- Personalised way-finding information – *“I’ve started using Citymapper instead of Google Maps. It tells you exactly the walk when you get to Old Street, what subway exit you need to take. It also tells you the current wait time. It would be useful if they had a live ‘how long is the security queue?’.”* (Business, Long Haul)

Ease

Passengers want to feel that Heathrow is an easy airport to access and that moving around the airport is manageable and easy. Passengers want to feel that their practical needs have been carefully addressed. Practical examples include:

- Better spaces for business travellers to work – *“the only thing is that if I wanted to do some work, I don’t know it’s that easy here. Unless I wanted to pay £35 or whatever for a lounge. It would be nice to have somewhere to sit with power – here, there’s power but no tables. You want to use your time well. Ordinarily I’d be working now [7:30am]. Privacy as well...I’ve got confidential stuff on my laptop It would be an embarrassment if someone saw it.”* (UK, Business, Direct)
- Improved provision of wheelchairs for passengers who need them – *“to have a wheelchair available when disembarking. We had to wait over an hour for one.”* (PRM, UK, Connecting)
- Facilities for families – more play options, add a toilet to baby change facilities, family lanes at security and courtesy push chairs – *“A family lane would have been good. It takes the pressure off. Because you don’t want to get delayed. But you also don’t want to delay other people. You don’t want to feel a burden.”* (Non-EU, Family, Long-Haul)
- Softer seating options - *“I’ve not been finding this easy. I need to rest. I need to sleep...I’m cold... I would have liked a leather foam chair. Something soft – not somewhere with a handle [across it].”* (Non-EU, Leisure, Connecting)

Well-being

Passengers want to feel a sense of calm through their journey. They want to feel simulated and entertained. Importantly they want to feel welcome and to enjoy the sense of local culture and identity. Practical examples include:

- Ambient surroundings – *“One of the things I found at Heathrow is the lack of light. It needs more greenery and plants, and it gives off a nice sense....it makes you feel more nice. More relaxed. It’s just nice being in nicer surroundings.” (Leisure, Short Haul)*
- Distractions (e.g. TVs, iPads, cinemas, libraries and creches) – *“In Toronto, there are a lot of seats around the departure gates...they have iPads in every seating area, you can relax and entertain yourself whilst you’re waiting.” (Premium, Non- EU)*
- Activities for children/ teenagers – *“I was in Louisville – they make baseball bats so they had a baseball cage for the kids to go and swing a bat.” (Leisure, Visiting Friends and Relatives (VFR))*
- Leisure activities (e.g. gyms and pools) – *“I like a nail bar. And in Amsterdam, they had these massage chairs.” (Business, Potential Heathrow flyer)*
- A sense of place and culture exhibitions – *“It’s nice to have something a bit different, some history. In Crete, at baggage reclaim they have all the history of the region about olive oil. Whilst you’re waiting for your bag.” (Leisure, VFR)*

Customer Care

Passengers want to feel looked after and valued. To feel that they have assistance readily available and that needs are managed particularly in unexpected/ adverse circumstances. Practical examples include:

- Manned help points and more face-to-face communication – *“There’s no one to talk to, to deal with difficulties.” (Non-EU, Leisure, Direct)*
- A stronger service culture amongst front-line staff – *“Dubai is amazing, they really acknowledge you as an individual and they look at ways to help you, they don’t wait for you to ask.” (Premium, Direct)*
- Personalised assistance - such as one-on-one chaperones for special assistance, flight connections, baggage retrieval or missed flight issues – *“Once they plop you down, they ignore you until you’re ready to go. I’ve been here for 4 hours and I haven’t even had a drink. No one has asked if I need anything.” (PRM, Non-EU, Connecting)*

Phase 2 – Quantitative prioritisation

Following this qualitative exercise, Systra carried out a prioritisation survey to understand which aspects of service were prioritised by consumers. This was mainly a “MaxDiff” exercise allowing passengers to rank service improvements in priority order.

Phase 3 – Quantitative trade-off (WTP Survey)

A shortlist of the most preferred improvements was then included within a second quantitative survey that used trade-off exercises to identify the relative importance of each defined service improvement, within the context of passengers paying for the improvements in the form of an increase in their future airfare. This featured a total of 22 distinct service improvements which was divided into two combinations of 15 service improvements – one for connecting flyers and another combination of 15 for direct flyers.

The outputs of this exercise were consumers valuations of the individual service areas. For our business planning, we have used 67th percentile value to reflect the ‘average’ value of all

the passengers, where 67% of passengers are willing to pay for the service improvement. This valuation is shown in the tables below:

Table 3: 67%ile Direct Passengers' WTP values¹⁰

Aspect of Service (Current → Improved Level)*	WTP (£) at 67 %ile
Punctuality – [80→] 85 out of 100 flights will depart on time	£3.71
Time waiting at passport control - 9 out of 10 times you will go through passport control in < [30→] 20 minutes (Non-EEA)	£2.56
Real-time information on waiting times at passport control, security and baggage reclaim (New)	£2.15
Time waiting at baggage reclaim for all bags - 9 out of 10 times you will wait no more than [45→] 35 minutes	£1.78
Time waiting at Security - 9 out of 10 times you will go through security in less than [5→] 3 minutes	£1.55
Dedicated lanes at Security for passengers that would like extra assistance - New additional security lane(s)	£1.54
Time waiting at passport control - 9 out of 10 times you will go through passport control in < [10→] 5 minutes (EEA)	£1.50
Wi-Fi Access - Ultra-high speed Wifi connection with total coverage throughout airport at any time (New)	£1.35
Self Service Bag Drops - You are able to choose self-service bag drop machines if you want (New)	£1.33
Real-time information about your onward travel from Heathrow by car, bus, rail, tube, taxi (New)	£1.23
Travel time, from arriving at the airport, to reaching your departure terminal - 10% less time [needed]	£1.19
Types of seating - A larger variety of different seating options that meet different needs	£0.93
Facilities at departure gate 'satellite' areas - Improved seating, F&B, retail and other services such as showers and spa	£0.84
Number of charging points - Charging points located near to all blocks of seating within the airport (New)	£0.76
Character of the airport - The airport to have a more distinct British look and feel (New)	£0.41
Provision of music in the terminals - Music played to passengers while they are within the terminal building (New)	£0.25

** Some of the service level descriptions have been slightly truncated for ease of comparison*

¹⁰ Systra, *Heathrow Airport Customer Valuation Research*, November 2018, page 51, Table 16

Table 4: 67%ile Connecting Passengers' WTP values¹¹

ATTRIBUTE*	
Time waiting at Security - 9 out of 10 times you will go through security in less than [5→] 3 minutes	█
Punctuality - [80→] 85 out of 100 flights will depart on time	█
[13→] 10 out of 1000 passengers' baggage will miss the connection between flights	█
The walk to connect flights will take 10% less time	█
Airport staff available to meet you off your plane if you have limited time to connect between flights (New)	█
Real-time information about the time it will take you to get through security (New)	█
Dedicated lanes at Security for passengers that would like extra assistance - New additional security lane(s)	█
Wi-Fi Access - Ultra-high speed Wifi connection with total coverage throughout airport at any time (New)	█
Types of seating - A larger variety of different seating options that meet different needs	█
10% less time to walk from security to your departure gate	█
Number of charging points - Charging points located near to all blocks of seating within the airport (New)	█
Storage facility for hand luggage after security, where you can leave your bag while you explore the departure lounge (New)	█
Facilities at departure gate 'satellite' areas - Improved seating, F&B, retail and other services such as showers and spa	█
Character of the airport - The airport to have a more distinct British look and feel (New)	█
Provision of music in the terminals - Music played to passengers while they are within the terminal building (New)	█

* Some of the service level descriptions have been slightly truncated for ease of comparison

From the above lists, both direct and connecting passengers want Heathrow to prioritise improvements that give them greater control and predictability; and, to a lesser degree, greater well-being.

The insight has been used three main ways. Firstly, it fed into defining consumer outcomes as described in the previous section. Secondly, it has been directly reviewed alongside the potential investments that Heathrow could carry out over H7 and the relevant costs of these investments. This has helped to provide a view of which initiatives were most likely to be cost beneficial and therefore the highest priority to deliver for consumers along with considerations

¹¹ Systra, Heathrow Airport Customer Valuation Research, November 2018, page 52, Table 17

such as safety, asset management plans and affordability constraints. This validated our investment plan and found opportunities to invest more in some areas to meet consumer needs. Thirdly, it has informed the early development of targets and incentives and is an important input to cost-benefit analysis. As detailed in Chapter - 3 H7 Plans and Choices, there are options for us to reflect highly valued improvements with more investment (and therefore a higher airport charge) within limits indicated by consumers.

4. Stakeholder outcomes

Heathrow cannot consider consumer outcomes in isolation. We must also consider the needs and views of our other key stakeholder groups – airlines, community, colleagues and investors. Our role is to balance these, often competing, sometimes complementary, needs and develop a plan that optimises the benefits for all. Put simply, if we do not understand and meet all our stakeholder needs, nobody wins, and we cannot deliver for consumers.

We defined four stakeholder groups in our Strategic Brief in 2018¹²; Community, Colleagues, Airlines and Investors (see figure 9). Stakeholder outcomes have not been defined using consumer research. However, they are based on similar extensive engagement over multiple years.



Figure 10: Stakeholder outcomes

4.1 Community

We want to benefit our local community and be a good neighbour, which is why we have taken the time to understand the views of the people living closest to the airport. Heathrow is also

¹² <https://www.heathrow.com/company/about-heathrow/company-information/heathrows-strategic-brief>

committed to spearheading a more sustainable future for air travel. Expansion at Heathrow cannot be at any cost.

Consulting with our local communities on a regular basis allows Heathrow to shape its future plans in a sustainable and beneficial way for everyone. Our definition of our local communities is our 9 boroughs, and that is constituted by inner and outer boroughs. We have also engaged communities outside of these immediate boroughs, as they are also affected by Heathrow.

We have held three key public consultations over the past two years. This has allowed residents and interested parties to make their views known about various aspects of our proposals and comment on the design of our final plans. In a similar manner to our principles for consumer engagement, we have used a range of methods to inform and engage with people about our consultations, including; leaflet drops, dedicated consultation websites, public exhibitions with documents available and colleagues on hand to answer questions, document inspection locations and a community phonenumber.

We understand that the main issues for local people are noise pollution, air quality, property compensation and increased job opportunities. We work closely with local communities to draw out the best plans to minimise the impact that expansion will have, and to ensure that there will be benefits to our surrounding areas.

Our community outcome can be summarised as: *“Commitments made by Heathrow for sustainable airport growth are met.”*

4.2 Colleagues

We want everyone who works at Heathrow to feel they can be safe, happy, motivated and developed in ways which encourage them to flourish. Engaged colleagues that represent the communities we serve will ensure we can deliver service for passengers and provide good quality jobs to communities who are most affected by the airport. We will create careers, not just jobs, where people will be trusted to make decisions and feel that they can do so quickly and with impact, taking opportunities to grow, adapt and develop.

Our colleague outcome can be summarised as: *“Heathrow is a great place to work.”*

4.3 Airlines

We have listened to our current and future airline customers through extensive engagement. They say they want more automation of the passenger journey, more investment in baggage systems to increase resilience, and a better connections proposition. They prioritise a robust, punctual and resilient airfield operation. There is also a strong preference that charges remain affordable. There is of course a tension between the desire for investment to drive service and efficiency and a lower airport charge. Airlines have a range of views on the speed and sequence of new capacity and whether Heathrow should focus on serving more passengers or maintaining a higher airfare yield.

We have also engaged specifically with airlines on some of the inputs to the building blocks as part of our pre-IBP engagement. This has included engagement on forecasting methodologies and consultants reports that support operating cost and commercial revenues forecasts, and our passenger forecast methodology. Further detail can be found in Annex 39 - airline engagement.

On expansion our airline engagement has evolved considerably since the Government decision in October 2016. There are now established forums and working groups for multilateral engagement that report into the monthly Joint Expansion Board. A fortnightly

Airline Working Group to review the detail required for the airlines to support the Development Consent Order (DCO) has been in place since August 2017. This meeting alone has led to 55 meetings and over 330 hours of engagement to date. The Cost & Benefit Working Group, which focuses on benefits, cost information and benchmarking started at the same time and has led to at least an additional 132 hours of engagement. As part of the expansion process we have also engaged with potential future airlines which are not currently operating at Heathrow.

As the UK's largest port, cargo is also a key part of Heathrow's operations. In order to understand the needs of our cargo community, we commissioned a programme of research amongst the extended community (carriers, forwarders, handlers, hauliers plus other, non-operational contacts such as sector consultants, industry associations and commentators). The findings showed that infrastructure improvements were a key priority for the cargo community, with many expressing concerns about the current cargo infrastructure at Heathrow, in particular its age and accessibility.¹³ Our quantitative study reinforced this and also identified that we could do more to enhance the ease and reliability of cargo operations at Heathrow.¹⁴ It also showed that cargo users were positive about Heathrow's future as a cargo airport in light of expansion, with 72% of respondents stating that they thought Heathrow Expansion offers the best opportunity to improve cargo infrastructure at Heathrow.¹⁵

Our airline outcome can be summarised as: *"Heathrow provides efficient, reliable and affordable airport services."*

4.4 Investors

Heathrow expansion will be one of the largest privately financed infrastructure projects in the world. We will invest £14 billion (2014p) to get the runway open, and more after opening to provide the passenger facilities to meet demand. This entire investment for the users of the airport will be financed without resort to tax funds or government guarantees.

Investors – equity and debt – cannot be taken for granted. This plan ensures the necessary cashflows to support global debt financing at existing strong investment grade ratings, while maintaining a sufficient return to attract equity investment to support the expansion programme.

We have engaged in some depth with debt and equity investors, rating agencies and the CAA's and DfT's financial advisors. We are hearing consistent messages:

- Maintaining an A- credit rating is critical to raise the amount of debt at appropriate cost, maintain confidence in us and support large bank facilities;
- Cashflow credit metrics are key to creditors and credit rating agencies; and
- Heathrow will need to raise a large quantum of new equity to enable the debt financing

Equity investors tell us they require an appropriate return on capital over the investment time horizon. Infrastructure equity investors are characterised as requiring long term stable returns. Heathrow's shareholders are no different. They represent some of the largest and best capitalised infrastructure investors globally and can commit to delivering expansion if returns are at a fair rate of return to reflect the additional risks compared to international comparators and Q6, which represents an inherently lower risk business plan. In addition to the significant fresh equity required to fund the expansion, the long period of negative free-cashflow during

¹³ Firebrand, *Summary review of qualitative research amongst the LHR cargo community – 2018*, February 2018

¹⁴ Firebrand, *Heathrow Airport Cargo Community Quantitative Research 2017/8*, May 2018

¹⁵ *Ibid*

construction, means recovery for equity investors is pushed very far into the future. For this reason, they require regulatory stability for longer than five years to give them confidence to invest. They also require higher returns compared with 'business as usual' including Q6, which does not reflect the same level of construction traffic growth and operational risk as H7.

Failure to build confidence from rating agencies, debt market and equity investors will impact our ability to deliver expansion at all or at financing costs where we can maintain charges at levels deemed to be affordable.

More information on investors can be found in Chapter 12 WACC and Chapter 13 Financing. Our investor outcome can be summarised as: *"Heathrow delivers predictable and fair returns."*

5. Our outcomes

Consolidating the six consumer and four stakeholder outcomes, provides an overview of what we aim to achieve in H7. Consumers are purposely put at the heart of our plans as we aim to deliver their outcomes but will be balanced against the views and constraints of our other stakeholders. For instance, we are balancing consumer preferences for more terminal investment with local community needs for compensation and airline needs for affordability. We discuss this further in Chapter 3 H7 Plans and Choices.



Figure 11: Our outcomes

5.1 The wider policy environment

As the UK's only hub airport, Heathrow is subject to significant policy scrutiny from the CAA, other authorities and Government. We must consider the policy conditions in the Airports National Policy Statement (ANPS), as these have an impact on how we deliver our consumer outcomes. For instance, the consumer outcome "I am confident I can get to and from the airport" must be placed in the context of the surface access targets outlined in the ANPS. To expand the airport and unlock the associated benefits for consumers, we need to comply with all these policy requirements. We have adjusted our plan where we needed to do so.

6. Consumer engagement impacts our plans

Our consumer engagement has directly impacted our base plans for 2022 onwards. This has meant that evaluation processes for masterplanning, capital business cases and portfolios, and internal business planning are all built with consumer insight. This ensures that insight increasingly permeates all of our plans.

The consumer insights team have also focused on disseminating the insights around the business as they engage. There has been particular internal focused dissemination amongst customer delivery, expansion, commercial and operations. Internal engagement and education has happened on both an ad hoc basis depending on the insight undertaken, but also more formally through regular cross-functional working groups and leadership teams, and our internal insight reporting platform where we share the latest consumer views. This is accessible to all areas of the business.



Figure 12: Our Discovery insights portal

We are already using insights to validate and course correct in iH7 with our new Service Transformation strategy for 2019-2021. We have backed that plan with £50m of new investment before 2022 as well as our broader, ongoing spending and investment. These insights have also been used for:

- The launching of a greater range of coach routes from areas that consumers are travelling to Heathrow from in order to give them greater accessibility to the airport
- Upgrading Heathrow's Wi-Fi infrastructure based on consumers wanting a higher connection speed, so that they can stay connected to their lives outside of the airport
- Improving closed gate rooms in Terminal 3, which were often rated lower than others, leading to the roll-out of Heathrow's Garden Gate followed by the 'decoration' of all other closed gates to provide an improved satisfaction ratings and sense of place.
- Delivering better paid for lounge offers across all terminals to meet the needs of our connecting passengers, with locations and offers led by consumer feedback.
- Working with our cleaning partners to alter the shift times of staff across the airport to ensure better coverage and an improvement in satisfaction scores
- Influencing the UK Government to extend which passengers have access to E-gates at immigration, which has improved satisfaction and made passengers arrivals journeys more reliable and predictable.

The Executive Committee and Board have also reviewed direct consumer insight, for example on masterplan options, from the Horizon workshops at regular away days and meetings

throughout 2019. Beyond these immediate inputs there are many examples of specific changes in our plans in the past 12-18 months. Below are just some of the examples where consumer insight has guided our plans to ensure we deliver the outcomes consumers prefer.

6.1 Masterplan changes

Our M4 gateway masterplan, which both the IBP and the summer 2019 Airport Expansion Consultation (AEC) are based on, had already been through a series of iterations. Consumer feedback drove many of the changes made in that process. Three examples demonstrate these steps.

Connections Experience

Many passengers tell us that the connections experience at Heathrow between terminals is not as good as when connecting within the same terminal. Aspects linked to our outcomes such as a predictable and reliable journey, feeling cared for and supported, and feeling comfortable and secure are highlighted as issues. They are linked to aspects of the airport service such as bussing, information and intuitive wayfinding. This difference in experience can be seen clearly in our QSM scores and regular, direct passenger feedback.

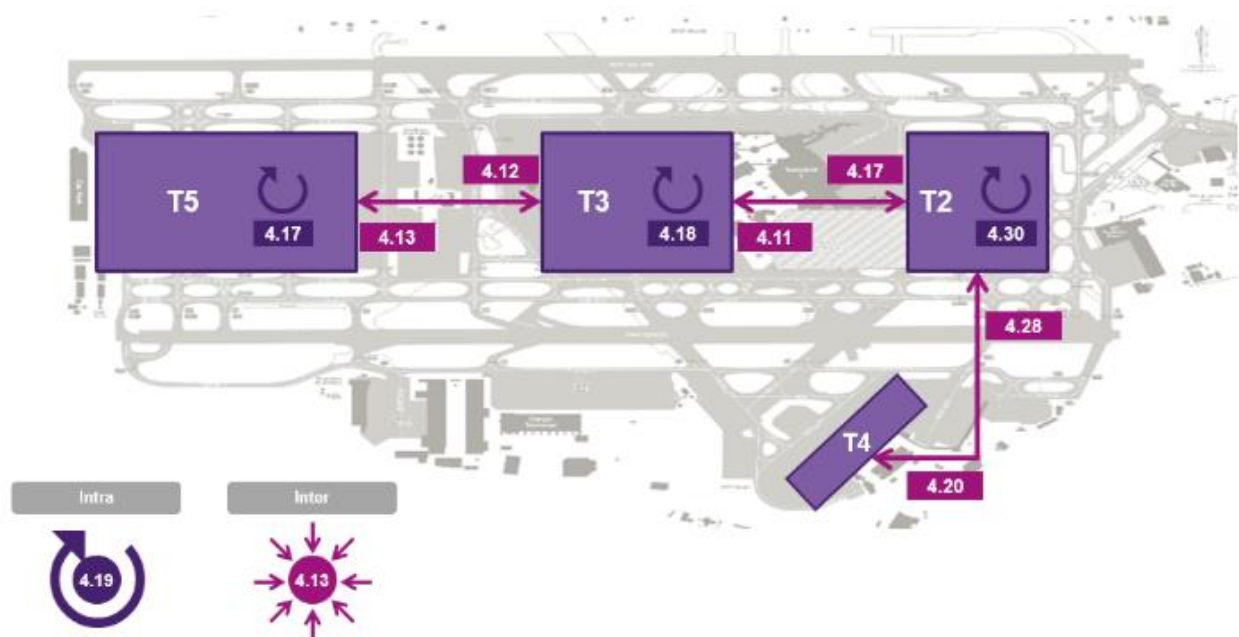


Figure 13: October 2018 QSM scores

We have a great ability in the UK to aspire to a developing country's infrastructure. On a rickety diesel bus between terminals at @HeathrowAirport with everything held up by a broken down baggage cart. Good job I've time to kill.

@HeathrowAirport How long to get moving from Terminal 5 to Terminal 3— already waiting 25 mins. Will connecting flights wait??

Figure 14: Passenger feedback snapshots

We have changed our masterplan to reflect these challenges. Our Early Growth programme will consolidate airline operations so millions more passengers connect within the same

terminal. We have proposed new direct connections in the masterplan between Terminals 2 and 3 and Terminal 5 and T5X, allocating hundreds of millions of pounds in the capital plan to do so. We have also launched work to explore new, better connection technologies to find affordable ways to offer enhanced connections. Where new technologies appear implausible we have ensured we include track transit solutions are included in our plan for connections to Terminal 2C or Terminal 5N satellites.

Walking distances

Consumers tell us clearly they do not like long walking distances and wayfinding can sometimes cause confusion moving around terminals.

- *“When you’re in your 80s it’s the walking. I’ve never been anywhere where you have to walk so far. We were quite alone coming along there from the plane (T2) and it was not very nice. There was nobody to ask if we were doing the right thing. We’re unusual for our age to be able to walk so far. It would have been nice to have a courtesy buggy like they do at Euston station. I always get a lift there.” UK Leisure, Arrivals Hall¹⁶*
- *“It felt like a maze. I kept on having get into one elevator, walk a distance and then get into another.” Heathrow user, foreign resident passenger¹⁷*

Short walking distances and limited level changes have key consumer benefits, as they allow for easy navigation and therefore logical, time efficient and intuitive journeys. For consumers this makes Heathrow more accessible, enabling easy movement for all consumers and in particular those requiring support or mobility assistance. We already have an investment programme underway that is looking at short-term improvements to the walkway experience for passengers in existing terminals.

Our masterplan has also been adapted in 2018-19 to address issues with walking distances. We are now proposing that new terminal spaces in the western and eastern campus be designed as a combination of “third space” areas and “semi-stacked” terminals. A “semi-stacked” layout provides line of sight, intuitive journeys, for most people, most of the time. Combined with open plan, intuitive third space landside areas, this means that travel through the airport from a passenger’s point of entry, either the public transport terminus or the car park, has fewer level changes or reversals in direction – an improvement on “stacked” terminals like Terminal 5. However, by stacking a few key steps or areas it reduces walk distances materially – for example compared to a terminal like Doha or Amsterdam. With these design changes we not only see a way to address three of the outcomes directly, but potentially limit build and operating costs.

Simple Journeys

Consumer want simple directions in and out of the airport, so they know how to carry on their journey.

¹⁶ Caroline Thompson Associates, *Willingness to Pay: Qualitative Research Findings*, November 2017

¹⁷ Collaborative Research, *Consumer attitudes to journey disruption: a qualitative research report*, 2016

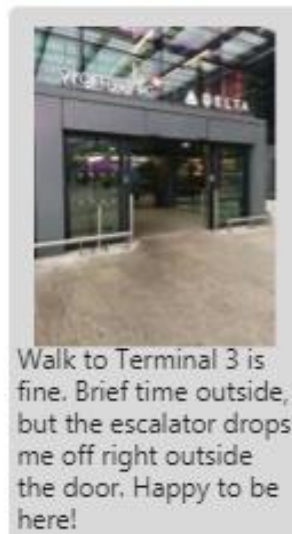


Figure 15: Passenger feedback from our Heathrow Express brand tracker

“Good public transport AND then very easy connection to the departure/arrivals areas - most importantly with really good signing.”¹⁸

“The walk from arrivals to public transport often feels very long, especially with baggage in tow”¹⁹

Well designed Public Transport Interchanges (PTI) make it much easier for people carry on their surface access journeys. Heathrow will be an inter-modal transport hub not just for aviation, but for all modes of public transport. Indeed, improving the interface between the terminals and public transport is even likely to help with mode share shift to public transport for consumers and colleagues.

Therefore, we have repeatedly iterated our designs for public transport access in and out of the eastern and western campuses throughout 2018-19. We are now narrowing in on layouts that allow intuitive, line of sight journeys via public “third space” areas with minimal (ideally only one) level change for either an arriving or departing journey. We have also been investigating the most effective “vertical circulation” options to make these PTI journeys simpler yet.

In essence we are seeking to minimise reliance on signs. Where signs are needed we are deliberately building in lessons from current airport experience, looking to bring in specialist design for these PTI routes and seeking to explore multi-language digital options too. All this adds up to a very different PTI experience from even that in Terminal 2 today, with better outcomes for consumers being confident that they can get to and from the airport and are comfortable and secure when there.

6.2 Surface Access changes

Our masterplan proposes significant changes to surface access to Heathrow in the next 15 years. How we implement these both in our masterplan and operationally makes a big difference to the confidence in access to and from the airport and predictable and reliable journey outcomes. We must also meet ANPS commitments on sustainable surface access including various targets on mode share and cars on the road. Since many passengers do

¹⁸ Join the Dots, *Horizon Surface Access report*, October 2018

¹⁹ Join the Dots, *Horizon workshop report*, September 2019

prefer private car travel this is an important balance to strike. It has thus been a part of our plans that has, and will continue, to change significantly in light of consumer insights. Further information on our surface access strategy can be found in annex 16 - surface access.

Easy road access

Car travel is still the most popular way to get to and from Heathrow – ■■■ of passengers came to Heathrow by car in 2018.²⁰

- *“Slightly stressed as I didn't get away from work as early as I planned but now nearly ready to set off for the airport. Traffic looking slow in places so fingers crossed.” Female Business Traveller²¹*
- *“Drive with no hold ups on roads straight to a parking space and soon as unloaded shuttle bus turns up and then goes straight to terminal.” User, Male, 55-64 British, UK²²*

Ease is the highest consumer priority in this journey, particular when by car. Reliability and resilience are a close second – consumers particularly do not want to worry or stress about traffic congestion and other hold ups when heading for a flight or for home or an important meeting. Our insight shows that confusing junctions, complex routes and carpark or car hire access are also important issues for consumers when driving around the airport.

We have therefore spent considerable time looking at the main road access routes to an expanded Heathrow in our masterplanning process through the lens of the drivers' ease and reliability. One major decision this has driven is deciding to propose two M25 junctions in our M4 gateway masterplan, which was consulted on in our AEC. Two junctions were shown by specialist road studies to provide both more intuitive routes in and out of the campus and also greater resilience and lower likelihood of congestion. Despite some manageable trade-offs for other masterplan considerations the consumer service choice was clearly in favour of two junctions.

Likewise, the preferred masterplan assembly in our AEC includes a Southern Road Tunnel. For the first time this will provide consumer access to Heathrow from the south. That will shorten travel times, simplify routes and increase resilience for the central or eastern terminal area in the case that either northern or southern tunnels are congested. The new tunnel would also support a north-south public transport corridor making new route options possible.

As with the M25 junctions, options without the Southern Road tunnel have been examined, on cost and construction complexity grounds, but ultimately discounted because of the service and resilience benefits. The tunnel is expected to be delivered by 2030.

A final aspect of decision making around road access has been car parks. Multiple smaller car parks can allow parking close to terminals, optimise the use of some spaces and offer a variety of commercial propositions. However, the consumer feedback is clear that lots of carparks in multiple locations causes confusion for passengers. In addition, if we are to make the space for the well-designed, consumer focused passenger transport interchanges (see above) we need to find ways to create spaces near the terminals. Again, following detailed optioneering, we are therefore proposing a Southern Parkway located at the south-west of the airport. It will make the road trip in or out to the western campus very simple and straightforward. A reliable parkway shuttle service and short journey times between parkways and the terminals will ensure consumers can be in control of their time and predict their journey into the airport from

²⁰ Join the Dots, *Horizon surface access report*, October 2018

²¹ Ipsos, *Heathrow Surface Access – Final Report*, 2016

²² Join the Dots, *Horizon surface access report*, October 2018

there. Our masterplan has then replicated the concept for the northern access to Heathrow from the M4 and M25 motorways with a northern parkway for later in the build programme. All three of these decision points in our planning around road access should reduce stress and increase consumer confidence in Heathrow as a predictable and reliable airport.

Public transport choices

Consumers make choices on what transport to use when accessing an airport. Our insight shows they weigh up the ease, speed and trust when choosing the mode for their journey. They also say that they value a wider range of choices and prefer some public transport options over others – for example direct rail services over complex multi-change journeys or coach. A better mix and greater ease, value and speed of public transport options not only meets consumer expectations but is also an effective way to reach the ANPS travel targets.

- █████ of users choose where to fly from based on distance from their house/destination. █████ chose due to ease of getting to/from the airport²³
- Reasons for choosing a particular mode of travel in rank order were (i) Easy to travel with luggage (█████), (ii) Quick journey time (█████), (iii) Value for money (█████), (iii) Flexibility in when I could travel (█████)²⁴
- *“Be able to hop on a train or other form of public transport that has Wi-Fi, runs at reliable frequency with a predictable journey time. It could also be cool if there were some airline check in kiosks onboard so that you could print your boarding pass (and perhaps bag tag) on board thus avoiding the queue at the airport.” Male, British²⁵*
- *“If we found out that buses or taxis or trains were going to be massively inconvenient then we would alter and go elsewhere.” User, Female, 55-64, British²⁶*
- *“You don’t want to have to get the HEx then a black cab as well to get home”²⁷*

Our plans have always assumed investment in and operational change to improve our public transport options. Greater insight has driven more us to think more carefully about the gaps in our network, cost effective ways to fill those gaps in the short term, and to highlight the importance of rail schemes in the long term. Feedback from consumers on an access charge is also clear – they will support it but far more so if it is used to increase transport choices or reduce overall costs than if it is a commercial money-making mechanism. This has begun to inform our treatment of surface access charges.

Building on this range of insight we have developed our current surface access plans to improve transport choices against today. Our surface access proposals, published as part of our AEC are set out in Annex 16 – Surface Access. The key deliverables, linked to consumer feedback, are:

- Improving coach and bus services – with targets to increase direct connections to the top 100 towns in the UK supported by our commercial model and investments. We are prioritising particular locations identified through consumer surveys and feedback as service gaps
- Providing more frequent connections to London with new trains through the Elizabeth Line and refreshed Heathrow Express services – where detailed survey and market testing data has shown a demand for tube, Elizabeth line and express options among both London based and overseas travellers

²³ Join the Dots, *Horizon surface access report*, October 2018

²⁴ Breaking Blue, *Transport Focus, Surface Access to Airports – Research Report*, August 2018

²⁵ Join the Dots, *Horizon surface access report*, October 2018

²⁶ Join the Dots, *Horizon airport choice report*, 2018

²⁷ Ipsos, *HEx Price and Value Report*, July 2017

- Proposing the Western Rail link be included in our plan, to open in 2020s. The link would remove the need to transfer via London for many consumers and responds directly to the preference for direct rail. In light of that preference, we have included the option of higher airport funding for this scheme in this business plan. If we choose that option, it would increase the likelihood of the link being built.
- Proposing a similar treatment for a Southern Rail link to open by 2030s, again reflecting clear consumer evidence of gaps to the south and a preference for direct rail links where they can be developed.
- Proposing that surface access charge income be used directly to reduce the airport charge for all users and potentially be a pass-through element for Heathrow so that this is not perceived as a commercial scheme.
- Consumer insight highlighted to us the importance of an integrated network – where multiple rail and road options mean greater resilience and more route options overall. We are testing our plan to ensure all terminals are served by at least two different rail options.

By focusing on increasing number of travel options to the airport by public transport we are responding to consumer outcomes at the same time as proposing optimal ways to address the ANPS targets. Resolving the tensions between these goals and overall costs will continue to be a focus of our ongoing engagement and plan development in 2020.

6.3 Terminal Changes

The terminal experience is important for consumers. It determines much of the predictability and reliability, comfort and security and enjoyable experience dimensions of their journey. Better understanding of what specific priorities underlie these outcomes have driven a number of changes to our plans in the last 12-18 months – three examples being baggage investment, our Next Generation Retail and Digital plans for satellites and our walkways and terminal refurbishment proposals.

Baggage

For direct passengers, baggage was cited as one of the most preferred improvements that Heathrow could make in our WTP research. It is a significant source of anxiety for customers when they do not know when they will receive their bag.

- 9 out of 10 direct passengers would like to wait no more than 35 minutes for their bag.²⁸
- 8% of total airport users identified faster baggage delivery as the single most important area to be improved at Heathrow²⁹
- Airport Experience Success Factors research identified handing over baggage at the earliest possible moment, confidence that your baggage will reach your destination, to retrieve your baggage "on-demand", to exit the airport with our bags in the most expeditious manner as four of the top consumer desires for airport service³⁰

Would be nice if our baggage from Nairobi arrived on the carousel some time today @BritishAirwaysT. @HeathrowAirport.

Figure 16: Passenger feedback on baggage experience

²⁸ Systra, *Heathrow Airport Customer Valuation Research*, November 2018

²⁹ Heathrow Passenger Experience & Airport Insights / QSM

³⁰ ARUP, *Future of Air Travel*, 2016

In the IBP, and the M4 gateway masterplan it is based on, we thus chose to bring forward by a number of years investment in Terminal 2 baggage in particular. Terminal 2 currently uses the old Terminal 1 baggage system and is thus among the most vulnerable elements of the Heathrow baggage service. Bringing a new system in by the mid-2020s will enhance the reliability and resilience of baggage handling operations across the airport.

Consumer feedback also suggested introducing real-time information at baggage reclaim could help passengers. As a result, our Digital Transformation is now looking in earnest to creating a single unified digital experience which could be extended to passengers' bags – and we have included potentially delivering this enhancement in our strategic options.

We also have more work to do as part of the Early Growth initiative and our masterplan development to identify options to increase baggage system resilience, capacity and reduce baggage travel distances and times. We are also proposing options to include more baggage related measures in the regulatory measures, targets and incentives in this plan.

Our increased focus on baggage resilience is directly linked to the consumer feedback on its importance for comfort and security and predictability and reliability outcomes.

Better use of satellite terminal buildings

Based on our research 62% of our passengers chose to go straight to the gate to know they are in the right place for their flight. They then stay there for an average of 72 minutes. This is often in a more remote satellite or pier where there are currently limited facilities.

- *"[We] walked straight to the gate as [we] wanted to know where it was first before deciding on what to eat or shop for. Once at the gate it was too far to go back to the A gates shopping and the food is so disappointing - nothing in B gates"*³¹
- *"[I] stayed on B satellite for 6 hours found the food options very limited"*³²

This insight has pushed us to up our focus on the offer beyond the main terminal departure lounges. That focus has been incorporated in 2019 in our Digital Transformation and Next Generation Retail programmes. For example, we have prioritised improvement to our digital channels to allow passengers to access a bigger range of products through virtual digital shops.

In addition to these online options, we have started developing plans in response to the consumer insight, to redesign space in existing satellites and piers as part of the Early Growth programme. We are planning to modify lounges and seating, adding physical food and beverage outlets and exploring entertainment options. Our new terminal spaces will also be designed with these principles in mind.

These changes and priorities allow us to better deliver the enjoyable experience and comfort and security outcomes. They also potentially offer ways for us to meet our stretching commercial revenue targets thus supporting the affordability of the wider plan.

Aesthetics and ambience

The Consumer Engagement Strategy work has reinforced for us that the way an airport looks and feels is important to consumers. It is clear from the feedback that while our newer

³¹ Heathrow on-airport passenger feedback

³² *Ibid*

terminals have been designed with aesthetics in mind, our older terminals sometimes need careful rework to achieve a similar impact. Furthermore, the engagement has highlighted that consumer expectations of ambience continue to rise – driven not only by ever better airport environments worldwide but newly created public spaces across the world’s urban areas – for example around London’s Kings Cross or Paddington stations.

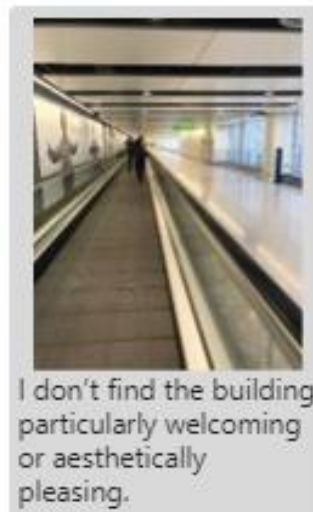


Figure 17: Passenger feedback form Heathrow Express brand tracker

- “It’s a bit dull. It could do with some art, maybe some music, some colour.” Leisure, UK, Direct³³

These findings have caused us to reflect on the tendency for masterplanning, consent processes, large capital and operational projects to focus on functional outcomes and aspects of service. As a result, we have incorporated more elements of aesthetic and environmental upgrades in our passenger experience proposals. One high priority area that emerges from research and co-creation is walkways, which thus feature in our list of proposed service investments under this project. This has also shaped ideas for better in-terminal facilities including seating, places to work and places to connect. We have confirmed targeted funding for an ongoing programme of events, space enhancements and cultural activities in our commercial and cost plans on the same basis.

A consumer driven attention to ambience has also impacted our plans. For our oldest terminal, Terminal 3, we are reflecting the consumer feedback by including investment in ambience in our masterplan. This includes renewal and refurbishment of key passenger facing areas to improve the ambience as well as operational improvements to increase efficiency.

Immigration

Our synthesis of consumer insights highlighted that immigration is a key element to deliver on consumers’ needs for a predictable and reliable journey and to feel cared for and supported at the airport.³⁴ Research with the Horizon Community also shows that the experience at immigration is a key driver of passengers’ overall satisfaction with their arrivals experience.³⁵

In April 2019, we carried out an exercise to consolidate our insights on the arrivals journey at Heathrow. This highlighted that immigration was a key pain point for passengers in their

³³ Systra, *Heathrow Airport Customer Valuation Research*, November 2018

³⁴ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, Page 24

³⁵ Join the Dots, *Horizon survey – Arrivals*, 2018

arrivals experience and became a point of even greater stress for infrequent fliers or non-English speaking passengers.³⁶ The top feelings cited by passengers at Heathrow immigration were:³⁷

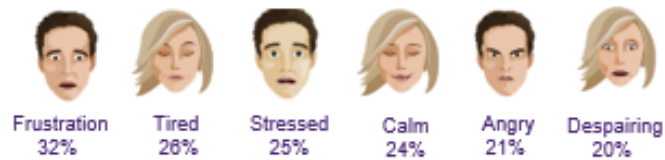


Figure 18: Top feelings at Heathrow immigration

Our insight showed that passengers just want to get through immigration and on to their destination. They want an efficient experience with clear communications and real-time information:

- [Immigration] This is the most overwhelming part of arrivals, so ensure that Heathrow have plenty of staff on hand to ease the stress and offset any negative experiences with border control staff³⁸
- For those passengers who did identify one or more areas of dissatisfaction, the common complaints related to long waiting times for various procedures (security checking, baggage reclaim, immigration counter) and long walking distances at the airport.³⁹

Our research does show, however, that immigration becomes less of a pain point for passengers who successfully use E-gates. 59% of respondents on the Horizon community stated that they preferred E-gates.⁴⁰ In September 2018 we saw a large gap open up between satisfaction with immigration waiting time for passengers who had used E-gates at 4.66 versus those who had used the main channel at 3.81.⁴¹ Findings from our Horizon community survey on communications at immigration, carried out in conjunction with Border Force, also showed that stress can be alleviated by providing clear and concise information about what passengers should expect:

- *"The instructions are clearer. At this stage I just want to know how to get through border control quickly and painlessly. So though supportiveness from the border force is welcome, clear instructions are far more welcome."* User, British, UK⁴²
- *"It's clear and unambiguous. People coming off a long flight will be jet-lagged and punch drunk. Seeing something that says in one breath 'you can use the eGates'"* User, British, UK⁴³

From these findings, we have identified a number of options to improve the immigration process for passengers:

³⁶ Join the Dots, *Horizon Community survey – Future Journey mapping*, 2018

³⁷ Join the Dots, *Horizon survey – Arrivals*, 2018

³⁸ Join the Dots, *Horizon survey – Arrivals*, 2018

³⁹ CAA, *CAP 1044 CAA passenger research satisfaction with the airport experience*, May 2013

⁴⁰ Ibid

⁴¹ Heathrow QSM

⁴² Join the Dots, *Horizon Border Force Research*, March 2018

⁴³ Ibid

- Further optimise the usage of E-gates following the widening of E-gates for use by passengers from Australia, Canada, Japan, New Zealand, Singapore, South Korea and the United States, for example by providing improved communications
- We propose to report publicly on wait times at immigration to ensure passengers are informed and increase reputational incentives for efficiency
- Ensure that our immigration halls are set up to maximise the flow of the queue by investigating alternative options for queue call forward mechanisms to ensure an efficient process
- Continue to improve our provision of help for passengers requiring support in immigration
- Improve the provision of queue and Border information for passengers to keep them informed, for example through investigating the development of real-time queue information

We are also proposing to carry out further research into our passengers' experience at immigration as part of our arrivals ethnographic research, as set out in Table 5.

6.4 Resilience

Disrupted journeys will negatively impact consumers experience more than most other issues. Based on what consumers tell us that particularly true when queueing or waiting turns into a serious delay such as long flight delays, cancellations or lost luggage. Resilience in the airport to avoid disruption is thus critical to delivering a reliable and predictable journey outcome.

Flight delays

Our consumer synthesis and underlying research gave us new insight into the links between frustration and length of delays. Consumers are reasonably tolerant of limited delays, especially if they are kept informed. But half of passengers said a delay of 1 to 2 hours would be very frustrating and a third said by that duration it would make them question using the airline or airport again (Ipsos Loyalty).

- *"[I was] feeling stressed – [my] inbound flight was late and [it] only left about an hour to make the connection"*⁴⁴
- *"It's particularly bad if you're already on the plane with no air conditioning. Sitting waiting on the tarmac is not pleasant."* (Heathrow user, foreign resident)⁴⁵
- *"I think airlines are very, very stretched in terms of planes, pilots.... One delay means that you're over your working hours, so they have to find another pilot, because they can't fly, you know? Everything has a knock on, it's like a domino effect, far more than in other businesses, I think."* (Heathrow users, frequent flyers)⁴⁶

The complex causes of delays in an integrated operation that stretches across the airport and far beyond to international airspace and other airports means it is difficult to resolve all of these longer delays. The importance of resilience has made us review our expansion plans from that angle, and we will have more work to do, including collaboratively with airlines. The importance of departing on time highlighted in this research has led us to propose departure punctuality as an outcome measure.

Airfield resilience considerations have informed some fundamental design questions in the last 2 years. The new runway has, after a period of examination and debate on the trade-offs for cost and complexity, thus been designed to be an adequate length to support all aircraft

⁴⁴ Heathrow on-airport passenger feedback

⁴⁵ Collaborate Research, *Consumer attitudes to journey disruption*, 2016

⁴⁶ *Ibid*

types in all flying conditions. This minimises operational constraints and maximises the resilience boost from new runway capacity. The supporting airfield infrastructure such as Rapid Access Taxiways (RATs) and Rapid Exit Taxiways (RETs) has been designed to enable operation in departure, landing or mixed modes on either easterly or westerly runway operations. Double taxiways and end-around taxiways (ATETs) have also been chosen in the plan to drive airfield resilience. So too has an allowance been made for de-icing pads. All this increases our ability to run to schedule, support punctuality and minimise airfield disruption.

In addition, we have looked to minimise the challenges associated with legacy design on the airfield (e.g. taxiway cul-de-sacs or terminal locations that require runway crossings). After multiple masterplan iterations with other terminal and airfield layouts, a consumer led focus on resilience has led us to confirm a satellite strategy. This makes stands accessible from multiple taxiways, and improves the freedom of movement around the airfield. Further detail on our resilience plans can be found in Chapter 5 - Resilience.

7. Our Approach to Insight

In order to gather robust consumer insights and feed them into our plans we have employed a robust process, starting with our existing base of research and insights and evolving our understanding through the creation of our consumer engagement strategy. We have summarised the process we undertook in Figure 11 below.

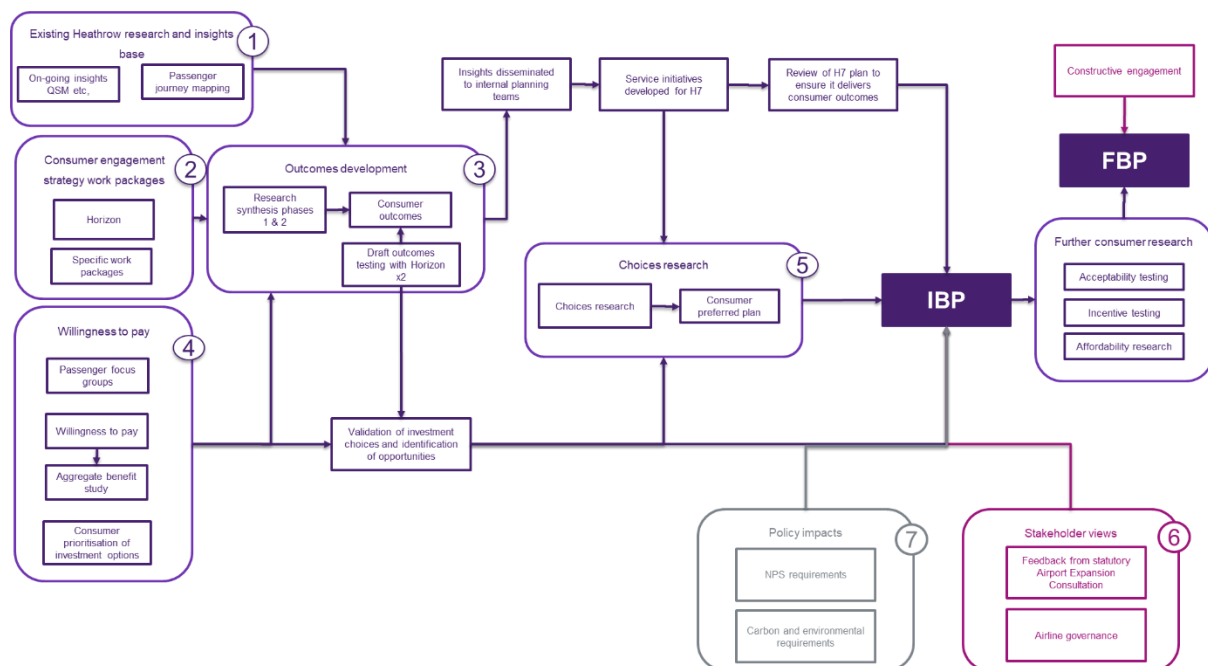


Figure 19: How consumer engagement has fed into our plans

7.1 Existing Heathrow consumer research and insights

Heathrow has long used consumer insight to shape our plans and improve our offer and operations in support our vision to offer the best airport service in the world. We have developed this knowledge base over many years. We regularly use qualitative and quantitative feedback from over 350,000 current consumers per year spending more than 70,000 hours per year engaging directly with consumers. With modern techniques, we are learning from our passengers every day – for example, receiving feedback from over 2 million current

consumers each year via real time channels such as social media (e.g. Twitter) and real-time “Happy or Not” devices across all terminals and stages of the passenger journey. This insight helps us to uncover the pain points and successes across the passenger journey. All of this engagement has now generated over 200 separate consumer insight reports or studies for Heathrow as a basis for understanding consumer views (see Table 4 for a summary).

This interaction and understanding allows us to either fix the problem right away and/or generate wider themes to be addressed. Those themes have direct impact on our plans and actions today. Examples in the last 12-18 months alone include:

- signage changes at particular points such as forecourts, stations and connections areas in response to passenger ratings on finding their way around the airport;
- deploying passenger hosts on the connections journey in response to passengers’ ratings on the ease of transferring between terminals;
- regular upgrades to the speed and availability of wi-fi in line with passenger feedback on their changing expectations and ever-increasing use of mobile technology;
- extra independent rest and relaxation lounge offers, as well as free quiet areas, to meet the requirements of our connecting passengers;
- additional e-passport gates to improve the arrivals experience in response to feedback on queues from both regular as well as non-frequent passengers of Heathrow

Table 5: Ongoing consumer research

Research	Frequency	Research technique
<p>Quality of service monitor (QSM)</p> <p>Heathrow’s flagship monthly customer satisfaction tracker of passenger experience across Departures, Arrivals & Connections. Engagement with 57k passengers a year to understand satisfaction levels across all stages in the end to end journey</p>	Continuous	Face to Face satisfaction study
<p>Key driver analysis (KDA)</p> <p>Regression analysis of QSM data to understand which service attributes drive overall satisfaction, taking into consideration usage and impact on overall experience</p>	Continuous	Regression analysis
<p>Make or Break Analysis</p> <p>Through QSM establish the single most important area that could improve the overall journey in departures, arrivals and connections by Terminal and Heathrow overall</p>	Continuous	Verbatim survey responses
<p>Airport service quality (ASQ)</p> <p>Quarterly satisfaction benchmarking study directed by ACI including more than 330 participating airports. Engagement with 12k passengers a year which helps us understand Heathrow’s performance in relation to all airports worldwide</p>	Continuous	Self- completion
<p>Real Time Feedback</p>	Continuous	Happy or Not

Research	Frequency	Research technique
Near real-time data-capture across the airport through Happy or Not devices, capturing feedback from 1.8m interactions a year		
Vox Pop passenger feedback Video capture of the moment passengers' experiences	Continuous	Video Capture
Social media Monitoring and responding to social media 24hrs a day which helps Heathrow augment its understanding of the overall passenger experience	Continuous	Verbatim comments
Passenger profiler Monthly passenger behavioural tracker across all Heathrow terminals. Engagement with 34.8k passengers a year	Continuous	Face to Face behavioural study
CAA Passenger Survey Study of the user behaviour of passengers using other UK Airports. Engagement with 150k passengers a year	Continuous	Face to Face behavioural study
Surface Access Satisfaction Study Quarterly satisfaction survey amongst departing passengers about attitudes towards mode of transport to the Airport. Engagement with 9.6k passengers a year	Continuous	Face to Face satisfaction study
Passengers with reduced mobility (PRM) Satisfaction Survey Satisfaction survey amongst passengers who have used the special assistance service at the Airport	Continuous	Self-completion online
Food and Beverage User Satisfaction Study Quarterly satisfaction survey amongst departing passenger using each of the F&B outlets at Heathrow understanding the level of service. Engagement with 11k F&B users each year	Continuous	Face to Face satisfaction study
Mystery Shopping Mystery passengers evaluating service standards at various parts of the airport journey	Continuous	Mystery Shopping
Brand tracker Tracker of UK residents' perception of Heathrow brand vs. peers conducted 5-6 times a year amongst over 10k UK residents a year. Waves also done amongst key international markets (e.g. US and China) on an ad-hoc basis	Continuous	Online Survey

Research	Frequency	Research technique
Consumer Insight Community 3,500 current and potential passengers, who we interact with 3 - 4 times a month in order to get feedback on potential ideas for improving their end to end airport experience	Continuous	Online Community
25-30 continuous / ad-hoc internal and external research projects annually Ad-hoc research to increase understanding of the end to end passenger journeys.	Continuous / Ad-hoc	Various
Airport Quality Club Collaborating amongst core European airports looking at broad issues impacting Passenger experience e.g. PRMs, Check-in, Technology	Continuous	Benchmarking
ACI Steering Group – ASQ Leading 2 task forces that relate to improvement to passenger experience via the development of a research mechanism to benchmark global passenger satisfaction performance	Continuous	Benchmarking
Association of Users of Research Agencies Learning from leading business in the UK about how to maximise customer research and insight business impact	Continuous	Benchmarking
Learning from the best Benchmarking of best practices in customer excellence with market leaders from other industries	Continuous	Benchmarking
Insight sharing within the business and with partners Insight-sharing with colleagues, airline partners and suppliers.	Continuous	Various

Our existing research base also informs our future plans. All our masterplan options have been evaluated against criteria based on this consumer insight. It has led to us creating both iH7 and H7 capital investment projects with a focus on service pain points. It informs our detailed thinking on areas as diverse as redesigning the passenger screening process, creating new offers in terminal satellites and investing more in and taking greater control of services for passengers with reduced mobility.

However, we have also discovered limitations in this research-based approach. We responded to these issues, in line with best practice and CCB guidance, by creating a Consumer Engagement Strategy.

7.2 Our Consumer Engagement Strategy

We recognise to achieve our vision, and to ensure that we build the airport consumers want, we must understand the needs of our passengers as comprehensively as possible. To do so, we need more integration of our insights and a higher-level view of consumer needs to build

a more holistic business plan based on those needs. We need to triangulate insights from different sources. We also required further engagement over and above our pre-existing insights base to fill in gaps in our knowledge. We had opportunities to use a wider range of sources and techniques including more co-creative and engaging ones. The focus on existing passengers and customers, meant there were also opportunities to engage consumers more broadly, to include potential users. The one-off effort of long-term planning also raises new questions in terms of consumer preferences, for example around value versus cost.

Our consumer engagement strategy has been developed to provide this integrated approach. It focuses on how we build and develop our consumer insights knowledge and capability, considering a broader range of inputs. It also highlights how the insights gathered have been disseminated around the business. It also identifies how we develop, test and validate our long-term plans to an appropriate level against the criteria consumers have highlighted. Though following this strategy, we have more confidence this business plan both reflects the outcomes that consumers have told us we should work towards. It also gives us a way to inform, triangulate and structure the plan with strong evidence-based research and inputs. By its very nature, consumer engagement can always be updated, improved and refined. We will continue to do so, with our Initial Business Plan (IBP) a positive step in the direction laid out in the Consumer Engagement Strategy.

We developed our Consumer Engagement Strategy requirements by;

- Defining consumer engagement based on best practice
- Determining our objectives for consumer engagement
- Defining principles for good consumer engagement
- Identifying gaps in our research and opportunities to fill them with new research and engagement work packages

Having set the strategy, we then conducted extra research, created new engagement capabilities and began an iterative process to define outcomes, test for consumer priorities and willingness to pay and start to understand consumer preferences on choices we face. We anticipate much further work before the Final Business Plan (FBP) and indeed beyond as the Consumer Engagement Strategy continues as a live, ongoing exercise for Heathrow.

Our Consumer Engagement Strategy has been developed and improved by the challenge and insight from our CCB as well as representatives from the airline community. We have engaged with the CCB regularly since 2017 and held specific engagement sessions with airline representatives on this topic. We continue to learn and are open to the challenge the CCB and airline community provides to improve our consumer engagement strategy and understanding. Whilst our objectives remain consistent we have the flexibility to update and evolve our engagement plans based on feedback received.

7.2.1 Defining consumer engagement

The terms consumer “representation”, consumer “research” and consumer “engagement” are sometimes referred to interchangeably but they are not the same. We have defined consumer engagement broadly to both encompass consumer research and consumer representation. Our engagement framework uses representation, research and engagement methods to form the basis of our consumer engagement strategy. We define each of them as:

Research

Our research methods are focused on conducting specific pieces of work to elicit consumer preferences and valuations. Our research sits within a wider process of engagement, with

engagement activities used to supplement and complement consumer participation and engagement methods. Heathrow conducts a wide range of consumer research which is both quantitative and qualitative in nature, but we want to broaden this research to include more qualitative methods to develop our understanding of future consumers preferences. We define qualitative and quantitative research methods as follows:

- Qualitative: qualitative research methods include focus groups and in-depth interviews that provide insights on the relative importance of consumers' views, feelings and experience. By design, qualitative research is usually small scale and uses purposive sampling to deliver insights on specific population groups.
- Quantitative: quantitative methods include any form of survey-based research that is representative, such as analysis of survey results or research into monetary valuations. The methods include stated preference, revealed preference, statistical (regression) analysis, experiments, analysis of day-to-day information, benchmarking or literature reviews of quantitative studies.

Representation

Direct engagement with consumers. It tends to be qualitative and deliberate in nature to supplement the quantitative research already undertaken. It is particularly powerful in deepening insight and co-development of solutions. We have increased our use of it for H7, for example by working extensively with the Passenger Insight Community ("Horizon") discussed later in this chapter.

Engagement

While consumer research and representation are great tools for understanding what consumers value, they do need to be supplemented with broader consumer engagement. For example, airlines have a wealth of insights into what consumers value which has been a useful input to our understanding. Consumer engagement, market research and economics specialists provide valuable insights to us to broaden our understanding of consumers. Literature reviews and understanding best practice outside the airport sector also allow us to establish global trends. There may also be aspects of Heathrow's business activities that are not visible to consumers but are important in delivering overall consumer experience, or they do not value which need to be understood by engaging with wider stakeholders.

7.2.2 Our consumer engagement objectives

Our objectives for consumer engagement are:

- To deliver insights into consumer priorities, preferences and valuations to inform our business plans; and
- To provide consumers with the opportunity to engage with Heathrow on long term planning so they can provide inputs, feedback and views that can be reflected in our approach to expansion.

When we refer to consumers, we are referring to current and future passengers and cargo owners. We have tested these objectives and definitions with the CCB and airlines as part of the development of our consumer engagement strategy from 2017. This refined our definitions by expanding our scope for consumers and emphasises the need to link to plans.

Our aim is to ensure that consumer views are at the heart of our plans and decision making. Consumer insight created the outcomes presented later in this chapter and has influenced decisions made in the plans. In addition, it has shaped the measures, targets and incentives

outlined in chapter 6, where we have linked consumer preferences to cost benefit analysis methodology. It has led to specific changes in our capital, operating and commercial plans and our masterplan choices.

7.2.3 Principles for good consumer engagement

To ensure we meet the objectives set out above, we identified best practice from other sectors and companies and took input from the CCB to develop our principles of good consumer engagement. Our principles are:

- Be clear on objectives, scope and definitions
- Engage with all segments representative of the consumer base affected by decisions on price or service
- Take a robust approach – valid methods that are applied in a robust way
- Be engaging, innovative and easy to understand
- Ensure we are proportionate, with engagement revisited overtime to reflect everchanging and evolving consumer wants/needs
- Use a mix of methods that is appropriate for each research question
- Engage with other consumer driven business, airports and regulated businesses
- Use a variety of communication channels, targeted to different groups of customers
- Ensure engagement is on-going and the process is embedded across the business
- Ensure that research and engagement is timely
- Show consumers that their input is valued – by giving feedback and acting upon it
- Consider consumer’s views across the full range of topics and on all aspects of the business plan, rather than pre-determining their priorities or seeking to endorse own priorities
- Demonstrate the impact of engagement

7.2.4 Knowledge gaps and new work packages

With our principles established, we created a set of work packages. These packages are designed to support our business plans by helping us to uncover consumers preferences and priorities. Some of these packages were designed to help to fill specific gaps in our consumer insights base including consumer vulnerability research, airline passenger insights synthesis to gather and summarise the consumer insights held by airlines and surface access research. Others we designed to bring in new techniques or integrate understanding.

Table 5 summarises the key work packages developed as part of our consumer engagement strategy. We also show proposed future work packages that we have already planned or are in train. Detail of the 20 work packages undertaken and the key insights gathered from these can be found in Annex 40 – Overview of insights from our work packages.

Table 6: Work packages commissioned under our consumer engagement strategy

Work ahead of IBP		
#	Work Package Name	High-level Objectives
WP1	Passenger focus groups and in-depth interviews	To capture the needs and wishes of current and future passengers making trips using Heathrow and to understand the language that passengers use to talk about their experiences.
WP2	Sustainability research	Understand passenger’s views on sustainability, the perceptions around Heathrow’s role in supporting and

		promoting sustainable practices and consolidate main themes.
WP3	Literature review	Draw on the latest thinking on consumer preferences including from other airports around the world and other sectors.
WP4	Willingness to Pay and aggregate benefit study	Customer prioritisation and valuation study to derive passengers' willingness to pay for an improved service at Heathrow.
WP5	Choices research	To gain a deeper understanding of passengers' preferences and priorities when presented with a full package of different options.
WP6	Airline passenger insights	Gather, amalgamate and summarise passenger related insights from all airlines operating at Heathrow, relating to air travel and more specifically the overall airport experience.
WP7	Synthesis of passenger insights (stages 1 and 2)	Create a synthesis of customer insight that can inform the outcomes and measures that are most important to passengers from previous work packages.
WP8	Horizon topics	To set up an ongoing insight community of frequent and extra care Heathrow passengers from our key markets and segments.
WP9	Cargo users business partner survey	To explore and define cargo-community priorities at the airport and then measure and evaluate those perceptions as they evolve and develop over time and in the light of Heathrow initiatives.
WP10	Airline business partner survey	Improve Heathrow's understanding of its Airline Partners' needs so it may build a better business partnership and improve the overall engagement.
WP11	Masterplanning Assembly Options	To provide an opportunity to provide input and critique of the short-listed masterplanning sub-assembly options for expansion in terms of elements that impact the passenger experience.
WP12	Masterplan Desktop reviews of emerging expansion design elements	Co-create potential solutions and validate emerging designs.
WP13	Surface access to the airport and modes of transport	Increase understanding on how current and potential passengers choose different modes of transport in order to reach airports and what are the key barriers to usage.
WP14	Understanding the role of HVAC in switching passengers to public transport	Understanding current and future passengers transport mode preferences and identifying what / why trade-offs consumers make and how we could influence behavioural change.
WP15	Generation Z	Understand what the consumer of the future desires from an end to end airport experience.
WP16	Airport choice	Understand the underlying factors that drive airport choice when booking a trip via an airport.
WP17	Resilience Study Qualitative	To engage consumers on their understanding of the meaning of resilience across the end to end passenger journey.

WP18	Western Rail	Understand the level of interest and potential usage of Western Rail as a mode of transport to/from Heathrow and key catchment areas.
WP19	Vehicle charging research	Understand the impact of the proposed charging schemes on future passenger behaviour.
WP20	Passengers requiring support	Insight on how Heathrow can provide the best service in the world to passengers requiring support at the airport.
Work ahead of FBP		
#	Work Package Name	High-level Objectives
WP21	Choices Research (Stage 2)	Conduct additional research with passengers in order to test the upper bound of what consumers would trade.
WP22	Acceptability testing	To test the acceptability of our overall business plan and the measures, targets & incentives package.
WP23	Synthesis of Passenger insights – Stage 3	Take all the insights (existing and new Heathrow insights and airline insights), triangulate and synthesise the results into a summary document.
WP24	Airlines business partner survey	Repeat of the study undertaken in 2019
WP25	Resilience (Quantitative Stage)	Understand what consumers expect and define as resilience at the airport following the qualitative. More specifically, what consumers value in the context of a growing airport and the risks/benefits they may associate with an opportunity to increase the runway scheduling capacity by 25,000 runway movements per year.
WP26	Affordability Research	Research with consumers to understand whether passengers would in fact accept an increase in the passenger charge in return for features they may find valuable.
WP27	Mode of transport – vulnerable consumers	Understand the surface access needs of passengers who require support, so we can deliver services that meet their needs.
WP28	Expansion Airport Choice	Understand how Heathrow can attract new consumers to use the airport in the future
WP29	Expansion define passenger of the future	Identify the demographics of Heathrow’s future consumers and then identify their needs from an airport
WP30	Arrivals Journey Ethnographic	Understand what the ideal Arrivals experience would look like from a consumer’s point of view
WP31	Consumer views of sustainability	Update of the 2018 research

7.3 Horizon Passenger Insight Community

Horizon was set up to extend our understanding of passenger’s needs. It has been one of our key consumer engagement interactions since setting the Consumer Engagement Strategy. Horizon is an online platform that enables consumers to take part in focus groups, targeted discussions and provide feedback on Heathrow’s plans. The tool enables direct passenger participation and was set up to aid decision making by engaging current and future passengers on the design of the airport, future products and services. Examples of our Horizon Community engagement include:

- Iterating and validating our consumer outcomes
- Testing and exploring consumer views on our surface access and communication strategies
- Understanding how consumers like to refer to themselves and define different consumer groups
- Exploring how vulnerable consumers view themselves and their needs

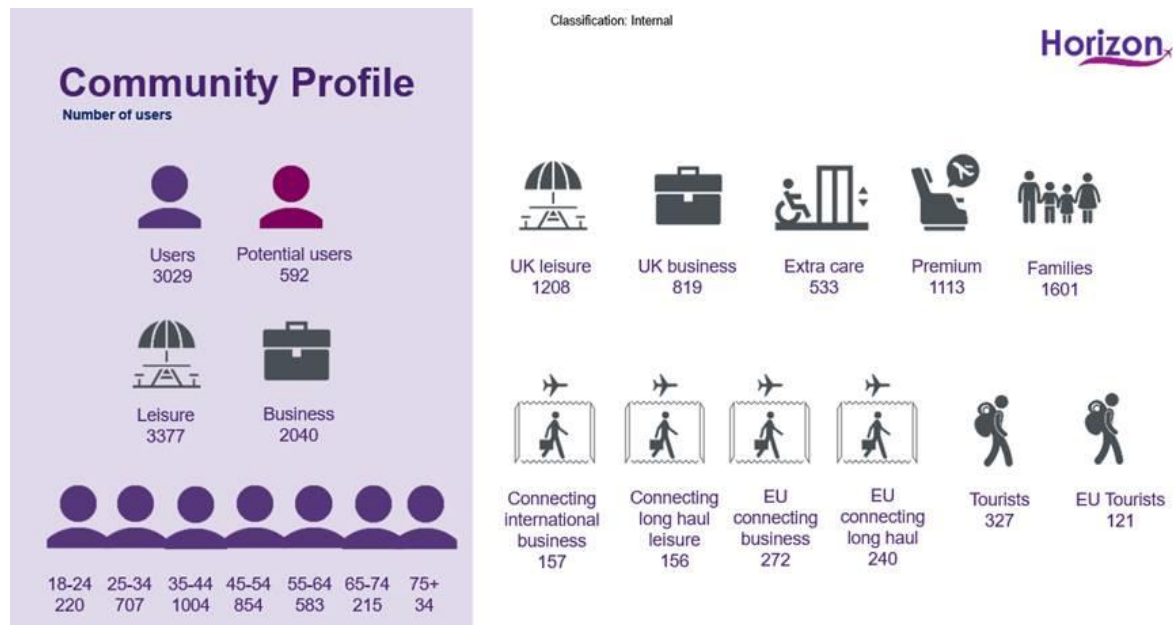


Figure 20: Horizon community profile

The Horizon Community has also played a large role in our consumer engagement to inform our expansion plans. We have held two engagement days with members of the Horizon community to get their direct input into our design choices for expansion.

Horizon workshop day (Q4 2018)

An independently moderated workshop, involving twenty Horizon members from various locations around the world. The day involved ‘stimulus’ materials to encourage discussion around what good looks like through the passenger lens. Stimulus included different terminal layouts, process order traveller personas and transit methods. A film crew was present throughout the workshop to film any insight and capture real-time qualitative insight, so information can be re-referred to throughout the evaluation process.

Horizon Expansion Consultation Workshop (Q3 2019)

Following challenge from the CCB to ensure that we also carry out robust consumer engagement on our summer Airport Expansion Consultation (AEC), we held a Horizon workshop day to get consumer views on landside access to the airport. This showed that consumers really liked our plans for expansion particularly the inclusion of a parkway, which is a large parking site with connections to the terminal and resulting public transport links, to make it easier for them to get to Heathrow. However, it did show that as we move forward with the detailed planning of new terminal buildings it is important that we consider passengers mindsets at different stages of their journey.

Both workshops saw the development of a more iterative, cocreational style which was supported by expert external moderation techniques.

7.4 Constructive challenge by the CCB

The role of the CCB is to provide Heathrow with independent consumer-focused challenge on how we engage effectively with consumers and how we use the consumer insights. The terms of reference and membership of the CCB is shown in the Annex 36 – Consumer Challenge Board. The CCB has been deeply involved in developing our Consumer Engagement Strategy and the resulting work, as well as feeding back on the findings that emerge. We may not always agree with all of the CCB's challenges and have some discretion on how we respond in terms of our strategies and business plans. However, it is important that we show how we have responded to the CCB's challenges and how this process has influenced our plans.

In total we have undertaken over 150 hours of engagement directly with the CCB. We have shared over 230 insights reports and presentations. A sample of the topics covered with the CCB include:

- What consumers of the future desire from an end-to-end airport experience
- Passenger valuation of service enhancements and trade-offs they may make
- Development of Heathrow's Horizon Passenger Community and Horizon topics and findings

The CCB Chair has periodically provided updates directly to the Heathrow Executive and Board. The CCB has also provided a series of "Issue Logs" highlighting areas of progress and concern in our consumer engagement. We have provided written feedback on each issue and had valuable discussions with the CCB on each as well.

Further detail on our engagement with the CCB, including the issues logs, can also be found in Annex 36.

7.5 Our Synthesis of passenger insights

To develop the synthesis, Blue Marble, our research agency, used a standard methodology.

First, every report was reviewed in brief and categorised by:

- Sample and data collection method
- Overarching objective (s)/ type of data (e.g. needs, performance, experience etc.)
- Consumer segments and journey stages covered
- Themes in findings were also coded and added to the evolving code framework to identify the key themes coming out of the base of insights

Second, each report was categorised based on two factors:

- (i) A robustness rating based on the quality of the evidence and scored against three levels
 - High quality research conducted by independent research experts or by industry bodies with strong credentials
 - Mid robustness for research where there may be doubts or lack of transparency about either the source or the method
 - Reports that did not contain evidenced research or where the quoted research could not be verified
- (ii) A relevance rating based on the brief to understand the needs of airport consumers was also scored

- High relevance where needs were voiced directly by consumers
- Mid relevance where consumer needs were implied rather than overtly stated
- Low/no relevance where the needs identified were distant to Heathrow

Once all the reports were scored, the higher scoring evidence was analysed to identify themes within each and then assessed for quality of the evidence and for any gaps in the evidence base.

- Each theme was analysed separately, prioritising the reports for detailed review
- The full set of themes relating to each potential outcome was drawn out and noted
- The outcomes and underlying themes were subject to further review to avoid themes overlapping in different outcome areas
- The analysis highlighted how themes within each outcome area related to different types of passengers and/or at different stages of the journey

7.6 Willingness to pay

The WTP research is undertaken through combined qualitative and quantitative research techniques. It identifies those service improvements that consumers would like to see introduced at Heathrow and the benefit they would assign to such improvements in monetary terms. These marginal valuations of key service aspects allow us to understand what consumers value. This ensures we are investing in the right initiatives and putting our focus on the right design solutions. This work feeds into our cost-benefit analysis framework, which takes consumer valuations of service improvements and maps these to the costs of providing the stated improvements. This helps to determine whether or not the improvement is beneficial. It can also identify the optimum future service proposition that will maximise passenger satisfaction at an affordable cost.

The research objectives defined were to understand:

- The service propositions where consumers most want to see improvement
- The overall value of improved service propositions to consumers
- Whether defined service improvements are valued differently by different groups
- How satisfied consumers are with current service levels at Heathrow
- How consumers perceive the value for money of the airport charge in relation to the services provided at the airport

The WTP study was carried out by the external agency SYSTRA, in association with Caroline Thompson & Associates and Epinion.

WTP research on its own can have limitations. Consumer feedback can over value improvements as against actual observed behaviour. It can fail to integrate different options fully. We sought to compensate for these issues with conversations in our assessments and external advice on approaches. We have also only used the WTP as one input to our plans, triangulating it with other feedback and research.

7.6.1 Phase 1 – Qualitative unconstrained improvements

The initial research was relatively unconstrained. This means that the researchers did not prompt with particular service areas but allowed the participants to propose whatever improvements they wished to understand what future service improvements passengers would like to see.

A wide mix of passengers were asked. Twelve focus groups across the current passenger segments as well as potential future Heathrow users were questioned. In addition, 91 on-airport interviews were conducted at different parts of the terminal buildings supplemented by 6 Skype interviews to include different consumer groups.

7.6.2 Phase 2 – Quantitative prioritisation

The first phase of the quantitative work was a Prioritisation Survey, which involved developing a clear, unambiguous description of the current service level, and a feasible improved quality level, for each potential improvement identified in the qualitative work set out above. A sample of 500 passengers were presented with descriptions of improvements and from their responses an assessment was made on the most preferred. Quotas were implemented to ensure there was sufficient representation of the Heathrow segments covering: UK and non-UK residency; short & long-haul; direct and connecting; with departing and arriving passengers across all the terminals.

The main component of the prioritisation survey was three “MaxDiff” exercises. These are best practice prioritisation techniques frequently used in willingness to pay exercises across regulated sectors. Each contained around nine service improvements. For each group of service improvements, respondents were firstly asked to identify their most preferred improvement. Respondents were then asked to identify their second most preferred improvement; and then their third most preferred. Having given their top three preferences, respondents were then asked to identify their least preferred improvement from the remaining list of six improvements. All respondents responded to all three MaxDiff questions. Rank-ordered logistic regression was used to analyse the response data from the MaxDiff exercises to determine the importance of each service improvement relative to a financial saving.

7.6.3 Phase 3 – Quantitative trade-off WTP survey

This phase extracted valuations from consumers by looking at what the improvements in service meant for their airfare. In order to get a robust valuation we needed to ensure both that:

- Representation was from a sample of sufficient size
- Respondents were fully informed of each of the service improvements’ potential value, including the context of the current quality level and cost passengers currently pay.

Given these complex requirements, the interview was expected to take 20 minutes, which many passengers cannot spare going through an airport. For this reason, a 2-part survey approach was adopted. Part I was a face-to-face interview surveying a representative sample of passengers at Heathrow. These interviews adopted Heathrow’s standard sampling procedures covering all terminals and proportional in terms of flight routes and carriers. 8,854 Part I interviews were conducted, with representation from departing, arriving and other consumer sub-groups e.g. passengers with reduced mobility (PRMs) and families.

A link for the Part II online survey was emailed to participants a few days later. This questionnaire introduced 15 service improvements, and asked respondents to undertake a series of trade-off exercises that elicited their relative preferences between subsets of these improvements and the momentary value for different packages of improvements. These responses to the two exercises we combined to derive benefit values, in monetary terms, for each individual service improvement. 2,483 Part II interviews took place.

When interpreting the customer benefit values, it is important to note the size/nature of the corresponding service improvement that each service relates to – and not just associate the

value with the general service aspect. Some defined service improvements may be greater than others in absolute, or proportional, terms and this likely to have influenced consumer valuations.

7.7 Community

In order to understand the needs of our local community, we carry out a range of engagement, including both formal consultations and regular engagement through forums and groups. The leading engagement sources include:

Heathrow Consultation 1 (January – March 2018)

This 10-week consultation sought views on our emerging proposals in terms of what the expanded airport could look like, how it might operate, and how we might best mitigate against the potential impacts, including proposals for compensation and noise insulation.

Airspace Future Operations Consultation (January – March 2019)

This 8-week consultation asked local communities to help shape the airport's plans for its future airspace. Key topics included:

- Airspace change for an expanded Heathrow: the local factors we should consider in different geographical areas when designing future flight paths
- Airspace change to make better use of our existing two runways: the local factors we should consider in different geographic areas when designing new flight paths for some aircraft arrivals on our existing two runways
- Future operations for an expanded Heathrow: how we will operate our three runways in the future – this includes managing noise; respite through runway and airspace alternation; directional preference and night flights.

Heathrow Airport Expansion Consultation (June – September 2019)

This asked for feedback on Heathrow's proposals for the future layout of the airport, including the new runway and other airport infrastructure such as terminals and road access and included preliminary environmental information on the proposed application. Communities were also able to share views on plans to manage the environmental impacts of expansion, including a proposed Heathrow Ultra Low Emissions Zone, Heathrow Vehicle Access Charge and a proposed 6.5-hour ban on scheduled night flights.

Local Focus Forums (LFF)

These were setup in order to engage with local communities on our current operations and future plans. The aim of the LFF is for members to improve Heathrow's understanding of the main concerns from local communities. The Chair and the secretariat are provided by Heathrow, and all other members consist of resident association representatives and ward councillors from the villagers in closest proximity to Heathrow; the boroughs of Spelthorne, Slough, South Buckinghamshire, Hounslow and Hillingdon. These members are elected.

Heathrow Community Engagement Board (HCEB)

The HCEB is an independent community engagement board put together in 2018. It was set up to increase community and stakeholder participation in Heathrow's planning and decision-making processes.

7.8 Colleague

In recent years we have engaged with our colleagues through the Best Companies survey to identify clear areas for improvement and are developing plans to address these issues. More recently we are also using the InPulse app to measure ongoing engagement. We have launched a new Colleague Experience Project aiming to give our colleagues a voice and address areas for improvement. As part of this we have recently launched the Colleague Engagement Forum, where a group of 30 colleagues from across the airport will take the lead on improvements in their working environment and help identify long-term projects. This will foster a sense of real involvement and ensure we make changes where they will really make a difference to our colleagues.

We fully appreciate the role that all Heathrow people play in delivering the best airport service in the world so, we spent time with colleagues from across Heathrow (including Team Heathrow) to understand what is unique about Heathrow's service at its best, and the role all colleagues can play in delivering our vision. Heathrow will only deliver the best airport service in the world if we recruit, skill and retain the best people. Our strategy is to have the best, multi-skilled and diverse talent at Heathrow.

7.9 Airlines

We have a formal governance structure in place for engaging with our airlines, allowing us to gather their views and take account of their feedback in our plans:

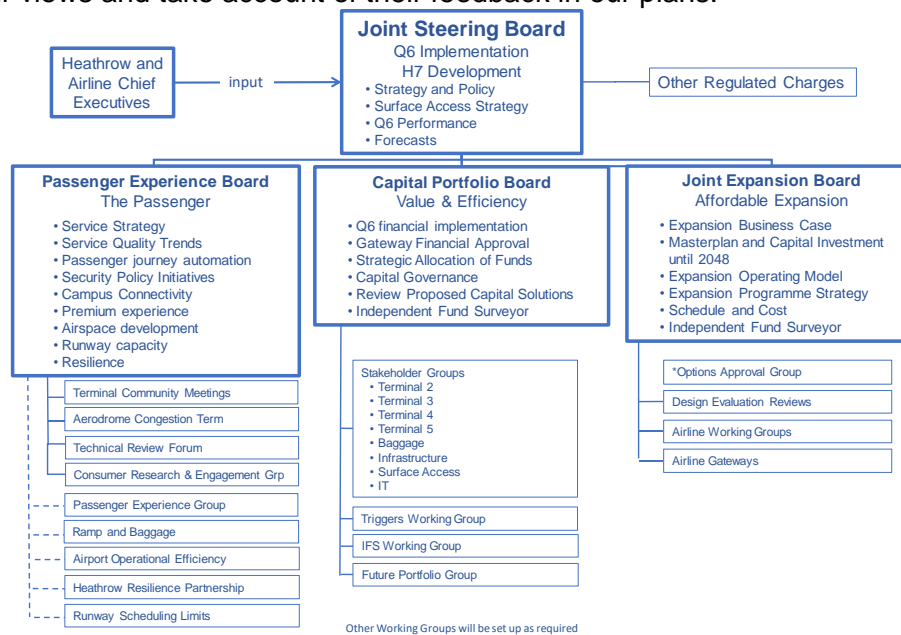


Figure 21: Airline engagement governance

Every 2 years Heathrow also undertakes its Airline Business Partner survey to understand how we can improve the service we offer day to day to our airline partners.

3 - OUR H7 PLANS & CHOICES

Overview

- We have a baseline plan centred around creating new capacity at Heathrow from 2022 onwards that is affordable, financeable, deliverable and sustainable
- There are choices to be made over this baseline plan that revolve around the speed we deliver new capacity, how much we invest in service and connectivity and the risks we take on and how they are managed and mitigated
- Consumer feedback clearly prioritises some targeted service improvements and consumers tell us they are willing to pay for this investment
- Consumers do want expansion, more choice and lower fares, but also tell us they might prioritise airport service over a faster pace of growth and even lower fares, although their actual behaviour in the market may differ
- We have designed two strategic options to capture these choices in summary:
 - **'Prioritising Savings'** saves £37 to £142 on airfares by the mid-2030s by opening the new runway earlier and growing faster at P70 and maintains service in the top half of European airports at a charge of £26.20 for 2022-36
 - **'Prioritising Service'** saves £21 to £81 on airfares by the mid-2030s, opening the new runway later and growing more slowly at P40 and invests extra to respond to consumer service priorities and lock-in new rail schemes to improve airport access in the way consumers prefer to deliver service likely in the top quartile of European airports for a charge of £29.91

1. Our base plan – affordable, financeable, deliverable, sustainable

Our base business plan for 2022-2036 creates a future Heathrow that serves over 100 million consumers with world standard hub connectivity by the mid-2030s. It will connect all of the UK to global growth, benefiting the economy by £187bn⁴⁷. New capacity is worth over £2 billion a year to consumers in reduced airfares. Our base plan also aims to do this while maintaining today's level of passenger satisfaction i.e. amongst the top half of European airports. The base plan can achieve consent for expansion under the Airports National Policy Statement (ANPS). It can adapt to a net zero carbon world and the sustainability challenges we face. We believe it can be entirely privately funded. It is designed as a 15-year plan for 2022 to 2036 to reflect the timescale of the overall project and how consumers both pay and gain from our plans.

We have ensured that this base plan is affordable, financeable, deliverable and sustainable. In all these dimensions there are degrees of certainty – some of which we explore in our strategic options – in addition to as yet unknown factors which will only emerge over the next few years. However, to the extent we can assess currently, both the strategic options we propose address all these challenges.

⁴⁷ Frontier Economics, Competition and Choice 2017, December 2017

Our plans are affordable in that they have been tested against consumer willingness to pay. They respond to the challenge to be as close as possible to 2016 charges in real terms. They offer big net reductions for consumers in the cost of travel as airfares are lower thanks to the capacity constraint being lifted and in all scenarios airfares fall more than the airport charges required to provide new capacity.

Our plans are deliverable in that they can meet ANPS and Development Consent Order (DCO) targets. The construction schedule has been carefully tested by experts including the Independent Fund Surveyor, and the operational and financial parameters are grounded in both existing performance and careful benchmarking.

None of this is easy, but our enviable track record in delivering complex infrastructure projects on time and on budget, and our strong, predominantly UK supply chain means that we can be trusted to deliver.

Our plans are financeable based on initial but extensive testing with debt and equity investors, market evidence and market participants such as ratings agencies. We have used this evidence directly to define our investment parameters and assumptions. We have assumed full private financing that is mobilised quickly in all market conditions so as not to delay growth, with a Regulated Asset Base and single till, have proven the most efficient ways to finance large, long term projects. This plan ensures the necessary cashflows to support global debt financing at an investment grade, while maintaining a sufficient return to attract equity investment to support the expansion programme through any shocks or the economic cycle.

Finally, but importantly, the plans are able to adapt to a net-zero carbon world and the wider environmental and social imperatives we face. We assume in all cases a carbon neutral airport operation from 2020, a carbon neutral runway build and a transition to net zero flight by 2050 at the latest. Indeed, the consumer value created from new capacity alone would more than fund the required carbon removal or fuel transition currently forecast. We likewise have assumed growth that is well within the assessment case limits in our DCO for noise, air quality and surface access. We have included the costs and impacts of the range of interventions we need to hit sustainability targets from the access charge, rail investment and compensation.

Much of our base plan has already undergone extensive iteration in the years before this Initial Business Plan (IBP). There have been years of engagement with consumers, other stakeholders and government authorities. This includes consumer feedback on our design choices and current operation and the extensive engagement process with the wider public and airlines around our masterplan gateways.

As a result, many aspects of the plan are now increasingly settled. For example, the operational capacity and position of the new runway are largely set by the ANPS. Opening the new runway in the late 2020s is similarly constrained by the timing for planning consent and physical construction on the one hand and policy requirements to deliver by 2030 on the other. We have now framed a single preferred masterplan with airlines which allows us to both forecast planning impacts and engage consumers and others on the potential ways to meet their requirements based on that plan. This plan thus holds the M4 Exit masterplan as a constant throughout. We maintain all the essential elements of our plan - such as sustainability - needed to ensure deliverability from a legal and stakeholder perspective.

Likewise, throughout the IBP we assume that Heathrow needs to continue to drive operational and capital efficiencies and drive non-aeronautical revenue in line with our global competitors and comparators. This is the least expectation of an efficient business from our consumers. These elements of the base plan are outlined in the further sections on each of the building blocks of our financial plan. The base plan aligns fully to the construction phasing in our M4

Exit masterplan which is underpinned by a P50 passenger forecast. It assumes limited investment in service.

We do face choices in what we deliver and when we deliver it. Indeed, the CAA has asked us to consider options. We are in a competitive environment, with consumer expectations rising. We have to get the right balance between the needs of all stakeholders, but it is right to consider other choices. We discuss the feedback from each stakeholder on their priorities for Heathrow in Chapter 2 Consumer Engagement.

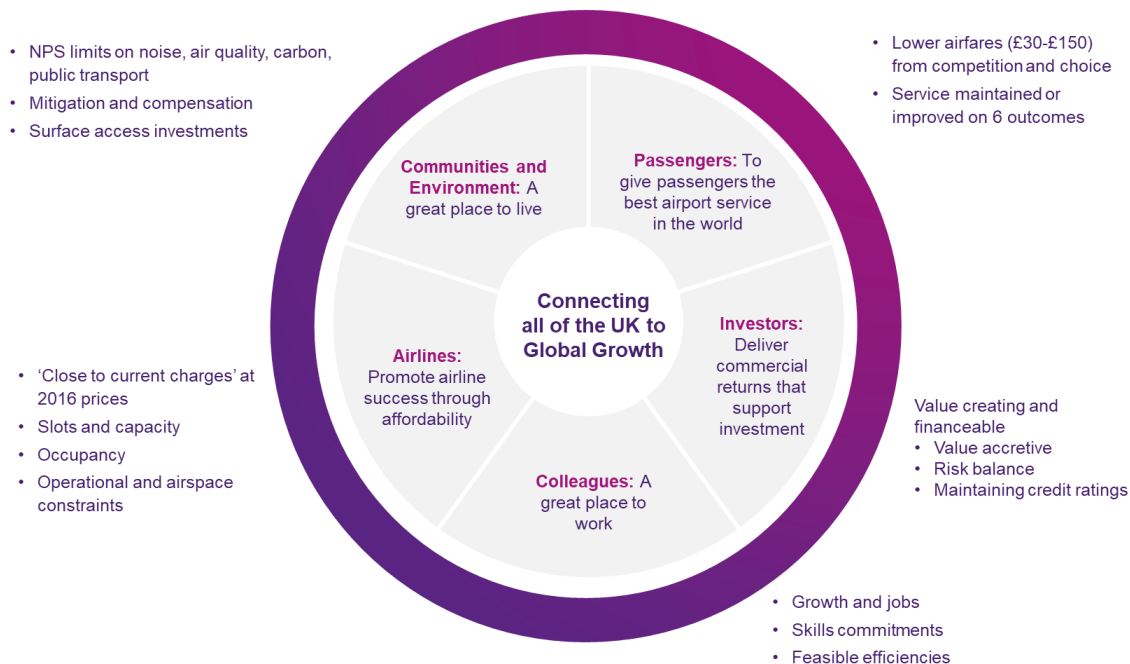


Figure 22: Stakeholder priorities

While we can discuss detailed options in specific aspects of the plan, we believe it is worthwhile to draw out the broader strategic, directional choices we can see for Heathrow over the next 15 years.

2. Choices we face

We have sought to frame the major options, within the baseline parameters, for Heathrow's plans. We see three big choices as we respond to consumer and other stakeholder challenges. The first is the speed we deliver new capacity. Speed determines the degree to which we enable airlines to offer more competition and choice, reduce airfares and potentially the pressure we put on service and operations. The second is how much more we invest in service aspects identified by consumers as priorities to improve. The third, is how much we mitigate risk for consumers and investors to deliver a more predictable or affordable economic outcome. How we make these choices affects the resulting airfares savings, service levels, our airport charges and possibly the way we regulate and finance the airport.

We have summarised these trade-offs as two potential routes forward – a 'Prioritising Savings' option and a 'Prioritising Service' option. The options build on our base plan. These are presented in summarised in Figure 2 and explained in some more detail in Section 7 below. The estimates for airfare savings are based on analysis by Frontier Economics. Once passenger numbers reach maturity, the savings would be similar in all cases.

'Prioritising Savings' saves £37-£142 on airfares by the mid-2030s by opening the new runway earlier (late 2027 or early 2028) and growing our passenger volumes faster at P70 on the forecast. To do so we bring forward some of the core masterplan investment, though the total quantum over the masterplan does not change. This does potentially mean working our infrastructure harder as we grow. It maintains service in the top half of European airports. It seeks to deliver new rail links with an airport contribution but limits this to our original estimates. However, given Network Rail's most recent assessment of the scheme costs, and pressures from government, this may not be sufficient to ensure this is delivered. Faster growth does help the economics of the airport charge so that we deliver a charge of £26.20 (2018 prices, £23.82 2014 prices) for 2022-36.

'Prioritising Service' saves £21-£81 on airfares by the mid-2030s. It assumes we open the new runway later (2029) and grow more slowly, at P40 on the passenger forecast. This creates more operational headroom as we grow to reinforce resilience. It gives us scope to invest extra to respond to consumer service priorities. We also allocate a larger contribution to new rail schemes, ensuring we improve airport access in the way consumers prefer. We estimate it could deliver service likely in the top quartile of European airports. The airport charge for 2022-36 is £29.91 (2018 prices, £27.20 2014 prices).

	PRIORITISING SAVINGS	PRIORITISING SERVICE
RISK AND REGULATION	<ul style="list-style-type: none"> 15 year duration with reopeners Trigger based regulation WACC cost of debt pass through ORC reclassification Lower touch regulatory/airline oversight, traffic risk sharing Access charge pass through 	<ul style="list-style-type: none"> 15 year duration with reopeners Trigger based regulation WACC cost of debt pass through ORC reclassification Access charge pass through Higher/broader service targets than Q6
SPEED AND SCOPE	<ul style="list-style-type: none"> Runway Opening: 2027-28 First terminal expansion: 2030 Faster passenger growth: P70 Includes early ATMs HULEZ/HVAC charge per AEC 	<ul style="list-style-type: none"> Runway Opening: 2029-30 First terminal expansion: 2031 Slower passenger growth: P40 Includes early ATMs HULEZ/HVAC charge per AEC
ADDITIONAL OPTIONS	<ul style="list-style-type: none"> Minimal investment in Western and Southern Rail projects Commercial developments excluded 	<ul style="list-style-type: none"> Higher investment in Western and Southern Rail projects (£1.65bn 2018p) Commercial developments in single till Service capex (£0.5bn 2018p per 5-year period)
CONSUMER AIRFARE SAVING	Shorthaul: £37 Longhaul: £142 2018p Shorthaul: £33 Longhaul: £129 2014p	Shorthaul: £21 Longhaul: £81 2018p Shorthaul: £19 Longhaul: £73 2014p
EST. CHARGE 2022-36	£26.20 2018p £23.82 2014p	£29.91 2018p £27.20 2014p

Figure 23: Strategic options⁴⁸

Put simply, the first option prioritises capacity earlier and fast growth. To keep airport charges and investment manageable it constrains service improvements and rail investments. It could likely need more risk mitigation to foster investment. The second option goes slower and can invest more in service, rail schemes and gives more time to adapt operations at the airport. To reiterate, we believe both are viable choices for Heathrow that deliver for consumers and other stakeholders. The question is, which is the option preferred by consumers and other stakeholders or is there a blend of both options which provides better balance.

⁴⁸ 2016 prices were £21.75 in 2014 and £23.92 in 2018 prices

3. Faster or slower expansion?

Strong evidence shows that the capacity constraint at Heathrow has meant consumers have had less choice in how they fly (see annex 60 for Frontier analysis). This has also led to higher airfares than would otherwise been the case. This problem would get worse without Heathrow expansion as demand grows. One of the greatest consumer benefits Heathrow can now deliver in the 2020s and 2030s is to remove the supply constraint so that airlines can offer new routes and significant lower airfares.

The sooner Heathrow can deliver this new capacity the greater the benefit for consumers. Fares and choices will improve earlier and for longer. It is also likely that faster release of capacity will be most conducive to fast growing or new airlines establishing a base at Heathrow. Furthermore, faster passenger growth improves the airport economics by bringing in more paying passengers sooner to spread the costs of investment. As an example, if airlines were able to fill their seats at Heathrow today in line with the IATA global load factor average, 2.5 million more passengers would have flown in 2018. That alone would reduce the airport charge by £0.70 (2018 prices). With new capacity, faster growth can reduce the airport charge at the same time as offering better airfares. From this perspective, releasing runway and then terminal capacity earlier is, all else equal, to consumers' benefit.

We are illustrating this potential with a plan option that opens the runway c. 12-18 months faster than our M4 Exit plan. In this option, the runway is forecast to open in late 2027. We would also invest so that new terminal capacity would open in parallel in both the west and east campuses ensuring that all airlines have an equal opportunity to grow.

Our alternative option demonstrates the trade-offs for consumers that play against the economic benefits of faster delivery of new capacity. This option is around 12-18 months slower than our M4 Exit option. It thus forecasts the runway opening in 2029 and a sequential build of new terminal capacity, starting in the western campus.

First of the trade-offs within these choices, is the physical and legal constraints on efficient investment the airport make in a given period. Opening the runway by 2027 requires us to invest £3.5 billion per year at peak in the early 2020s, more than we have previously achieved. We believe we can accelerate delivery of new stand and terminal capacity by 1-2 years versus our M4 exit plan. This bounds our faster option. The slower option reduces pressure on the construction schedule.

Secondly, we need to consider the impact on passenger service while expansion is underway. Construction brings challenges for passengers in terms of airport access, terminal spaces and potential disruption or impacts on reliability. The impacts can be seen at other airports undergoing redevelopment for example Amsterdam saw an ASQ reduction during construction works and a change to its security model. Heathrow has good experience in managing these impacts, but we foresee limits to what is feasible if we wish to maintain today's level of service. Additionally, faster passenger growth within existing infrastructure can strain processes and lead to issues such as crowding. Some of this could be further mitigated by collaboration with airlines to improve the efficient use of airport infrastructure but this cannot be taken as a given without understanding the feasibility for airline operations. We have thus benchmarked our M4 Exit plan against Heathrow today and international comparators to 12,500 sqm per mppa to maintain current service. In our faster option terminals will be under strain as volumes exceed this benchmark for a significant period. In our slower option, we cap passenger volumes at P40 in our forecast range which ensures the capacity benchmark is never exceeded.

Thirdly, there is additional £4bn of investment brought forward by 2036 to deliver new capacity. If passenger volumes grow sufficiently they can offset the impact of this on the airport charge. We have illustrated this impact in our building blocks calculations with both higher capex and higher passenger volumes. However, this scenario also alters the risk balance for investors and consumers. We would therefore need to adopt new measures in terms of risk mitigation and incentives to pursue such an option. As shown in Section 5 below, these could include different incentives for airlines to maximise growth to fill available capacity.

4. Investing in service and connectivity?

Consumers can clearly identify aspects of the airport service they would like to see improved. However, as with any consumer purchase, they implicitly balance these wants against how much they pay to travel. The challenge for our IBP is prioritising these and testing them against the costs of making the improvements. Viewed another way this can be seen as the genuine tension between seeking to deliver a huge expansion of an airport at the most affordable airport charge and seizing expansion as an opportunity to build the truly first-class hub airport that Britain deserves in terms of service and connectivity.

Chapter 2 sets out our engagement with consumers. They highlight multiple service aspects they would like to see improved, as illustrated and summarised in the Willingness to Pay (WTP) research described in that chapter. We have used this engagement to develop potential options for improving service above the base level included in our plan. Additional options have been identified through:

- Cost benefit assessment of specific interventions to improve service
- Reviewing passenger insight from our consumer feedback and benchmarking
- Identifying the key choices on offer around surface access that relate to the consumer outcome “I am confident I can get to and from the airport” given the materiality of cost and impact of discrete schemes in this space

Addressing these choices in isolation risks a disjointed approach to consumer value. Therefore, a key element of our consumer engagement strategy has been to present an integrated package for testing in the ‘Choices’ research. This both investigated consumers preference for faster or slower expansion and for paying higher charges to receive a higher service. We show below what an integrated package would look like and this is consistent with the insight from the Choices research on impact on the airport charge. This reinforces the sense that the service interventions we are considering are pitched at an appropriate level.

Service improvements identified using top-down cost benefit analysis

Heathrow has undertaken a cost benefit exercise to identify the monetary benefits of potential service interventions. This consisted of three stages:

- Identifying potential interventions that affect service together with their costs;
- Determining the monetary benefits as assessed by consumers from changes to different service levels; and
- Applying the monetary benefits to each potential intervention and comparing the benefit with the cost.

The interventions assessed included some that were included in the M4 baseline expenditure and some that were potential additional actions the business could take. This allowed reductions in activity to be considered as well as increases in activity.

The monetary benefits of the schemes were determined from WTP research and Webtag valuations. The resulting valuations are set out in a report produced for Heathrow by ICS.⁴⁹ These valuations were applied to the potential interventions and compared to the cost. This exercise showed that the interventions already included in the M4 expenditure were cost beneficial.⁵⁰ This is consistent with consumer insight showing that consumers do not want to see a reduction in service levels at the airport.⁵¹ Consequently, we have not investigated service reductions any further.

The remaining schemes that were not included in the M4 baseline were then ranked in terms of their cost benefit ratio. In theory, a cost benefit ratio of greater than 1.0 means that the value consumers attach to the improvement is greater than its cost. However, uncertainty in valuations and costs means that care needs to be taken where cost benefit ratios are close to 1.0. In practice, this means that to increase confidence that interventions are cost beneficial a cost benefit cut-off of well above 1.0 is used. In this case a cut-off Cost-Benefit Analysis ratio of 3.0 was used to identify a set of interventions that are clearly cost beneficial.

The resulting interventions (i.e. those above a ratio of 3) are summarised in Table 7, which sets out a summary of the interventions, their cost and their cost benefit ratio. We estimate these initiatives lead to in additional capital expenditure of £240m between 2022-2026.

Table 7 - Cost Beneficial Service Interventions

Performance Aspect	Initiatives	Capex £m (2022-2026)	Benefit Cost Ratio
Baggage Loading	Improved Baggage Performance Management/ Collaboration	■	171
Departure Punctuality	Asset Information, Building Fabric, Stand Planning and Allocation	■	33
Wayfinding, Flight Information Screens, Wifi Seating Availability	Multi Faith Rooms, VIP Improvements, Lifts, Escalators, Conveyors, Help Points	■	17
Total		240	

Source: Heathrow/ ICS

Service impacts were also illustrated to allow consumers to assess the interventions, as set out in

Table 8. Since measuring service impacts is an inexact process, these should not be seen as commitments to achieve particular service levels. Again, this is a reason for caution in pursuing interventions with lower cost-benefit ratios.

⁴⁹ ICS; “Developing the Cost Benefit Analysis Framework Valuations and Initial CBA Results- Consolidation of the Investment Options”

⁵⁰ ICS; “Developing the Cost Benefit Analysis Framework Valuations and Initial CBA Results- Valuation and initial CBA results”

⁵¹ Accent; H7 Service Package Choice Research

Table 8 - Impact of interventions on service levels

Intervention	Service Improved	Base Service Level 2020s	Illustrative Improvement	Illustrative service in 2020s with intervention
Baggage Loading	Baggage not Loaded Rate	7 bags per 1000	1.2 bags per 1000	5.8 bags per 1000
Departure Punctuality	On time departure rate	81%	1%	82%
Wayfinding Fight Information Screens, Wifi, Seating Availability	Flight Information Display Score	4.30	+0.04	4.34
	Seating Availability Score	3.80	+0.03	3.83
	Wayfinding Score	4.10	+0.06	4.16
	Wifi Score	4.15	+0.03	4.18

Source: Heathrow/ ICS

Service improvements identified through ongoing bottom-up consumer insight

Consumers are also able to identify immediate service priorities as they use Heathrow. These tend to be more immediate and accessible for consumers to understand. We have thus also used consumer insight directly - based on analysis of survey feedback, customer comments, international benchmarking and consumer workshops to understand how we can maximise passenger satisfaction, which for shorthand we measure based on results on the Airport Service Quality survey. From this work we identified four 'pillars' that offer immediate opportunities to improve Heathrow service even as passenger volumes grow and without major new infrastructure such as new terminals. Within each 'pillar' sits a set of investment opportunities in the period 2022-2024 based on the specific feedback. The pillars are:

Championing Service

Through investing and empowering our people through more advanced resource deployment, new service tools and service training facilities we will be able to provide more consistent, distinctively British service throughout the airport.

Best Environment

'Ambience' is consistently shown to be important to consumers. Basic parts of the airport environment have a significant impact on passenger experience. We have identified opportunities to upgrade passenger spaces and amenities such as walkways, gates, washrooms and the overall welcome to the UK.

Leading Product

The reliability, predictability and ease of Heathrow's passenger product drives both service satisfaction and volumes and commercial success. There are opportunities in the next 5 years

to use automation and upgrade or create facilities for underserved passenger needs like smoking facilities, VAT reclaim and relaxation areas.

Open Communications

Passengers increasingly appreciate and expect the airport to share information in real time across multiple channels and have meaningful two-way digital conversations. We can invest in the next generation of digital signage and live journey information across multiple platforms.

We estimate that if we were to invest £140 million to 2024, we could pursue the most immediately identifiable consumer priorities of this sort. Again, measuring impact is not an exact process especially given ever rising consumer expectations. However, based on current feedback at Heathrow and elsewhere, we estimate these could deliver up to c.0.05 - c.0.10 improvement in Airport Service Quality (ASQ) by 2024. This could be more than offset a forecasted reduction in ASQ of c.0.05 as Heathrow continues to see passenger demand grow whilst operating in a capacity constrained environment.

This could lead to an overall forecasted ASQ of c.4.25 in 2024, an improvement on 2019. This would likely ensure Heathrow was rated by passengers firmly amongst the top quartile of airports in Europe, rather than just solidly in the top half. Costs and estimated impacts on ASQ for each 'pillar' are detailed in Table 3.

Table 9 - Four pillars to improve satisfaction

Pillar	Initiatives	Illustrative Net ASQ Change (2022-2024)	Cost (Capex) £m (2022-2024)	Cost (Opex) £m (2022-2024)
Championing Service	Dynamic Resource Deployment	c.0.01		75
Best Environment	Boarding Gate Transformation, Arrivals Sense of Space	c.0.01	■	
Leading Product	Rest & Relaxation Zones, Dedicated Work Areas	c.0.01	■	
Open Communication	Live Journey Information, Real Time Feedback, Mega FIDs, Digital Assistance	c.0.02	■	
Total		c.0.05	140	75

Source: Heathrow

Illustrative improvements to detailed service measures as a result of implementing four pillars are also shown in Table 4. Again, it is worth noting that these are estimates based on current consumer responses and correlated impacts not firm future forecasts.

Table 10 – Impacts to service measures (ASQ)

Service Measure	Improvement (2022-2024)
Seating Availability	c.0.03
Wayfinding	c.0.06
Flight Information	c.0.04
Cleanliness	c.0.05
Wi-Fi	c.0.03

Source: Heathrow

While it is possible to imagine investing in only the ‘top down’ systems improvements and the ‘bottom up’ customer inspired ideas, for the purposes of the choices we have included both as additive potential investments. This is partly because they address different parts of the total consumer package and partly because, while from different sources, they are complimentary and additive in terms of value for the consumer.

Transforming service to consumers with digitalisation

Consumer insights tell us that some consumers are increasingly using digital channels to tailor and personalise the services received e.g. non-English speakers. More widely preferences for self-service are changing rapidly as people experience new technology in airports for the first time.

Our current plan anticipates some investment to meet consumer needs in this area. However, there is clearly the potential to do significantly more and we are carrying out further research to better understand how best to serve consumers in this area. Consequently, in our enhanced service package we have included £125m for investment in automation and personalisation in digital services.

Combine extra investment

Bringing these three areas of potential extra investment together implies investing c.£500m over 5 years, comprised of an additional c.£380m ‘top down’ and ‘bottom up’ investment on service and c.£125m on digital service. The same potential choice exists beyond 2026. It is very hard to predict with any accuracy what interventions might have a similar impact on this time horizon given that consumer habits, preferences, products and technology continue to change rapidly. Our Strategic Brief for the masterplan design has looked at these future consumer needs and ‘megatrends’ to at least seek to prevent us foreclosing important options. What it also shows is that addressing emerging trends will require further investment. Indicatively we have thus illustrated this with a similar c.£100m annual investment from 2027.

Service investments identified in Surface Access

Consumers are concerned with their end-to-end journey. They tell us the journey to or from the airport is so important to them we have defined an entire outcome just to meet their need: “I am confident I can get to and from the airport”. Our research as synthesised by Ipsos Mori

also shows clear preferences. Consumers prefer direct access without changes and a journey mode that allows them to transfer their luggage easily.

The speed of rail links, however, can satisfy consumers' needs for a quick journey to the airport and the high satisfaction ratings for Heathrow Express are driven by the speed and comfort of the journey to and from London.⁵² There is a clear consumer need therefore for improvements to direct rail services.

Better public transport connections also increase the airport catchment area, making it easier to attract consumers and improve airline load factors. Heathrow has historically invested in rail access to the airport – for example Heathrow Express and the Elizabeth line connecting to central London. H7 offers a transformational opportunity to create similar connections to underserved markets in the west and south. The Western Rail project could have an overall mode share of 3%, contributing to our public transport targets under the ANPS. Western Rail access, as a direct rail service to currently hard to access places, would clearly be in line with the stated preferences of airport consumers in many ways. Results from our research show that 56% of those surveyed thought that Western Rail was an appealing option for travelling to Heathrow, with 51% of respondents saying that they would be interested in using the new service. Our research also shows that 46% of respondents would be more likely to choose Heathrow as their arrival or departure airport if the Western Rail link was available.⁵³

While we believe that delivery of Western Rail would be the right outcome for consumers, our surface access assessment case, as set out in our surface access annex, shows that we could use a variety of other measures to meet our mode share targets. This would include a greater focus on so called 'push' measures, in particular a higher vehicle access charge, to incentivise people to switch to public transport. We would also include more investment in bus and coach provision to give passengers a public transport alternative. Although this could meet our mode share targets, we know it wouldn't meet consumer needs as effectively. For example, while consumers who have used coach services to access the airport are satisfied with their journey, we know that coach is often not a consideration for consumers with our coach user research showing that only 6% of passengers have considered taking the coach to Heathrow.⁵⁴

However, such investments come with a real cost. It requires a collective judgement as to whether they are in the long-term consumer interest. The M4 Exit masterplan included an allowance of £100m for Heathrow's contribution to the cost of Western Rail Access. Since then Network Rail's plan has matured and the expected cost has increased. Although a final position on the level of contribution is not yet agreed, we have assumed a contribution of £750m for the purposes of this IBP⁵⁵. For the purposes of the choices we have therefore included an option for an airport contribution at this higher amount in 2022-2026.

Southern Rail access is a similar project but less progressed in development. It would provide a direct connection to the high value catchment areas to the south of Heathrow. We estimate it is more likely to be delivered in the late 2020s or 2030s. Any contribution is far more speculative for this project. However, for the purposes of illustration we have included a further £750m contribution to such a scheme at some point in the final five years to 2036.

In either option we will pursue both rail schemes. However, there is a higher chance of rapid and assured delivery of these schemes if the airport is prepared to invest a large contribution. We therefore see this as a genuine strategic choice for all stakeholders in this regard.

⁵² Ipsos Mori, *Heathrow Surface Access Insights Synthesis*, April 2019

⁵³ Populus, *Exploring potential usage of Western Rail Access to Heathrow*, November 2018

⁵⁴ Breaking Blue, *Surface access to airports research report*, August 2018

⁵⁵ Any contribution to Western Rail will be consistent with the CAA's surface access policy

Combined service options

We have sought to test an integrated package of service options with consumers. Table 5 below sets out the combined cost of the service options and also sets out the projected impact on the charge in 2022-2026 and 2022-2036. To estimate the charge over the longer period we have assumed that additional expenditure on improving service will be incurred in the periods 2027-2031 and 2032-2036 equal to the spend on the CBA and four 'pillars' in the period 2022-2026. We have also assumed surface access investments as described above.

Table 11 - Combined Service Options

Year	2022	2023	2024	2025	2026	Total
CAPEX (£m)						
Four Pillars	70	70				140
Service Options	55	50	45	45	45	240
IT Automation & Personalisation	25	25	25	25	25	125
Surface Access contribution			422	403		825
Sub-Total	150	145	492	473	70	1,330
OPEX (£m)						
Four Pillars	15	15	15	15	15	75
Service Operations	8	15	15	15	15	68
Sub-Total	23	30	30	30	30	143
Airport Charge Change (Pence per passenger)						+£0.99

Source: Heathrow

Table 11 shows that the additional service package can be delivered to consumers for less than a £1 impact on the charge. The WTP and choices research indicates that consumers express a willingness to pay up to £1-£2 more for their service priorities. Under a £1 impact, is thus well within well within the indications from our insight of what would be acceptable, which is a useful conservatism given the nature of such research. Investments in better rail lines would avoid the need for a higher vehicle access charge and higher operational expenditure on alternative surface access interventions. We therefore consider that this service package could be supported by the consumer insight on preferences. The corresponding impact on service levels of the combined package is set out in Table 12.

Table 12 - Potential Service Levels

Service Metric	Unit	Current Performance (2018)	Estimated Base Performance (2026)	Potential Service Package Performance (2026)
Baggage Loading	%	98.8	99.3	c.99.5
Departure Punctuality	%	77.8	81.0	c.82.0
Passenger Search	%	95.70	95.00	c.96.00- 97.00
Wayfinding	number	4.26	4.10	c.4.16

Staff Search	%	97.92	95.00	c.96.00
Flight Information	number	4.40	4.30	c.4.34
Wi-Fi	number	4.13	4.15	c.4.18
Seating Availability	number	4.18	3.80	c.3.83

Source: Heathrow SQRB July 2018/ ICS

5. Consumer views on speed and service choices

As part of our IBP submission we have set out strategic options, or choices for the future. We presented these choices to consumers to understand their preferences and to tease out the tension between affordability and service. This work builds on the WTP, service measures and related improvements and consumer outcomes as discussed earlier in the chapter.

The main research objective was to understand the most acceptable service package amongst current and potential future users of Heathrow – trading off price (separately for the Passenger Service Charge, the element of airport charges shown on the airline ticket) as well as their overall journey cost (including changes in total air ticket price) and service characteristics within a series of four different service packages that consumers could experience when travelling from Heathrow in the future.

The main focus of the research was quantitative but qualitative work was undertaken at the outset. The qualitative work was focused on ensuring that the service characteristics presented were elements that consumers understood and felt that they could be consulted on. Additionally, the attributes were articulated in a way that was understandable. This stage included 30 Heathrow users and 30 potential users. Small amendments were made to the materials to prepare for the quantitative work including more clearly defining and highlighting costs and changing some of the terminology.

The quantitative work included surveys with current and potential users to quantify the most preferred package amongst users and potential users. This stage interviewed 1,566 Heathrow users and 2,014 potential users. Four packages were presented which tested key measures (punctuality, baggage, surroundings etc.), speed (runway opening) and charge (car access, airport charge and fare impact). All package options were shown as pairs of options with the package order randomised.



Source: Accent H7 Service Package Choice Research

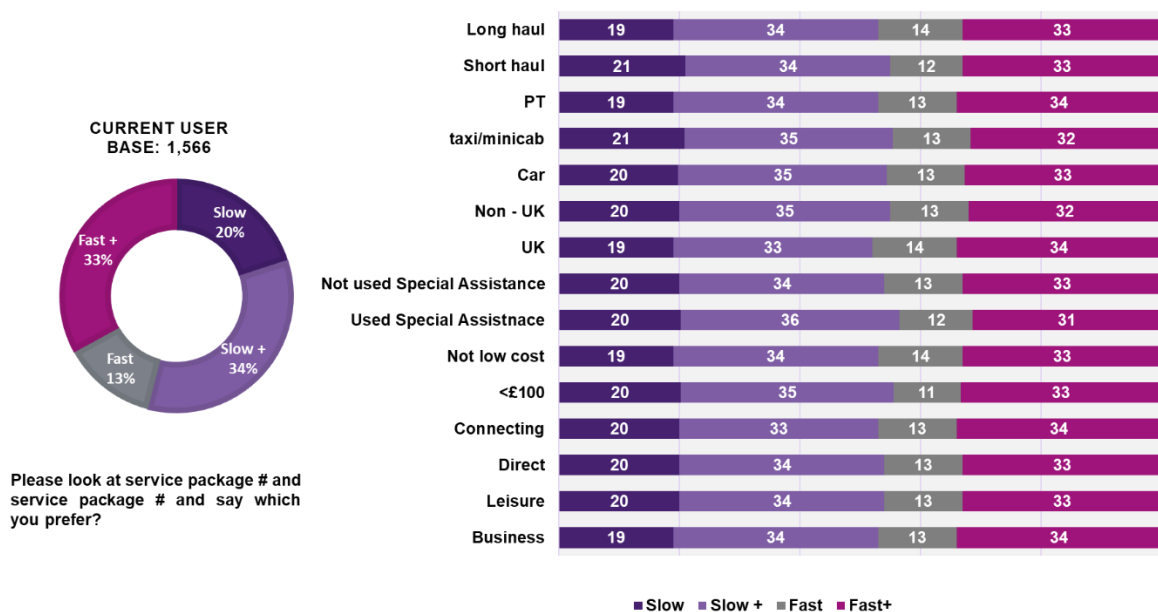
Figure 24: Examples of packages presented

Current users

Key findings from the research were:

- Over half of Heathrow users consider other airports
 - The main alternative airport for direct fliers is Gatwick (42%) and for connecting is Schiphol (25%)
 - 66% of short haul passengers are more likely to consider other airports, compared to 49% of long haul passengers
 - There is no difference between business and leisure
- Whilst the majority (81%) feel that the airport charge per passenger is good value for money, there is a perception for some that charges are higher (36%) at Heathrow versus other UK airports
- For passengers, the most important aspects were:
 - Reduced baggage delay (with 56% stating very important and 29% important)
 - No increase in terminal crowdedness (with 42% stating very important and 39% important)
 - Flight punctuality improves (with 43% stating very important and 38% important)
- Connecting passengers place significantly more importance on improving customer satisfaction for connecting journeys (with 48% stating very important and 40% important)
- Those who access the airport via public transport state that its more important that Heathrow introduce a vehicle access charge (41%) versus those using private transport (32%)

The packages with a higher service element were preferred (67%) over a lower service element. This trend occurred when only the Passenger Service Charge was shown, when a higher Passenger Service Charge was shown and when the impact on airfare was also shown. As we have also seen in other consumer research (e.g. Willingness to Pay and Aggregated benefits) this demonstrates strong consumer support for enhancements to their end-to-end airport journey, with some indifference about the speed of opening of third runway.



Source: Accent H7 Service Package Choice Research

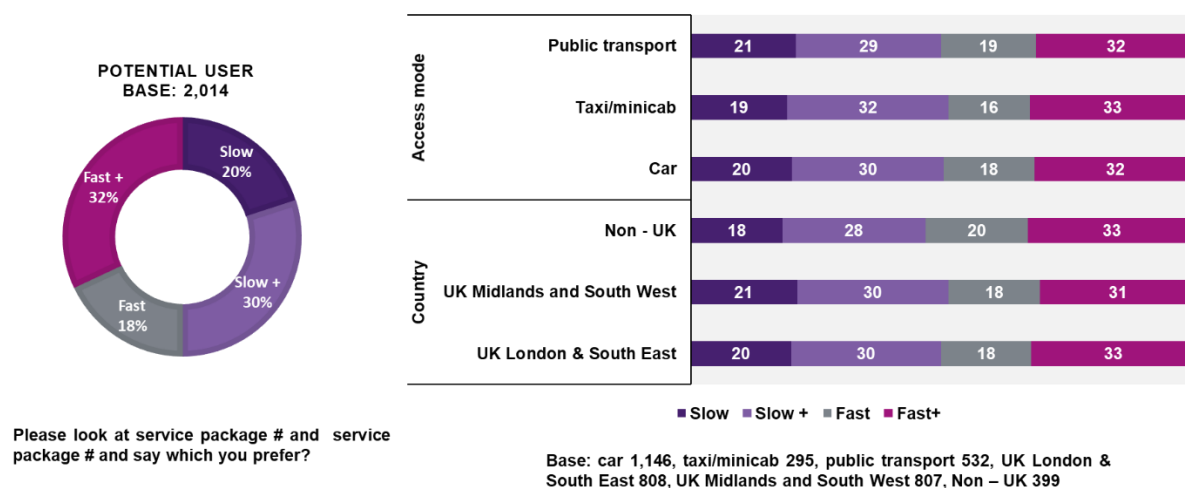
Figure 25: Preferred package for current users

Potential users

Similar trends were also determined for potential users as current:

- Most important aspects were:
 - Reduced baggage delay (with 49% stating it is very important and 31% important)
 - No increase in crowdedness (with 38% stating it is very important and 39% important)
 - Improved flight punctuality (with 36% stating it is very important and 41% important)
 - Improvement in customer satisfaction (with 31% stating it is very important and 44% important)
- The non-UK sample gave higher importance to an earlier third runway and vehicle access charge than the UK sample
- There is fairly low awareness of the Passenger Service Charge, although slightly higher than for Heathrow users (41% versus 36%). There is similar perception that charges are higher versus other UK airports.

Again, the packages with a higher service level were preferred (59%). If the services at Heathrow replicated the preferred package, it would attract 64% of those asked to fly through Heathrow in the future.



Source: Accent H7 Service Package Choice Research

Figure 26: Preferred package for potential users

The main conclusion of the research is that there is strong support for enhancement of airport services. There was no significant difference between either the Heathrow users and potential users, or the segments that fall under these categories.

Further detail of how this choices research has been incorporated can be found throughout the building block chapters (Passenger Forecast, Operating Cost, Capital Expenditure) where there is a potential impact on what we deliver and how we achieve the desired consumer outcomes.

The results show a clear consumer preference. For current users, twice as many respondents preferred the “+” (i.e. “enhanced” or higher service) options over the lower service options. Nearly half as many potential users also picked the enhanced option. This trend was true irrespective of the speed of new capacity (and thus services) was provided. There was a less

pronounced consumer preference for slower development (52-56% of respondents picked a 'Slow' option).

6. Options to mitigate risk?

Lower or better allocated risk can reduce the cost of investment. This is particularly so for a long 15-year period of investment with multiple hard to forecast elements. Consumers could benefit in terms of either enabling more investment and thus benefit at a given charge or a lower charge if risk was adjusted through Heathrow's regulatory framework to 2036.

Various options for better risk management are outlined in Chapter 15 Governance and Assurance. Some of these are clearly in consumers' interests so we have assumed them in our plans. We are assuming a 15-year period of regulatory stability to underpin equity investor confidence, supported by indexation of the cost of new debt. These ensure that consumers benefit from cheaper future debt funding and the lower cost of long-term patient capital. Likewise, we are assuming that Heathrow will be required to trigger certain regulatory steps – including an expansion risk premium and the introduction of additional ATMs. This ensures that consumers only fund expansion once the legal, planning, airspace and commercial conditions are met to proceed.

Other options are raised for discussion with consumers, airlines and the CAA. We can see a good case in principle for providing airlines with more incentive to grow passenger volumes in the expansion period, thus reducing the long-term airport charge for consumers. This could mean sharing some volume downside or upside with airlines as against the Q6 approach of this all being borne by equity investors at the airport. We can also see potential to create new consumer and business facilities at Heathrow faster while simultaneously reducing the charge in the single till through the development potential of commercial property over a 15-year period. Heathrow carries material capital expenditure risk in the Q6 model, both from disallowance and ex-ante incentives applied at G3. While the CAA has discussed further ex-ante incentives, we believe these would increase the required expansion risk premium and therefore airport charges, by £2 to £7. Further details are provided in Chapter 12 WACC.

We believe that approaches to sharing risk are needed more in the faster, 'Prioritising Savings' option. Such regulatory change would allow all parties to pursue the more complex and challenging path that delivers greater consumer benefit. There is however scope to consider such regulatory innovation in any scenario.

These choices all require further engagement with consumers, airlines and the CAA to understand the trade-offs from their perspective. Based on that engagement we would hope to define a more detailed approach to each risk management choice in our Final Business Plan in 2020.

7. Summarising our Strategic Options

As described above we have combined the above choices into two strategic options for Heathrow from 2022-2036. We show the two strategic options in the table below. The second table then compares the two options at a high level against our outcomes. The third and fourth tables show a consolidated view of the plan variables for each option. We plan to engage further with consumers, airlines, regulators and other stakeholders to understand their views on these choices.

	PRIORITISING SAVINGS	PRIORITISING SERVICE
RISK AND REGULATION	<ul style="list-style-type: none"> • 15 year duration with reopeners • Trigger based regulation • WACC cost of debt pass through • ORC reclassification • Lower touch regulatory/airline oversight, traffic risk sharing • Access charge pass through 	<ul style="list-style-type: none"> • 15 year duration with reopeners • Trigger based regulation • WACC cost of debt pass through • ORC reclassification • Access charge pass through • Higher/broader service targets than Q6
SPEED AND SCOPE	<ul style="list-style-type: none"> • Runway Opening: 2027-28 • First terminal expansion: 2030 • Faster passenger growth: P70 • Includes early ATMs • HULEZ/HVAC charge per AEC 	<ul style="list-style-type: none"> • Runway Opening: 2029-30 • First terminal expansion: 2031 • Slower passenger growth: P40 • Includes early ATMs • HULEZ/HVAC charge per AEC
ADDITIONAL OPTIONS	<ul style="list-style-type: none"> • Minimal investment in Western and Southern Rail projects • Commercial developments excluded 	<ul style="list-style-type: none"> • Higher investment in Western and Southern Rail projects (£1.65bn 2018p) • Commercial developments in single till • Service capex (£0.5bn 2018p per 5-year period)
CONSUMER AIRFARE SAVING	Shorthaul: £37 Longhaul: £142 2018p Shorthaul:£33 Longhaul: £129 2014p	Shorthaul: £21 Longhaul: £81 2018p Shorthaul: £19 Longhaul: £73 2014p
EST. CHARGE 2022-36	£26.20 2018p £23.82 2014p	£29.91 2018p £27.20 2014p

Prioritising Savings

- Based on M4 construction with a faster build profile
- Runway opening date 2027
- P70 passenger forecast
- Forward curve cost of debt WACC, starting at 6.4%
- ULEZ/HVAC charge included
- Updated Other Regulated Charges package
- Basic surface access and service improvements included only

Prioritising Savings	(2018p)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Opening RAB	£m	17,378	19,681	22,886	26,436	29,466	31,793	33,830	35,419	36,177	36,461	36,598	36,244	36,019	36,061	36,357
Capex	£m	3,175	4,077	4,399	3,881	3,307	3,020	2,525	1,762	1,390	1,348	880	1,057	1,318	1,562	997
Depreciation	£m	-872	-872	-848	-851	-980	-984	-935	-1,004	-1,106	-1,211	-1,235	-1,282	-1,275	-1,265	-1,353
Closing RAB	£m	19,681	22,886	26,436	29,466	31,793	33,830	35,419	36,177	36,461	36,598	36,244	36,019	36,061	36,357	36,002
Mid-year RAB	£m	18,529	21,283	24,661	27,951	30,630	32,812	34,624	35,798	36,319	36,530	36,421	36,131	36,040	36,209	36,179
Return on RAB	£m	1,134	1,305	1,512	1,713	1,877	1,870	1,973	2,040	2,069	2,081	2,016	2,000	1,995	2,004	2,002
Operating costs	£m	1,250	1,266	1,273	1,272	1,333	1,325	1,349	1,326	1,421	1,461	1,439	1,518	1,487	1,482	1,475
Commercial revenue	£m	1,344	1,350	1,349	1,345	1,584	1,576	1,640	1,595	1,674	1,743	1,796	1,860	1,902	1,936	1,969
WACC (5 Year Average)	%	6.1%					5.7%					5.5%				
Passengers	m	84.1	85.6	86.4	87.0	87.8	88.4	93.5	98.5	103.5	107.9	112.3	115.8	118.9	121.3	123.7
Est. Airport Charge per Passenger	£	26.20														

Prioritising Service

- Based on M4 construction with a slower build profile
- Runway opening date 2029
- P40 passenger forecast
- Forward curve cost of debt WACC, starting at 6.4%
- ULEZ/HVAC charge included
- Updated Other Regulated Charges package
- Additional surface access and service improvements included

Prioritising Service	(2018p)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Opening RAB	£m	17,370	19,616	22,410	25,833	29,531	31,766	33,795	35,458	36,752	37,524	38,032	38,188	37,887	38,179	38,530
Capex	£m	3,118	3,666	4,293	4,568	3,203	3,140	2,676	2,330	1,908	1,779	1,533	1,112	1,681	1,802	1,633
Depreciation	£m	-872	-872	-870	-871	-968	-1,110	-1,013	-1,036	-1,136	-1,271	-1,378	-1,412	-1,389	-1,451	-1,545
Closing RAB	£m	19,616	22,410	25,833	29,531	31,766	33,795	35,458	36,752	37,524	38,032	38,188	37,887	38,179	38,530	38,618
Mid-year RAB	£m	18,493	21,013	24,121	27,682	30,648	32,780	34,627	36,105	37,138	37,778	38,110	38,037	38,033	38,354	38,574
Return on RAB	£m	1,131	1,288	1,479	1,697	1,878	1,868	1,973	2,058	2,116	2,152	2,109	2,105	2,105	2,123	2,135
Operating costs	£m	1,265	1,287	1,296	1,295	1,355	1,346	1,339	1,295	1,311	1,379	1,359	1,442	1,417	1,499	1,469
Commercial revenue	£m	1,330	1,338	1,341	1,339	1,573	1,566	1,572	1,490	1,530	1,598	1,653	1,726	1,778	1,846	1,892
WACC (5 Year Average)	%	6.1%					5.7%					5.5%				
Passengers	m	82.3	84.0	85.0	85.8	86.3	86.8	87.2	87.6	91.7	95.6	99.7	103.9	107.9	111.8	115.2
Est. Airport Charge per Passenger	£	29.91														

	Prioritising Savings	Prioritising Service
I have more choice of flights and destinations⁵⁶	Rapid increase in destinations and services from late 2020s. Growth of 47% in volumes, forecast £37-£142 fares benefit	Steady increase in destinations and services through 2030s. Growth of 40% in volumes, forecast £21-£81 fares benefit
I am confident I can get to and from the airport	More risk to Western Rail, may need to be a higher access charge	New Western Rail (and later Southern Rail) connections
I have a predictable and reliable journey	Sustains today's reliability, pressure points as airline and airport operations change to accommodate faster growth	Extra investment in baggage, punctuality and resilience improved reliability over today
I feel comfortable and secure at the airport	Security and safety remains paramount, service aspects broadly in line with today	Improved ambience and service options compared to today
I feel cared for and supported	As today with a focus on service through people	Extra investment in service, information and welcome
I have an enjoyable experience at the airport	Pressure on terminal and other processes but broadly in line with today. More commercial facilities on the airport facilitated by regulatory flexibility	Extra investment in passenger amenity, reduced potential for crowding at pinch points
Heathrow provides efficient, affordable and reliable airport services for airlines	Lower airport charge and faster release of capacity matched with more need to change airline operations	Higher airport charge matched with less strain on resilience and less need for airline operation changes
Heathrow is a great place to work	Faster growth up of career opportunities, more gradual workplace change	Slower growth of career opportunities, more gradual workplace change
Commitments made by Heathrow for sustainable growth are met	More mitigation through operational change, access charging and other levers may be required to create growth envelope	Slower passenger growth, more public transport investment make environmentally managed growth commitments easier to meet in some cases
Heathrow delivers predictable and fair returns	Some risk mitigation and regulatory flexibility required to manage risks of faster schedule	Likely more in line with today's framework

⁵⁶ 2016 prices were £21.75 in 2014 and £23.92 in 2018 prices

4 - SUSTAINABLE GROWTH

Overview

- Sustainability is a priority for consumers. 97% say it is important to them and 43% say their attitudes have changed in the last 12 months
- Heathrow 2.0, our sustainability plan, sets out how we will improve life for communities and colleagues, contribute to a thriving economy, and help to tackle global challenges including climate change
- We have invested £150m already in sustainability which will only increase with expansion and rising expectations
- Tackling carbon is essential for growth. Since the ANPS vote, we have committed to doing all we can to reach net zero flying by 2050. For Heathrow's own operations at the airport we will be carbon neutral from next year and in 2020 we will set out our plan to be net zero as soon as possible.
- Aircraft noise is the biggest single issue for local communities, and we are committed to ensuring that fewer people will be impacted by aircraft noise than today, even with expansion
- Ensuring there are no more cars on the road with expansion is the key to better air quality and less traffic congestion. This drives our surface access strategy, focused around public transport

1. Introduction

This chapter sets out our sustainability strategy and priorities for H7. Heathrow delivers significant benefits to consumers and a wider economic boost to the local, regional, and national economy. As we look forward to expansion we will continue to see those benefits grow as we enable new routes to new markets and support competition and innovation.

This is only possible however, if we operate in a way that maintains government, community and consumer support. That means we must play our part in tackling the negative impacts of air travel. These include big global environmental challenges like climate change through to local impacts such as aircraft noise which affects the quality of life for our local communities.

Heathrow has made sustainable growth one of its four business priorities. The sustainability issues that are most important to our stakeholders are included in Heathrow 2.0, our plan for sustainable growth⁵⁷. We developed the plan after listening to the views of local people, technical experts, NGO's, politicians, airline customers and consumers.

Heathrow 2.0 has four pillars; (i) a great place to work; (ii) a great place to live; (iii) a thriving sustainable economy, and; (iv) a world worth travelling. They reflect our local, national and global impact.

⁵⁷ See <https://www.heathrow.com/company/about-heathrow/heathrow-2-0-sustainability-strategy>

Each of the four pillars has specific, measurable targets, and we have made good progress in delivering them. We are very proud that this has been recognised by the prestigious Edie awards, which named Heathrow ‘Sustainable business of the year 2019’. Since we launched Heathrow 2.0 in 2017 the IPCC report has highlighted the need to act faster on carbon. For Heathrow’s own operations at the airport we will be carbon neutral from next year and in 2020 we will set out our plan to be net zero as soon as possible. Heathrow has committed to doing all we can to reach net zero flying by 2050. IAG, our largest airline customer, became the first airline in the world to commit to be net zero carbon by 2050.

Although sustainability is not an explicit part of CAA’s business plan criteria⁵⁸, the Civil Aviation Act (2012) does place a statutory duty on the CAA to give consideration to sustainability and environmental impacts⁵⁹, Heathrow therefore considers that there is also a legal basis for considering this agenda in the context of this Initial Business Plan.

2. Sustainability is a priority

The sustainability agenda has evolved rapidly since the start of Q6 with policy developments, regulation and public and consumer opinion shifting markedly. The pace of change continues to accelerate. Climate change has become a global priority. Health concerns from poor air quality are reshaping personal travel options and vehicle purchasing choices. There is a public backlash against waste and plastic pollution.

There are clear policy and consumer signals for all businesses to do more to address sustainability issues, and to act faster. Airports are a focal point for attention given the challenges of decarbonising the aviation industry and the diversity, scale and visibility of sustainability impacts linked to airport operations. Trend analysis⁶⁰ shows a sharp and sustained increase in NGO activity on ‘Aviation carbon emissions’ during 2019, underpinning the growing media coverage of aviation carbon emissions and sustainability more broadly.

Sustainability is already a key business priority for Heathrow. We have a successful track record of operating in a way that delivers the positive benefits of air travel whilst addressing the environmental and local community impacts. As a significant national infrastructure asset we need to look to the future and take a long-term view of risk. It is clear that current sustainability trends are here to stay and will only gather pace. There are growing demands for Heathrow to raise our level of ambition further. We believe the 2020s are the right time to accelerate action.

2.1 Consumers’ views

Sustainability is ultimately about delivering better outcomes for consumers. It underpins the consumer benefits from our IBP and is an enabler of growth with its broader consumer benefits like more consumer choice and competition. Consumers also have their own views directly on sustainability.

We have engaged with consumers on sustainability since 2015. Action on sustainability is demonstrably growing in importance to consumers. Stakeholder engagement was at the heart

⁵⁸ CAP1819 – Economic Regulation of capacity expansion at Heathrow airport: consultation on early costs and regulatory timetable - Appendix D – Business Plan Guidance

⁵⁹ <http://www.legislation.gov.uk/ukpga/2012/19/section/1/enacted> “the need to secure that each holder of a licence under this Chapter is able to take reasonable measures to reduce, control or mitigate the adverse environmental effects of the airport to which the licence relates, facilities used or intended to be used in connection with that airport (“associated facilities”) and aircraft using that airport”

⁶⁰ SIGWATCH – see <https://www.sigwatch.com/>

of the development of Heathrow 2.0 and we consulted a broad range of stakeholders to shape a plan that would successfully deliver sustainable growth. We formally consulted consumers for the first time on sustainability during that process. We included different consumer groups (frequent and infrequent flyers, business and leisure consumers) to understand their perspectives on sustainability, both generally and specifically relating to Heathrow. We tested the development of our 2.0 plan with them too.

In our subsequent engagement we have carried out several consumer insight studies looking at different aspects of our Heathrow 2.0 plan. There has been a strong emphasis on carbon. This is helping us to keep track of changes in consumer attitudes to sustainability, their needs and wants for Heathrow-led action, and ultimately reflect those insights in how we refine Heathrow 2.0 and our IBP. We have shared the research and findings with the Consumer Challenge Board (CCB), benefiting from independent scrutiny and using the feedback to support future insight work.

Five key insights emerged:

Consumers have a strong commitment to sustainability. This is a growing trend driven largely by greater awareness of a stronger environmental narrative in the media. This supports evidence from external consumer trend surveys which show sustainability is an increasingly important aspect of the consumer experience.

94% of Heathrow consumers say they care about the environment and express strong feelings that action should be taken. (2018)

97% of consumers said sustainability is important to them and 43% said their attitudes have changed in the past 12 months. (2019)

Although sustainability is seen as primarily 'environmentally' driven by consumers, particularly the protection and preservation of global resources, the non-environment elements of our Heathrow 2.0 plan are also important. Consumers support Heathrow investing in our people and contributing to the sustainability of local communities.

83% of consumers said that Heathrow is doing the right thing by setting flagship initiatives on apprenticeships and living wages.

Consumers expect Heathrow to 'do the right thing' and to take a lead on the big sustainability challenges by working in partnership with airlines and government. Sustainability is considered part of the service by consumers travelling through Heathrow and is 'expected' rather than a 'nice to have'.

Consumers expressed clear views on the priority areas for action with a focus on addressing climate change based on avoiding the use of fossil fuels, switching to renewable sources of energy and adopting the best technology, and using it. They specifically reference using solar power and clean aircraft fuel. Consumers also showed an openness to offsetting emissions from their flight if it was made easier for them to do.

Supporting sustainable travel by offering simple public transport options to Heathrow that are both easier and cheaper than driving was also considered important. Consumers recognise this cuts car journeys and reduces the local impacts on surrounding communities.

The conservation of resources and demonstrating ‘on the ground’ ways in which Heathrow is reducing, reusing and recycling plastics, energy and food waste was an overriding theme. Consumers encouraged Heathrow to offer schemes and options across the whole airport that passengers can easily take part in.

Key sustainability focus areas for consumers (based on first preferences)

Climate change - 39%

Sustainable public transport – 13%

Increasingly consumers also want to take responsibility themselves – our research shows that passengers are translating their strong feelings on environment and sustainability into personal action. We have considered how we can support this in our plan.

66% of consumers are making active efforts to limit their carbon emissions in some form and investing in low commitment actions such as recycling or reducing energy use and food waste.

Consumer insights continue to support Heathrow’s balanced approach to sustainability in Heathrow 2.0. This plan tackles the big environmental challenges whilst also addressing sustainability with respect to Heathrow’s colleagues and wider society, particularly local communities and offering consumers a way to act personally. We have also acknowledged consumers growing expectation for action by making sustainability a focus for H7.

2.2 Business case

An increasing focus and action on sustainability can’t come at any cost. It must be benefits led and affordable. Sustainability has a strong business case and is compatible with wider consumer interests. Although there will be a level of benefit realised from the outset of investment in sustainability measures, it must be recognised that many benefits are strategic in nature, becoming increasingly valuable over the longer term. The business case must be considered in this context.

As well as securing Heathrow’s licence to operate and grow, the wider benefits broadly fall into five key areas and include:

Cost efficiencies

Direct savings

Action to improve sustainability will deliver an improvement in cost efficiency over the medium to long term. Identifying and tackling inefficient use of resources generates direct financial savings. This has been demonstrated by the success of Heathrow’s Energy Demand Programme. In Q6, investment in energy efficiency projects has reduced the total electricity procured by Heathrow by almost 15%.

Avoided costs

The government already uses financial signals and direct taxation to incentivise sustainable change and support delivery of national policy objectives and targets. The Climate Change Levy, Landfill Tax and Carbon Emissions Trading are some of the costs that Heathrow currently pays. Heathrow expects these types of costs to grow as the UK increases action on

climate change to achieve net zero emissions and tackles other priority issues. Government policy will also affect market prices over the medium and long term. Adopting a proactive stance on delivering sustainable improvements at the right pace is the best way to mitigate the financial risks of changing policy.

Borrowing costs

The ability to raise affordable investment will increasingly be linked to companies' exposure to climate related financial risks. Demonstrating and taking credible action on addressing climate risks within the airport (infrastructure and operation) and aviation more broadly will be important for accessing capital and particularly the cheapest borrowing rates. Heathrow, like many companies, has committed to implement the recommendations of the Task Force for Climate Related Financial Disclosures (TCFD). In our 2019 Annual Report and Accounts we will begin to share with the investment community climate related risks that have the most material financial impact for Heathrow. We will maintain transparent disclosure on these risks in future years.

Cost efficient investment decisions

By adopting a forward looking approach to sustainability we are ensuring that we are making capital investment decisions that are fit for the future and aligned with future policy direction. This will minimise investment in long-life assets linked to fossil fuel use or less sustainable practices. Such assets risk becoming increasingly obsolete given the backdrop of decarbonisation and wider sustainability shifts in society.

Improved resilience

There is a natural focus on the action Heathrow must take to cut carbon emissions and contribute to avoiding the worst effects of climate change. However, there will also be some impacts from climate change on the airport itself. Risks assessed by Heathrow in response to a Department for Transport (DfT) requirement include an increasing frequency of severe weather events, higher temperatures and an increase in flood risk. Action on sustainability also considers changing environmental conditions and the resulting impacts on Heathrow's infrastructure and operations. It forms part of Heathrow's wider focus on resilience and the benefits this delivers. These investments form part of our capital and other plans.

Regulatory compliance

Heathrow is subject to a broad range of environmental regulations. We manage several activities regulated by environmental permits issued by the Environment Agency. We have built a good level of engagement with the Environment Agency in recent years based on our track record of investment in minimising environmental risks and impacts. An example is a £30m project in Q6 that has transformed the treatment capacity of the Eastern Catchment of the airport pollution control system, reducing the impact of winter operations on local rivers and watercourses and ensuring Heathrow is meeting compliance requirements.

As a designated airport the government has set a number of noise abatement procedures and monitoring requirements for Heathrow. Investing in the support systems to drive improvements in compliance with procedures and reduce noise impacts generally has been an ongoing feature of Heathrow's approach to noise management. For example, more recently this has been through extending the noise monitoring network, supporting innovative research to investigate how aircraft landing gear deployment could be monitored automatically or providing direct access to performance data for airlines via "PerformTrak".

Service and passenger experience

Consumers are increasingly demanding a more sustainable experience when they travel through Heathrow. They want more sustainable options available to them at different stages of their journey through the airport. They also want to see the sustainability impacts of the airport addressed on their behalf. The latest consumer trends and consumer feedback point to sustainability being an integral part of their overall experience. We have reflected this in our proposals for elements of the 'I feel cared for and supported' and 'I have an enjoyable experience at the airport' outcomes such as better recycling, electric passenger bussing, increased electric vehicle charging points and flight offset options.

Attracting and retaining talent

Sustainability is increasingly a factor considered by prospective colleagues when looking for jobs. For example, a survey by Swytch in February 2019 found that nearly 40% of millennials have chosen a job because of the company's sustainability approach. Investing in our people and creating rewarding careers and not just jobs allows Heathrow to attract and retain good people and maintaining their skills and motivation is essential for delivering excellent consumer experience.

3. Leading sustainable growth

3.1 Heathrow 2.0

We launched Heathrow 2.0, our sustainability plan, in 2017, to help inspire and enable a positive future for the aviation sector. It sets out how we will improve life for colleagues and communities, contribute to a thriving economy, and help to tackle global challenges including climate change.

The plan covers our own business as well as the role we will play in driving change across the wider industry and shows how we aim to go beyond mitigation and deliver positive impacts that enable us and those around us to thrive.

It includes ambitious goals and targets for how we will address the negative impacts of our business and forms the basis for securing and delivering sustainable growth. We developed the plan based on engagement with all Heathrow's stakeholders including consumers and airlines.

The plan was approved by the Heathrow Sustainability Partnership, with representatives of the largest companies across the supply chain at Heathrow and by Heathrow's Board.

The launch of the plan was positively received, and it is considered the leading global airport sustainability strategy. We continue to refine and develop it to keep pace with the evolving policy and public position and feedback from our stakeholders.

It sets the tone and direction for sustainability at Heathrow and has helped shape the IBP. It forms the basis for delivering sustainability in the plan.

3.2 Our flagship goals

Heathrow 2.0 focuses on the most material issues for Heathrow. It is built around 4 pillars which represent the sustainability outcomes our stakeholders want to see. Each pillar is supported by a series of objectives, goals, targets and indicators which form a comprehensive detailed plan over the short to medium and longer term. A summary of the plan and the key elements has been included in the table below.

Our 10 flagship goals are some of the key targets and aspirations in Heathrow 2.0. They include goals from each of our four pillars and represent focus areas where we are seeking to have a significant positive impact. Some flagship goals cover Heathrow activities which we control. In other cases, they also reflect Team Heathrow activities, where we are working with our business partners who operate at Heathrow to deliver sustainable change.

Airlines face the same policy challenges and consumer pressure on climate change and other sustainability issues as Heathrow, so Heathrow 2.0 and our overall approach is based on collaboration. It supports airlines' efforts to decarbonise by providing zero carbon infrastructure to base their operations, charge vehicles and power aircraft on the ground. Likewise, we are seeking to support the uptake of sustainable aviation fuels. We will also take direct action where we can, in conjunction with airlines, to support carbon emissions reductions from flights.

Pillar 1: A great place to work

We believe the places we work should provide people with opportunities and, at Heathrow, that starts with the work itself. We want everyone who works here to feel they can be happy, motivated and developed in ways which encourage them to flourish. We want every individual to know they have the right to put their own safety, and the safety of all those around them, before anything else. And we want our people to understand that they can shape our future too. For us to create a true culture of sustainability, we must do it together. Everyone at Heathrow needs to live and breathe Heathrow 2.0.

Objective 1: Safe and well

We want everyone working at or visiting Heathrow to go home safe and well. That starts with having the right processes in place to manage safety risks. Just as important though is creating a culture where colleagues feel empowered to put safety first and to prioritise the mental and physical wellbeing of everyone at the airport.

Objective 2: Careers, Not Just Jobs

At Heathrow we talk about careers, not jobs. Every role should offer a sense of purpose and progress, with opportunities for our colleagues to develop and grow. We'll need tens of thousands of people with the right skills to help us expand Heathrow. So we've made big commitments to increase our investment in skills, training and work experience.

Flagship goals

- 10,000 apprenticeships by 2030 to help people develop skilled and sustainable careers
- Reflect local diversity at every level by 2025 so that we can become a truly great place to work whilst helping local people find careers that can fulfil their potential

Objective 3: Culture of Sustainability

We want to embed sustainability into our culture at Heathrow, so all our colleagues know they have a part to play in shaping our future. That philosophy is at the core of a joined-up programme to attract and retain the best talent, develop our leaders and give every colleague the ability to help deliver our sustainability goals.

Pillar 2: A great place to live

Being a responsible neighbour means making sure that we are taking steps to improve quality of life for those living near Heathrow. We want to benefit our local community, not detract from it, and that can only happen if we take the time to listen to the people around us. We know noise impacts lives in many ways, so we're collaborating with airlines and researchers to reduce its negative effects. We know the main cause of local air pollution is road vehicles, so we're cutting road emissions from airport related traffic in and around the airport. Above all, we're building stronger relationships with our communities. Because only by better understanding their needs can we help them to thrive.

Objective 4: Respite for Residents

Noise from aircraft has an impact on the lives of people living near to Heathrow. We've been working for many years to reduce noise disturbance including by incentivising the use of quieter aircraft and reducing flights at night. Noise levels have fallen but there is still more we can and will do.

Flagship goals

- As part of our voluntary Quiet Night Charter, by 2022 we will seek to at least halve the number of flights on non-disrupted days which operate late after 11.30pm

Objective 5: Quality Air, Locally

We're committed to reducing our effect on air quality around Heathrow so our local communities can breathe clean air. Our Emissions Strategy and Action Plan sets out how we will reduce harmful emissions by improving efficiency and minimising fuel use; employing the latest technologies; and using our size and scale to encourage others to act.

Flagship goals

- Airside ultra-low emissions zone by 2025 to improve quality of life through cleaner air
- 50% airport passenger journeys made by public transport by 2030, supporting no more airport-related cars on the road, so local areas can thrive without increased congestion and halve colleague car trips

Objective 6: Sustainable Communities

We aim to have a positive impact on the communities around Heathrow, collaborating with local people and partners on projects that make their areas even better places to live. Whether it's enhancing green spaces, investing in skills or supporting local community group, we aim to support the wellbeing and economic prosperity of our neighbours. We report on our progress regularly through our Better Neighbour Report.

Pillar 3: A thriving sustainable economy

More than 400 businesses operate from or supply goods and services to Heathrow, but our influence stretches far beyond our boundary. As the UK's hub airport, we have a critical role to play in the national economy – both today and in the future. To us, that means enabling UK businesses big and small to take advantage of an ever-growing range of global opportunities; especially innovative, forward-looking businesses that provide sustainability benefits for all.

And it means rewarding our colleagues fairly for all the work they do to help us achieve our shared objectives.

We want to use our influence to drive change that is ethical, low carbon and sustainable. Change that creates a prosperous future for this and every generation

Objective 7: Connecting the UK

Heathrow is the UK's hub airport, used by international passengers connecting to other destinations around the world. We want to make it easy for passengers to complete their journeys via Heathrow and to increase the economic benefits the airport brings across the UK. We have a target for the airport to be connected to the UK's 100 largest towns and cities by 2033 and we reached 60 in 2018. We encourage lower carbon options such as rail and coach transfers and we also connect to seven UK cities by air.

Flagship goals

- Largest 100 towns and cities connected to Heathrow by 2033 to create opportunities all over the country and deliver a stronger UK

Objective 8: The Next Economy

Small and medium sized businesses (SMEs) and social enterprises (SEs) play an important role in the UK economy as job creators and sources of innovation. Through Heathrow 2.0 we aim to support SMEs across the UK, helping them to join our supply chain and offering opportunities for them to showcase their products to Heathrow passengers.

Objective 9: Sustainable Supply Chain

With more than 900 companies operating from or supplying goods and services to Heathrow, our influence stretches far beyond our boundary. We want to use that influence to encourage others to adopt ethical, low carbon and sustainable practices.

Flagship goals

- All our direct supply chain colleagues working at Heathrow will be transitioned to be paid the London Living Wage by the end of 2020 and we will encourage commercial partners and our supply chain to work towards the London Living Wage, while continuing to give affordable service to our customers

Pillar 4: A world worth travelling

Travelling through our amazing world is one of life's great joys. But if we want subsequent generations to share in the fullness of that joy, we must do more to protect our unique planet. Whether it's through developing zero carbon infrastructure, taking the best possible care of everyone and everything that passes through our gates or uncovering innovative new ideas, as a major international airport, we at Heathrow have an extraordinary opportunity to lead a more sustainable future for air travel.

Objective 10: Zero Carbon Airport

Our goal is for Heathrow to be a zero carbon, resource efficient airport with zero waste. To get there, we're integrating efficiency into the way we design and run our buildings and infrastructure. We're also trialling new technologies and innovative approaches that can help us cut down on the energy and water we use, reduce waste and increase recycling.

Flagship goals

- We will be a carbon neutral airport by 2020. This will be measured by achieving level 3+ carbon neutrality within the Airports Carbon Accreditation Scheme. This will require us to offset all the residual scope 1 and 2 Heathrow carbon emissions

Objective 11: Accelerating the Era of Sustainable Flight

We want to play our part in transforming and decarbonising the aviation industry, helping to speed up the rate of change. A key priority is to make sure that the expansion of Heathrow does not result in a net increase in carbon emissions. That means reducing emissions as much as possible and offsetting any growth in emissions through the purchase of high-quality carbon credits. We published our roadmap for carbon neutral growth in 2018 showing how we will do this. It focuses on four areas where we can use our scale and convening power to influence change. We have already made progress but now we will go further.

Flagship goals:

- An aspiration to make growth from our new runway carbon neutral so that we can protect the planet for future generations to discover and enjoy
- Establish the Heathrow Centre of Excellence for sustainability at airports and in the wider aviation sector and trial 25 sustainable innovations by 2025

Objective 12: Responsible Gateway

We're collaborating with partners across Heathrow and beyond to tackle pressing issues such as slavery, human trafficking and poaching of endangered species.

Figure 1: A summary of Heathrow 2.0 pillars, objectives and the flagship goals

Heathrow is already delivering against our commitments however there is much more to do. Some of the key 2018 achievements are set out below.



Figure 2: Heathrow 2.0 2018 achievements

3.3 Heathrow 2.0 delivery options

We will deliver the Heathrow 2.0 plan by using a variety of different mechanisms. A significant amount can be achieved by changing processes, collaborating with partners and suppliers, incentivising positive behavioural change through non-financial means or setting non-aeronautical charges in a way that promotes more sustainable outcomes.

There are also more creative measures that can be used. For example an access charge, the community compensation model as required by the Airports National Policy Statement (ANPS) to fund local community improvements as the airport grows, or revenue generating business models such as segregation and sorting waste streams to maximise the sale of material that has a commercial value.

We can also bring new ideas and innovation to the airport from outside that deliver sustainable change or generates solutions. It is for this reason that Heathrow established the Centre of Excellence for Sustainability to collaborate with academia, business and our own colleagues to identify innovative solutions to key challenges.

Part of the solution must also include capital funding where investment to improve infrastructure is necessary. Capital investment is considered where there is no credible alternative to delivering the level of improvement needed and it is appropriate to do so.

The capital investment required to deliver Heathrow 2.0 in the H7 period has been built into our business plan and is linked to delivering several of our Heathrow 2.0 flagship goals, specifically tackling carbon emissions, insulating homes from aircraft noise and increasing sustainable travel options. Likewise, we have significant investment in our Expansion portfolio linked to sustainability. Chief among them are noise mitigation packages, property compensation and rail investments.

Even with a focus on capital efficiency it is important to recognise that sustainability costs will always make up a larger proportion of the plan by comparison with Heathrow's competitor hub airports when assessed on a like-for-like basis. As a wholly privately-owned airport in the UK Heathrow must fully fund its sustainability investment obligations through aeronautical charges. Hubs however benefit from other funding models including direct taxation. As an example, Paris' airports fund noise insulation using a noise pollution tax separate from the

airport charge. Similarly, Amsterdam and Frankfurt airports are partly funded by separate noise levies and regional funds. Care therefore needs to be taken when comparing airport charges across countries.

3.4 Sustainability investment in H7

We have invested an estimated £150m in capital investment during the 5 years of Q6. This will increase to an estimated £534m in the 2019 to 2021 period to deliver a range of projects that deliver sustainable improvement as a primary benefit. These comprise significant investments in safety, noise monitoring, surface access connections, electric vehicle charging and pre-conditioned air for aircraft, energy and water efficiency upgrades, renewable energy generation, waste management improvements and water quality compliance.

In H7 we will build on this and we will invest in the next phase of delivering our Heathrow 2.0 plan that will confront the big sustainability challenges highlighted in this chapter. The four priority investment areas in H7 are:

Tackling carbon

Climate change is one of the world's greatest challenges and constitutes an existential threat for the whole aviation industry. Since May 2019 the political and public landscape has evolved rapidly. The Government has formally set a target for net-zero emissions by 2050. Heathrow was one of the large businesses that wrote to the government urging it to set this commitment. In June, parliament declared a "climate change emergency" and the UN Secretary General held a special one day climate action summit in September attended by Heathrow's CEO. The focus on net zero and aviation's carbon emissions has increased and a failure to address this could lead to a combination of new growth limits, new taxes or demand reduction interventions to cut flying.

The forecasted impacts that climate change could have on aviation are substantial. These include both physical (e.g. increased flooding, turbulence, limits to maximum payload, etc.) and transitional risks (e.g. higher carbon prices and decreased passenger demand, higher carbon prices, etc). Detailed quantitative analyses for all projected climate risks are being carried out in line with recommendations from the Taskforce for Climate Related Financial Disclosure and will inform future financial reporting.

Aviation is one of the more prominent and difficult to address sources of emissions. Aviation emissions are growing as demand to fly grows – with global passenger kilometres having more than quadrupled since 1990 and passenger numbers predicted to more than double from now to 2038 under current trends. While aviation is currently only around 3% of global CO2 emissions, as other sources reduce, aviation could come to be as much as c.30% of worldwide emissions.

Heathrow's aviation emissions – that is the total emissions linked to flights and other activities through Heathrow – are 20.8 Mt CO2 today. 95% of this total is emitted by aircraft engines in the air. Airport operations, including energy use in buildings and all operational vehicles, generates 0.09 Mt CO2.

Airport infrastructure emissions

While the vast majority of aviation emissions from Heathrow come from flights, our ability to decarbonise on-airport infrastructure is an important aspect of our contribution to a net zero target for the whole of the economy. We've been making good progress in decarbonising the airport. Emissions have reduced by over 90% since 1990 as we have invested in energy

efficiency and bought fully renewable electricity. We are committed to zero carbon infrastructure by 2050. In 2020 we will set out our plan to be net zero as soon as possible.

Planned investment is part of a wider strategy linked to Heathrow 2.0 that will shift Heathrow to zero carbon efficiently and credibly, and provide the enabling infrastructure and support required by airlines, other airport partners and passengers to cut their own carbon emissions. This is a long-term programme. In H7 the investment is directed at the following areas:

- Continued investment in improving the energy efficiency of Heathrow's buildings and infrastructure to minimise energy consumption.
- Continued electrification of airport energy networks to enable the supply of zero carbon energy and reduce on-site combustion of fossil fuels.
- Continued electrification of Heathrow's operational vehicles and provision of charging infrastructure at a pace that supports the needs of Heathrow, airlines and our partners and responds to the expected growth of electric vehicles use by passengers.
- Increased on-airport renewable energy generation capacity by increasing the coverage of photovoltaic solar panels to generate more of our own renewable power, responding both to the UK's renewable generation challenge and making savings from a localised renewable supply.
- Developing a heat exchange system, which can reuse heat from buildings in summer and stores it to provide heating in winter. This would provide a low energy alternative to traditional heating and cooling systems. It would also eliminate the last major source of gross carbon emissions in running the airport.

This supports Heathrow 2.0 objectives 5 and 10 which cover the phasing out of fossil fuels to eliminate the carbon associated with running the airport, and improving local air quality.

Aircraft emissions

Given that the vast majority of carbon associated with Heathrow comes from aircraft and flights, it is also critical that we continue to support and encourage airlines and the wider aviation industry on the big solutions required to cut carbon from flying in our plan. On the ground, our H7 investment includes improving the availability of effective pre-conditioned air to cut carbon emissions from aircraft on the ground and reduce air quality impacts.

To tackle emissions in the air, our focus is on Sustainable Aviation Fuel (SAF) and offsetting. This aligns with airlines' direction of travel toward decarbonisation; for example, IAG's commitment to net zero emissions by 2050 and actions including a \$400m investment in SAF and offsetting all domestic flights from 2020.

The single largest opportunity now is to move from fossil fuels to SAF. We are working closely with airlines, manufacturers and other airports to implement a roadmap for SAF across the UK. We are developing plans to deliver the infrastructure and incentives that will be needed to support the development and uptake of sustainable fuels by airlines based on steps that are within Heathrow's control.

Currently production of SAF is subscale and costs are too high, so we have ways this that could be delivered in collaboration with airlines and governments. These include prioritising biofuels for aviation, promoting appropriate SAF mandates and certification, policies to stimulate SAF production and incentives for SAF to narrow the cost gap to fossil kerosene. Heathrow is already incentivising new technology through its landing charges by offering a year of free charges for the first electric or hybrid flight from the airport.

Offsetting will play an important transitional role. We expect that airlines will increasingly encourage passengers to offset their flights. There may even be a role for government to encourage offsetting for example through opt out schemes to deliver offsetting at scale.

Heathrow will continue to explore the significant opportunities to promote voluntary passenger offsetting to passengers who have not used an airline scheme and scale up investment in nature-based carbon removal in the UK, including peatland, forest, soil or ocean-based projects. Consumer surveys consistently show the vast majority of passengers would consider offsetting but actual uptake remains limited. Heathrow's research shows trust and awareness are two key considerations to unlocking greater potential passenger offsetting as well as making it easy and convenient to do. This is an important way to allow consumers to act as well.

These steps all support Heathrow 2.0 objective 11 which focuses on Heathrow's role in tackling carbon flights.

Minimising aircraft noise

Aircraft noise is the biggest single issue for local communities. The 'noise footprint' of the airport is smaller than it has even been, thanks to significant investment by airlines in new, quieter aircraft. However, there will be new communities impacted by aircraft noise.

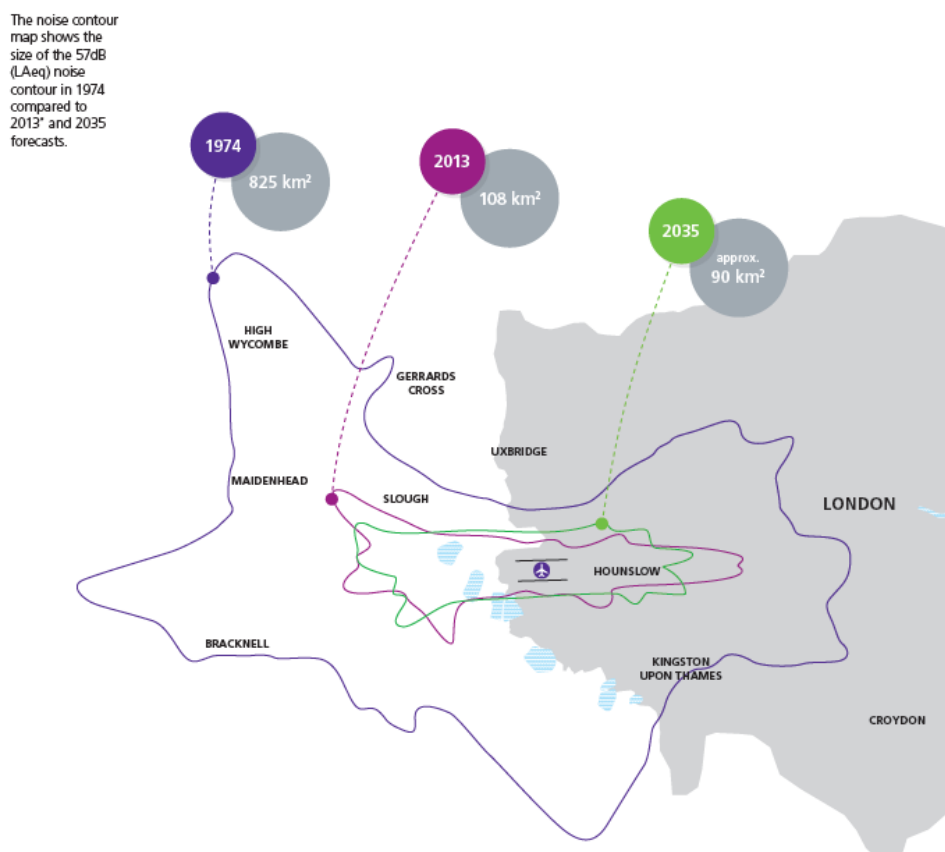


Figure 3: Noise contour map for Heathrow (Heathrow Airport Expansion Consultation)

Through progressive consultation with local communities over the last five years we have developed a package of measures to ensure that fewer people will be impacted by aircraft noise than today. The new runway has been located to the north and west of the current airport to keep planes flying higher over London. We are also changing operating procedures to

minimise noise, for example, by moving the landing point and changing the angle of descent. Every community close to the airport will have respite from noise through runway alternation. Changes to airspace design may allow noise to be allocated more fairly and to have more predictable respite. We propose extending the period at night without scheduled flights from the voluntary 5 hours today to a 6.5 hour ban when the new runway opens.

Future growth at Heathrow will deliver significant benefits to passengers. However, it is important that expansion is not at the expense of local communities. This will require an appropriate level of investment proportional to the scale of impact. Our approach to noise management has been developed through public consultation and engagement and is in line with government policy. It aims to avoid, mitigate, minimise and where possible, contribute to improvements in health and quality of life from noise effects from construction, road and rail traffic, and aircraft. As part of the mitigation and compensation programme, Heathrow plans to offer both residential and community building based noise insulation and relocation assistance schemes for eligible properties that will be most affected by noise during the construction and operation of an expanded airport, prioritising the most impacted homes.

The development of Heathrow's noise management plans will also require continued investment in research to better understand the impacts of aviation on local communities, to support monitoring and access to information for both community and industry stakeholders.

These initiatives support Heathrow 2.0 objective 4 which covers Heathrow's commitments on aircraft noise.

Increasing sustainable travel options

Our commitment in the ANPS is to have no increase in Heathrow related traffic, even with Heathrow expansion. This is to improve air quality and reduce traffic congestion. Surface access improvements will increase sustainable travel options for airport colleagues and passengers. Planned investment is linked to Heathrow's surface access strategy. Further information about how our strategy has been developed is included in our surface access annex. Some of our key surface access delivery priorities for H7 are:

- Putting Heathrow at the heart of the rail network by maximising the impact from the new Elizabeth Line.
- Working with others to support new rail connections including Western Rail Access and a new direct to Heathrow connection from the south.
- Introducing a landside ultra-low emissions zone from 2022 to encourage use of low emission options, followed by a vehicle access charge.
- Supporting improvements to bus and coach services, including introducing new routes for passengers and colleagues
- Scaling up of electric vehicle infrastructure
- Introduction of additional colleague travel incentives and reducing colleague parking
- Developing new and improved active travel infrastructure, such as cycle paths
- Introducing taxi and private hire backfill schemes
- Constructing of a freight vehicle call forward facility

This supports Heathrow 2.0 objectives 5 and 7 which collectively cover Heathrow's commitments to improving the sustainability of travel to and from the airport.

Community Fund

The National Policy Statement called for £50m per year Community Compensation fund to be set up for 15 years. We have assumed that this will be a separate levy on passengers. We

look forward to hearing views on how this should be raised, administered and used most efficiently.

4. Responding to a new context in H7

We have a solid plan that responds to political and stakeholder priorities by addressing the big sustainability issues. It ensures Heathrow has infrastructure and processes that are fit for the future and delivers consumer expectations for more sustainable journeys. Sustainability is a key theme which runs throughout our IBP with an acknowledgement that addressing airport impacts is a foundation on which the benefits of the overall plan depend.

It is important that the theme of sustainability should be adequately supported by the CAA, as is the case in other regulatory sectors. This aligns with its secondary duty to support us mitigating on impacts on the environment. Ofwat for example, has long recognised that sustainability is vital to the long-term future of the water industry and delivering a good outcome for consumers. It has built accountability for delivering better environmental and social outcomes into the business planning process alongside the interests of consumers. The CAA should adopt a similar approach based on learning from other sectors and consider sustainability more formally in the business plan criteria, sustainability outcomes should be a key success measure. In doing so the following principles are of crucial importance and should be considered and addressed by the CAA.

4.1 Intangible value

Although it is becoming possible to monetise intangible benefits and impacts often linked to sustainability, it is still difficult to quantify these using traditional financial appraisal. This can often undermine progress on sustainability. The CAA should ensure that the development and execution of the H7 plan does not discriminate against investment in strategic initiatives with intangible benefits that are in the consumer interest.

We have been working with leading UK businesses and the accountancy industry through the Prince of Wales Accounting for Sustainability Project to set the standards for valuing intangible benefits in monetary terms. Much of this work builds on knowledge developed by companies in other regulated industries such as water and energy. As we increase our capability, Heathrow will increasingly build the costs and benefits of environmental and social impacts into business cases to support balanced decision-making. This will highlight wider opportunities and risks, deliver better outcomes and greater value.

4.2 Taking a longer-term view

Sustainability requires a longer-term strategic view of risks and benefits. When considered over the long-term, sustainability driven initiatives like renewable energy generation will deliver an increasing benefit for passengers. It will reduce energy costs by insulating Heathrow from rising energy prices, increase the diversity of the airport energy supply and cut airport carbon emissions. This is an example of one of many long-term sustainability related risks that need to be considered within the plan. Our work in this area and knowledge continues to grow helped by our work on implementing Task Force on Climate-related Financial Disclosures recommendations for disclosing carbon related financial risks and broadening this approach to consider the longer-term risks of other sustainability issues.

We will develop an increasing number of sustainability focused business cases in H7 and we encourage the CAA to ensure that long term strategic priorities like sustainability are supported where there is a demonstrable benefit to passengers.

Heathrow calls on the CAA to recognise the importance of sustainability in H7 and to formally recognise and support the inclusion of sustainability as an objective, aligned to Heathrow's work in this area, its own statutory duties and best practice in other regulatory sectors.

5 – RESILIENCE

Overview

- Resilience of the airport operation and related infrastructure is hugely important to consumers and indeed airlines and others
- We will build on the step change in operational resilience during Q6 from 2022, continuing to standardise, systemise and integrate under a single control centre
- Heathrow expansion will allow us to deliver a more resilient airport by creating headroom in our capacity and more alternative infrastructure over time
- We will ensure that there is no impact on resilience during intensive construction
- We can deliver early growth ahead of runway opening while maintaining resilience

1. Introduction

Since the snow crisis of 2010, we have taken responsibility for the end to end passenger journey at Heathrow. We have worked with Team Heathrow partners to create a complete view of airport operations in our Airport Operations Centre (APOC). We have standardised processes and systems to increase resilience. This has also reduced operating costs and improved efficiency and service. The number of “Gold” incidents has fallen significantly, and we were the only airport in Europe to remain open through a week of snow in early 2018.

In this chapter we set out our plans for a resilient Heathrow in the period 2022 to 2036. We provide details of our insights on the importance of resilience to consumers. We set out our integrated approach to resilience at Heathrow, delivered through working with colleagues across Team Heathrow, including key activities. We discuss our priorities for H7, building on our learning from Q6 and highlight the emerging challenges. We detail the opportunity for increased resilience created by Heathrow Expansion and built into our plans. We highlight our approach to ensuring that our resilience is not negatively impacted ahead of the opening of Heathrow’s third runway.

2. The importance of a resilient airport

2.1 For the wider UK

As the UK’s hub airport, we have a responsibility for ensuring over 80 million consumers travel safely through Heathrow each year. As the UK’s biggest port by value we are also a critical link for many UK and international businesses. Our scale of operation means that if a significant incident is to occur, it has the potential to cause a ripple effect of disruption across the UK and beyond. This is why UK airports are classed as Critical National Infrastructure by the Centre for the Protection of National Infrastructure (CPNI).

2.2 For consumer outcomes

Consumers believe ‘resilience’ is the ability to withstand something negative. They view it as the ability to bounce back, the speed of recovery and the strength of someone or something. Therefore, two key components of resilience are about our ability to avoid incidents happening and our ability to rapidly return to normal operations when things have gone wrong. For example, a key challenge remains as to how we keep operating through inclement weather and withstand flight restrictions imposed by Eurocontrol due to crowding in their skies.

Resilience is hugely important to consumers. Knowing that they can travel safely and securely through the airport, and that their airline will depart and arrive on schedule is fundamental. Disruption and delay, whatever the cause, badly affects consumers' perception of their end-to-end journey, from causing inconvenience to preventing their journey happening altogether. Our insights tell us that disruption has the greatest impact on air travel satisfaction levels. If a consumer experiences disruption, overall satisfaction falls from 87% to 69%, while dissatisfaction also increases significantly from 4% to 18%⁶¹. If consumers are impacted by disruption and their flight does not depart on time, they expect the whole airport community to work together to provide them with the following⁶²:

- **Communication** – which needs to be prompt (as soon as airline/airport knows there is an issue) then communications need to be updated regularly;
- **Clarity** – communication should clearly state what the issue is, what the impact is and what is happening to fix the issue
- **Calm** – keep people calm – both “me” and other people; the effect of the behaviour of other people was a key factor in the overall experience for some people who were unnerved or even scared by other consumers getting angry
- **Control** – people want to feel as much in control of their journey as possible, the key way of doing this is to keep them informed
- **Comfort** – provide comfort for disrupted consumers. This covers seating and facilities such as toilets or restaurants. During disruption more types of consumers need special care; connecting passengers, young people and those who don't speak English, in addition to families and passengers with reduced mobility.

Resilience links most directly with four of our consumer outcomes;

I have a predictable and reliable journey

For consumers' travel on direct point-to-point flights, our consumer research tells us that anxiety levels are particularly heightened about getting to the airport on time *“I'm an anxious traveller...I'm worrying already about my trip next week. Getting to the airport and going through the airport really is the worst part about travel”*⁶³ and once at the airport then getting through security search *“The airport isn't something you think you will enjoy but they have been getting much better: shorter security queues, It makes all the difference”*⁶⁴

⁶¹ Civil Aviation Authority, *UK Aviation Consumer Survey*, June 2017

⁶² Populus, *Resilience Qualitative Research*, October 2019

⁶³ Populus, *Resilience Qualitative Research*, October 2019

⁶⁴ Truth Consulting, *Heathrow DNA Programme Research*, 2017

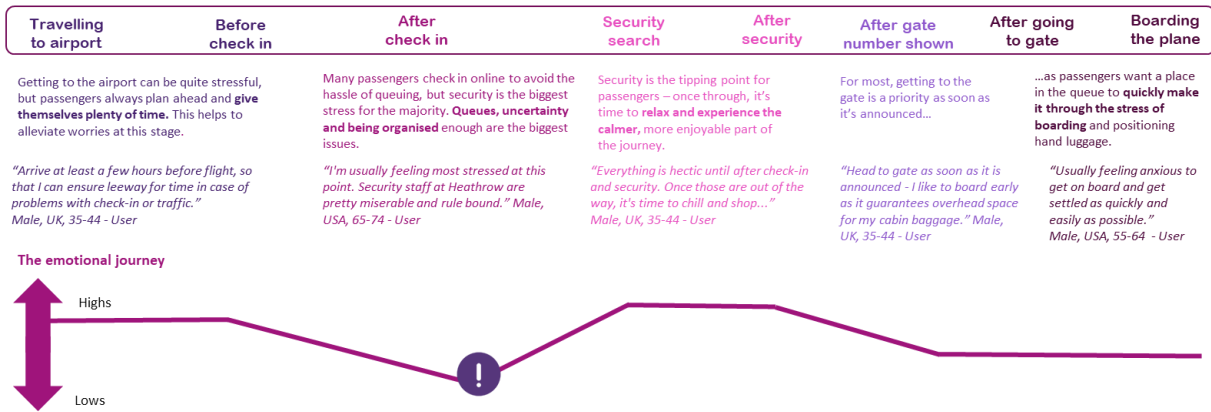


Figure 27: Customer Emotional Journeys⁶⁵

Connecting passengers are most concerned about wayfinding, the time taken to transfer and the speed of security search and immigration "I am always really worried about not knowing which gate to go to or how to get there and not understanding how the security system in this airport works"⁶⁶



Figure 28: Connecting Passengers Key Drivers Satisfaction

Arriving passengers want to ensure that their flight arrives on time, that they can get their belongings and onto their onward journey as quickly as possible. "All you want to do is get out and into taxi to get you home so you can have a nice cup of tea and a hot shower."⁶⁷

I can get to and from the airport

⁶⁵ Future Journey Mapping, 2018

⁶⁶ Truth Consulting, *Heathrow DNA Programme Research*, 2017

⁶⁷ Join the Dots, *Horizon Arrivals Report*, September 2018

Time is critical for consumers travelling to or from the airport. They either have a flight to catch or want to get to their destination as quickly as possible. Consumers' perception of speed is important when they are making choices between modes. Consumers' need to trust that a surface access option will deliver for them and know that there are different options available. *"Easy access. It's the biggest one for me, if I can't get there easily it becomes a big event [I'm worried about] getting there on time."*

I feel cared for and supported

A key priority for consumers in the event of disruption is to be informed promptly and effectively. Without adequate information, consumers could feel 'in limbo', and unable to relax, prepare themselves for their flight or do anything productive during the wait period. *"The most important thing is that you just tell us what's going on. There's nothing worse than 'the unknown'...once we know the situation, we're then able to make a decision on what to do next."*⁶⁸

Neither do consumers differentiate between the responsibilities of airports and their partners. They care about the issue being addressed and rectified *"As long as I get an answer, it doesn't really matter who is at fault. When you're in the middle of your trip, you don't have time to care...you just want to get to your destination."*⁶⁹

The feeling of being looked after is something that can be memorable for consumers, bringing actively positive impressions of an airport, and potentially feeding into airport preference and choice. Cared for needs are accentuated particularly in unexpected or crisis situations where additional stress is experienced. At present, just under half (47%) of consumers interviewed by the CAA agree that they are confident they will be treated fairly when things go wrong, meaning more can be done in this area.⁷⁰

I feel comfortable and secure at the airport

If a consumer is impacted by disruption, then they expect to be kept safe and comfortable while they wait to continue their journey. It is important that the airport community work together to meet both passengers physical and emotional needs at these times. *"If they could improve their seating that would be awesome! Leg rests! Foot rests! You've been in a plane travelling in Economy for six or seven hours and then you get to an airport and you are in the same sitting position – it's really tiring", "What I would expect is that the toilets would function, and that there would be the basics to eat and drink."*⁷¹

2.3 For airline operations

For airlines, operating to schedule is of critical importance. Any disruption to the schedule, due to events such as weather at Heathrow or at other UK or international airports, can impact punctuality, service and profitability. This is particularly the case for airlines operating complex network and long-haul operations. Heathrow operating to schedule every single day, regardless of the circumstances, matters to our airline customers. Our resilience qualitative research also provides evidence of the importance of resilience *"To me, resilience is the ability to deliver as much of the normal schedule every single day as possible, regardless of the circumstances that you're operating within."*⁷²

⁶⁸ Populus, *Resilience Qualitative Research*, October 2019

⁶⁹ Populus, *Resilience Qualitative Research*, October 2019

⁷⁰ Civil Aviation Authority, *UK Aviation Consumer Survey*, June 2019

⁷¹ Caroline Thompson, *Passenger Welfare Report*, 2011

⁷² Populus, *Resilience Qualitative Research*, October 2019

Airlines and our wider Team Heathrow partners want Heathrow to focus on improving resilience every day under existing conditions, across all the key stages of the journey (e.g. getting to the airport, security, immigration). They also want us to plan for avoid and respond to disruption events. They want us to work together on communication improvements, ensuring accurate information and relevant solutions. An example of where better coordination could reduce cancellations and help aircraft depart on schedule is if ground handlers shared de-icing resources. Another example is our own learning, over the summer, of resilience in facing potential industrial action. This is leading us to further changes to better protect the business, for example in our security function.

The critical importance to airlines of operational resilience has been communicated strongly in their Airport Expansion Consultation feedback. In collaboration with airlines we have developed requirements that will inform the design for expansion to builds in a greater focus on resilience.

We collaborate with airlines, handlers, Border Force, emergency services and other Team Heathrow colleagues to avoid, reduce and recover from any disruption to passengers. When disruption does happen colleagues from right across Team Heathrow are the first responders in helping passengers and stakeholders alike.

3. Our approach to resilience in Q6

3.1 Our Q6 resilience strategy

Our Operational Resilience Plan outlines Heathrow’s current overall approach to managing resilience. First launched in 2014, it outlines our responsibilities and details the systems, procedures and roles and responsibilities for preventing, mitigating, preparing, responding and recovering from disruption. Significant Q6 resilience challenges are outlined in Table 1.

Table 13: Summary of Q6 Resilience

Q6 resilience challenge	What we’ve achieved
To strengthen our response to events impacting the operation we needed a more joined up approach to resilience in Q6.	We centralised our terminal control centres into one Airport Operations Control Centre which opened in November 2014.
To reduce the impact of disruption on passengers and airlines we need to respond quickly, provide up to date information and have the mechanisms in place to continue to learn and improve.	We introduced an Operational Resilience Plan in 2014. We established a command and control structure, modelled on the approach used by the emergency services.
With the constraint on Heathrow’s capacity we need to build resilience into our infrastructure so that we can recover quickly and mitigate risks to the day to day operation.	We improved the resilience of our infrastructure through a programme of investment of £1.75bn in projects such as Sierra A and C taxiways, reconfiguration of stands and widening of aprons to accommodate the new generation of wide body aircraft.

<p>Passengers expect to travel with their bags and the repatriation of lost bags can be a significant cost for airlines. We need to ensure we have resilient baggage infrastructure and recovery facilities in place when things go wrong.</p>	<p>We invested £674m in our baggage systems to support resilience.</p> <p>The baggage 'not loaded rate' fell from 19 in every 1000 in 2014 to 12 in 2018.</p>
<p>We need to sustain our punctuality performance so that passengers depart and arrive on time and airlines are able to efficiently manage their operations.</p>	<p>Maintaining on-time departures punctuality at 78% in Q6 where other European airports have seen a decline.</p>
<p>We must be able to respond to financial and information security risks that could impact our operations, our information, and our organisational resilience.</p>	<p>Strengthening our Data Centre Network and investment in Next Generation Firewall infrastructure to mitigate the risk of cyber security threats.</p>

Heathrow takes a holistic approach to resilience. The model we use is aligned to industry best practice. It covers five continuous sequential stages: Prevent, Mitigate, Prepare, Respond and Recover. Our day-to-day operation is built to ensure that we are not only equipped to deal with every eventuality, but that we also minimise the risk of disruption occurring in the first place. In recent years Heathrow has seen disruption or the threat of disruption for reasons including, but not limited to, critical asset failures, higher than expected demand, industrial relations, civil protests, adverse weather and security issues.



Figure 29: Heathrow's overall approach to managing resilience

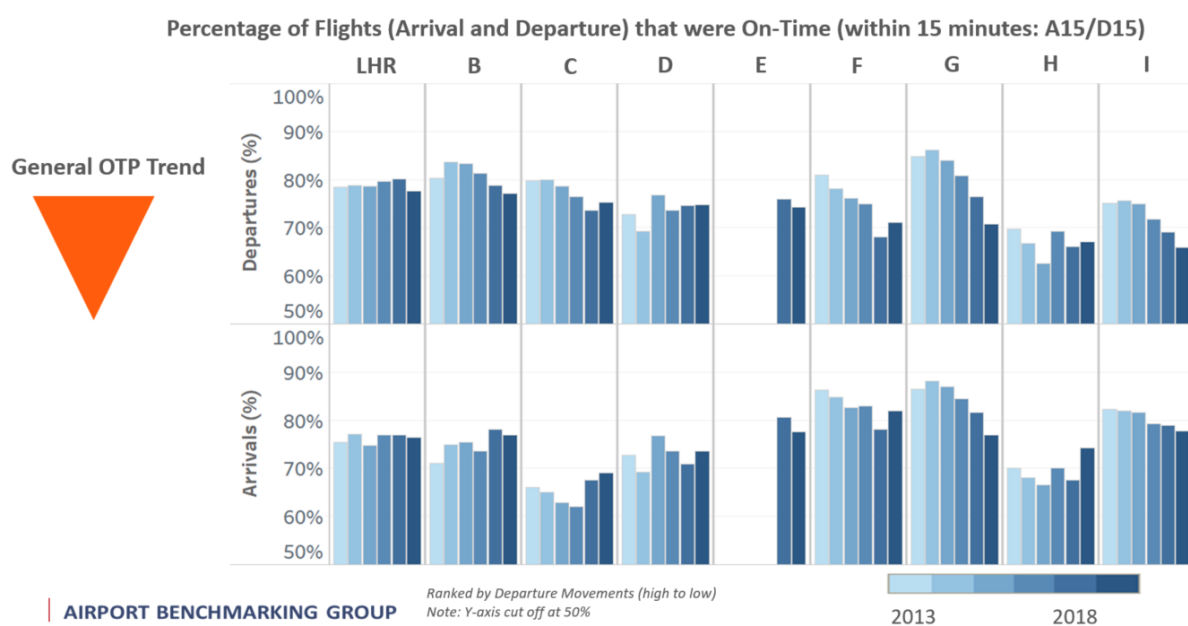
Using a 'horizon scan' approach, we assess the risk of different events occurring and put in place resilience and mitigation plans. We also carry out regular practice events and trial runs to test our contingency plans are effective. Two of our biggest learning activities in Q6 were Exercise Raptor and Gator, which were carried out with hundreds of colleagues from airlines and the emergency services. Exercises and drilling like this foster continual learning and improvement. We also have a well-established command and control process in place to respond to any event. An example of this process working in practice is in 2018 when Heathrow remained open while airports across Europe were forced to close during the infamous week long 'Beast from the East' snow event.

3.2 Key operational improvements in Q6 to support resilience

During Q6 we delivered significantly better service to consumers, most particularly through improvements in baggage and sustained punctuality performance. We continue to spend significant effort and resource in having regular discussions and collaboration with airlines and authorities to understand how punctuality performance can be improved. This gradual process of dialogue started with us focusing on the worst performers to drive improvements. We have introduced Airport Collaborative Decision Making (A-CDM) and made iterative improvements to the process over time, which has ensured we are more resilient to delays compared to European peers. We also improved runway throughput and reduced bunching at hold through Enhanced Time-Based Separation (eTBS) and Re-categorisation of the ICAO Wake Turbulence Separation Minima (RECAT EU). As a result, we see Heathrow's performance remain consistent over time compared to a gradual decline across other airports. We also reduced the number of late running flights and cancellations, providing greater predictability to passengers and airlines and reducing the impact on local communities.

In our chapter on operating costs we have described the role of the Airport Benchmarking Group, which we set up with leading global hubs such as Hong Kong International Airport and Imperial College London in 2017. The benchmarking data shows that whilst on-time performance has deteriorated across most airports across the sample, Heathrow's performance has remained consistent and is more resilient to seasons than local peers.

On-Time Performance (OTP): Arrivals and Departures (LHR) General worsening of OTP for most airports; high and steady OTP for LHR



Source: Airport Benchmarking Group

Figure 30: On-time performance benchmarking

Better planning and co-ordination drove much of the improvement and is a key pillar of our resilience strategy. If we can improve the predictability of operations by reducing the variability of many areas e.g. improved weather forecasting, drone detection/awareness, strikes and European Air Traffic Control (ATC) issues, then we can operate to plan. Key tools, processes and resources that underpin this are:

Resilience Governance Group (RGG)

This group provides a forum for sharing risks at a strategic level and ensures that our resilience plans and processes are future proofed, particularly for future Heathrow and expansion activities. The RGG provides a central governance of the processes, systems, and management of the Heathrow command and control structure, driving consistency, collaboration and central coordination. It also monitors and measures the delivery of resilience activities against objectives.

Airport Operations Centre (APOC)

Opened in 2014, APOC is our 24/7 monitoring and control centre for the entire airport operation with a focus on managing and improving every step of passengers' journey through Heathrow. Previously the day-to-day operation of Heathrow was coordinated through a network of different control centres. APOC sees the complete Heathrow picture, offering the right information to the right people at the right time enabling proactive and effective decision making during normal and disruptive operations. APOC is constantly being improved and developed in collaboration with the AOC, airlines and other stakeholders. The Airport Operations Manager manages operations on the day and deals with first response for any major incident.

Command and Control Structure

We have introduced a Gold/Silver/Bronze command and control structure, similar to the emergency services, to manage an incident. Colleagues are rostered 24/7 throughout the year to be able to respond quickly. We carry out training and rehearsals to maintain capability, even as the number of incidents has reduced.

HADACAB and Demand vs Capacity procedures (DvC)

As Heathrow currently operates at, or near to, maximum capacity for significant parts of the day it must be able to quickly recover to disruption. Policies and procedures have been established in collaboration with stakeholders to balance capacity and demand. This, alongside our Demand and Capacity Balancing (DCB) tool has helped us to predict airfield and airspace performance and minimized the need for pre-tactical cancellations.

Continuity of Service Plan ("CSP")

To meet our CAA obligations, we developed our CSP, detailing key contacts and role expectations, which an administrator or others could use to run the business. We also annually report, signed by the Board, confirmation that we expect to have the resources in place to be able to run the airport effectively over the next couple of years as assurance of our financial resilience.

Airport Operating Plan (AOP)

This is based on an improved version of the Airport Collaborative Decision Making (A-CDM) introduced in 2014. This runs thousands of air-traffic behaviour simulations to predict future flight operations for the entire scheduling season. This has enabled colleagues across the airport to ensure they can provide the best possible service by pinpointing any potential pressures and helping them solve problems before they happen.

Here to Help

Following the snow disruption in 2010, we developed our Here to Help programme. Our non-operational colleagues sign up to support operations during disruption such as adverse weather or industrial action. During 2018 and 2019 for example, Here to Help provided support across a number of incidents including baggage issues, power failures, airline IT failures, strike action and adverse weather. We currently have over 600 colleagues signed up to the scheme with the ability to deploy 365 days a year.

Improved Communications

The implementation of the Community App which was rolled out in 2018 has significantly improved communications across the airport providing time critical information to frontline colleagues across Team Heathrow. Heathrow is committed to its continuous improvement working with a community of airports to jointly develop the app.

We also invested to deliver a step-change in our physical and technology resilience. Our Q6 strategic programme invested £496m in physical airport resilience. Further investments focused on baggage resilience (£285m), asset management (£100m) and cyber security (£7m).

Key initiatives included:

Airfield infrastructure

We have delivered a host of resilience infrastructure which includes implementation of Time-Based Separation (TBS), enhanced Instrument Landing Systems (ILS) and the Airport Operating Plan (AOP) tool. We have also invested £427m in the reconfiguration of three taxiways, reconfiguration of Sierra for code F aircraft, the ongoing construction of Kilo taxiway and accompanying infrastructure, and the widening of both Alpha and Bravo north taxiways. This has provided a reduction in taxi times, increased capacity for wide-bodied aircraft and increased life of assets. This has made our airfield more resilient and will allow us to adapt.

Baggage

Improving our baggage capability has been essential as passenger volumes have grown. During Q6 we replaced hold baggage screening machines across all terminals and installed new conveyors and increased baggage storage capacity in Terminal 5. This, alongside integration with APOC, improved the baggage system and meant that passengers had more reliable baggage delivery. This has been tested through multiple baggage incidents from 2015 to summer 2019. The speed of recovery has improved year-on-year with each major incident showing fewer missed bags and shorter outage time. For example, in summer 2019, following an airline IT issue the joint baggage resilience team was able to recover 10,000 bags within 24hrs, nearly 5 times the rate achieved 4 years earlier.

Assets

Our asset management programme assesses the cost, performance and risk associated with our £14 billion asset base, along with the condition and criticality to our operation. During Q6 we have made investments in the Terminal 3 roof, 12 airbridges, the Terminal 5 track transit, the Terminal 3 fire alarm system and airport fire mains, alongside many other improvements. This has improved resilience by extending the life of the assets, as well as providing increased flexibility and operational functionality in use of the airbridges.

Cyber Security

During Q6 we enhanced our Data Centre Network, implementing a simplified, secure and scalable architecture. This also included the addition of Next Generation Firewall infrastructure

which will be instrumental for mitigating the risk of disruption through minimising cyber security threats. This investment has also provided greater automation supporting faster deployment, improving our ability to manage and recover from unforeseen events. We have improved our ability to detect and respond to Cyber incidents by putting in place a 24/7 Security Operations Centre, provided on a managed basis by a specialist security company. Alongside this, we invested in dedicated Managed Security Services, part of which identifies and patches vulnerabilities in our systems as well as providing rapid Incident Management capability. We have replaced legacy systems and hardware with standardised cloud-based packages which can be updated more easily for the latest security threats.

3.3 Lessons for our H7 resilience

The investments we made in Q6 have improved resilience. As part of our investment planning for H7 we have engaged with consumers, airlines and wider resilience partners. We also want to embed the lessons learnt from the past few years into H7.

First of these lessons is the power of a robust, integrated approach to contingency planning and continuously improving operational responses to disruptive events. People are crucial to success in this. Therefore, we propose to keep investing in our training, testing and exercising of teams. Cooperation is also crucial. Thus, we need to consider the end-to-end view of the passenger journey, not just the airport's direct contribution, and seek ever deeper involvement from partners across the industry. The Airport Operating Centre (APOC) will have a stronger role in developing daily operating plans and in allocating resources across the airport to address any changes. Increasingly we will have better visibility of passenger flows coming to, and through the airport and will be able to predict and avoid bottlenecks using artificial intelligence.

Second is the value of investing in a degree of operational 'headroom', which provides a resilient airport with capability to meet demand, withstand disruption and recover quickly. We have shown we can achieve 'headroom' through the efficient use of technology, better processes and, if needed, airport infrastructure. Our plans therefore need to look ahead to accommodate future demand for a new generation of wide-bodied aircraft, build greater resilience to adverse weather and other events and of course maintain the highest safety standards. It can be tempting to hold off on such investment or change until problems emerge but the more efficient, and consumer focused, approach is to be proactive in building steadily over time.

Third is the importance of flexibility across a single integrated operation. Many of the challenges and subsequent improvements in Q6 were unknown in 2014. If we had adopted too rigid an investment plan or operating approach we would not have had as much traction as we did. One of our lessons for H7 – particularly given the even longer-term time horizon of the masterplan and expansion at its core – is the creation of a way for airport, airlines and others to adjust and refocus on different resilience solutions as the need arises.

4. Resilience challenges in H7

4.1 Emerging challenges in our environment

Perhaps the most profound changes to the resilience challenges we face as we look at H7 is how they have expanded over time to encompass physical operations, political climate and technology infrastructure. As travel becomes ever more dependent on and enabled by technology, the importance of these systems running smoothly and defending them from threats only increases. For example, the European Aviation Safety Agency estimates there are 1,000 cyber-attacks on aviation systems each month.⁷³ We must be cognisant of the potential

⁷³ PA Consulting "Overcome the silent threat"

impact of a cyber-attack or system failure. This is a heightened threat that we must proactively act to manage through the 2020s and 2030s.

As core services above and below wing are progressively automated, we will invest in technology and people to provide resilience. As an international hub, with a very diverse passenger base, we will always need a core number of people to provide service and security. Increasingly, we will need to develop a multiskilled team, capable of providing core front of house passenger services, such as check-in and bag drop as well as other service roles to ensure that the operation keeps flowing even if technology fails.

Technological advances have also enabled the rapid development of drones. Used near a busy airfield these could have catastrophic consequences. Despite it being illegal to fly near an airport, the drones sighted near Gatwick Airport in December 2018 forced authorities to ground aircraft for 36 hours. This disrupted tens-of-thousands of passengers and cost the airport, airlines and others significant sums. Drones are a rising threat, for example with activist groups suggesting they will fly drones near Heathrow on multiple recent occasions. Existing resilience plans are in place, but we will need to keep investing and innovating in the coming years to stay ahead of the challenge.

Heathrow will also need to be increasingly resilient to changing business and political environments. We need to be prepared to react to anything that can impact us directly, or indirectly through our customers and supply chains. Relevant recent examples include the BA IT issues, Brexit preparations and the collapse of airlines (e.g. Jet Airways). We have mobilised our contingency planning capability to deal with these. It is important in H7 that we have both the operational capability and the financial strength and stability to respond in an agile way.

Finally, as outlined in Chapter 4 – Sustainable Growth, we need to act to be resilient to climate change. We must invest in the next few years to ensure alternatives to fuel and energy sources such as oil and natural gas. This poses a considerable resilience risk should the aviation industry not migrate to alternatives in time. We are already using alternative energy around the airport where possible, such as solar power and an increasing electrified fleet but will need to move further and faster in the future. Likewise, we will need to invest and plan to address impacts of changing weather – be it increased flooding risk addressed in our masterplans or continued substantial investment in winter and adverse weather contingencies. Our expansion plans also take into account carbon and other environmental limits and the impacts of an increasing carbon price.

4.2 Resilience and consumer outcomes

As we highlight above there is no one ‘resilience outcome’ – our research and engagement has led us to develop four consumer outcomes that have a strong resilience thread. These are:

- I have a predictable and reliable journey
- I am confident I can get to and from the airport
- I feel cared for and supported
- I feel comfortable and secure at the airport

Building resilience into our future infrastructure and operations at Heathrow is critical to ensuring we deliver these outcomes for consumers as we move into a period of growth. To do this we need to identify and mitigate the key risks to resilience, as well as making sure we harness the opportunities that an expanded airport will bring.

Throughout 2022 to 2036 we propose to invest in building our resilience across our airfield and airspace, our terminals, in the airport’s supporting infrastructure and systems and in surface

access to Heathrow. We are also starting to proactively plan to ensure construction activity does not undermine our resilience.

New capacity is in itself an important investment in resilience. Without the additional capacity expansion will bring, Heathrow will continue to operate ever closer to maximum limits, constantly challenging resilient operations. Opening a new runway will deliver much greater airfield resilience through more runway, airspace, stand, taxiway and apron headroom as well as more alternatives to provide flexibility. Furthermore, the improved and new terminal infrastructure will help make the most of our best assets, while replacing those that are older and more liable to fail or underperform.

Rather than being a separate initiative, this resilience approach runs through all our plans. Below we outline the resilience enhancements with respect to the airport infrastructure and operations that will help us to deliver our consumer outcomes. We will continue to use the approaches and mechanisms we have developed during Q6 to manage the impact of disruption to our passengers and airlines, as set out earlier in this chapter. This supports us in the delivery of our 'cared for and supported' and 'comfortable and secure' consumer outcomes.

4.2.1 Resilience and a predictable and reliable journey

Consumers want their flights to arrive and depart on time, and punctuality is a key measure of successful delivery against this outcome. Punctuality is also critical for our airline partners as it helps them to deliver an efficient operation as well as supporting delivery of this outcome for consumers. Expansion brings both opportunities and risks from a resilience perspective. We outline our mitigation plans below that will allow us to continue to deliver this outcome for consumers. These are split across three core areas – airspace and airfield; terminals and airport support infrastructure. Many of these plans are still under development in consultation with our airline partners and key stakeholders.

Airspace & Airfield

Upgrades of NATS and Heathrow's airspace capability

New technology will continue to allow us to deliver improvements in the efficient use of our runways to accommodate new capacity in a resilient way. This is most critical for early growth before the runway opens but will also be important for expansion after the runway opens too.

Subject to regulatory approval, initiatives we are exploring to improve operations will include Independent Parallel Approaches (IPA), Performance Based Navigation (PBN) and enhanced Time-Based Separation (eTBS).

Airspace resilience plans are dependent on wider government airspace changes, designed to make more efficient use of airspace and reduce delays. Performance Based Navigation (PBN) redefines the aircraft's required navigation capability from equipment based to performance based. PBN is being introduced across the world and allows more flexible positioning of routes improving operational performance and reducing delays. PBN has the potential to increase our resilience both before and after runway opening, reducing weather delays and helping to improve punctuality.

Enhanced Time-Based Separation (eTBS) will provide air traffic controllers with separation indications to the runway threshold based on RECAT-EU plus Optimised Runway Delivery. This is a technical term for modelling the gaps between aircraft pairs as they slow down to their landing speed. eTBS will optimise the delivery of aircraft to the runway thus increasing the tactical runway capacity and improving resilience.

IPA is a change to the way that some aircraft arrive at Heathrow. It has the potential to increase the efficiency and resilience of the airport by making arrivals procedures more efficient to reduce arrival delays. Typical savings are estimated to be up to 13 hours of arrival flight delay per day. Potential benefits of IPA thus include reducing carbon emissions, improving the flight punctuality and cutting the number of late running flights and cancellations, as well as creating new capacity. It also involves some new arrival routes into Heathrow from the holding stacks.

Introducing these package of airspace changes will require both regulatory airspace changes and upgrades to NATS capability. The investments for these upgrades are included in the NATS business plan. Heathrow is proposing working closely with NATS, the CAA, DfT, airlines and other airports to deliver the legal and technological change needed. While the exact package of changes will continue to evolve through the 2020s, we are confident that there is sufficient new resilience capability that the airport can maintain operational performance while growing the number of flights.

New runway

The new runway is itself a major enhancement to resilience. The new runway will increase capacity for passengers and freight, enabling around 260,000 additional flights per annum. Once operational it will provide Heathrow with an additional 50% runway capacity. It will also spread Air Traffic Movements (ATMs) over three fully operational runways rather than two. This will enable punctuality improvements, reduced airborne holding and reduced cancellations in adverse circumstances, all to consumers' benefit.

A third runway will also provide additional recovery capacity. If one runway were limited for any reason, there will be a greater capacity to recover.

New taxiways

Taxiways act as the 'arteries' of the airport, enabling aircraft to move between areas for parking, refueling, and boarding consumers safely and efficiently. New Around the End Taxiways (ATETs) will be positioned at the western end of the central runway and will allow aircraft to travel between the new runway and the existing airfield without affecting the operation of the central runway. Positioning the taxiways in this area will minimise taxiing time to the northern runway and have less effect on residential and commercial property than if taxiways were built to the east. Western Bypass Taxiways will be also located to the west of Terminal 5 and will help to reduce congestion within the existing airfield by providing an alternative north-south route for taxiing aircraft.

New stands

Airfield enhancements such as stands, hold and terminal areas will increase Heathrow's capacity and give us confidence that early ATM growth can be achieved while maintaining resilience. We will continue to comply with existing criteria in relation to airport operational resilience and service quality to ensure that early ATM growth is achieved without impacting the effective operation of the airport for our airlines, passengers and communities.

Much of the future taxiway network will also be available when the runway opens. This means that, in the years following opening, the overall airfield infrastructure will be operating less intensively than today. This will enable airlines to optimise their operations compared to today.

For example, the improved predictability of movements could translate into reduced buffer times allowing better utilisation of both aircraft and stands. The provision of remote stands closer to terminals will allow a more intensive towing operation which will improve levels of pier

service. The flexibility of the airfield will be increased by providing additional MARs stands (Multiple Aircraft Ramping solution) and increasing the capability to undertake short tows

Re-organisation of the airfield

We will invest in the design and re-provision of key runway infrastructure that will enable us to reduce runway occupancy times for aircraft landing and taking off and thereby increase runway throughput.

Significant financial investment and effort has enabled us to improve our understanding of wake turbulence generated by aircraft allowing us to optimise future runway operating modes, particularly where we intend to use one runway for mixed mode operations. These technologies will also be used throughout the next regulatory period to identify other areas where separations between aircraft can be optimised for resilience.

Our taxiway network will also undergo significant investment. We will reduce the number of runway crossings required by improving access for all aircraft over the taxiway network, therefore improving the performance of the runways.

We will also continue to work with our airline customers and other service providers to ensure that the latest technology for taxiway and aprons can be accommodated to improve the predictability and reliability of the turnaround of aircraft for airlines and passengers alike.

Investment in winter and climate resilience

We will continue to invest in winter resilience as we have done over Q6. We will ensure the winter operations capability at the airport is maintained and continuously improved. Heathrow made significant investments in winter equipment in 2011 following the 'Begg Report'. During H7 a large proportion of this equipment will reach its 15-year full lifecycle and be renewed. Investment in vehicle equipment has been included in the plan in line with any increased capability we need to enhanced safety and service standards. We will continue to evaluate our asset replacement methodology so it is in line with operational strategy and advances in technology. This will include automation of processes as technologies that facilitate enhanced safety and performance standards become proven in use. We will also continue to transition to a more sustainable fleet as the zero or low-emissions technology emerges for 'heavy vehicles'.

We will invest in technology that will assist in identifying, managing and minimising any disruptions in adverse weather. This will look to include replacing and enhancing our metrological system capability. Enhancements within our Airport Operating Plan (AOP) linked to procedure changes network-wide for arriving and departing traffic will continue to ensure we optimise on time performance. Planned significant investment to our Air Navigational Service Provision facilities, systems and technology will ensure we maintain resilience and enhance our capability, especially in disruption. Enhanced digital technology will improve our capability to consistently deliver more of the schedule in adverse weather scenarios.

Investment in infrastructure, technology, processes and sustainability will also make us a more resilient airport for aircraft de-icing. We will increase the use of de-icing pads to increase the rate we can de-ice planes. These facilities will be supported by better safety and efficiency technology and more aligned procedures and service standards. This allows aircraft to be de-iced closer to the runways and stands, increasing their efficiency. The end result is that more flights will be able to depart on time, with fewer cancellations, during winter operations. The new infrastructure will be aligned to future ground winter operations allowing for electric de-icing vehicles and better capture and recycling of aircraft de-icing fluids.

Early Growth

In 2016 we announced our intention to propose up to 25,000 additional ATMs a year to respond to the urgent need for additional airport capacity. Early ATM growth forms part of the first phase of our expansion. It would happen soon after the grant of consent for our Development Consent Order (DCO). We are testing how these additional flights could be introduced while maintaining the resilience of our operations.

We believe it will be possible to maintain current punctuality and recovery performance before the new runway opens. Latest analysis indicates that the ATM growth can be introduced consistent with the policies of the Airports National Policy Statement (ANPS) and Heathrow's targets for quality service and resilience. This analysis is the basis for our planning proposals on early growth, which are:

- The first additional flights will start some-time after the grant of DCO consent to allow time for preparation and necessary airspace changes.
- Launching the new flights will depend on approval for the necessary airspace changes because to do otherwise could compromise resilience and reliability. Early Growth will thus need to be 'triggered' in the settlement (see Chapter 14 - Regulatory Framework).
- It is proposed that early ATM growth will be implemented in three phases, gradually adding flights. This builds on our resilience lessons from airline moves, terminal openings and global case studies to phase changes and avoid a 'big bang'. We are proposing that the current 480k flight cap should be lifted following the DCO approval in 2021. [REDACTED]
[REDACTED] The specific timing of the subsequent phases will be based on how quickly operational teams can accommodate the extra movements without compromising resilience.
- The additional ATMs will be distributed across the schedule and will be allocated predominantly at times of day and year that are considered off-peak. This helps reduce the pressure on the Heathrow operation at peak periods.

Based on our current analysis these measures, combined with airspace change, should create some additional punctuality headroom on two runways as well as new ATM capacity.

Terminals

Process improvement and resilience

The Early Growth programme will create capacity to serve an additional 10 million passengers per annum in Terminal 5 to reach a total capacity of 43 million passengers per annum. Through this programme increased resilience will come from additional automation within check-in and immigration to enable a more predictable service and by equipping T5 with multiuser capability.

T5X terminal and stands

An extension to Terminal 5, T5X and apron, will be constructed and integrated into T5 by 2030 to provide additional capacity to meet demand. At a later stage T5X will be expanded with a northern satellite, referred to as T5X North, located between the existing central runway and the proposed runway. This northern satellite will provide additional aircraft stands and taxiways, supporting the operational performance of the airport.

Terminal 3 (T3) investment in assets

T3 currently accommodates almost 20m passengers each year and prior to new terminal infrastructure being built, it will need to serve a greater number of passengers. T3 is our oldest terminal. To ensure it is resilient for future operations we are renewing and refurbishing the terminal. This includes investing in check-in and arrivals to improve the passenger experience and using new technology to make the experience more efficient and to maintain our resilience.

A connector bridge is also proposed between T2 and T3. This would help to minimise connection times between the terminals, meaning fewer passengers would miss connections. It will also support our resilience by in essence combining stand and terminal capacity across the existing two terminals. Terminals 2 and 3 will increasingly be seen as a single “Eastern Campus”, providing greater resilience, flexibility and a better connections experience.

T2 future baggage

At present, Terminal 2 uses the old Terminal 1 baggage system which is 85% life expired or obsolete plant. We are proposing to invest in a new T2 baggage system, to ensure that performance and resilience are at a consistently high level.

Providing a new baggage system for Terminal 2A and 2B before runway opening will enhance the reliability and resilience of the whole airport’s baggage handling operations. This new system is aligned with the masterplan so that it integrates with planned future additions to support T2C and T2D from both a baggage processing and passenger transport perspective.

The introduction of a new baggage system for T2 will allow an integrated baggage transfer service across the Eastern and Western campuses. Baggage loading and unloading remains a very manual process and as part of the T2 future baggage programme we will explore options to provide more efficient operation that can recover faster from any disruption.

Airport Support Infrastructure

Cyber and IT upgrades

In response to the anticipated increased threat of Cyber Attacks and to meet our regulatory commitments in terms of Network and Information Systems (NIS) and GDPR we will continue to significantly increase our investment in Cyber and IT upgrades. Our established Cyber+ programme will continue to evolve. We will update the Cyber+ Target Operating Model improving the monitoring of key systems. We plan to carry out the largest ever application modernisation programme at Heathrow. This will mean we can achieve ISO27001 cyber industry accreditation and implement new technologies that reduce the risk of an attack via our connected supply chain. In addition, we will be making further improvements to our Target Operating Model to further increase our overall protection capabilities. We will also continue to build on the strong progress we have made in educating our colleagues on the threats of cyber security and how they play their part to protect the airport.

APOC automation

We are developing our Operating to Plan approach to further improve total airport management by introducing additional analytical tools and functionality. This will provide more real-time information to APOC allowing us to predict and respond to events more effectively. This will mean we will, for example, be able to deploy exactly the right number of people at the right time in the airport. We will also be able to more closely monitor the performance of resilience KPIs, such as variance to plan, speed of recovery from incidents and on time performance. Increasingly we will be combining data from a range of sources on passenger flows and using artificial intelligence to better predict and deploy all our resources.

As Heathrow continues to innovate and introduce more automation we will have to adapt our workforce. We need to move to a model of APOC ever more actively deploying people with the right skills to the right place at the right time to deliver world class service. A multi-skilled workforce, who have access to every piece of information at their fingertips, can be go to wherever is needed during a disruption event. That will strengthen our resilience and support a speedy return to business as usual.

We will be making further enhancements to APOC, delivering intelligent asset replacement and IT enhancements. This reduces the risk of assets failing as they are more likely to be replaced before problems occur. Combined with our Operating to Plan approach will lead to better situational awareness, reduced delays and more informed contingency plans.

Resilience during construction

It is important that the resilience of the airport is maintained throughout the intense construction period – especially from 2022 to the late 2020s. We already have extensive experience of successfully managing construction projects within a live operational environment. Examples include the construction of Terminal 5, opening in March 2008, and Terminal 2, in June 2014, More recently, the T3 Integrated Baggage System and the new T3 Flight Connections Centre were built entirely within an airside operating environment.

We recognise that the expansion of Heathrow will impact a large area. However significant elements of the construction work can be segregated so that they do not disrupt the day to day operation. In addition, we are adopting a more innovative approach to construction that will see large elements constructed off-site and assembled at the airport.

Given the scale of the construction work over the next 10 years, and the complexities involved, there are of course challenges which we are working to mitigate through our concept design work, and through working collaboratively with external stakeholders. For example, construction work to extend the existing Terminal 5 buildings is particularly challenging in a live operation as the availability of stands is critical to maintaining performance. To mitigate this risk our design teams have tested constructability at a conceptual level to work out the best way to achieve this ahead of more detailed design later in the programme.

There is also a dedicated team working on the concept design for the M25 works which are particularly complex. The team are actively engaging with Highways England to address the integration and interface questions raised.

During the construction period we will also deploy a full Command and Control Structure, similar to the approach used in our existing day to day operation and with the same capability. This will be used in situations where construction work is impacting the operation above an agreed level of acceptability. A construction control centre, within APOC, will be implemented to enable a coordinated multi-agency response to incidents during the construction period. This builds on the robust processes, systems and ways of working that enable us to deliver complex projects and hand them back to the operational teams on time and without incident even overnight. An example of this approach on a critical asset was the successful runway resurfacing in 2013/14.

4.2.2 Resilience and confidence to get to and from the airport

A consumer's physical journey begins from the moment they leave their home, office or hotel. So getting to, from and around Heathrow matters to airport experience and airport choice. Consumers want to do so quickly, easily and in a way they trust. Predictable and reliable

surface access options are important to consumers as they give greater choice and improve the resilience of the airport.

Improved Rail Connections

“A quicker journey on more comfortable trains, useful for travelling from West to East across London”

“By the time I get to Paddington, I could have got there by road”.⁷⁴

Crossrail

Together with Network Rail and Transport for London, Crossrail are working to prepare for the start of the Elizabeth Line services. This will significantly improve links between Heathrow and a number of central London destinations. A fleet of new trains will provide six Elizabeth line services per hour serving Heathrow Terminals and almost halving the travel time between Heathrow and Central London. This firstly ensures passengers are able to make seamless connections without significant waiting time for their onward journey. In addition, it provides passengers with a choice of London connections based on their preferences and availability. Thirdly it means more options in the case of disruption to other services from the early 2020s. We are working with TfL to increase the frequency of services further and ease of use for consumers, for example by introducing contactless payment.

“The more public transport options available, the better”.⁷⁵

“Greatly improved connection to the rail network. Heathrow Express is no use when travelling from beyond London - a train link even to Reading would be much better”⁷⁶

Western & Southern Rail

Network Rail is promoting a Western Rail Link project, which is subject to a separate DCO application. A proposal is also in place for a Southern Rail Link to the airport is also promoted outside of Heathrow’s expansion DCO. While independent our plans for expansion have been designed to be compatible with these future Rail Links. Additional public transport links can only benefit the future resilience of the airport. It means providing consumers with a range of options to travel to the airport and allowing them to travel with confidence. It should be noted that we anticipate meeting the ANPS targets without relying on the implementation of third-party rail schemes.

Improved Road Access

Southern road tunnel

Road access to the Eastern Campus (CTA) is currently only possible via the Northern Road Tunnel which connects to the M4 and A4. As part of expansion, a new twin-bore tunnel is proposed to provide access to the CTA from the Southern Perimeter Road by 2030. This will greatly enhance resilience by enabling dual access to the central site.

⁷⁴ Insitas, *Understanding mode choices to Heathrow, including the appeal of Crossrail*, November 2015

⁷⁵ Join the Dots, *Horizon Surface Access Strategy Interventions*, April 2019

⁷⁶ Join the Dots, *Horizon Surface Access Communication Strategy*, December 2018

To support this new route, we will also rearrange the cargo area and upgrade parts of the Southern Perimeter Road from two to three lanes, alongside upgrading links to the road to provide greater capacity to accommodate increased traffic flows associated with the tunnel.

Capacity from Parkways

We are proposing a Southern Parkway to be located to the south-west of the airport, south of the Southern Perimeter Road and east of the Stanwell Moor Road (A3044). Access to the Parkway would be via a direct spur from a proposed new roundabout on the Southern Perimeter Road, to the east of Stanwell Moor Junction. The Southern Parkway will include up to 22,000 spaces, comprising a mixture of public and colleague spaces. It will be connected to Western Campus by a Mass Rapid Transit (MRT) system. This helps support our resilience by providing more capacity and reduced risk.

M25

We will widen the M25 and simplify the segregation of the lanes where between airport traffic and through traffic. This will reduce congestion and improve air quality and safety.

5. Options and resilience

When developing our strategic choices, we have considered the resilience of the airfield, terminal space and public transport, and believe we can offer equivalent levels of resilience in both cases. We estimate that maintaining resilience in the Prioritising Savings option will require more collaborative operational change between airport, airlines, air traffic control and other operators. This option might also slow the delivery of any new rail links given we are proposing a lower contribution to any such schemes from Heathrow. Furthermore, in our Prioritising Service option we would invest in targeted way to improve punctuality and baggage performance. This should help resilience and reliability for consumers, potentially improving performance above that achieved at Heathrow today over time. All these forecasts are heavily dependent on other factors such as airspace change that remain uncertain. Given that uncertainty we will need to do a considerable amount of work collaboratively with airlines and others to explore the implications of the options and way to manage those implications.

6 - MEASURES, TARGETS & INCENTIVES

Overview

- We have developed a set of performance measures grounded in consumer research, building on the existing Service Quality Rebates and Bonuses (SQRB) scheme
- Heathrow delivers world class service to passengers - we believe that maintaining existing targets is appropriate given the affordability challenge, the impact of Heathrow expansion and rising consumer expectations
- We propose some changes to incentives to sharpen the commercial rationale for service delivery. We set out an alternative package of measures which better reflect the end to end passenger journey

1. Introduction

In this chapter we set out how we have translated the insights gained from our engagement with consumers, Consumer Challenge Board (CCB) and airlines into a set of measures, targets and incentives to be implemented in H7. Our focus for H7 has been to design a performance framework that has quantifiable, achievable and controllable factors that are as closely linked to consumer outcomes that will measure our success.

Heathrow delivers world class levels of service to its passengers being in the top 10 of Skytrax's airports rating every year since 2013 and the UK's highest-ranking airport. We are currently the second highest ranking airport in Europe.

The increasing number of passengers will make it harder to maintain current levels of service. However, we have a clear ambition to invest and maintain current service levels whilst delivering an affordable expanded airport.

Heathrow is strongly incentivised by commercial incentives to deliver great service to consumers:

- We face competition for passengers from other London airports and hub airports across the globe. Good service leads to more consumers and airlines choosing to fly from Heathrow;
- Consumers also have a greater propensity to engage with our commercial offering, which in turn increases commercial revenue

Both of these incentives are directly financial. A strong reputational commercial incentive also exists, where service directly links to the airport's licence to grow and operate. The power of these incentives can be seen in Heathrow consistently achieving above regulatory service standards or indeed in our airport appearing for example in the Skytrax top 10.

Our airline partners also benefit from high levels of customer service. Higher numbers of passengers and greater commercial income reduces the airport charges they have to pay and helps them increase yield.

In addition to these commercial incentives, we are subject to regulatory incentives. In Q6 this is through the Service Quality Rebates and Bonuses Scheme (SQRB). This monitors some areas of performance and enables Heathrow to be rewarded for good service or pay rebates to airlines if service drops below the required standard.

Two changes have shaped our approach to these regulatory incentives in this plan. First is that we are structuring it around consumer outcomes. This requires a more fundamental rethink of the appropriate measure, targets and incentives. Second is the need to set them in the context of the huge one-off consumer opportunity of new capacity. Increasing numbers of passengers and investment constraints will make it harder to maintain current levels of service. So too will ever rising consumer expectations. Even in this challenging context we have aimed to at least maintain current service levels while delivering an affordable Heathrow expansion.

Our proposed consumer measures, targets and incentives should be viewed in the wider context of all of the incentives we are facing and are intrinsically linked to other parts of our plan. In developing other parts of our Initial Business Plan (IBP), in particular our operating costs and capital investment plan, we have ensured consistency and taken an integrated approach so we are able to deliver our commitments. This package of incentives cannot therefore be adjusted without changes elsewhere.

In the following sections we set out:

- The package of measures we propose for H7 regulatory incentives;
- The targets we propose for each measure;
- The incentives we propose around each target; and
- How we plan to update targets and incentives.

2. Measures

The first stage in setting an incentive scheme is to define the measures. In proposing measures, we are first of all aware of their relevance to our outcomes. We also understand the CAA and airlines' desire to build on the existing SQRB and Q6 experience. New information came from consumer engagement. We have also had to balance comprehensiveness with complexity and practical ability to measure outputs, as any scheme will do. Ideally, we seek measures that are easy to understand too. We are proposing a comprehensive package of 26 measures based on what we have understood to be most important to consumers and airlines. The package is largely based on the existing Q6 SQRB measures, with some new measures added to reflect the importance of delivering performance across the end to end journey and all consumer outcomes. The elements of the package are set out below.

The SQRB was introduced in 2003 to provide a formal mechanism for incentivising Heathrow to deliver service quality standards to airlines. However, the SQRB has not materially changed since its introduction and its scope was designed with a different purpose. The SQRB covers only those elements of the passenger journey that Heathrow controls. We know from our insights that consumers do not differentiate between the responsibilities of airports and their partners:

“As long as I get an answer, it doesn't really matter who is at fault. When you're in the middle of your trip, you don't have time to care...you just want to get to your destination.”⁷⁷

⁷⁷ Populus Resilience Qualitative Research, October 2019

Consumers' high-level needs go beyond that which Heathrow has sole responsibility. For example, all passengers want to know they will have a predictable and reliable journey, they don't care that the punctuality of their flight or the control of the UK's borders are not in Heathrow's control. Poor performance by ground handlers also impacts passenger perceptions of their end-to-end service. They don't know that a delay with steps to aircraft or the delivery of arrivals baggage to the carousels is not within the control of the airport. We must therefore work closely with airlines and wider Team Heathrow colleagues to deliver the right outcomes for consumers. Our plan and measures should reflect this broader scope.

Consequently, we consider it is appropriate to update the regulatory service incentive framework to align it more closely to the consumer outcomes (see Chapter 2 – Consumer Engagement). This evolution has been informed by a wide range of evidence including our consumer engagement – passenger synthesis⁷⁸, Cost Benefit Analysis⁷⁹ (CBA) and Willingness to Pay (WTP)⁸⁰, and engagement with airlines and the CCB.

2.1 Approach

We began with the existing SQRB scheme and matching it to our consumer outcomes. It is readily apparent that many SQRB elements do fit with the outcomes that emerged from the consumer research. (see Figure 1).

The bulk of existing SQRB measures are retained as they capture a large proportion of the airline and consumer outcomes, historical data exists for setting targets and there is no evidence to suggest that these measures are no longer relevant to the delivery of consumer needs. In addition, airlines tell us that they value these measures.

2.2 Outcome based measures

When proposing changes, we further sought to simplify and remove measures if possible given the complexity of the SQRB relative to the simplicity of our higher-level outcomes. We also reflected feedback that retaining a core of airline facing measures is ultimately crucial for a predictable reliable journey and other outcomes including airline efficiency.

The proposal removes two Q6 SQRB measures:

- 'Priority Passenger Sensitive Equipment (PSE)'. Priority PSE is a subset of General PSE. With increasing passenger numbers and terminal utilisation all our PSE equipment is important, and we consider it is no longer appropriate to distinguish priority PSE from all PSE.
- 'Flight Information Display Screens (FIDS)'. The availability of FIDS measure has been removed because it no longer reflects the different ways consumers source flight information and the impact of digital channels and airline apps. Consumers are now telling us what they want is real time information, so they can plan their journey. "Availability of real time information" is one measure we will develop in the future to respond to this shift in consumer preference (see end of this section).

We propose to add five new measures because they cover areas of performance that consumers consider important parts of their journey. This has been informed by our consumer research including priorities identified by our choices research⁸¹ and WTP study:

⁷⁸ Blue Marble Research, *Heathrow Synthesis of evidence to support outcomes: Stages 1 & 2*, July 2019

⁷⁹ ICS, *Developing the Cost Benefit Analysis Framework - Parts 1, 2 & 3*, July 2019

⁸⁰ Systra, *Heathrow Airport Customer Valuation Research*, November 2018

⁸¹ Accent, *H7 Service Package Choices Research*, November 2019

- Queuing time at arrivals immigration for European Economic Area (EEA) passengers;
- Queuing time at arrivals for non-EEA passengers;
- Departures punctuality;
- Passengers with Reduced Mobility (PRM) satisfaction; and
- Departures baggage delivery performance

We also propose changing the definition of four measures:

- Control Post Queuing – a single measure of performance that will be calculated by averaging all vehicle queue times captured.
- Departures seating availability - the QSM measure will be broadened to include other seating such as seating in the gaterooms. The definition will be agreed with the CAA in 2020 so that data can be collected throughout 2020 and 2021 and a target agreed with the CAA in 2022.
- Aerodrome Congestion Term (ACT) – has been renamed Runway Operational Resilience.
- Passenger Sensitive Equipment (PSE) General - has been renamed Lifts, Escalators & Travellators.

The proposed change to how we will measure performance of control posts aligns with our criteria as set out in Annex 46 – Measures, Targets & Incentives Annex. The criteria state that measures should be simple and be closely aligned to the outcomes. The departures seating availability measure will be broadened as consumers told us⁸² that they wanted to see different types of seating. Currently this is not measurable and therefore we propose to update the definition, so it better aligns to what consumers have told us they need. The labelling of the ACT and PSE measures have changed to be consistent with our criteria for selecting measures that are simple and easy to understand.

A summary of the proposed measures is set out in Figure 1. We view the package of measures we propose for H7 as a step in a journey. We are committed to continuously updating and improving how we measure service quality so that our measures continue to remain relevant to consumers and airlines. While this could be at five-year review points between 2022 and 2036 we believe it would be more commercial and progressive to update and flex measures more continuously year to year.

⁸² Caroline Thompson Associates, *Willingness to Pay Qualitative Research Findings*, November 2017

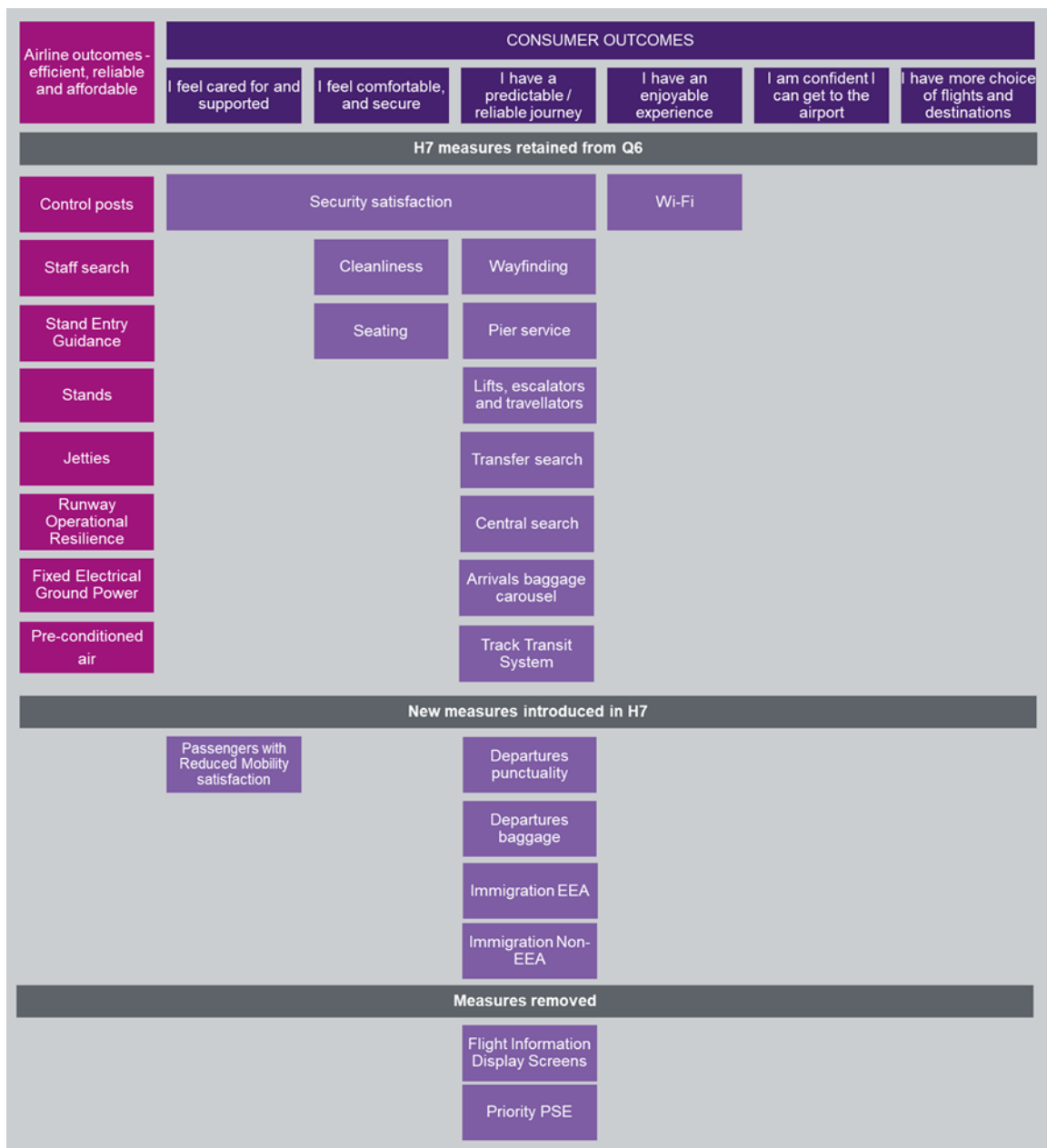


Figure 31: H7 measures against outcomes

2.3 Alternative measures

The package of measures that emerged from our initial work posed challenges. It creates a workable basis for regulatory incentives. However, it does not create a measure for every consumer outcome. If anything, it is weighted to “basic” outcomes of a predictable and reliable journey and feeling comfortable and secure. While important to consumers, these are not the full spectrum of their needs. While arguably other incentives fill the gap, we believed that this needed further consideration. When testing early versions of the measures with consumers they did flag that there was more scope to take an end-to-end view of their airport journey.

The CCB provided similar feedback. Therefore, we have also developed an alternative potential package of measures. This alternative package could better reflect the full spectrum of our consumer outcomes and the end-to-end passenger journey. The package of alternative measures adds a further six measures and removes two existing measures compared to our

base proposal. This is shown in Figure 2. We are undertaking consumer acceptability testing on this alternative package in 2020.

The additional measures proposed are:

Check-in satisfaction

This is a QSM measure already captured and well established at Heathrow. This matches consumer feedback. It ensures coverage of the early stage of the departure journey for feeling comfortable and secure. Clearly as check-in is operated only by airlines or handlers this is at best a measure that Heathrow can at best influence (e.g. through deploying automated processes) but not fully in our control.

Baggage satisfaction

This is a QSM measure already captured and well established at Heathrow. This aligns to consumer feedback. It ensures coverage of the early stage of the departure journey for feeling comfortable and secure. As with check-in, as this is not wholly in our control, and partially operated by airlines or handlers, this is a measure that Heathrow at best can only influence.

Choice of facilities satisfaction

The inclusion of this measures aligns to the outcome 'I am confident I have an enjoyable experience' and ensures coverage against all our consumer outcomes.

Ease of access to the airport

This is satisfaction measure. The inclusion of this measure aligns to the outcome 'I am confident I can get to the airport' and ensures coverage against all our consumer outcomes across the end to end journey

Offers flights to my destination

This a metric within Heathrow's existing brand tracker. The inclusion of this measure aligns to the outcome 'I have more choice of flights and destinations outcome' and ensures coverage against all our consumer outcomes across the end to end journey.

Being sustainable satisfaction

This a metric within Heathrow's existing brand tracker. The inclusion of this measures aligns to the outcome 'I have more choice of flights and destinations' and ensures that we have a consumer metric that incorporates Heathrow 2.0 aspirations.

We also proposed to remove two additional existing measures in the alternative package:

Fixed Electrical Ground Power (FEGP).

We have not developed a clear link through our consumer engagement to consumer outcomes for this measure

Pre-Conditioned Air (PCA)

We have not developed a clear link through our consumer engagement to consumer outcomes for this measure. In addition, we are moving to a commercial model for the provision of PCA.

The potential alternative package of measures that could be added or removed to our list of H7 measures is listed below in Figure 2.

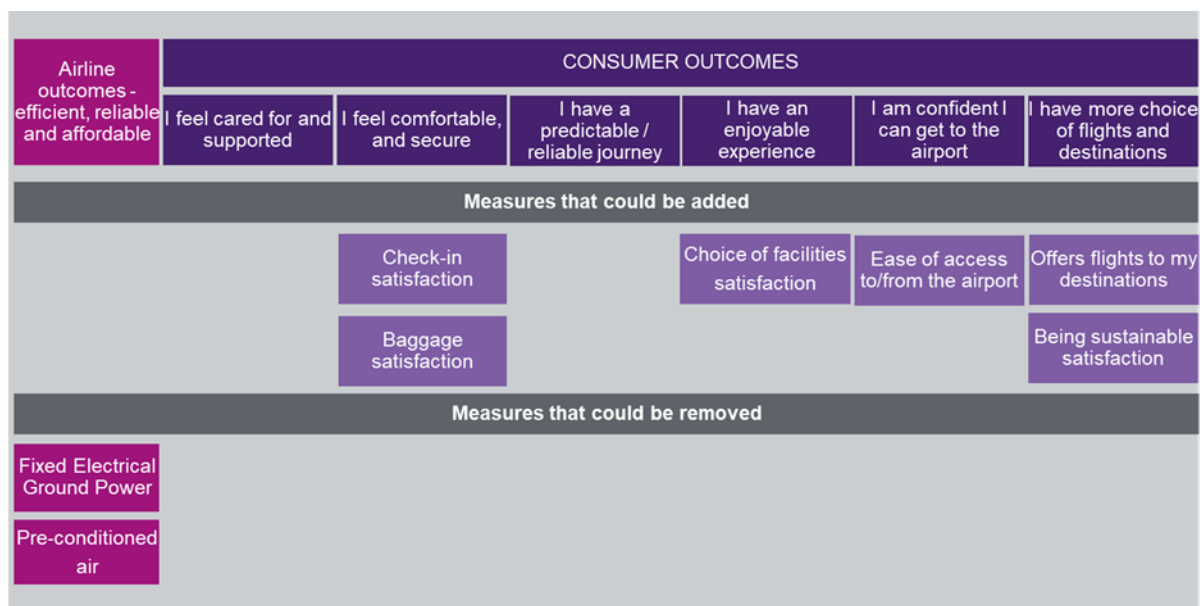


Figure 32: H7 Potential alternative package of measures

We believe further work will be required to refine either package or choose between them. There are ten work packages which include acceptability testing, affordability research, choices, resilience quantitative research and incentive testing. Further details are provided in Annex 46 – Measures, Targets & Incentives Annex. We think either set of measures is a viable option, however the rest of this chapter focuses on the baseline option.

3. Targets

Setting targets is the next step once measures are defined. We have calibrated the proposed targets with specific consumer research and the wider context of our performance and our overall plan. To a degree, targets in the regulatory incentive scheme can be seen as setting a service ambition. However, this should not be overplayed. Firstly, regulatory targets are in part a baseline for service. Heathrow regularly exceeds SQRB targets or drives better service on non-targeted aspects of service. Secondly, the measures and targets can only be a partial representation of service. What actually matters to consumers is the end outcome in its entirety.

3.1 Approach

In developing targets, we first reviewed WTP, CBA, historical performance, and consumer insights to identify consumer expectations. Figure 3 illustrates the wide range of approaches and evidence that we used to develop our H7 targets. We have drawn heavily on the methodology used in the most recent price control in the water sector, as the outcomes-based approach is most well-established in this sector. Further detail of which is contained in Annex 46 – Measures, Targets & Incentives Annex.

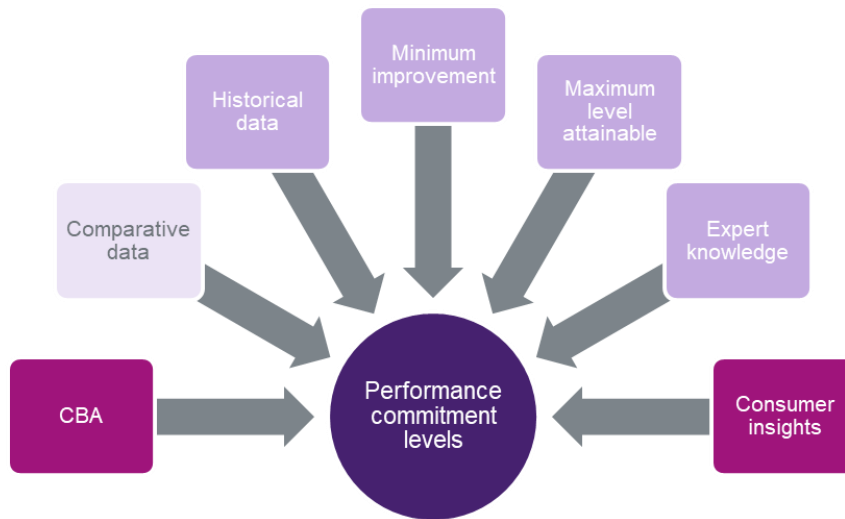


Figure 33: Approach to setting targets

In setting targets, we need to balance the level of the target with the cost of delivery. Improvements in many measures is difficult as our current target is already set at 99% or at a level that is among the top performers in the world. This means that for most measures we face diminishing returns - for example going from 99% to 100% for asset availability will be harder and costlier to achieve than an improvement from a lower level of performance.

In addition, there are a number of reasons for why maintaining current service will become a challenge without additional investment. Firstly, passenger numbers continue to grow. For example, in 2008 one in every five days we welcomed over 200,000 passengers in a single day. We now welcome over 200,000 passengers four in every five days. Passenger growth will increase crowding and asset utilisation making delivery of current service levels more difficult. As growth accelerates before new terminal capacity this will come under further pressure. Secondly, expansion construction may impact the availability of some assets. This means that for operational measures around asset availability, maintaining current performance will be stretching. Finally, consumer expectations mean we have to perform better to keep satisfaction levels at today's level – what was above and beyond in 2009, and excellent in 2019 will just be satisfactory in 2029.

Our consumer engagement shows that consumers want to see the service levels Heathrow offer maintained or ideally improved. For example, the H7 Choices Research showed that 67% of users preferred plans which offered improvements in service and in the WTP research only 2% of passengers were willing to accept a reduction in service in return for fares decreasing slightly.⁸³ This demonstrates that consumers support improvements in service. In addition, our choices research has shown that consumers prefer options where service levels are maintained or improved over those where service levels are reduced.⁸⁴ However, on balance given affordability and the realities of Heathrow expansion from 2022 to at least the early 2030s, we believe maintaining the Q6 target levels to be an appropriate starting point. In our base case we propose to maintain current targets for H7. This will ensure that we deliver world class levels of performance whilst maintaining our focus on delivering an affordable and efficient service. We are proposing to have the same targets for all terminals.

For proposed new H7 regulatory measures we have set targets to align with agreed Service Level Agreements (SLA) or existing performance. This reflects both the logic of service quality

⁸³ SYSTRA, *Aggregate Benefit Value Study*, March 2019

⁸⁴ Accent, *H7 Service Package Choices, Research*, November 2019

targets and that these services and SLAs are not wholly in our control. For the new baggage departures measure (% of departure bags delivered) we have set a target of 99% to align with the existing arrivals baggage system availability measure.

Our strategic options do allow some flexibility to set higher targets if investment is included in the 'Prioritising Service' option. These proposals are outlined below at 3.3. Consumers also give a clear sense of where they might prioritise extra investment in service. Our WTP research clearly ranks relative priorities. WTP research does have its limitations and needs to be cross-referenced with other insights. However, it helps to indicate where we might prioritise more stretching targets.

Service Choice

The WTP research we undertook shows that consumers are prepared to pay significantly more to get higher levels of service.⁸⁵ A choice set of 15 improvements was presented to respondents that could potentially increase their airfare by around £20. The results of this research were used together with valuations from WebTAG to identify the monetary value to consumers of improvements to a range of measures. These valuations were applied to a package of potential service improvements to calculate the cost benefit ratio of the improvements. This showed that improvements in some areas would be supported by consumers' willingness to pay

To further validate consumers' willingness to pay more for a higher level of service we undertook choices research. This examined consumers preferences for different speeds of expansion and different levels of service. In one option the higher levels of service lead to an increase in the airport charge of £1, in another it led to an increase of £2. The results of this research showed that twice as many respondents preferred options with higher levels of service than the current level. This confirms that consumers are willing to pay £1-£2 more for improved service at Heathrow.

A potential choice for improved service is set out in Chapter 3 – H7 Plans and Choices. This sets out some potential interventions that would deliver improvements in punctuality, wayfinding, ambience and communication. We consider that this additional service package, which we refer to as the 'Prioritising Service' option, appears to be supported by consumers' willingness to pay more for higher levels of service. As noted above, stretch targets linked to this additional service package are set out below.

3.2 Proposed H7 Targets

Error! Reference source not found. below sets out our targets for the first five years of the H7 period based on 'Prioritising Savings' option. We propose to review the measures and targets periodically during the 15-year H7 period as set out in Chapter 14 – Regulatory Framework. This would ensure that the SQRB is continuously improved to reflect consumer outcomes.

Table 14: Proposed service targets for 'Prioritising Savings'

No.	Measure	H7 target
1	Lifts, escalators, travellators availability	99.00%
2	Terminal 5 Track Transit System (TTS) availability - one train target	99.00%

⁸⁵ Systra, *Heathrow Airport Customer Valuation Research*, November 2018

No.	Measure	H7 target
3	Terminal 5 Track Transit System (TTS) availability - two train target	97.00%
4	Arrivals Baggage - arrivals carousel availability	99.00%
5	Pier service – % passengers accessing pier served stand (excl T5)	95.00%
6	Transfer search – % queue times < 10 mins	95.00%
7	Central search - % queue times < 5 mins	95.00%
8	Central search - passengers waiting < 10 mins	99.00%
9	Staff search – % queue times < 10 mins	95.00%
10	Control posts search - % vehicle queue times < 15 mins	95.00% ⁱ
11	Stand Entry Guidance (SEG) availability	99.00%
12	Stands availability	99.00%
13	Jetties availability	99.00%
14	Fixed Electrical Ground Power (FEGP) availability	99.00%
15	Pre-conditioned Air (PCA) Availability	98.00%
16	Runway Operational Resilience	As per Q6 licence
17	Cleanliness passenger satisfaction	4.00
18	Wayfinding passenger satisfaction	4.10
19	Seating passenger satisfaction	3.80
20	Wi-Fi passenger satisfaction	Monitor only
21	Security passenger satisfaction	Monitor only
22	Passengers with Reduced Mobility (PRM) satisfaction	4.00
23	Departures Baggage - % bags delivered to output	99.00%
24	Immigration non-EEA queuing time (< 45 mins)	95.00%
25	Immigration EEA queuing time (< 25 mins)	95.00%
26	Departures punctuality - % flights depart off stand < 15 mins	80.00%

ⁱ The target for control posts may be revised once the final definition is agreed.

3.3 Strategic Options and Targets

The 'Prioritising Service' option includes investment for service enhancements identified from our consumer engagement. These would allow us to:

- Implement leading products such as automation - improving punctuality and baggage performance,
- Improve the airport environment - which would reduce the potential for crowding,
- Improve service and implement more next generation digital communications – improving passenger satisfaction in ease of getting around.

This package could also allow Heathrow to target higher service quality regulatory targets for four measures. These targets are shown in Table 2 below. Without the additional investment, there is no way to deliver the enhanced targets.

Table 15: 'Prioritising Service' targets for enhanced choices

	Base case target to 2026	2022	2023	2024	2025	2026
Departure Punctuality	80%	80%	80%	81%	81%	82%
Cleanliness passenger satisfaction	4.00	4.00	4.05	4.05	4.05	4.05
Wayfinding passenger satisfaction	4.10	4.10	4.15	4.15	4.15	4.15
Seating availability passenger satisfaction	3.80	3.80	3.85	3.85	3.85	3.85

4. Incentives

Once targets are set the regulatory incentives need to be designed. We propose some change to Q6 incentives to sharpen the commercial rationale for service delivery for Heathrow.

4.1 Approach

Error! Reference source not found.4 illustrates the approach we have used for H7 to determine our incentive structure and is based on best practice seen in other sectors. Details of our approach are set out Annex 46 – Measures, targets & incentives Annex. The key principles are that for passenger experience measures, incentives should reflect consumer insights and that outperformance should be incentivised, particularly in areas where consumers value better performance

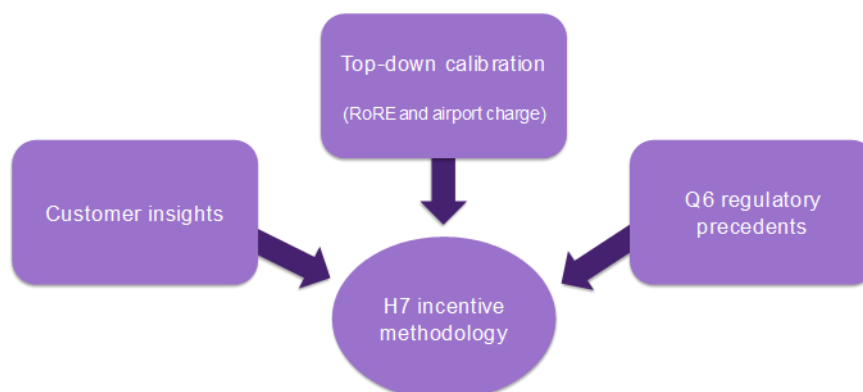


Figure 34: Approach to determining incentives

We approached incentives in three steps; identifying whether targets should have reputational or financial incentives, identifying the appropriate incentive rate for financial incentives and identifying the appropriate structure for the incentives.

4.2 Proposed Incentives by Measure

We have adopted reputational incentives for measures where performance is not wholly within our control, or they do not have established targets or where we do not have historical performance data against which to calibrate. **Error! Reference source not found.** sets out those measures with reputational incentives.

Table 16: Measures with reputational incentives

	Measure	Reason
20	Wi-Fi availability satisfaction	Not wholly in Heathrow's control
21	Security satisfaction	Incentive duplicates security queue measure
22	Passengers with Reduced Mobility (PRM) satisfaction	Not wholly in Heathrow's control
23	Departures Baggage - % bags delivered to output	SLA proposed as part of Baggage ORC
24	Immigration waiting time for EEA	Not in Heathrow's control
25	Immigration waiting time for Non-EEA	Not in Heathrow's control
26	Departures Punctuality	Not wholly in Heathrow's control

The Q6 SQRB incentive scheme includes rebates and bonuses that were largely based on Q5 precedent and did not take account of WTP consumer valuations.

Therefore, where we have consumer valuations we have used them to calibrate the incentive rates. This applies to wayfinding, cleanliness and seating availability. In these cases, the valuations suggest incentive rates that are multiple times higher than the Q6 rates. Given the uncertainty in WTP research, we have adopted a conservative approach and propose to limit increases to no more than twice the Q6 rates. This reflects the consumer research which indicates that consumers place a higher value on these aspects but also ensures that we do not diverge too much from regulatory precedent. It also ensures that the balance of incentives between different measures is not skewed too much towards satisfaction measures.

Where we do not yet have robust consumer valuations for measures we have retained the Q6 incentive rate.

The proposed incentive rates are set out in **Error! Reference source not found.** below.

4.3 Structure and Level of Incentives

The third key consideration for proposed incentives is their structure. Most simply this is whether to use a knife-edge or sliding scale approach. Figure 5 illustrates the difference between the two approaches. The Q6 SQRB design structure included a knife edge approach for all financial rebates. The drawback of a knife edge approach is that once a company has not met the target there is no financial incentive to improve performance for the remainder of the month, and for every additional unit of underperformance it would face no further rebates.

We consider that every unit of performance should count, and we should pay increasingly larger rebates if our performance was to worsen. Similarly, every unit of outperformance should be rewarded. We will test this with consumers through acceptability testing in 2020. The proposed approach is in line with regulatory best practice (for more detail, refer to Annex 46 – Measures, Targets & Incentives Annex).

For example, this is the approach supported by the latest outcome delivery incentives designed for the PR19 price control in the water sector and RIIO 2 in energy. For H7 we have therefore used a sliding scale approach to payments for under and over-performance. Note that for measures where performance is close to 100% we can only be rewarded with bonuses at a level of 100% as it is not possible to apply a symmetrical sliding scale.

Example measure: Cleanliness satisfaction

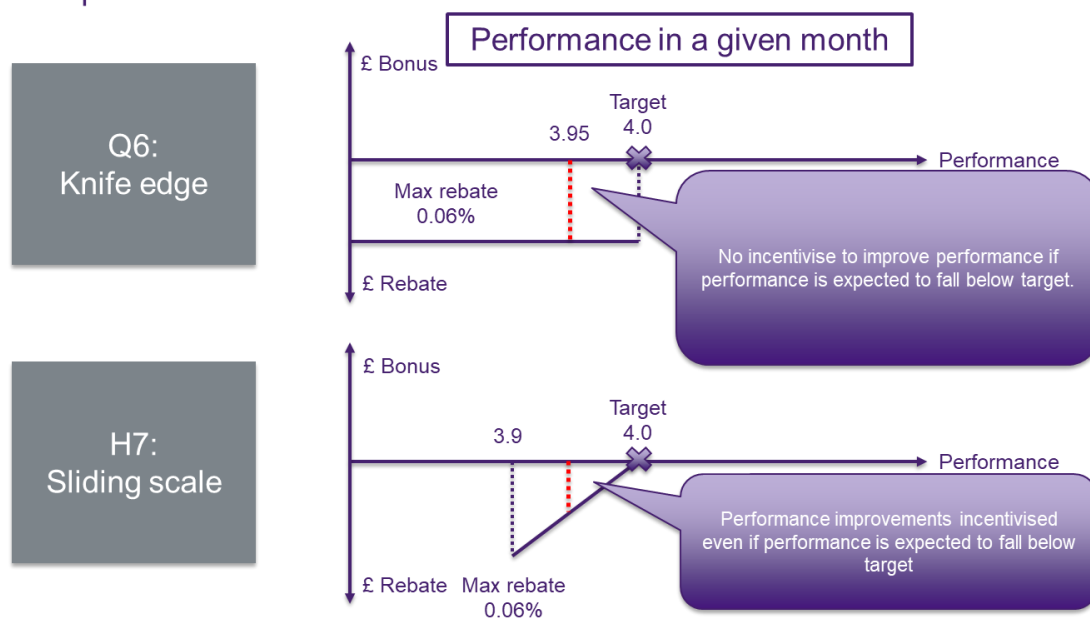


Figure 35: Knife edge versus sliding scale financial incentives

Another factor for the proposed incentives is whether they should be rebate only or include bonuses as well as rebates. The Q6 SQRB incentive structure included bonuses for only four measures with all the other measures being rebate-only.

For H7 we consider that in principle it is appropriate to include the ability to obtain bonuses for all measures. This is because primarily consumers clearly value improved performance in many areas, so our incentive scheme should reflect this. This is reflected in our choices research and WTP aggregate benefit study⁸⁶. Whilst it will be challenging for us to maintain performance against current targets it is appropriate for us to have incentives to improve performance if we can find innovative and cost-beneficial ways of doing so.

Secondly, this structure reflects regulatory best practice. Regulators in other sectors including Ofwat and Ofgem, have encouraged the inclusion of bonuses to provide an additional spur to innovation and improvements in performance.

We have designed the incentive structure so that a rebate is due if performance falls below target. The rebate increases as performance deteriorates until a rebate collar is reached. If performance falls below the rebate collar the rebate does not grow any further.

For bonuses however, we have included a deadband above the target. It is only if performance exceeds this deadband that Heathrow would start to earn a bonus. This ensures that we only receive bonuses for delivering exceptional performance. As for rebates we also include a bonus cap. If performance improves above the cap, then the bonus will not grow any further.

Figure 6 illustrates the proposed incentive structure.

Example measure: **Cleanliness satisfaction**

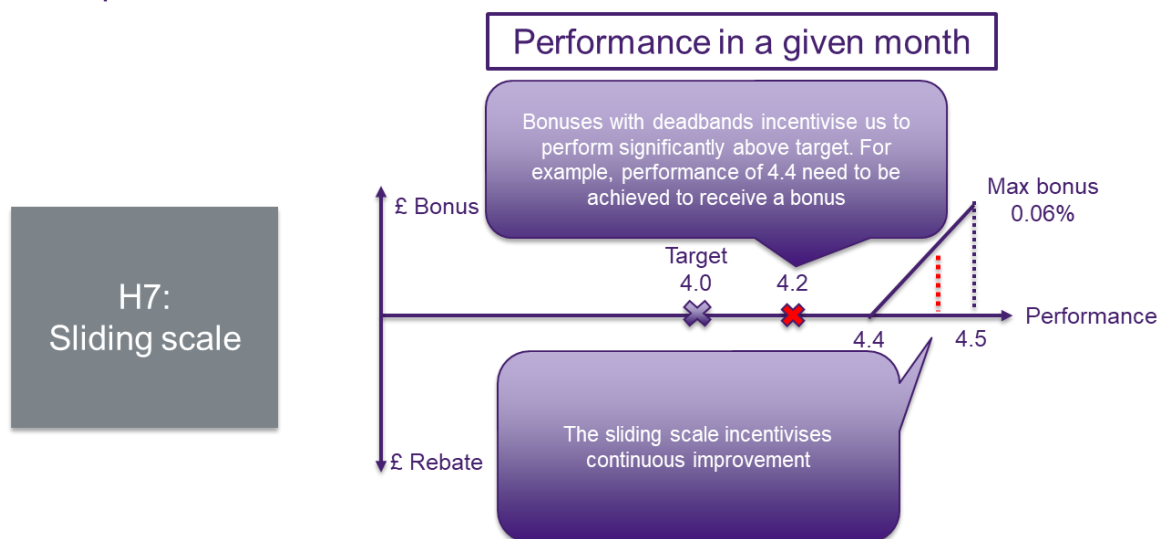


Figure 36: Incentive structure

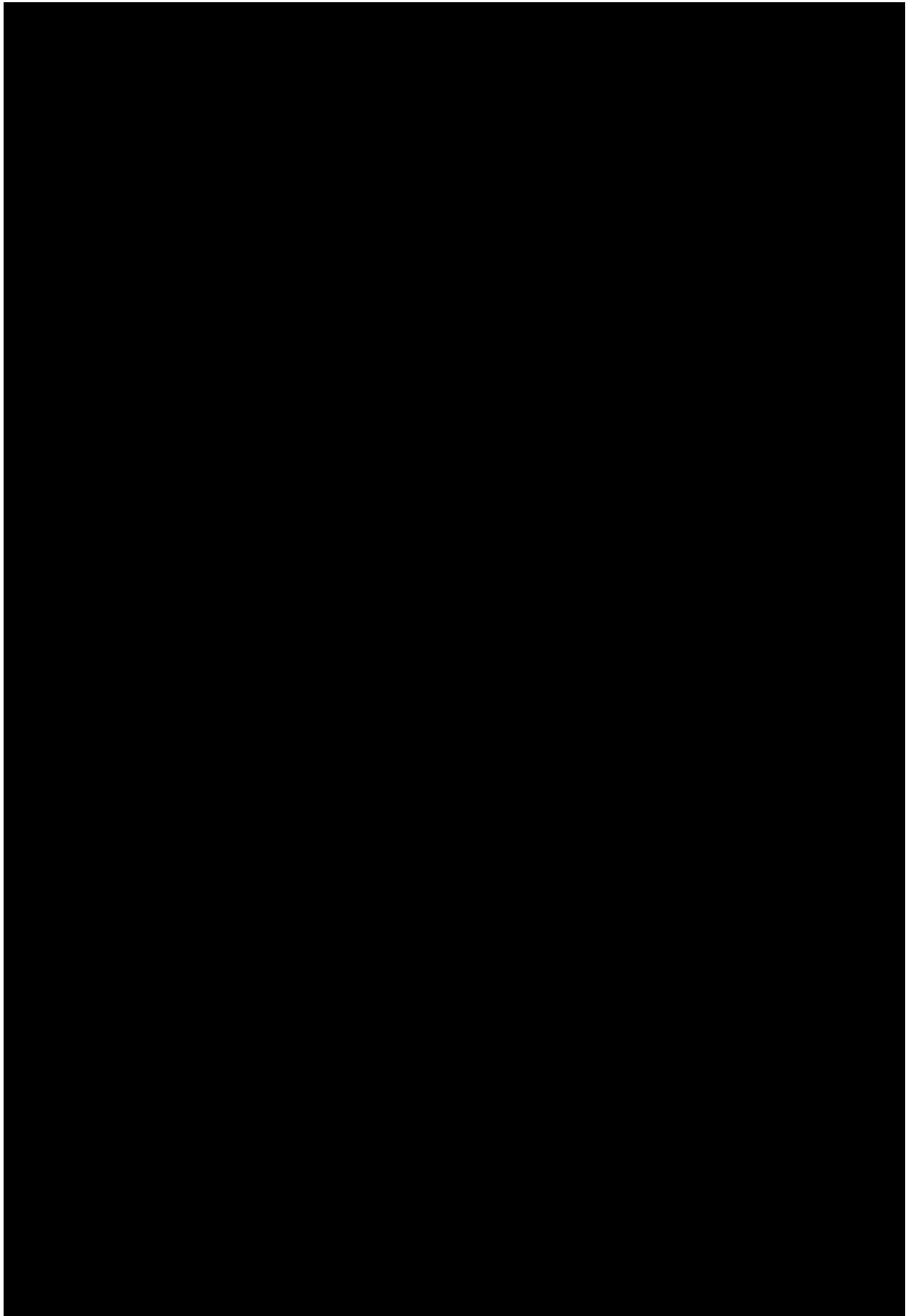
Seven measures have proposed targets at 99%, and one at 98%. For these measures we have set the bonus deadband at 100%.

Some of the measures, e.g. staff search and control post queue time, are not immediately visible to consumers. However, they measure aspects of our performance that are important to airlines and key to delivering important outcomes to passengers. For example, queues at staff search could lead to delays to departures. In addition, airlines tell us that these measures are key to them for delivering their services to consumers. Therefore, we have included bonuses for these despite the indirect relation to consumer experience.

We propose performance will be compared to target monthly at terminal level (apart from control posts which will be a campus wide average of all queue times captured) with rebates and bonuses determined for each terminal or control posts as a whole. Rebates would be potentially triggered every month of the year. This is a change from Q6 where there was a maximum of 6 rebates per year. This helps to ensure that performance is incentivised equally throughout the year. Rebates would be paid monthly one month in arrears of assessing the performance. Bonuses would be incorporated into the airport charging mechanism as for Q6.

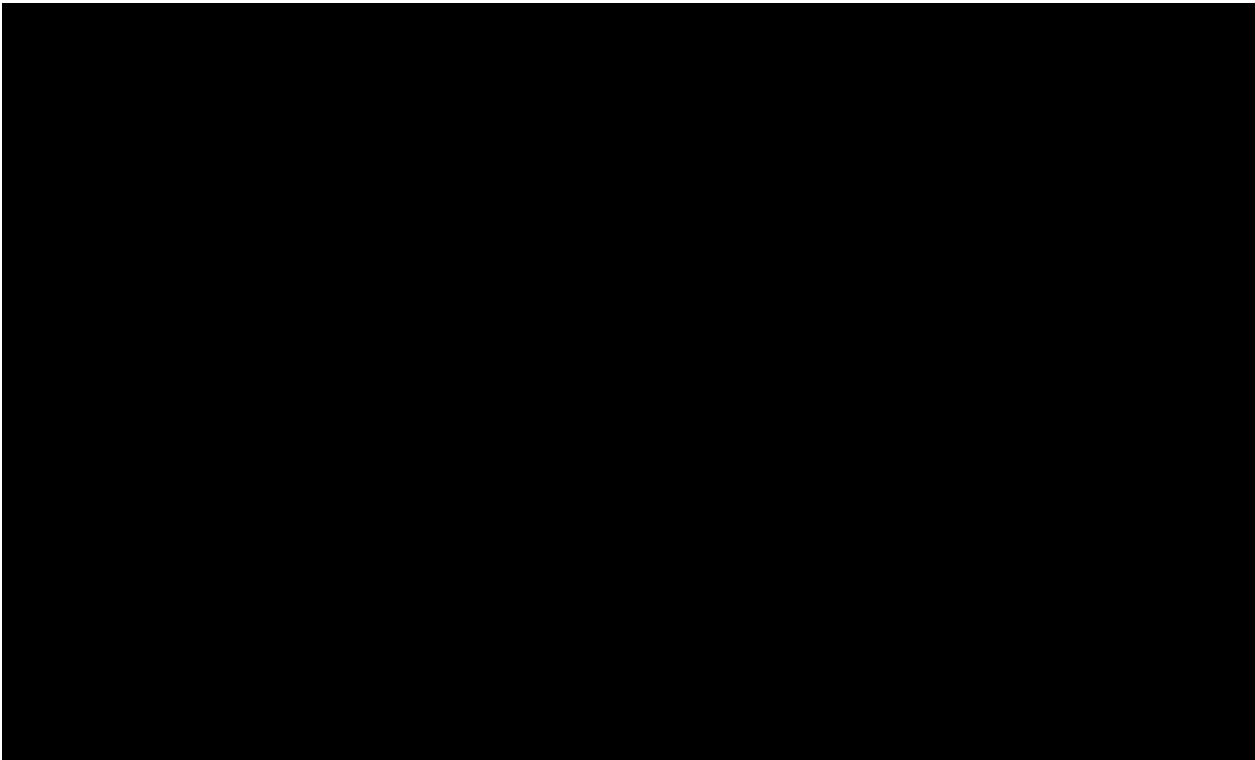
We are proposing incentives that lead to a maximum upside/downside range [redacted] of aeronautical revenue. Performance will be assessed at the terminal level and the maximum rebates and bonuses will be scaled to reflect the differences in terminal sizes based on actual outturn data for the relevant month of performance.

Incentives are summarised in Table 4 and the range of outcomes in Figure 7.





The maximum rebates we could pay in a given year amount to [REDACTED]. This is shown below. However, we stress that these maximum figures are not very likely. Achieving the maximum downside would involve us failing all measures in every single month in every terminal, which we believe is unlikely, and some rebates may be offset in part by bonuses earned elsewhere. Likewise, we would need to earn bonuses in every single month on every measure in every terminal to achieve the maximum. The outturn outcome will likely lie somewhere closer to the middle.

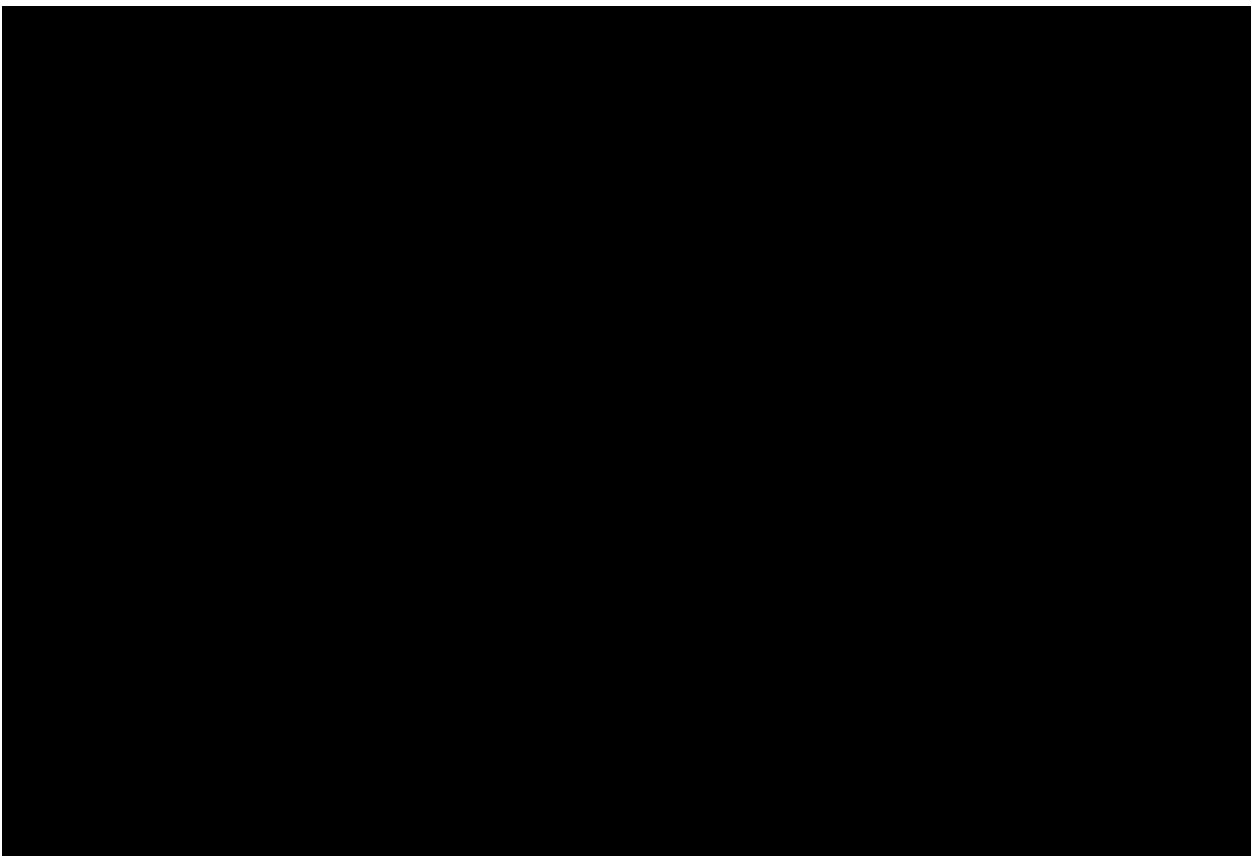


Source: Heathrow

Figure 37: Q6 versus H7 impact of financial incentives in terms of Airport Charges

We have also expressed the upside and downside as a return on regulated equity (RoRE). This gives an indication of the impact and relevance of our proposed approach for shareholders and its impact on our shareholders. This of course shows only the impact of these formal incentives, not the total RoRE variance of the settlement or risk taken by investors which is significantly greater and provide strong incentives as well. As shown below:

- The upside amounts to a [REDACTED]
- The downside amounts to a RoRE downside of [REDACTED] - down [REDACTED] during Q6. The RoRE downside is smaller than in Q6 even though the downside expressed as part of the airport charge has increased. This is because the inputs to the RoRE calculations (e.g. regulated equity) also change between Q6 and H7. We also present the hypothetical RoRE range for H7's incentive structure if the regulatory equity had remained constant from Q6. This exercise confirms that the RoRE impact of H7's incentives would be larger than the previous incentive structure in Q6, however this is presented solely for illustrative purposes. As regulatory equity is expected to increase significantly over the H7 period, the impact of H7's incentive structure on the RoRE is diminished.



Source: Heathrow

Figure 38: Upside versus downside impact of financial incentives in terms of RoRE

We have also compare the RoRE impact of our proposed financial incentives to that under similar approaches in other regulated sectors. In the water sector, companies' RoRE impact of similar service quality financial incentives varies and tends to be in the region of -2% to +1%, suggesting that our proposed approach is broadly in line with regulatory precedent in water. Similarly, for RIIO-GD1, the RoRE impact was around -1% to +1%. Again, this highlights that our proposed approach brings us in line with companies in other regulated sectors, unlike the Q6 approach.

5. Further Development and beyond 2026

Consumer priorities evolve rapidly and the expansion period will see new pressures and opportunities at the airport. We therefore think that the SQRB/outcomes incentive regime should become more flexible and evolve more quickly over time. We would ideally see changes in measures and the incentives mechanisms steadily over the years rather than await a potential 5-year reset. In any case between 2022 and 2036 we can expect at least two to three reviews.

Our insights identified some measures of success that could give us useful insight on how we are performing against our outcomes but which we cannot currently introduce because they are not clearly defined, not tested or it is unclear whether they would be cost beneficial. Examples include real time information about onward travel, ease of access to and from the airport and more choice of flights and destinations.

We want to continually improve our approach and ensure measures keep evolving with changing consumer preferences. We will work closely with consumers and our stakeholders to innovate, learn and adapt our approach to performance monitoring. Our approach pushes the boundary on regulatory best practice as similar issues arise in other sectors. For example, in the water sector innovation regarding measures has been limited between PR14 and PR19 as companies generally have used metrics that already exist. Unlike these sectors we will not wait until the next price control to update our measures. In Annex 46 – Measures, Targets & incentives Annex we set out our approach to designing, costing, testing and setting targets and incentives for such measures. We will discuss the governance and timescales for introducing such measures during Constructive Engagement.

For H7 we propose to continue with the current approach for airline facing measures. However, for passenger facing measures, we propose to engage consumers, CCB and airlines on a new approach for rebates. The Q6 SQRB mechanism operates such that in the event of underperformance, Heathrow pays rebates to airlines and in the event of outperformance, any bonuses that Heathrow receive are paid for via airlines. This process seems reasonable for the measures which impact directly on airlines, such as stand entry guidance, but we have been challenged by our CCB to consider the mechanism for consumer facing measures. We will engage consumers on whether they view it fair and reasonable that rebates for under performance of passenger-facing measures, such as cleanliness and wayfinding are paid to airlines and whether they would like rebates to be directed elsewhere.⁸⁷

Practical considerations will need to be considered. Ideally perhaps Heathrow would pay rebates to the passengers who actually experienced the lower levels of service quality at the time the underperformance happened. This would be akin to the lateness rebates offered to passengers in the rail industry. But it could be administratively costly and complex to identify those specific passengers. It could be simpler to pay out rebates to all future passengers in a particular month, even though we recognise that most of these passengers would not have experienced the service deterioration at the time. While this approach has its limitations, there are parallels between this and our current approach – i.e. in the event of a service failure, we pay a rebate out to all airlines in a terminal at a later point in time, regardless of whether they were impacted by the service failure or not. A third option seen at some other European airports, such as Copenhagen, is for such rebates to be put into a fund to drive direct improvements that benefit passengers. A brief for engaging consumers on potential mechanisms will be shared with airlines and CCB in Q1 2020.

⁸⁷ As Heathrow is capacity constrained there is minimal pass through of rebates/bonuses to ticket prices. If the rebates were passed on, ticket prices would fall, and demand would increase, but as there is no capacity for extra demand ticket prices would not fall. For this reason, passengers can only truly benefit if the current mechanism changes.

7 - PASSENGER FORECASTING

Overview

- Passenger forecasts are inherently uncertain yet fundamental to delivering consumer benefit, planning efficiently and the economics of the regulatory settlement
- We have comprehensively reviewed our forecasting model with independent input to build on the improved accuracy of the Q6 models with refreshed, robust assumptions
- The main driver of growth is lifting the constraint of the 480,000 ATM cap – first with 25,000 ATMs in Early Growth and then releasing 24,000 ATMs p.a. after a new runway. We model a range of forecast outcomes. Our central case sees growth rising from c1% p.a. now to c.5% for 6 years after the runway opens
- We use the P70 forecast for our ‘Prioritising Savings’ option and the P40 for the ‘Prioritising Service’ option based on their relationship to physical capacity and airline strategies. Growth rates are heavily influenced by airline strategies, which have tended toward yield rather than volume at Heathrow. Achieving global average aircraft seat densities and load factors alone would increase passengers by c.7m per year from the current 80.1m today, effectively reducing the charge by 8% or close to £2 (2019 prices), a material amount in the context of affordability, delivered by airlines through operational changes and choices within their control
- We propose both triggers on key stages of slot release and potentially more sharing of the benefits of traffic growth to manage the uncertainties in the 2022 to 2036 forecast

1. Introduction

In this chapter we set out our approach to passenger forecasting at Heathrow in 2022 to 2036. We provide details of Heathrow’s passenger growth in Q6 and discuss the drivers for passenger growth. We set out our methodology for the 2022 to 2036, capturing learning from Q6 and reflecting the increased capacity which will become available at Heathrow. We provide our passenger forecasts for Q6, presented as ranges around a central case.

Passenger forecasts are an integral part of our Initial Business Plan (IBP). Passenger numbers determine the total benefit gain from using Heathrow. Passenger forecasts drive our operational cost, commercial revenue and capital expenditure forecasts, and inform our passenger service quality targets. The forecasts also support stakeholders in optimising their use of the infrastructure. Passenger forecasts are also directly linked to airport charges per passenger.

This section sets out the drivers of passenger volumes in Q6 and H7, our forecast methodology and the summary outputs generated for our IBP.

1.1 Our outcomes and the passenger forecast

The number of passengers we serve directly links to our outcomes. The most direct link to a specific outcome is that faster growth delivers the outcome of ‘more choice of flights and

destinations'. Passenger volumes also directly link to the aggregate value delivered across our other consumer outcomes – the more people we serve, all else equal, the more consumer benefit. Of course, not all is always equal, more passengers can put pressure on our other outcomes such as pressure on resilience, crowding, process times and many other dimensions⁸⁸. Changes in passenger volumes also impact positively or negatively on our stakeholder outcomes. Higher volumes may increase airline opportunities, deliver lower airport charges and create more economic opportunities for communities for example. Conversely higher volumes can make environmental impacts more challenging to mitigate or funding from investors more demanding.

It is not just the number of passengers. Accuracy of the forecast itself also affects how well we deliver the outcomes. A more robust forecast means a better infrastructure investment plan, better operational delivery and more efficient environmentally managed growth at any level of volumes. Doing all of those better will improve our delivery of each of the six consumer outcomes.

1.2 Consumer factors in passenger volumes

Passenger volumes are a result of the most fundamental consumer choice of all – whether to fly and which airport to use. In addition to considering impacts our forecast can have on our delivery for consumers, we need to think about what is determining consumer choice to fly via Heathrow⁸⁹.

Air travel connects people across the globe. Passengers have many motivations for travel ranging from business trips to holidays or visiting friends and relatives. Speed, safety and comfort are just some of the reasons passengers choose to travel by air over other modes of transport. Air travel remains an attractive choice. We also know that even modest economic growth, even at high income level, increases consumers' propensity to fly. Cost also plays a role. The airfare tends to be more significant for leisure passengers who generally have greater flexibility in when and where they fly. Business travellers tend to be less price sensitive. Consumers tend to pick direct flights over changing planes but will transfer for reasons of total cost or if there is no direct option. Thus, transfer passengers also tend to be more price sensitive.

How consumers book travel has changed considerably. It is no longer necessary to visit a travel agent on the high street or call an airline directly. Consumers compare thousands of itineraries and routes in seconds online to find the best price and most convenient option⁹⁰. This transparency has sharpened competition – between modes, between airlines and between airports. Each consumer has different needs when booking, influenced by budget, reason for travel and experience. But all consumers need a choice of airport, airline and route that achieves their travel plans. Our research highlights the consumer factors in choice of airport, the top three of which are:

- Enabling good value and affordable travel; ██████████ say they are more concerned with finding a good value offer than finding the cheapest price in air travel⁹¹
- Offering the right routes at suitable times
- Providing easy access from where the passenger lives or is travelling to

This reinforces the importance of our outcomes around 'a choice of flights and destinations' and 'access to the airport' when consumers are booking. This is particularly true for Heathrow as a hub

⁸⁸ Those who have experienced disruption give consistently lower ratings across the entire journey experience. The most commonly cited disruptions are crowding and long queues at the airport, delays once boarding prior to take-off and delays of up to 2 hours. A third (32%) of those who experienced a disruption were not informed of the reason for this (CAA Consumer Tracker, 2017)

⁸⁹ ██████████ consider another airport when booking flights to or from Heathrow – H7 Service Package Choice Research

⁹⁰ "Generally, with airports I look on Skyscanner, search for the whole of the UK and then go down. If East Midlands is the cheapest, I'll go for that" - Coach and Airports Research Debrief June 2018.pdf

⁹¹ Final Literature Review 2017

airport. We must ensure that Heathrow is able to offer the right flights, with the right carriers at the right fares. Our transfer passengers have many alternatives in the UK and at other European, US and Middle Eastern hub airports that a consumer can choose. Our direct passengers too have increasing consumer choice across the South East Airports. For example, with Heathrow capacity constrained, airlines have grown at other London airports – in 2019 a London based consumer could travel to 10 cities in the United States from London airports directly with many more indirect options.

The service Heathrow provides also forms part of the decision to choose us in the future. Consumers must be able to trust that the airport will deliver for them, which includes elements of safety and reliability. In particular, consumers want to trust they can travel without delays and cancellations. One of the advantages to passengers of flying from Heathrow is the frequency of flights to destinations – both daily services throughout the year and multiple services on any day. This provides business travellers in particular with enormous resilience for their travel plans, in the event of travel disruption; as well as flexibility in changes to their plans. There is evidence that previous passenger experience of an airport (e.g. the airport environment and facilities) can have a significant influence on booking decisions, demonstrated by the fact that more than 60% of the 80 million passengers we served in 2018 visited Heathrow on more than one occasion. This means that in order to ensure we are able to grow our passenger numbers in the future, we need to provide an excellent airport experience and make consumers excited about travelling with us.

1.3 A new period of growth

Heathrow's passenger volume growth has been lower than other hub airports in recent years – averaging 1.3% since 2005. This can be directly traced to the air traffic movement capacity constraint which started to affect growth from the early 2000s. The period of this business plan looks forward to new capacity through the 2020s. Our forecast thus aims to reflect this new capacity, and the increased volatility and uncertainty that could come with faster growth.

Current predictions are that world demand for air travel is expected to increase, particularly from emerging economies. This means that there will be additional demand adding to the current unfulfilled demand from consumers to fly from Heathrow. Therefore, we are confident that with the right infrastructure and mix of airlines going forward Heathrow will see faster growth to 2036.

Our central forecast predicts 1.3% growth to runway opening, a 5-6 year period of faster growth at 4.4% and then ongoing growth of 1.8% to 2036. Importantly this level of growth is well above Heathrow's experience under constraint and underscores the higher expansion demand risk. Two crucial factors in the forecast are the timing and scale of release of new slots pre-opening (the 25,000 ATM 'Early Growth') and post runway opening. The environmental growth framework created by planning consent will influence the rate those slots are used and the UK's slot policy. Commercial considerations for airlines will also play their part in deciding the rate at which Heathrow capacity fills. These factors all introduce uncertainty to the forecast. Given the wide range of factors and uncertainty around each, we have produced a ranged forecast based on factors with the strongest proven statistical impact on passenger numbers.

2. Q6 trends

Global and European air travel have both seen steady growth of 7% per year since 2013. Demand has broadly increased in line with global GDP growth, with the world economy consistently experiencing positive growth since the 2008/9 global financial crisis. Emerging economies particularly have seen significant overall growth and increases in relative per capita wealth. That has meant they have become a large part of global aviation demand. We have worked collaboratively with airlines to help unlock these new markets through our network development strategy, for example Heathrow offers flights to 13 Chinese destinations in 2019, up from 4 in 2013.

Passengers served during 2013-18
Passenger volume (Millions)

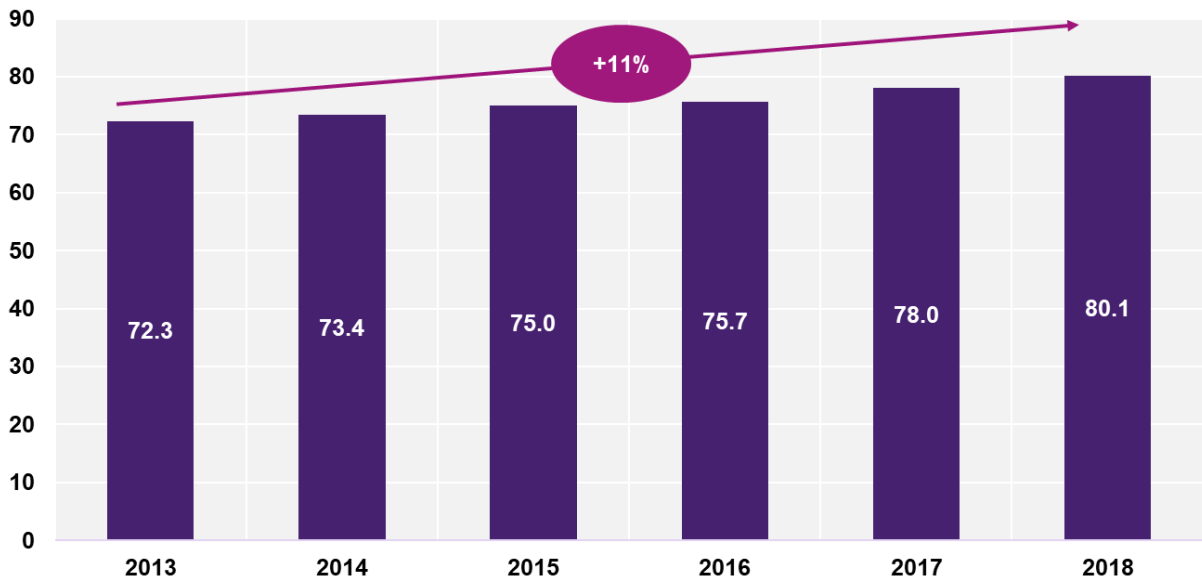


Figure 39: Heathrow passenger volumes for 2013 to 2018

Heathrow's growth since 2013 has been lower than global rates at 2.1%. Heathrow's Air Traffic Movements (ATMs) have been legally capped at 480,000 per year throughout. Over Q6, Heathrow growth has thus lagged behind the other London airports, European competitors and global competitor hubs.

Heathrow's ATM Utilisation
Utilisation (%)

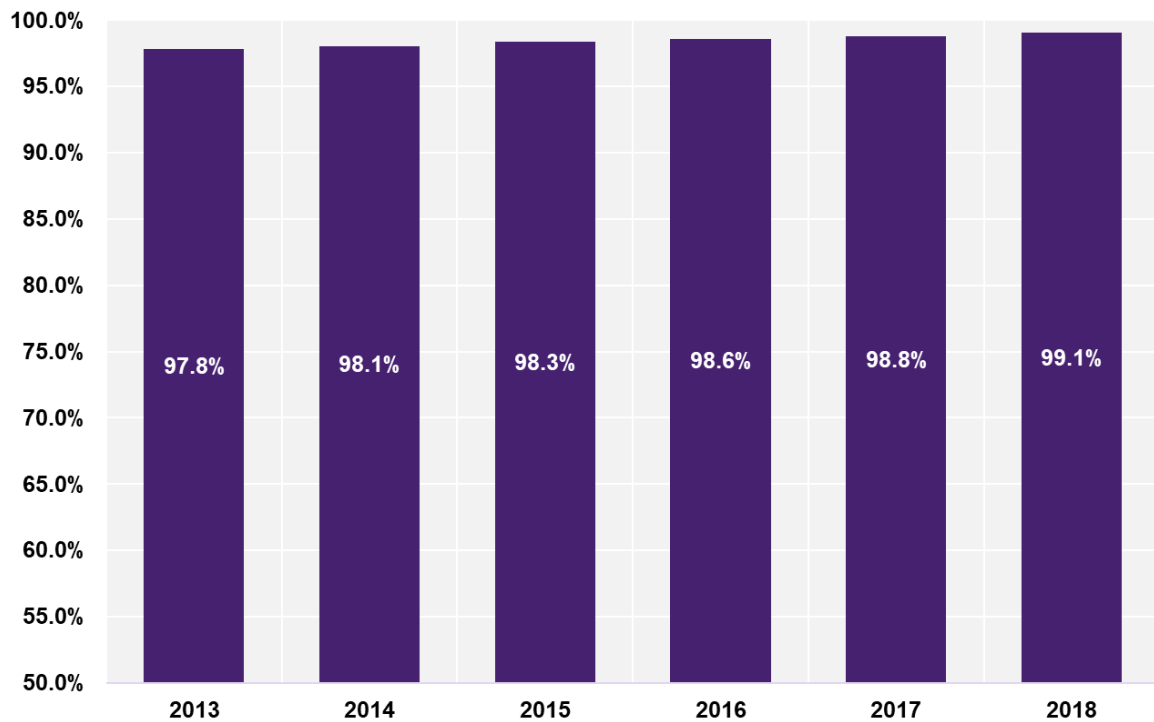


Figure 40: Heathrow ATM utilisation of the 480,000 cap

Operating at over 98% of the ATM limit during Q6 has clearly limited the growth at the airport, resulting in consumers having to travel from other London airports and further afield. This has led to the other London airports growing by almost three times the rate seen at Heathrow. Amsterdam, Frankfurt and Paris have also benefitted from the slot constraint at Heathrow, with airlines growing long haul services at these airports instead, which fundamentally means the UK as a whole is missing out on the economic benefits offered by these routes.

Heathrow passenger growth
Indexed growth (2013 = 100%)

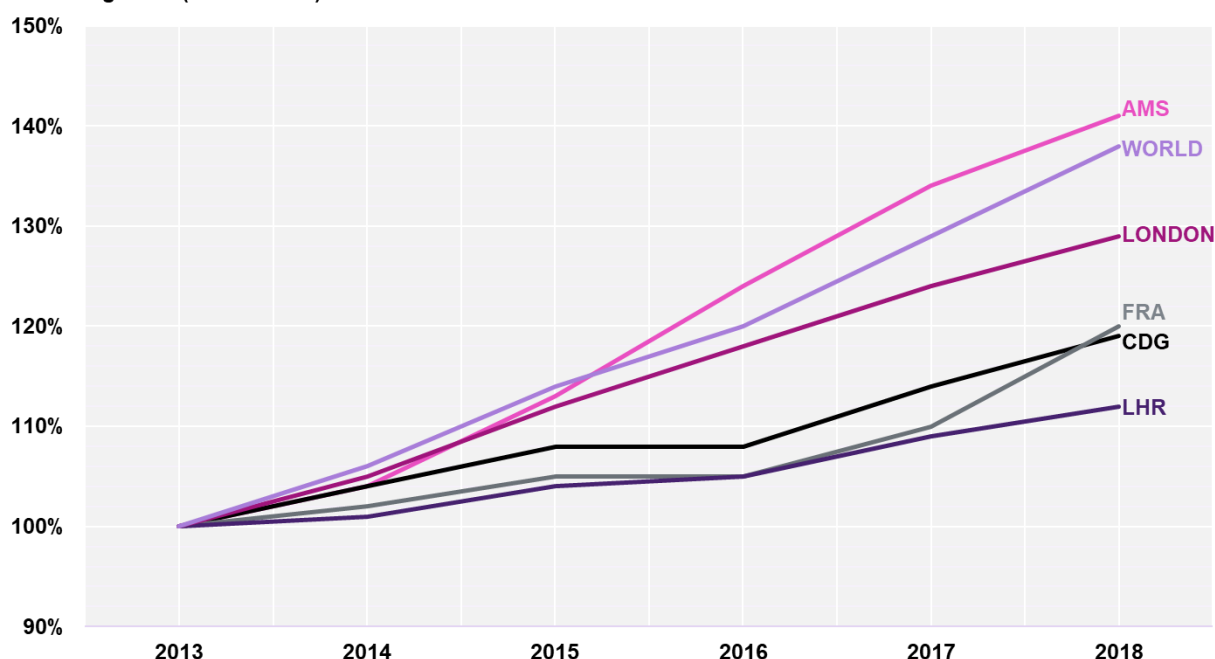


Figure 41: Indexed passenger growth at Heathrow and comparator markets from 2013 to 2018

Nevertheless, Heathrow did serve a record 80m passengers in 2018. The largest growth markets since 2014 have been Europe, the Middle East, North America and East Asia. Heathrow has launched incentives over the course of Q6 to maximise the use of the limited capacity and drive growth in other ways. These have included incentives for transfer and domestic passengers, residual slot use in quieter seasons, new route support and the iH7 volume discounts.

The evolution of passenger volume metrics in Q6 is shown below. We next discuss the trends in each metric.

Q6 Passenger volume metrics

Table 18: Heathrow metric growths from 2013 to 2018

Metric	2013	2018	Total Absolute Change	% CAGR
Movements	469,552	475,624	6,072	0.3%
Seats Per Movement	201.9	212.1	10.2	1.0%
Seats	94,819,445	100,893,342	6,073,897	1.2%
Load Factor	76.30%	79.40%	3.1%	0.8%
Passengers	72,332,919	80,102,017	7,769,098	2.1%

2.1 Movements

Q6 has seen only very limited growth from new movements at Heathrow with only 6,000 ATMs added over Q6. With a limit on ATMs, well-timed Heathrow slot pairs have become very valuable for airlines. Secondary trading of slots and active slot leasing means that these valuable slots are gradually better utilised. The highest price paid to date for a pair of take-off and landing slots at Heathrow was \$75m paid by Oman Air to Kenya Airways⁹². The value of slot pairs illustrates the level of the consumer premium that incumbent airlines are able to achieve at Heathrow. At the same time airlines have a strong incentive to retain Heathrow slots even if load factors are lower or other airlines might make better use of the capacity. Slot constraint has also meant that airlines consistently reviewed their network strategies to increase the number of long-haul flights. These typically use bigger wide-bodied aircraft with a higher capacity.

During Q6 Heathrow launched charging initiatives to encourage airlines to make greater use of slots right up to the 480k ATM limit. This led to a decrease in the number of slots handed back pre-season and increased the number of flights operated at the airport over the course of the winter 2017/18 and summer 2019 seasons. In 2019 Heathrow is thus physically operating at 99.2% of its ATM limit leaving very limited scope to grow passengers through ATMs.

2.2 Seats Per Movement

More seats per movement, combined with the growth in movements themselves, has added over 6 million seats between 2013 and 2018. There was a significant increase in seats per movement up to 2015/16 which has since slowed markedly. The key factors driving seats per movement is airline choice of aircraft and the density choices they make on those planes.

Flexibility in aircraft choices allows airlines to use the right aircraft for the right route and to fly routes that previously weren't viable. This translates into more affordable choices for passengers. Over the last decade, airlines have tended to choose the largest model types for most popular aircraft types, namely the Airbus A320 and Boeing 777. The average A320 at Heathrow now carries an extra 9 seats per aircraft and a 777 carries an extra 22 seats in 2018 versus 2008. Heathrow has also seen growth in the number of flights on A380s from 900 per year in 2008 to over 17,000 movements in 2018. These tend to replace older 747s which on average results in an increase of 166 seats per movement.

Seats per movement saw a period of rapid growth between 2012 and 2016 driven by IAG acquiring bmi. IAG phased out bmi's fleet of Embraers and replaced them with larger A320 family aircraft. The number of flights on regional jets at Heathrow has dropped two thirds since 2008. This was followed by seat densification on the IAG A320 fleet, which grew capacity on these aircraft to low cost carrier levels (e.g. a British Airways A320NEO has 180 seats vs. an EasyJet A320NEO with 186 seats).

Many of the early Q6 fleet changes have now 'washed through'. Since 2016 we are seeing a stalling or even reversal in seat per movement growth. More efficient twin jets such as Boeing 787s and Airbus A350s have led to airlines switching older, larger aircraft for these modern replacements. The remaining 747s are often being replaced with these aircraft – with an average net loss of 60 seats per movement. We have also already seen the replacement of A380s for these more efficient aircraft (e.g., on Malaysia Airlines, Singapore Airlines), with other airlines announcing plans to retire the A380 from their fleet as soon as 2024 (e.g. Qatar). We are confident that A380 movements at Heathrow have already peaked.

92

<https://www.businessstraveller.com/news/2016/03/02/kenya-airways-sells-its-only-heathrow-slot/>

We anticipate that the growth in seats per movement will be modest. In long-haul the switch to smaller aircraft types will largely be offset by flights switching from short-haul to long-haul destinations. This network switch adds c.120 seats per movement on average. In short-haul, there are further orders of larger A320NEOs due to replace smaller A320CEOs with a number of carriers. We also anticipate airlines to continue densifying their short haul fleets to offset the capacity reductions through network switches.

There is also a major opportunity for airlines to grow capacity through densification of their long-haul fleets. Airlines at Heathrow currently operate some of the lowest seat densities by aircraft type in the world, particularly on long-haul aircraft. This is likely driven by a combination of a higher proportion of lower density premium seating and a yield focused choice of aircraft. If aircraft operating at the Heathrow were configured to the global average seating by aircraft type, then the airport would see an extra 11 seats per movement, delivering an additional 4 million passengers in 2018. This alone would have reduced the airport charge by 5% or over £1 (2018 prices).

2.3 Load Factors

At the start of Q6, load factors at Heathrow stood at 76.3%. This was 4% points behind the IATA industry average, which is counter to expectations at a capacity constrained airport and reflects airline preferences to target yield over volume. We have focused on growing load factors over the last 5 years. Working with airlines to shift the balance from yield to volume, Heathrow reached a record average load factor of 79.4% in 2018. This compared to an IATA average of 81.9%. The gap to IATA average load factors still represents around 2.5 million extra passengers a year that Heathrow could serve – which would also reduce the airport charge by around £0.70 (2018 prices). Growing this further and achieving the load factors seen at Gatwick would yield an extra c.8m passenger versus today and reduce the average charge by c.£1.70 (2018 prices).

Heathrow introduced charging incentives and worked directly with airlines to promote routes which has helped deliver lower average entry fares and drive passenger growth. This is particularly apparent on short-haul routes where the average load factor has increased by c.4% points over the last decade. Long haul flights have only seen a c.2% increase in load factors. The commercial deal that Heathrow agreed with airlines for the iH7 period continued the principle of charging incentives for growth.

Until new ATM capacity is available load factors are the most likely way for airlines to grow passenger volumes at Heathrow. Despite the growth over Q6, 1 in 5 seats at Heathrow is still flying empty – which implies c20m empty seats each year. To give another sense of the economic opportunity, filling half of those seats would reduce the airport charge by c.£2.5.

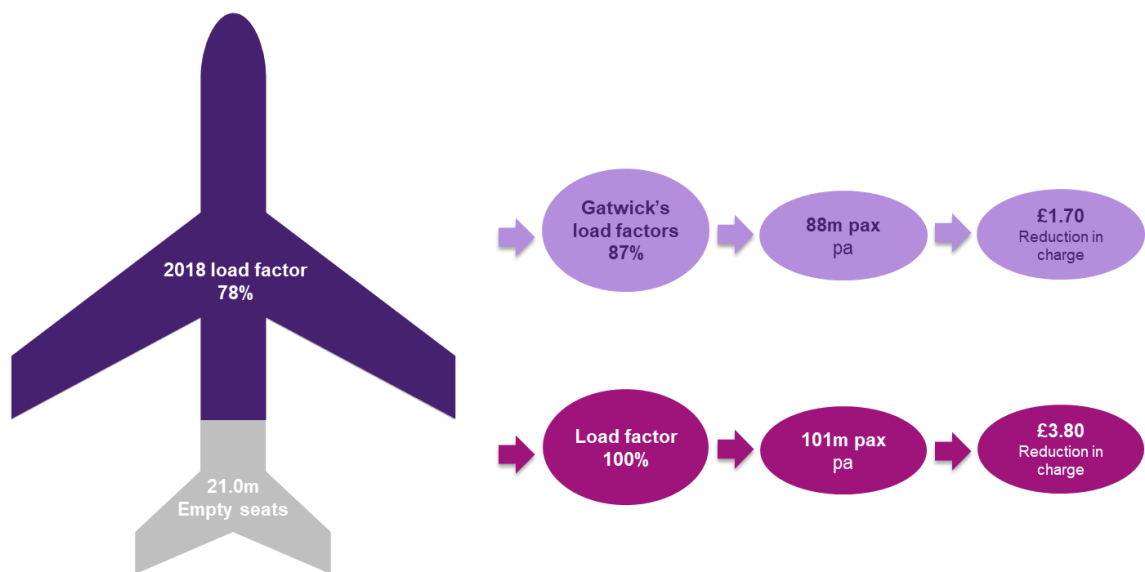


Figure 42: Charge impact from growing load factors

2.4 iH7 and the early 2020s

In Q6 a combination of load factor growth, early growth in seats per movement and using the final few ATMs available up to the limit in subsequent years underpinned steady growth at Heathrow. We are now finding much of the benefit of these trends and initiatives have been realised. We will continue to use incentives and growth initiatives in H7 but we anticipate diminishing marginal returns until Heathrow is either able to offer new ATM capacity and or airlines are able to commercially swing to more volume rather than yield focused strategies.

Worldwide economic growth has been strong and stable over Q6, with generally low oil prices further supporting growth. The near-term outlook is not as favourable. As of later 2019, UK GDP growth is slowing, Brexit and the potential of a US or global recession are looming and increasing oil prices are putting pressure on demand. This has already translated through to lower growth rates in 2019 and most UK and European airlines are indicating cautious capacity plans into 2020. Heathrow's forecasts for the medium term reflect these capacity decisions.

Long term however the evidence suggests demand for air travel continues to grow. Particularly if Heathrow can create the capacity to fulfil this consumer demand, we expect these short-term fluctuations to ultimately return to renewed growth. We thus model future passenger demand for an expanded Heathrow based on the wider context of the demand for air travel.

3. Forecasting future growth

3.1 Observed consumer behaviour

Forecasting passenger demand can either be based on actual travel observed, or through research such as consumer surveys which ask passengers how they think they will behave. The latter is useful in revealing consumer motivations as different types of consumers respond to different drivers in travel.

However, for our primary quantitative forecasts we have used the former approach. At an aggregate level, there are some key external factors we can measure that affect observed air passenger demand – primarily economic growth and changes in incomes. At a macroeconomic level, research consistently shows⁹³ that as incomes rise, the demand for air travel also increases. This effect is particularly apparent in emerging economies with growing middle-class populations.

We have therefore based our forecasts on relating existing passenger data to these external factors. In one approach we relate volumes to changes in GDP, allowing us to understand the relationship between economic growth and the likelihood of air travel. In another we relate volumes to observable airline capacity metrics. Using actual data means we capture passengers’ “revealed preference” rather than their “stated preference”. Actual observed behaviour provides the most robust input for our calculations as it is not artificially skewed by sampling bias present in the survey data. As Heathrow moves from a constrained to unconstrained environment, prediction based on observed behaviour becomes more challenging, but it remains the most accurate forecast we are able to make.

3.2 Q6 methodology

In Q6 we introduced two separate but complementary modelling approaches to forecast Heathrow’s long-term passenger numbers. These included:

- An econometric model – that forecasts the change in passenger 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);
- A capacity supply model – that considers passenger demand from an airline supply point of view and forecasts changes in aircraft movements, average aircraft size (number of seats) and load factors.

These models produced forecasts with significantly improved accuracy versus those in Q5, seeing the error more than halved versus Q5. The early years of Q6 saw significant accuracy improvements, with 2017 and 2018 outperforming the settlement supported by the introduction of growth incentives at Heathrow.

⁹³ <https://www.airbus.com/content/dam/corporate-topics/publications/media-day/GMF-2018-2037.pdf>
https://www.icao.int/sustainability/Pages/Facts-Figures_WorldEconomyData.aspx
<https://www.kfw-ipex-bank.de/International-financing/KfW-IPEX-Bank/Analyses-and-Views/Market-analyses/GDP-growth-and-airline-passengers/>
<https://www.pwc.com/gx/en/capital-projects-infrastructure/pdf/pwc-propensity-to-fly-in-emerging-economies.pdf>

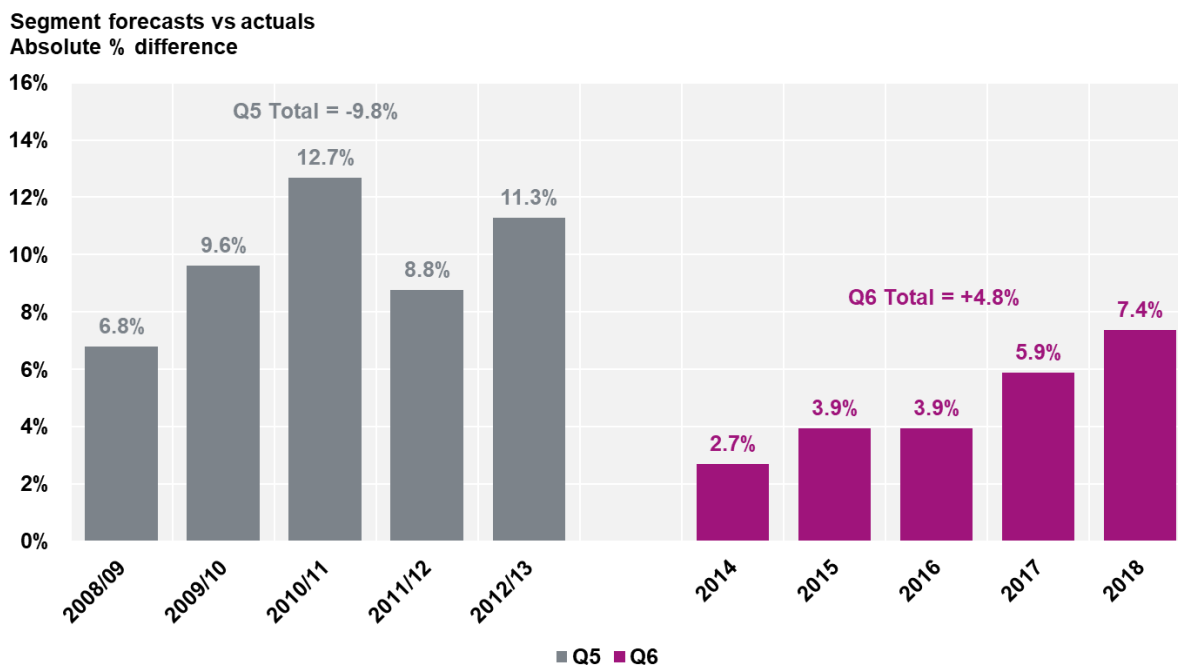


Figure 43: Overview of settlement forecast errors for Q5 and Q6

Both modelling approaches took account of the 480k limit on Heathrow flights and focused on the growth potential through passengers per flight. The prospect of new capacity at Heathrow through expansion means we need new models that lift the ATM limit. This has also allowed us to test and confirm all aspects of the modelling including with third party review. We explain below the model development.

3.3 H7 model methodology review

Our new model brings together the previously separate econometric and capacity models. This builds on the successes of the Q6 models and also takes on board feedback from airlines and the CAA on their performance. We then worked with Steer to carry out a detailed peer review and refine the approach.

For the model methodology definition, Steer assessed what the model needed to achieve and what data inputs are available to do this. Steer has also reviewed Heathrow’s proposed top down econometric and bottom up capacity methodologies and looked at approaches used by other organisations.

Specifically, the model methodology review covered:

- Data inputs – what are the leading and most relevant sources of historical air traffic data and data inputs used by air traffic forecasters.
- Top down forecast methodology – how to fine tune the regressions and how to use alternative approaches to better determine market flow totals and shares.
- Bottom up forecast methodology – advice on the development of the tool to estimate movements, aircraft and load factors, including its potential for scenario overlays.
- Methodologies used by others – a comprehensive review of the most relevant modelling approaches externally by a variety of organisations to ensure that our developed model is based on best practice. This is particularly important in the airports sector where no prescriptive approach for assessing passenger demand exists.

The comprehensive review gives us confidence that Heathrow has designed a robust forecasting methodology based on reliable data inputs, sound mathematical techniques and industry best practice.

3.4 Our new forecast methodology

Our methodology consists of a comprehensive “top down” demand model which assesses total demand available to Heathrow, along with a “bottom up” supply model which accounts for changing airport capacity and anticipated airline responses to these changes. The two link to each other to ensure that supply forecast (and thus forecast passenger numbers) fit within demand envelopes.

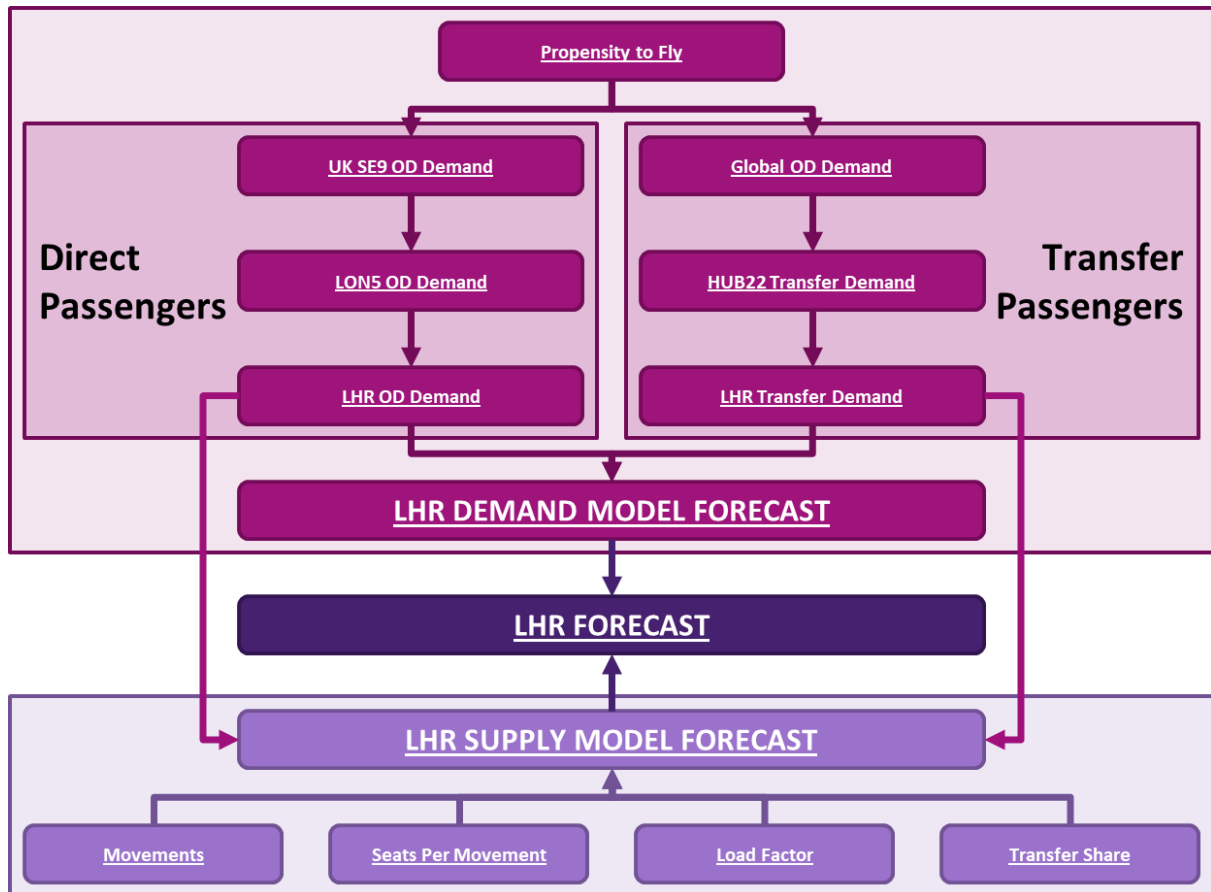


Figure 44: Heathrow forecast model overview

3.5 Demand Model

The demand model produces annual Heathrow volumes of total passengers, O/D passengers and transfer passengers by 13 geographical markets. We explored the use of different datasets and assessed the impact of factors which may logically be drivers of demand. We tested over 100 different regression models, using different combinations of variables before deciding on the approach below, which gave the best correlation to historic actual passenger demand.

The resulting demand model uses a 2-stage regression model; the first part forecasts passenger propensity to fly and the second part forecasts passenger flows between country and market pairs.

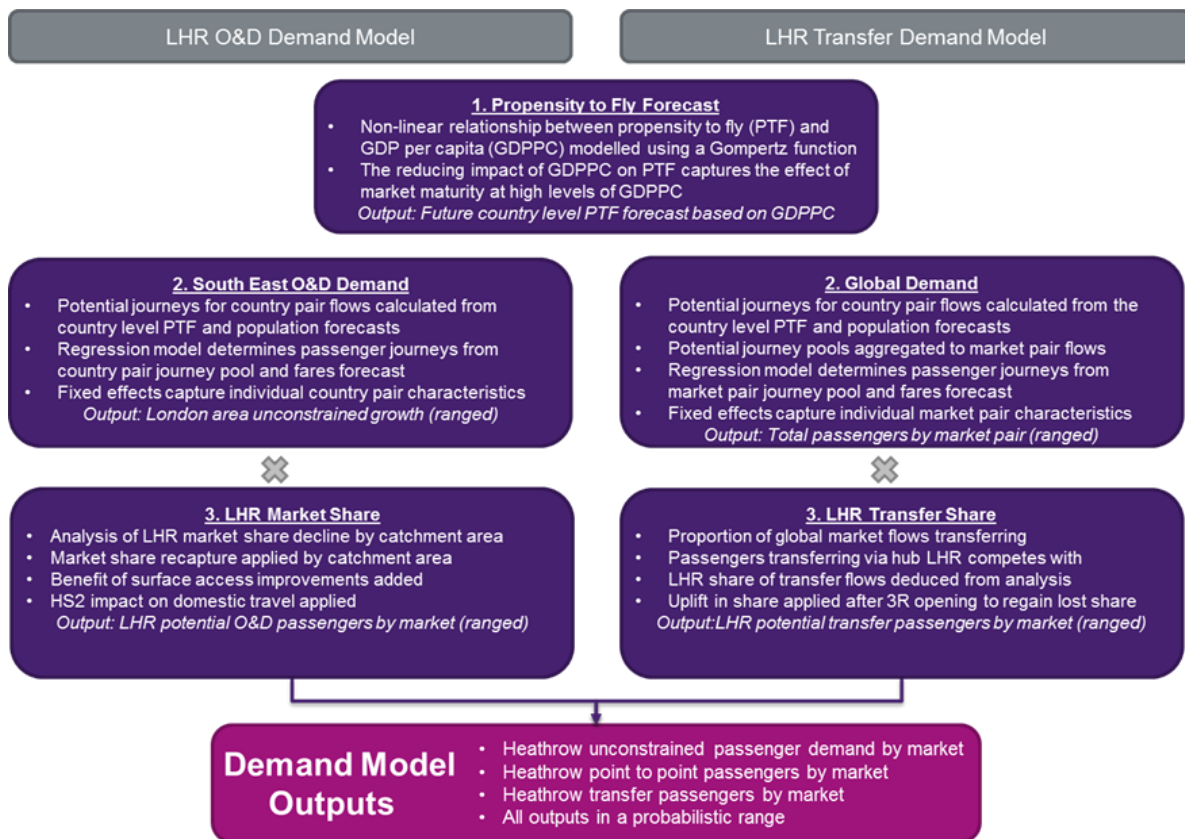


Figure 45: Heathrow demand model overview

The model is composed of the following elements:

- **Propensity to Fly** - models the relationship between GDP per capita and the number of flights purchased per person at a country level. It captures the likelihood of people choosing to fly as their incomes grow. Propensity to fly multiplied by the population generates the pool of available journeys to/from an individual country. The modelled relationship was fitted to over 1,300 data points with an R-squared value of 81%.

**Demand model
Propensity to fly**

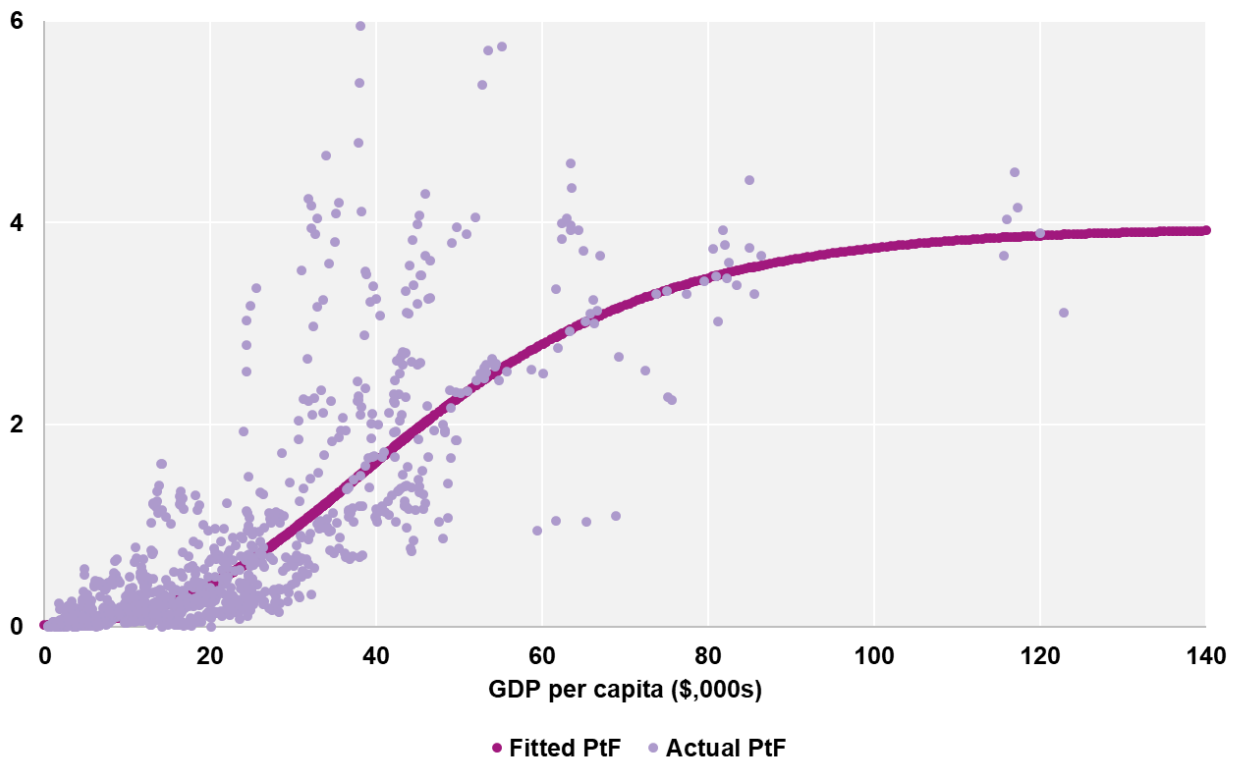


Figure 46: Modelled versus actual propensity to fly relationship

- **Heathrow O/D demand** – models the demand for Origin and Destination (O/D) flying from Heathrow. This is a series of steps that establish market forecasts and then estimate the likely proportion of consumers that will fly through Heathrow. The steps are:
 - South East O/D demand model – In order to capture the full unconstrained O/D market demand, we model O/D demand at 9 South East UK airports with traffic split by almost 200 countries. Explanatory variables include propensity to fly multiplied by country population (pool of available journeys), cost of travel (e.g. fares) and time-invariant country pair characteristics.
 - London O/D demand model – The South East O/D growth rates are then applied to the 5 major London airports only. This gives us totals that can be used with the CAA survey data, which is only collected from the 5 London airports and not the other 4 South East airports.
 - LHR O/D market share model – For each geographical market, we generate market share envelopes based on Heathrow’s share of historic demand. These are based on data from 2005 to 2018 and calculate the maximum share, minimum share, current share and trended share, where the latest market share is grown or shrunk in line with the trend from 2005 – 2018. We can also feed in specific assumptions on the rate of change of market share at a UK county/borough level to generate a separate Heathrow O/D demand forecast.

**Heathrow direct share of LON5 demand
Heathrow's market share (%)**

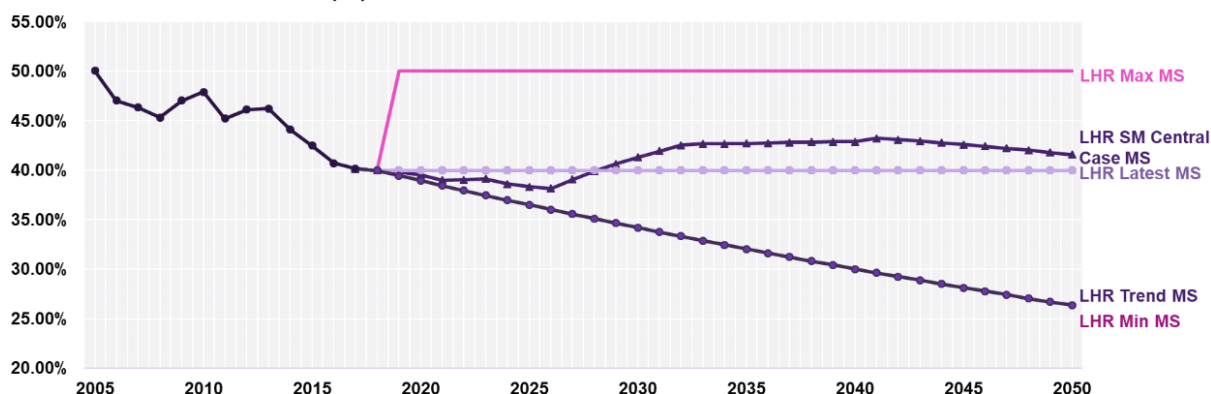


Figure 47: Heathrow market share envelopes of London 5 OD demand

- Heathrow transfer demand** – the other market we need to model for Heathrow is those consumers who are transferring through us as a hub airport. For this we need to forecast a wider consumer market and then the share for Heathrow in those markets. We do that in three steps:

 - Global O/D demand model – A similar approach to the UK O/D demand model is used, however regressions are run at the market level due to the large number of country combinations. Passenger demand is forecast for every international global flow.
 - LHR Transfer market share model – Transfer demand is obtained by first forecasting the proportion of global international journeys that pass through the 22 largest European and Middle Eastern hub airports (Hub22) with which Heathrow competes. This proportion increased between 2005 and 2015 as transfer volumes grew at a faster rate compared to global growth. However, between 2016 and 2018 the share has declined as transfer growth has slowed. We apply a forecast Hub 22 share in future spot years based on market by market analysis. The model then calculates Heathrow market share envelopes of the Hub22 demand, in the same way as the O/D market share model.

Heathrow's market share of Hub 22 transfer traffic compared to passenger growth

Indexed passenger growth (2005 = 100%)
300%

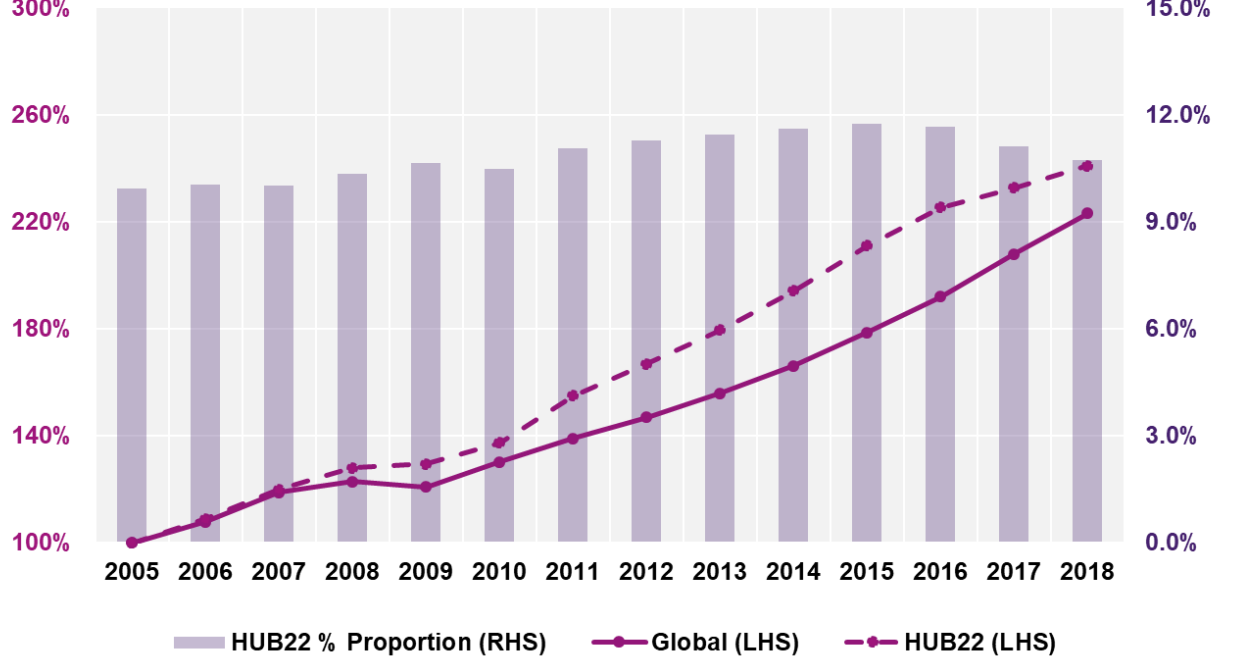


Figure 48: Indexed growth of global journeys and HUB22 transfers from 2005, with the HUB22 percentage share of total

Heathrow transfer share of HUB22 demand
Heathrow's market share (%)

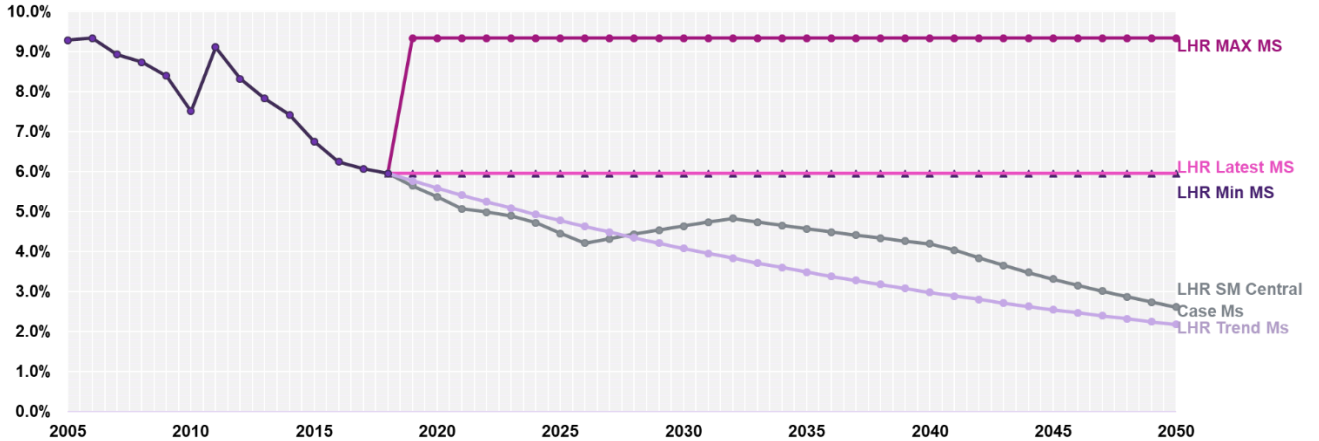


Figure 49: Heathrow market share envelopes of HUB22 transfer demand

3.6 Supply Model

The supply model takes the approach of a typical capacity-based forecasting model. Heathrow passenger demand is built up from assumptions on the key metrics that can influence passenger volumes: movements, seats per movement, load factor and transfer share. A view of the future available capacity at the airport is determined through assumptions on slot release strategies,

airport and airline growth strategies and future fleets operating at the airport. Assumptions are created for up to 9 distinct airline group and 8 geographical markets.

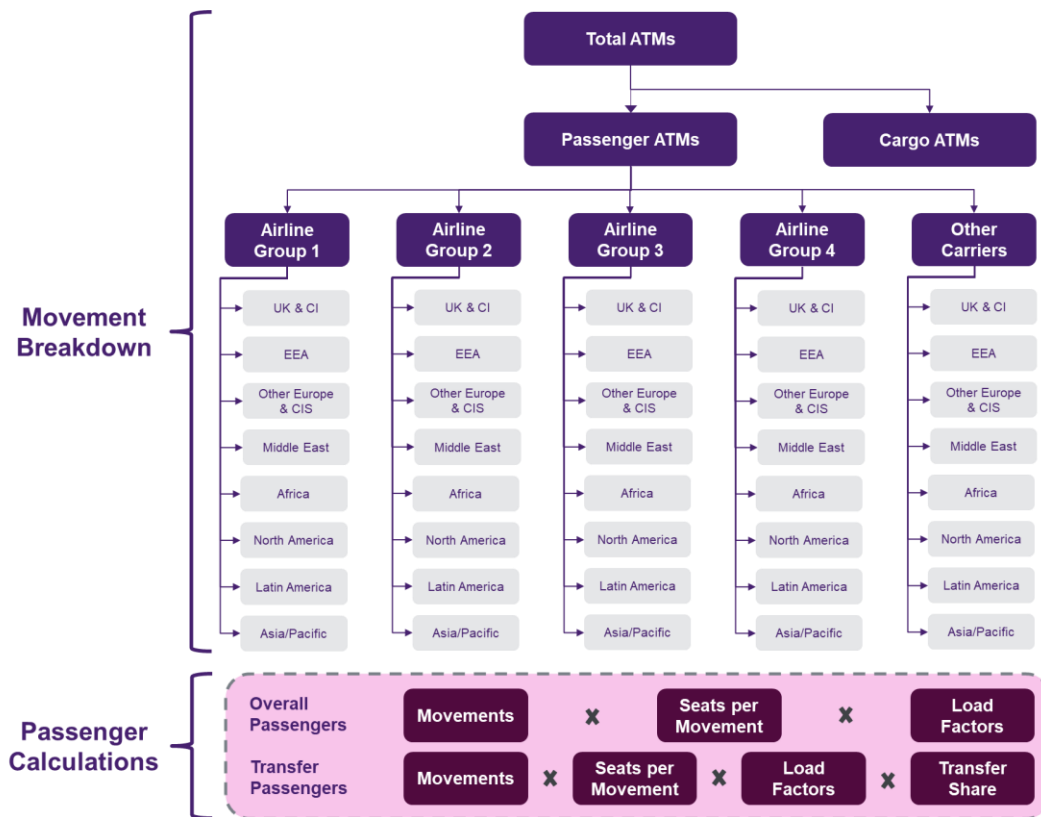


Figure 50: Heathrow supply model overview

Aviation is a cyclical industry, exposed to both the overall business cycle and aviation-specific events. This uncertainty is reflected by the use of standard probability modelling techniques, e.g. Monte Carlo⁹⁴ simulations, using ranges for key inputs to generate ranged forecasts around the central value. Monte Carlo simulation is applied in both the top down and bottom up models, with ranges for each input variable calculated from historically observed values.

The P50 is used as the basis of our central case forecast as it represents the most likely outcome and is delivered through different combinations of input assumptions. The P40 assumes slower growth in the input assumptions and serves to highlight the downside risk if growth doesn't materialise as expected. The P70 highlights the potential upside if growth materialises faster through extra flights or faster growth in passengers per flights for example. Both the P40 and P70 scenarios have a lower probability of occurring versus the P50.

4 Testing the forecast with market research

Extensive market analysis has supported our forecasting methodology and models. This research provided a comprehensive database of comparative data. This has allowed us to test overall

⁹⁴ Probabilistic Monte Carlo type evaluations provide a statistical confidence level for an estimate. P50 is defined as the midpoint of the estimates where 50% of estimates exceed the P50 and by definition, 50% of the estimates fall below the P50. P90 means 90% of the estimates are below this point and just 10% of the estimates are above. It does not mean that the estimate has a 90% chance of occurring – that is a very different concept. The central limit theorem indicates that the P50 estimate has the highest chance of occurring.

results and growth paths at similar or competitor hubs which have seen capacity growth and the release of a capacity constraint. The market analysis was done with support from Steer and Jacobs consultants. It encompasses:

- Heathrow historical analysis. This covers Heathrow's traffic development by market and by country for the 30 biggest countries, airline composition, current and closed domestic connections from Heathrow, terminating passenger demographics, connecting traffic and latest performance.
- UK 5mppa+ airports historical analysis. This consists of a detailed historical traffic analysis of 9 UK airports which catered for over 5 million passengers in 2016: London Gatwick, Manchester, London Stansted, London Luton, Edinburgh, Birmingham, Glasgow, Bristol, Belfast International.
- Competitive dynamics of traffic in the London area. London airports traffic shares both at a total and segment level (domestic, EU and non-EU, long-haul and short-haul) are key considerations for the catchment area model.
- Competitive dynamics of transfer traffic at key hub airports. Transfer volume and proportion in Europe, busiest transfer passenger markets at Heathrow, traffic share and air services are key considerations for the design of the transfer share model.
- Economic indicators. Terminating passenger growth at London airports by segment (UK resident business/leisure, foreign resident business/leisure), jet fuel prices and air fares, and traffic elasticities to main economic drivers (GDP, income, fares) have been reviewed.
- Airline market research. Analysis of the biggest airlines operating at Heathrow and at its competitors, including looking at their fleet composition and financial positions which is necessary to inform the bottom up methodology and scenario overlays.

The main conclusions that emerge from this research are that our estimates of growth are in line with what has emerged in Heathrow's or similar markets in similar circumstances to what we expect from 2022-2036.

Drawing on various sources of traffic data i.e. AirportIS, CAA Survey, Heathrow actuals, ensures that the forecast is supported by a rich pool of information. Our forecasts have also been informed by ongoing engagement with airlines to understand their plans for an expanded Heathrow in terms of fleet utilisation, slot take-up and network opportunities.

5 External Shocks

External shocks are events that reduce passenger volumes at Heathrow. These shocks are events that cannot be forecast and are not explained by any economic variables or supply metrics within the models. Historically, these have included the impact of 9/11, SARS, the Gulf War, industrial action and volcanic ash clouds. In order to account for these events, the average size of historic shocks is estimated using a comparison of actual and modelled Heathrow passenger volumes. This average shock factor is then applied to each annual forecast output. The methodology for this calculation was established for Q6.

Currently the shock factor equates to an annual reduction of 1.07%, which is an improvement on the Q6 shock factor of 1.41% and reflects the absence of major shocks in last few years. Heathrow will update this factor at the start of 2020 to include events up to 2019, such as the recent pilot strikes.

6 New capacity

New ATM capacity is perhaps the largest factor in the forecast for 2022-2036. We plan to introduce new capacity in two phases. The first, Early Growth, will be following DCO submission and before opening a new runway. The second would be after a new runway is operational. In this second phase we anticipate a period of rapid slot release and growth immediately after opening. Growth in ATMs and passengers will then fall to steadier pace as the runway becomes fuller.

Our underlying forecasting assumptions on ATM capacity therefore are:

- Up to 2021, Heathrow is a two-runway airport operating at full capacity (“constrained”) of 480,000 ATMs;
- From 2022, the ATM cap is increased post-DCO by 25k from 480k to 505k;
- From 2027-2029 onwards, Heathrow operates with three runways with a maximum capacity of 756,000 ATMs.

In terms of the release of ATMS once capacity is available we assume:

- [Redacted]
- [Redacted]

We have also tested, and where necessary constrained, the forecast against both terminal capacity and NPS environmental assumptions. These assumptions do vary by scenario and are in turn built on a number of assumptions (e.g. around the noise or carbon impacts of aircraft fleets or public transport mode shares).

7 Results

Our forecast predicts that Heathrow passenger numbers will grow from 80 million in 2018 to 119 million in 2036 in the central case based on a P50, which represents the most likely outcome from the Monte Carlo modelling. Table 2 shows the annual passenger forecasts as derived from the combination of the top down and bottom up models. Ranges around the central values are obtained by taking the P40 with a Dec 2029 runway opening data (‘Prioritising Service’) and taking the P70 with a Dec 2027 runway opening date (‘Prioritising Savings’). Table 2 provides year by year values for each scenario and the P50 number without the Early Growth ATMs and a ‘2R’ forecast with no ATM increase.

Heathrow passenger forecast
Passenger numbers (Millions)

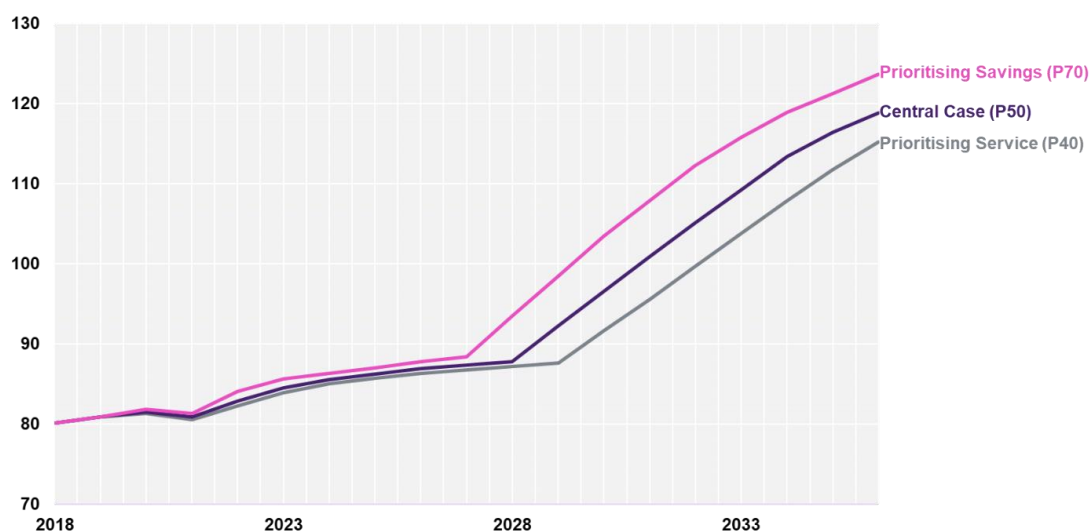


Figure 51: Heathrow passenger forecasts, v10.00 Sep 2019 update

Table 19: Heathrow forecasts, v10.00 Sep 2019 update with alternative scenarios

Year	3R Central Case ATMs (k)	3R Central Case Passengers (m)	3R Prioritising Savings Passengers (m)	3R Prioritising Service Passengers (m)	3R Central Case w/o Early Growth Passengers (m)	2R Central Case Passengers (m)
2018	476	80.10	80.10	80.10	80.10	80.10
2019	479	80.91	80.91	80.91	80.91	80.91
2020	478	81.50	81.87	81.36	81.50	81.50
2021	478	80.88	81.34	80.61	80.88	80.88
2022	487	82.91	84.08	82.32	81.21	81.30
2023	495	84.54	85.64	83.96	81.55	81.73
2024	500	85.57	86.35	85.04	81.87	82.16
2025	502	86.29	87.05	85.76	82.30	82.64
2026	502	86.93	87.77	86.31	82.75	83.15
2027	502	87.40	88.37	86.81	83.12	83.46
2028	502	87.85	93.54	87.24	83.50	83.93
2029	525	92.27	98.50	87.65	89.56	84.18
2030	549	96.57	103.47	91.67	94.24	84.53
2031	573	100.90	107.89	95.57	98.37	84.81
2032	597	105.14	112.31	99.70	102.67	85.05
2033	622	109.31	115.82	103.87	106.65	85.38
2034	644	113.39	118.94	107.92	110.83	85.49
2035	660	116.41	121.28	111.77	114.89	85.89
2036	671	118.86	123.65	115.19	117.97	86.22

Table 20: Heathrow forecast CAGRs for iH7, H7, H8 and H9

Year	3R Central Case ATMs	3R Central Case Passengers	3R Prioritising Savings Passengers	3R Prioritising Service Passengers	3R Central Case w/o Early Growth Passengers	2R Central Case Passengers
2018 - 2021	0.2%	0.3%	0.5%	0.2%	0.3%	0.3%
2021 - 2026	1.0%	1.5%	1.5%	1.4%	0.5%	0.6%
2026 - 2031	2.7%	3.0%	4.2%	2.1%	3.5%	0.4%
2031 - 2036	3.2%	3.3%	2.8%	3.8%	3.7%	0.3%

8 Risks, opportunities and key assumptions

Ranged results around the central case express the risk and opportunities to the forecast.

The different scenarios could be described as:

- ‘Prioritising Service’ - slower uptake of slots, slowdown in load factor and aircraft growth associated with a general economic downturn.
- ‘Prioritising Savings’ – more commercial deals with airlines to deliver faster growth associated with a positive economic environment. Reformed slot regulation allowing wider access and therefore faster take-up of new slots.

Another way of thinking about the risks, is that the forecasts in this plan rely on certain assumptions. If those assumptions differ in reality or are not met passenger volumes change. This in turn has a potential impact on the passenger charge, non-aeronautical revenues, operating cost and capital expenditure. The most important assumptions in the forecast are outlined below.

8.1 Environmental constraints

Heathrow has been given clear limits in the Airport National Policy Statement (NPS) which will inform our submission for Development Consent Order (DCO). These limits set out the maximum level of impact and/or the required mitigation that will be allowed as the airport grows. We are proposing to manage our growth and impacts through an environmental impacts framework. This approach, known as Environmentally Managed Growth, will require us to monitor, review and report on the effect of our growth in relation to surface access and traffic, air quality, aircraft noise and other factors. The first critical assumption is that Environmentally Managed Growth is approved. Alternatives might include absolute ATM caps or other options which would change the ATM assumptions in the forecast. The second critical assumption would be that if approved, Heathrow will be legally bound by the limits and growth will need to be capped within them. If limits were set at a different level than we currently assume this would also affect the numbers of ATMs that underpin each year of the passenger forecast.

8.2 Airspace consultation

Growth at Heathrow will mean both the new runway and a change to the flight paths planes follow. This airspace change is part of the Government’s plans to modernise the UK’s airspace to accommodate growing demand for air travel. Whilst not exclusively driven by expansion alone, the changes made to accommodate a third runway at Heathrow will also need to fit in with the changing airspace of the UK and Europe. Heathrow is working closely with NATS and other south-east of England airports to develop an integrated approach to airspace modernisation. If airspace change

is delayed or not implemented the new ATM capacity at Heathrow we forecast will not happen in the same way.

As part of the airspace change process, Heathrow is also consulting on proposed short-term changes before runway opening to the way aircraft arrive at Heathrow. This is required to enable Early Growth. These changes include options such as Precision Based Navigation (PBN) and Independent Parallel Approaches (IPA) and may involve some new arrival routes into Heathrow from the holding stacks. These will need to be approved by the CAA and are subject to changes based on the feedback we receive. If approved, it will make us more efficient and resilient to disruption, reducing the chances of delays to passengers. Heathrow has assumed a change in airspace occurs when forming passenger forecasts.

8.3 25k ATM uplift

Through the government airspace consultation and the DCO, Heathrow is seeking an additional 25,000 Air Traffic Movements (ATM) prior to runway opening as discussed above. This would generate capacity for c.4m additional passenger per annum. The additional ATMs have been embedded into the passenger forecast assumptions. They bring the benefit of new choices for consumers and lower airport charges per passenger through to 2036.

If Heathrow did not receive permission to operate the additional 25k ATMs then this would significantly reduce the passenger forecast throughout. We propose that the CAA treat this decision as a trigger point in the regulatory framework for H7 to help manage this risk in the forecast.

8.4 Schedule risk and runway opening date

Heathrow is working to a current masterplan schedule to maximise consumer benefits. We current plan on DCO consent in 2021 and opening the runway between 2027 – 2029. Any delays, or acceleration, because of changes in required spend, unexpected events, policy change, or through other schedule deviations affecting the runway opening date will change the subsequent passenger forecasts, and indeed consumer benefits and charges.

8.5 Terminal capacity and phasing

The introduction of additional terminal capacity could be impacted by a delay to runway opening and/or schedule delays. This would mean Heathrow is capacity constrained and would negatively impact passenger forecasts and service. Conversely, we may find opportunities to serve more passengers than current terminal limit assumptions which could allow faster growth at some points. Both are being considered to ensure that the most efficient provision of capacity is made to satisfy the different forecast demand scenarios.

8.6 Slot regulation

An expanded Heathrow will create an additional estimated 356 new daily slot pairs. This is a considerable increase to the market – at over 20% of all London slots. Current slot allocation rules favour incumbents through “Grandfather Rights” which entitles an airline to continue using the same slot in the next scheduling period, providing it has used the slot for at least 80% of the previous period. Once grandfather slots are accounted for, the remaining slots are pooled and “new entrant” airlines have priority access to 50% of these slots free of charge.

An airline holding more than 5% of the total slots available on the day in question at a particular airport, or more than 4% of the total slots available on the day in question in an airport system of

which that airport forms part, is not considered as a new entrant at that airport. This means that a potential new entrant would find it difficult to gain the slots from the pool to grow operations to scale at Heathrow and this to successfully operate and compete. This could be a significant blocker to access for fast growing or new entrant low cost carriers at Heathrow.

Low cost carriers could bring significant growth to Heathrow in a short space of time based on experience at other hubs. Carriers such as EasyJet and Jet Blue for example, would bring different networks, pricing options and service offering. They would provide more choice to consumers at lower prices. The leisure passengers they might focus on are forecast to be a key segment for growth in the future and represent a passenger demographic where Heathrow has lost share of since becoming capacity constrained. Such low cost carriers also tend to make efficient use of runway capacity as they operate high average rates of passengers per flight.

Slot allocation rules are being reviewed by government. Given the dynamics for new carriers, new rules could lead to faster growth than forecast. The central forecast does not assume any reform to slot allocation as it has yet to be confirmed. However, the P70 provides a guide as to the faster passenger growth that could be unlocked if slot reform led to a faster shift in airline entry and growth. If slot regulations remain unchanged then we expect this to negatively impact consumer choice and benefit, as well as leading to higher charges.

8.7 Airlines supporting growth

Fundamentally, passenger volumes and growth are delivered by airlines rather than the airport. Airlines do not have a single view of the opportunities or face the same commercial incentives from new Heathrow capacity. This heterogeneity is a good thing. For expansion to provide the maximum benefit for consumers, there should be greater choice of routes, service and lower airfares from competition. More broadly it should be all airlines' interest to fly the right aircraft for the route to fill the capacity of their ATMs in order to support more affordable airport charges – or to adopt a higher yield strategy that implies a higher airport charge per passenger.

Our forecast assumes that a mix of airlines will pursue growth with new ATMs. More airlines that adopt a more volume-oriented strategy could drive a higher forecast. On the other hand, other European hubs have seen new capacity that filled more slowly as airlines pursued more yield focused strategies. Linked to this assumption are both the incentives and economics for airlines and the speed with which we create capacity. We outline some thoughts for gain sharing that would incentivise volume strategies in the regulatory framework chapter.

9 Choices and passenger forecasts

Heathrow is presenting strategic choices in this business plan. These are intrinsically linked to the passenger forecasts as the two options being presented imply different speeds of expansion. The choices differ in the assumed runway opening date and subsequent terminal development. This shifts the ATM release assumption. Implicitly they also assume different airline mixes and terminal occupancies and different slot reform approaches. For the purpose of illustrating the strategic options we have used the P40 with a Dec 2029 third runway opening date for the 'Prioritising Service' scenario. We have used the P70 with a Dec 2027 third runway opening date for the 'Prioritising Savings' scenario.

The two scenarios differ in terms of the 'more choice of flights and destinations outcome primarily because of the different passenger numbers this implies. Put simply, faster growth means more passengers benefit from Heathrow's infrastructure, airlines offer more services and air fares are lower.

The basis for choosing the P40 is that [it is the highest forecast band that does not require any constraint on terminal capacity based on an assumption of 12,500 sq m of terminal space per million passengers per annum (mppa). This thus represents a forecast that avoids any impacts on resilience and service. It is the forecast implication of protecting consumer outcomes such as 'a predictable and reliable journey' and 'feeling comfortable and secure at the airport.

The basis for choosing the P70 for the 'Prioritising Savings' option is that it represents a rate of sustained growth that matches the top third of those observed at other major hubs with new capacity release. It is also demonstrably within environmental limits as currently understood in our DCO planning. Furthermore, it only triggers terminal constraints in two specific years, assuming faster terminal build as we have in the related capital investment, which are not consecutive.

A supportive regulatory framework can help ensure the right incentives to drive these options. The relationship of the strategic options and passenger forecasts illustrates the trade-offs between consumer benefit, airline opportunity and a lower airport charge and investment, service and resilience pressures and risk on the other.

8 - CAPITAL INVESTMENT

Overview

- Heathrow plans a major capital investment programme over the next 15 years to deliver its outcomes
- We can deliver new runway capacity for £14.4bn (in 2014 prices)
- We plan three portfolios – Expansion, Generating Capacity and Maintain and Improve
- This rate of investment is far higher than in Q6, potentially peaking at £4bn p.a. This implies a significantly higher construction risk for a fully privately financed business.
- Our investment plan has been shaped by consumer insight and airline feedback, following a robust process of masterplan optioneering
- We have developed an efficient capital plan with robust and externally validated cost benchmarks, risk allowances and schedule
- The Development and Core framework supports an affordable and financeable delivery of the plan, building on our proven track record of efficient capital investment

1 Introduction

In this chapter we first set out our investment plans for 2022-2036. We set out the process we are following to develop an efficient investment plan and we discuss how our consumer research has shaped our proposals. We set out the impact of the strategic options on our plan. We also provide details of our approach to ensuring efficient delivery of our plan.

2 Investment to deliver our outcomes

Heathrow expansion will deliver significant benefits to consumers. The economic benefits to the UK economy of expansion have been estimated to be £187bn⁹⁵. Expansion will deliver the capacity to handle over 260,000 additional aircraft movements per year at the airport, enable 62 million additional passengers to fly and to and from Heathrow each year compared to 2018, including over 40 new long-haul destinations. Expansion will create 10,000 apprenticeships by 2030 and up to 40,000 jobs for our local communities⁹⁶.

The Government has set out its policy for expansion at Heathrow in its Airports National Policy Statement (ANPS)⁹⁷. Our H7 Initial Business Plan (IBP) sets out a plan for expansion that will meet the Government's objectives. We will expand sustainably; we will get to carbon neutral as an airport within the next 12 months, whilst not affecting any more people through noise than we did in 2013. Whilst delivering these ambitious plans for growth, we will ensure that the high levels of service our passengers have come to expect from us are not undermined through continued investment in our Generate Capacity and Maintain and Improve portfolios.

We have an opportunity to build the Heathrow that Britain needs and that consumers want, today and in the future. Our investment plan for H7 is focused around delivering expansion

⁹⁵ Competition and Choice report 2017 - Frontier Economics

⁹⁶ *Ibid*

⁹⁷ Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England, June 2018

and is designed with our consumers and stakeholders, airlines, local community, colleagues and investors in mind.

Expanding Heathrow presents a unique opportunity, but also a challenge - delivering a major construction programme whilst continuing to operate the airport and maintaining standards of service, passenger outcomes and colleague experience. We are committed to maintaining a high level of operating performance and resilience whilst delivering Heathrow expansion.

In developing these plans for H7, we have engaged extensively with our stakeholders to understand their requirements and priorities for developing our airport of the future. This engagement is set out in detail in Chapter 2 Consumer Engagement. Examples of specific engagement around our investment plans include:

- Engagement with consumers to understand their future needs, preferred choices for how we operate Heathrow in future
- Engagement with consumers regarding their willingness to pay for investments that prioritise service improvement
- Regular engagement with the airline community through dedicated forums, and
- Engagement with our local communities, local and statutory authorities, stakeholder groups and the public through our airport and airspace expansion consultations.

Delivering on our outcomes, including expansion, drives the need for an unprecedented level of capital investment.

- The additional capacity that expansion will provide will give consumers **'more choice of flights and destinations'** as well as better resilience. The third runway will allow for more flights to arrive at and take off from Heathrow, providing a wider choice of airlines and destinations. We will invest to buy the land and complete the civil engineering, road works and airfield infrastructure to bring the new runway into operation.
- Investment in Western Rail and Passenger Transport Interchanges (PTIs), parkways and roads will provide our consumers with additional options in accessing the airport to ensure that they **'feel confident that they can get to and from the airport'**.
- We will ensure that consumers continue to **'feel comfortable and secure at the airport'**, **'have an enjoyable experience at the airport'** and **'feel cared for and supported'** throughout the construction of an expanded Heathrow. We will do this by continuing to maintain and improve our existing facilities and refresh and renew our commercial offerings. Significant capacity-enabling projects (in T3 and T5 and extensions to T5 (T5X, T5N) and T2). within the airport's current boundaries will improve the passenger and colleague experience in these terminals and streamline airline operations.
- Our investment in resilience initiatives, such as improving our baggage capability in T2 and elsewhere and the construction of the southern road tunnel, alongside continued investment in maintaining and improving our existing infrastructure, will allow consumers to **'have a predictable and reliable journey'**.
- For our local communities, we will ensure that **'commitments made by Heathrow for sustainable airport growth are met'**, for example through investment in noise insulation schemes.
- Across all of the projects that we invest in, we will **'provide efficient, reliable and affordable airport services'** to airlines by investing in projects that generate positive commercial outcomes, such as retail and property refurbishments. We will support airlines' operational efficiency, such as automation-related initiatives to reduce our costs and support affordability by investing in capacity generating projects.

The investment plan (the H7 plan) that we present here is one step in a detailed and involved process. The H7 plan builds on the Milestone 4 (M4) Masterplan⁹⁸, which is the masterplan we consulted upon in the Airport Expansion Consultation (AEC) in mid-2019. The H7 plan will evolve, taking into account feedback on our M4 Masterplan gathered through the AEC and feedback and insight received through Constructive Engagement (CE) with the airline community. This will inform the fifth milestone of our overall masterplan development process, referred to as the M5 Masterplan. Subsequently, the M5 Masterplan will be submitted to the Planning Inspectorate as part of the Development Consent Order (DCO) application and will form the basis of our Final Business Plan (FBP) in 2020 in support of the H7 regulatory process. An illustration of this process is provided in Figure 1.

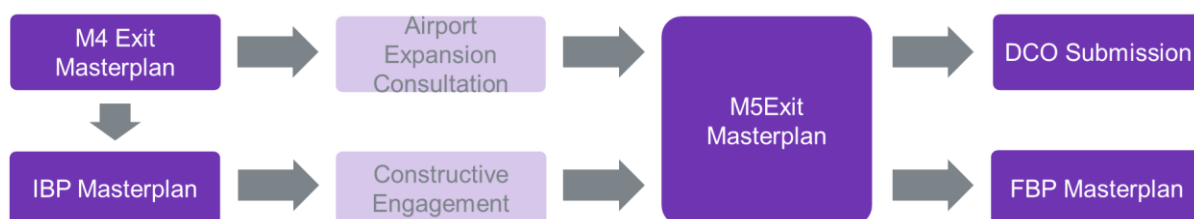


Figure 1: Illustration of process to M5 Masterplan

3 Investment driving change

Our H7 investment plan will deliver significant change at Heathrow. We have worked meticulously to develop an investment plan that delivers an operable expanded airport that meets the need of consumers and airlines that is affordable, financeable, deliverable and sustainable. Our plan continues to meet the affordability challenge⁹⁹, delivering new runway capacity for £14.4bn¹⁰⁰ (in 2014 prices).

In this section we provide an overview of the key portfolios of investment across the airport over the next 15 years, including an outline of the key programmes and business cases within each portfolio. The H7 investment plan is consistent with the M4 Exit masterplan. We have made minor amendments relating to H7's initial years of investment, reflecting more up to date information. We have adjusted the timings of runway opening and the construction schedule to reflect IFS feedback, CAA policy on pre DCO Category C spend and the strategic options in this IBP. In addition, we have updated the price base of the plan to 2018 prices following the CAA's guidance. Figure 2 outlines changes to the H7 plan and the M4 Exit masterplan over the next 15 years.

⁹⁸ The process to develop the masterplan is discussed later in this chapter

⁹⁹ As set by the previous SoS for Transport

¹⁰⁰ In Q3 2014p

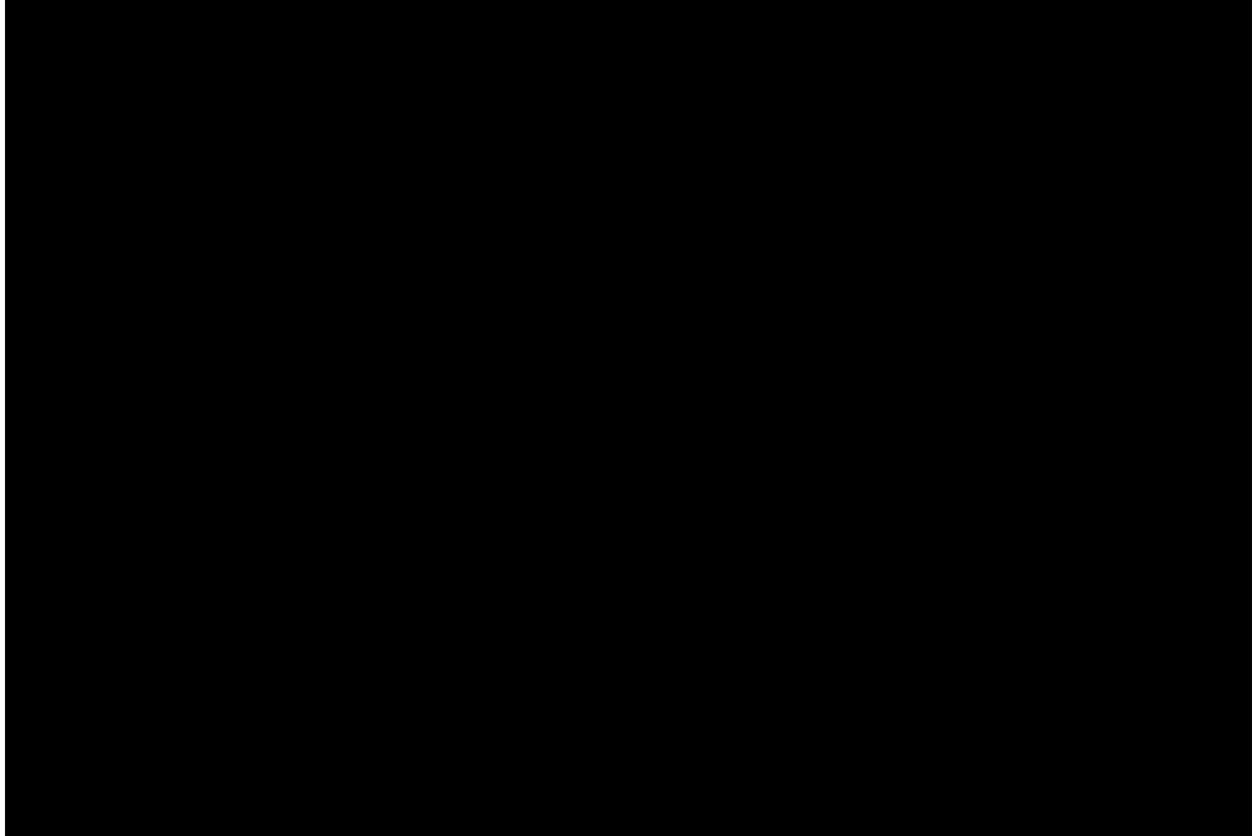


Figure 2: From M4 Exit to IBP investment 2022-2036

There are three main portfolios of investment within our H7 plan¹⁰¹:

- **Expansion** – the largest investment portfolio for the period will be our programme of work related to expanding the airport beyond our existing boundary, including building our new north-west runway, new terminal space, as well as other associated development.
- **Create Capacity** – investments within our existing airport boundary to generate increases in capacity in order to support an affordable expanded airport; and
- **Maintain and Improve** – we will continue to invest to ensure we can operate smoothly, meet all safety, legal and security requirements, and deliver on outcomes, in the medium term.

¹⁰¹ This structure ensures that there is no double counting of capital investment meeting the CAA's criteria for a high-quality business plan in CAP1819

Table 21: Summary of capital expenditure in plan

£m, 2018p	2020	2021	2022-2026	2027-2031	2032-2036
Total Expansion Capex	364.6	848.2	13,985.6	8,021.2	3,212.3
Total Create Capacity Capex	277.2	370.4	1,810.2	62.0	-
Total M&I Capex	425.8	468.8	1,949.8	2,522.8	2,852.7
	1,067.6	1,687.4	17,745.5	10,606.0	6,065.0

We illustrate a 30 years view of the investment plan we present in this plan in Figure 3. For convenience investment is grouped according to the main 3 portfolios that we propose for H7. It is clear from the graph that first 15 years of investment will be geared towards expanding the airport. Once expansion is substantially complete, Maintain and Improve investment would become more substantial, in order to ensure that the operational condition of an expanded airport is maintained at optimal levels.

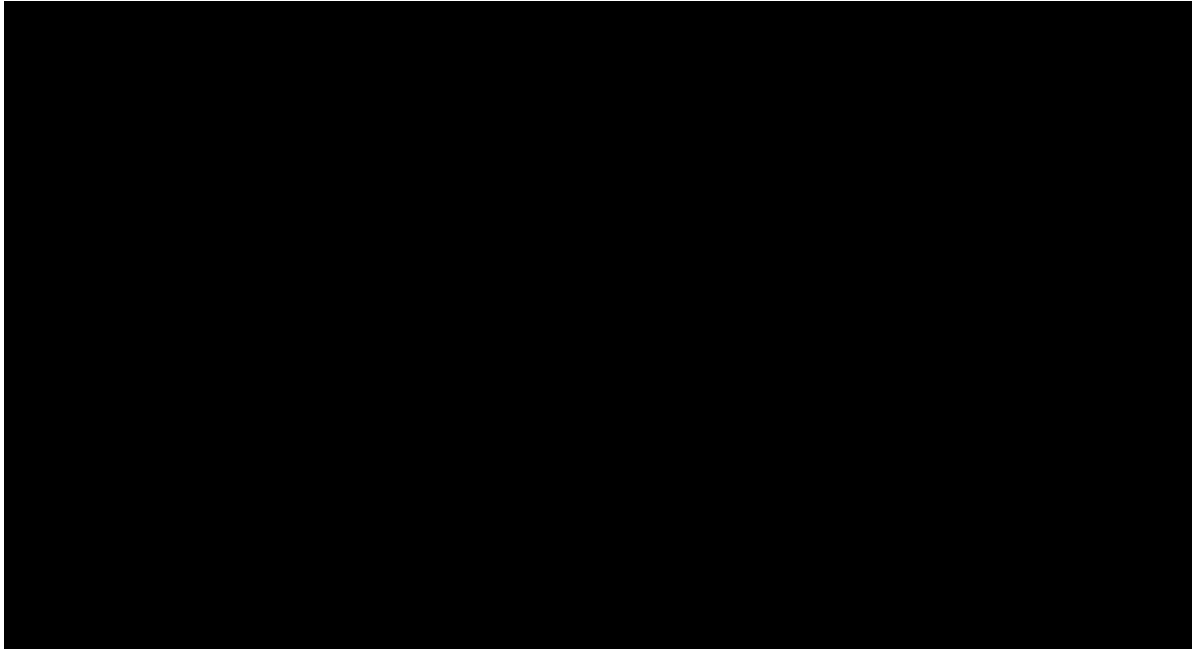
The cost maturity of individual business cases varies. Business cases delivering outcomes in the near future are better developed, with greater scope and cost certainty. The cost and scope of business cases forecast to be delivered later in H7 are less certain at this stage. A strong focus on efficiency and affordability, industry best practice and the Development and Core portfolio process, will allow us to manage cost and scope uncertainty during H7, delivering value for money for consumers and airlines. Consumers and airlines will continue to play an important role by reviewing and helping to develop our business cases through our gateway process (the Heathrow Gateway Lifecycle)¹⁰². This further engagement with

¹⁰² Which forms part of the Development and Core process

consumers and airlines will help to ensure that our investment plan will deliver on our outcomes and commitments.

We describe each of the three portfolios in the following sections

Figure 3: Capital investment plan by portfolio (2020 – 2050)



3.1 Expansion

3.1.1 Phasing

There are four distinct phases to our masterplan for an expanded Heathrow:

Phase 1 - includes a new 3,500m north-west runway and full length parallel taxiways planned to open in 2028. This first phase of our preferred masterplan will bring Heathrow's capacity to 95mppa, including 185 operable stands, including new stands at both Terminal 2 and Terminal 5. This phase also includes diversion of the M25, other roads, several rivers and the Colnbrook Railhead to accommodate the new runway. Other key relocations include the Lakeside energy from waste plant operated by Grundon Waste Management and Viridor, British Airways' Waterside head office, SSE Pylon and substation, BT data centre and the Home Office immigration removal. By the completion of this phase, we will have re-provided green space for our local communities, constructed surface water treatment facilities and started work to build the consolidated car parking provision known as the Southern Parkway. More detail is provided in Figure 4 below.

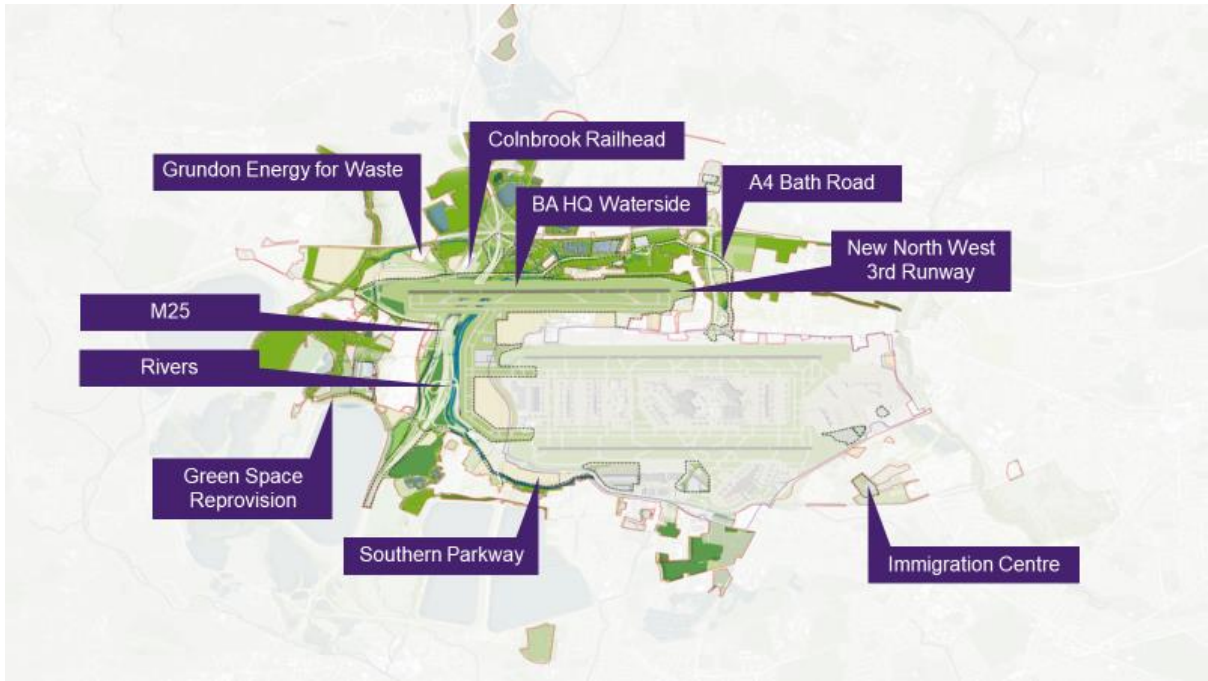


Figure 4: Phase 1 of Masterplan delivery

Phase 2 - to be delivered by 2030, will introduce new terminal capacity through the construction of the first phase of the Terminal 5 extension and associated aprons, increasing airport capacity to 115mppa including 226 operable stands including new stands at T2 and T5X. A Southern Road Tunnel will increase connectivity from the south of the airport to the Central Terminal Area. Further local road and junction relocations and reconfigurations will have taken place, and construction will have commenced on a seasonal thermal store to the north of the airport; a key part of our sustainability plan, this thermal store will hold heat expelled from terminals during the summer for heating during the winter. By 2030, we will also have completed the fitout of Terminal 2's new baggage system, demolished Terminal 1, and expanded T2A to the north, whilst the Southern Parkway will have been further extended. More detail is provided in Figure 5.



Figure 5: Phase 2 of Masterplan delivery

Phase 3 of our preferred masterplan will have delivered further terminal capacity through an expanded T5X, increasing capacity to 130mppa by 2035. The first phase of T5XN, a satellite terminal facility to the south of the new north-west runway, will have been delivered, along with associated apron space and a road-based connectivity system to T5X. 255 stands will be operable at the end of this phase, including new stands at both T5X and T5XN. The Southern Parkway will be further expanded to its fullest extent, whilst parking facilities currently located along the north side of the airport will have been relocated to Phase 1 of the Northern Parkway. More detail is provided in Figure 6.

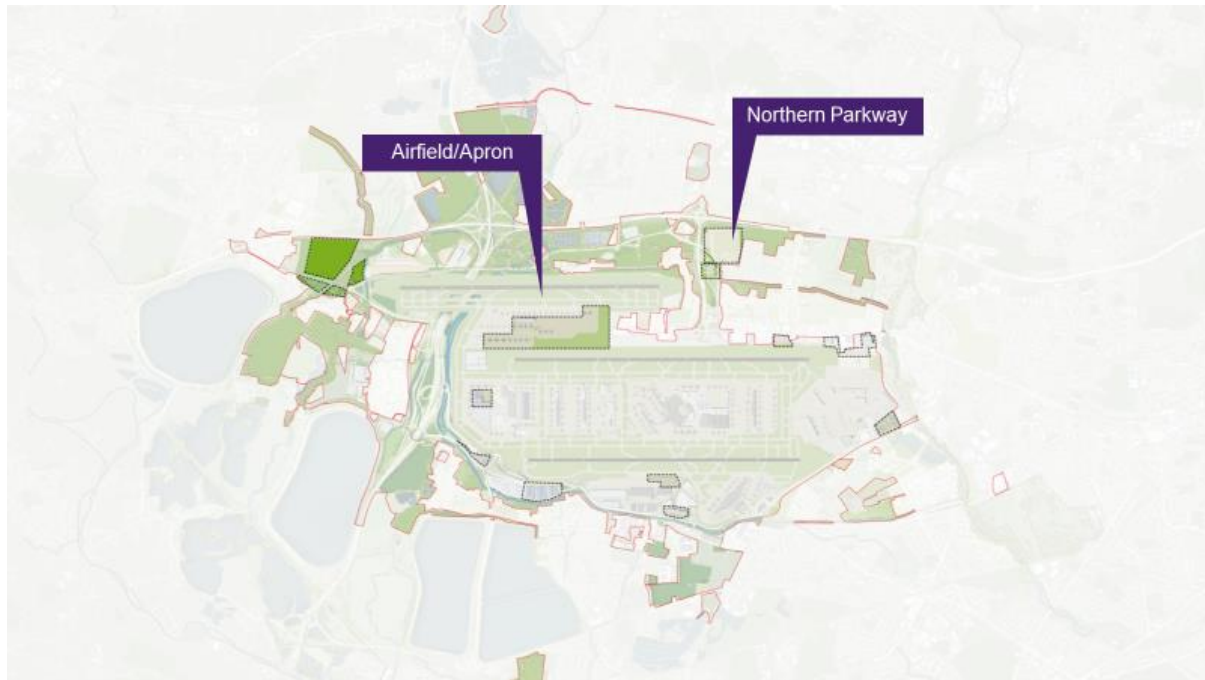


Figure 6: Phase 3 of Masterplan delivery

Phase 4 - the final phase of our preferred masterplan will deliver a completed T5XN, including an improved connectivity system to T5X, and will create capacity of 142mppa by 2050. Additional Rapid Exit Taxiways (RETs) will enable improved operability and resilience of the north-west runway. A Northern Parkway will have been fully completed to complement provision at the Southern Parkway site. With the final full demolition of Terminal 3 and the construction of satellite terminals T2C and T2D, operable stand capacity of 295 will be achieved. Figure 7 illustrates how an expanded Heathrow could look in 2050.



Figure 7: Phase 4 of Masterplan delivery

3.1.2 Expansion investment throughout iH7

A significant proportion of the investment plan for 2020 and 2021 relates to Category B costs and pre-DCO Category C costs. Category B costs will enable us to prepare a high quality DCO in 2020. Pre-DCO Category C investment will allow us to start acquiring land, relocating services, carrying out more accurate tender process and detailed design to allow a fast start to construction following receipt of DCO consent. It is also critical for ensuring a high-quality DCO, for example by demonstrating active engagement and seeking agreement with residential and commercial property owners.

Our schedule for delivering Heathrow's new runway by 2027-2029 is reliant upon maximising the number of preparatory activities undertaken ahead of consent. These include commercial and residential compensation and acquisition, early design, engineering surveys including ground investigations and site preparation.

Future changes to Heathrow's timetable for delivering expansion will add costs to the programme (both Category B and total Category C costs). Schedule changes would result in our team and associated consultancy support being mobilised for longer. These changes would also increase the exposure to additional risks, such as the likelihood of having to remodel our environmental and traffic impact assessments to align with changed dates. This in turn would affect affordability and financeability, hence the deliverability of expansion.

The construction cost information in this chapter relates to the detailed work we have undertaken up to the M4 Gateway, which fed into the AEC. It is consistent with the information that we have shared with the airline community, the CAA and its consultants through formal governance at the Cost and Benefit Working Group (CBWG) and Joint Expansion Board (JEB). Following the masterplan development process, more information is likely to be available at the M5 Gateway, which would inform the FBP.

The CAA's criteria for a high-quality business plan outlines the need to adequately report on the expected costs for the iH7 period, including how these costs reconcile with cost projections

in providing additional capacity as soon as practicably possible to ensure the affordability of expansion for our consumers. In addition, these costs are required to fairly compensate our local communities for the unavoidable disruption that expanding the airport will generate.

Major Commercial Acquisitions

[REDACTED] A duration of four to five years is needed to consent where required, construct, commission and transfer operations ahead of demolition and clearance. Only then can vacant possession can be obtained and airport construction activities can start. These sites host significant activities with a high degree of complexity and will require many years in some cases to relocate. The six areas are: 1) British Airways Waterside Head office; 2) Colnbrook Rail Head; 3) Home Office Immigration Removal Centre; 4) Lakeside Energy from Waste plant; 5) SSE Pylon and Sub-Station Diversion and 6) BT Data Centre.

Commercial Disturbance Costs

Aside from the major commercial properties outlined above there are approximately 300 other commercial businesses of varying sizes and complexity currently located within the required scope of the scheme. We estimate around 100 of these will need to have commenced and/or completed relocations ahead of DCO consent. The construction schedule dictates the required vacant possession date for each business. [REDACTED]

Residential Compensation

This cost includes hardship payments, blight payments and payments through our Home Purchase Bond scheme. Residents need to be provided with the opportunity to move and relocate in a timely way¹⁰⁴. Relevant guidance makes it clear that we should seek to acquire land by negotiated agreement wherever possible and compulsory acquisition powers should only be sought in a DCO if attempts to acquire by agreement fail. There are 756 homes within the Compulsory Purchase Zone (CPZ) which need to be removed. [REDACTED]

Seeking Agreement

As a scheme promoter, Heathrow is expected, under the DCO process, to have been proactive in residential and commercial negotiations and used genuine and reasonable efforts to secure agreements, thereby minimising the requirement for compulsory acquisition. Ahead of DCO, Heathrow will incur legal and advisory fees and set-up costs to agree terms for acquisition including the Home Purchase Bond scheme and commercial agreements.

Design, Pre-Construction Planning and Phase 1 Construction Works

This cost includes the works necessary to commence construction promptly, including surveys, ground investigations (in addition to those required for DCO submission), scoping, estimation, procurement, detailed design and construction planning.

¹⁰⁴ 'Planning Act 2008: Guidance on the procedures for the compulsory acquisition of land', DCLG, September 2013.

Noise and Vortex

This cost includes the works necessary to mitigate the noise and vortex impacts from construction and operation of the new north-west runway. Significant noise insulation investment is required to meet the objectives of the ANPS in delivering expansion. Due to the scale of the required works it is essential we begin works in advance of DCO consent.

Risk and Contingency

There is a level of risk associated with delivering expansion programme and we have undertaken activities to better understand these. This has enabled appropriate management strategies to be developed for risk. For pre-DCO Category C costs, a 40% allocation has been made for property costs which reflects a greater uncertainty for these activities, 35% for off-airport costs and 25% allocation for on airport costs (as outlined below).

3.2 Generate Capacity

To deliver expansion affordably, it is critical that we make the best use of existing facilities to enable them to accommodate growth in passenger numbers. To do this we have two key programmes (Future T2 and Heathrow Additional Capacity) that will generate capacity within our existing airport boundary prior to 2028. At the same time as ensuring the affordability of expansion, this additional capacity will offer more choice of destinations for consumers and a better passenger experience through improved airline colocation and terminal experiences.

3.2.1 Early Growth (Heathrow Additional Capacity)

The Early Growth programme commenced in 2018 and will continue through to 2024. We plan an additional 10mppa capacity step up in T5 through a targeted investment programme delivering extensions to T5B and T5C to connect more passengers directly to the terminal via pier-served stands. To enable an increase in flights and destinations, further remote stands and stand centrelines will be provided. An extended and reconfigured passenger search facility for departing and connecting passengers will increase capacity, whilst reconfigured departures areas and lounges across all three T5 buildings will improve the passenger experience, decreasing congestion in T5A. A renewed and expanded track transit system will connect T5A with the two satellite buildings, increasing capacity and reducing waiting times for passengers. Additional e-gates in the immigration hall will allow more passengers to efficiently clear the UK Border, whilst additional baggage reclaim facilities will increase operational resilience.

Achieving our vision will require process changes and improvements to be delivered by all of Team Heathrow. We have completed an occupancy review for planned capacity that will be created in T5 through the programme. We consulted on the evaluation criteria that will be used to assess both the occupancy for the T5 project and wider future occupancy reviews. This proposal received strong support from the airline community.

[REDACTED]

[REDACTED] This was identified as the lead option through the evaluation process as it is assessed to be within both terminal and stand capacity, provides good utilisation of assets, has the biggest net increase in intra-terminal passenger connections and provides opportunity for further future growth.

The rebalancing of flights and airlines between terminals will facilitate the co-location of flight pairs that have a high volume of connecting passengers and bags between them. The associated higher percentage of passengers connecting within, rather than between, terminals

will ease a known ‘pain point’ for consumers and reduce the risk of misconnections. This is well evidenced by Willingness to Pay (WTP) study developed by Systra, where connecting passengers are willing to pay up to ██████ to reduce the walking time between connecting flights by just ██████¹⁰⁵.

We have identified the need for a significantly reconfigured central search area to ensure we continue to meet security compliance requirements. This capital spend is included as it was at M4. In addition, we have made an allowance in both strategic options for a direct link from T2 to T3. This responds to consumer feedback and the need for more flexible operating capacity for airlines. Further, we are investigating the need for additional products and services for our passengers and airlines, as part of the T3 programme. This would require a considerable amount of further investment.

3.2.2 Future T2 Programme

The Future T2 programme commenced in 2019 and will continue through to 2024 in its first phase. The programme will commence with the demolition of parts of T1 and will continue with the construction of a basement to the north of T2A. This basement will be connected to the basement currently under construction by the Kilo Apron Development project and will eventually house a new baggage system for T2. This will allow the existing life expired baggage system in T1 to be closed. The basement will also create the substructure required for the first phase of the extended T2A, and connectivity to the future TTS to T2B and future T2C, with possibilities to improve minimum connection times for passengers in the future in the Eastern Campus.

The closure of the T1 baggage system will enable the future demolition of the T1 main building to create the space for a further extended T2A.

The T1 prolongation business case will investigate the engineering, fabric, IT and baggage system projects to extend operational life of the Terminal 1 Baggage system ensuring that it remains fit for purpose to support the T2 operation ahead of a new baggage system for T2. To ensure that we make the most of the investment we would only refit operational areas excluding any areas scheduled for demolition.

3.3 Maintain and Improve

Heathrow is committed to our vision to give passengers the best airport service in the world. Consumers will only continue to choose Heathrow if we continue to deliver a quality product that maintains or improves our current service levels whilst managing a safe, predictable and reliable journey. Through the Maintain and Improve portfolio, we will ensure that consumers continue to feel comfortable and secure at the airport, have an enjoyable experience at the airport and feel cared for and supported. In everything that we do, we will continue to meet all of our safety, security and legal requirements.

This element of our investment plan is being progressively developed with the airline community through established governance forums with a focus on delivering H7 outcomes. A significant proportion of this element of the portfolio will have been agreed prior to the start of H7, with expenditure spanning both iH7 and H7 for a number of key business cases. These investments are currently at different stages of maturity. Further engagement and prioritisation, with a view of meeting the affordability challenge, will be required throughout CE and beyond as business cases mature. The current state of each proposed Maintain and Improve business cases as at October 2019 is provided as an annex¹⁰⁶. This rolling approach

¹⁰⁵ Systra W2P report– Systra, willingness to pay - Systra benefit values connecting passengers

¹⁰⁶ Supporting numbers to IBP investment plan

to portfolio development will minimise the impact of the regulatory boundary of a move to H7 and maximise delivery efficiency.

As we have done in Q6, we will continue to ensure flexibility of the Maintain and Improve portfolio. We will organise our proposed investments to enable agile management in response to changing business needs as the portfolio matures throughout H7.

The proposed future Maintain and Improve investment has been derived from an assessment of historical asset replacement costs and applied to both the existing asset base and the assumed expanded asset base as the masterplan develops. Additionally, allowances have also been included to undertake strategic improvement initiatives (particularly in Commercial and IT) which are not pure asset replacement investments. These allowances are to ensure the asset base is maintained efficiently.

3.3.1 Operations

On the airfield, we will invest in our fuel infrastructure to improve operational resilience. We will replace the existing contingency air traffic control (ATC) tower facility and upgrade the current ATC tower to achieve an increase in the aircraft movement rate through increased levels of automation. These operational improvements will be augmented by a number of initiatives focused on improving arrivals punctuality, turnaround times and landing rates.

With a direct focus on our passengers, we will continue to invest in the rollout of automation, including self-boarding gates and self-service bag drops in all terminals. Significant improvements to existing infrastructure in T3 and T4 will facilitate a continuous arrivals journey for our passengers with additional needs.

Baggage represents a critical component of the passenger journey. To continue to meet the expectations of our passengers, we will invest in a rolling programme of works to replace key baggage assets across the airport that are life expired or obsolete, improving operational resilience, whilst also introducing new features to provide additional resilience and recovery capabilities. Specific investments will increase baggage capacity and system headroom, supporting passenger growth.

Several asset replacement programmes will upgrade or replace life expired assets and systems, including across our rail asset base, to ensure we continue to remain compliant with all requirements and deliver high levels of passenger experience and operational performance. This will include the rehabilitation of the southern runway.

Focusing on sustainability, we will continue to invest in electric vehicle charging infrastructure for airside and landside vehicles, create a Heathrow Sustainability Hub, and will improve our waste and water processing capabilities. We will also maximise the amount of zero carbon energy generated on site at our airport through the installation of solar panels, realising opex reductions.

To continuing to maintain compliance with Department for Transport (DfT) security standards for passenger and colleague screening, we will replace the current cabin baggage x-ray detection systems across all terminals and will invest in our control posts to ensure continuity of standards. Next Generation Security will also invest in capital equipment and passenger areas for enhanced passenger screening which enables passengers to go through security without the need to remove liquids and laptops from bags.

3.3.2 Other Maintain and Improve projects

Our focus on surface access will see the consolidation of travel products and services to offer a greater transport choice for passengers and colleagues, optimising our existing car parks,

rolling out further electric vehicle charging points and improving our yield management systems. We will have also allocated the capital to implement the HULEZ and HVAC access charges.

Next Generation Retail & Digital programme will invest in the systems to ensure that our retail offer is fit for purpose as we grow. [REDACTED]

[REDACTED] supporting our passenger service proposition and growing revenue performance. Or new website, apps and other digital initiatives support a more personalised digital experience to our passengers.

A significant retail optimisation project in T2 and T5 will improve both our commercial performance and passenger flows, offering an expanded retail choice for passengers. We will be able to increase our passenger reach through engaging with consumers via additional digital channels, providing new and improved digital experiences at the same time as growing revenue.

The Magenta programme will deliver significant business effectiveness improvements through transforming our back-office systems and processes, implementing new technology and improving operational resilience at the same time as reducing operational expenditure. We will also continue to invest in wider IT systems for resilience, cyber security and IT cost efficiencies.

We will address current inefficiencies within our cargo operation in response to feedback from our cargo community, including increasing operational efficiency at control posts¹⁰⁷. Various efficiency opportunities will be explored including a review of the cargo and catering screening process (e.g. airlocks) and the removal unnecessary movements control posts.

3.4 Depreciation

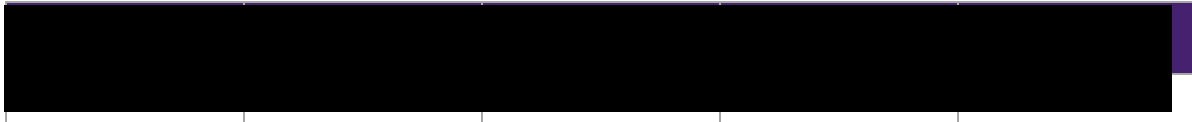
Depreciation plays a fundamental role in the regulatory economic model. Firstly, depreciation plays a key role in determining the value of the Regulated Asset Base (RAB). Annually, the RAB is adjusted by additional capital expenditure and reduced by asset disposals and forecast depreciation. The opening RAB for H7 has been estimated by rolling over the RAB from the previous year and reducing it by projected depreciation agreed in the iH7 Commercial deal between Heathrow and airlines, and as approved by the CAA.

Secondly, under the current regulatory framework, Heathrow can recoup its capital expenditure through aeronautical revenues via the 'building blocks' mechanism. How much capital expenditure is recoverable in a given price control is set by the CAA which determines the final depreciation value as part of its price determination.

We have maintained depreciation assumptions and methodologies consistent with Q6. For this particular building block, policy consistency between different price controls is a key consideration given the direct impact it has on affordability and financeability. The approach is straight line with depreciation spread evenly over the useful economic life depending on the asset. This method prohibits depreciation gain or losses to Heathrow as the RAB is reduced by forecast depreciation in each given period. Equally, maintaining a clear link between the economic life of our airport assets with the value of the RAB provides clarity and assurance to all stakeholders involved including debt and equity investors.

¹⁰⁷ Firebrand, Summary review of qualitative research amongst the LHR cargo community - 2018

Table 2: Depreciation 2022-2036



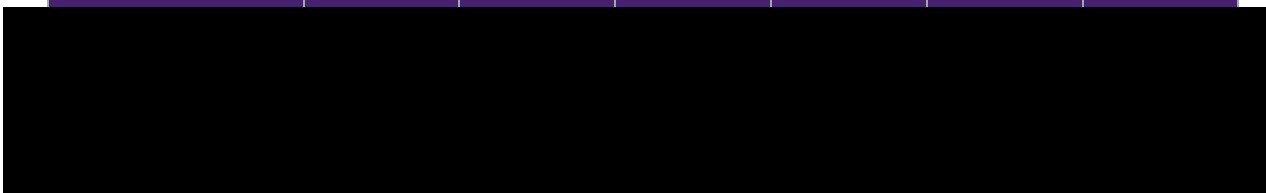
4. The impact of strategic options

As set out in Chapter 3 – Our H7 Plans & Choices, we see three big choices as we respond to consumer and other stakeholder challenges. We have summarised these trade-offs as two potential routes forward – a ‘Prioritising Savings’ option and a ‘Prioritising Service’ option. The quantum of construction spend is the same total as the M4 Exit masterplan to 2050, however the phasing differs with each option. There is further optionality with rail and service investments. The build profile we have created ensures that the terminals are not capacity constrained with a different passenger forecast.

Prioritising Savings opens the new runway in late 2027 with the first phase of T5X terminal capacity in 2030 (T5X Phase 1). There will be simultaneous East and West development with T2A Phase 2 anticipated to be delivered by 2031. Prior to this we will invest in making best use of our existing terminal infrastructure, investing in T5 and T3 to provide sufficient capacity to meet consumer demand as we expand. In this option we make minimal contributions to rail schemes (c.£100m in line with M4 Exit) and minimal upgrades to passenger service, working to maintain service performance at current levels.

Prioritising Service opens the new runway in late 2029 with terminal expansion focussed in the West with the development of T5X Phase 1. There is a slower build profile of additional capacity. In this option we will make a more significant contribution to Western Rail in the 2020s and Southern Rail in the 2030s (illustrated as £750m for each). As set out in Chapter 3 - H7 Plans & Choices there are also additional service investments we can make to improve service levels. These include investments that are aligned to our willingness to pay study and those that are specific service performance interventions and total c.£500m

Table 3: Impact of choices on capital expenditure



5. Developing and delivering an efficient plan

Heathrow has a proven track record of delivering infrastructure efficiently. Over the last decade we have delivered state of the art facilities such as Terminals 2 and 5, the Terminal 3 Integrated Baggage system and satellite buildings. We are well recognised by Government and industry as best in class, championing best practice and innovation in the construction supply chain as part of Project 13¹⁰⁸. We have robust systems and processes in place for infrastructure delivery, including continuous engagement with the airline community. We understand the challenge ahead and are confident that we have the required knowledge and experience to efficiently deliver our investment plan.

¹⁰⁸ Project 13, an initiative led by the Institution of Civil Engineers (ICE), with the support of industry partners (clients, suppliers and academics) designed to improve productivity in this construction industry

In this section we demonstrate how we are developing our expansion plans, and how we plan to deliver on them over H7. We discuss how we are striving for efficiency by delivering the right solutions driven by stakeholder input. We outline the key elements of our delivery model and the proposed regulatory arrangements that would govern and incentivise efficient delivery.

Finally, we explain how we have invited industry to participate in delivering an expanded Heathrow.

5.1 Developing the plan

In order to develop a high-quality masterplan that underpins our DCO submission and that forms the backbone of the H7 plan, we have listened and acted and will continue to listen and act to our stakeholders' feedback. No investment plan would meet every single requirement of each stakeholder; indeed, we have had to make compromises at times and discarded investment options having assessed the benefits and costs associated with them. We provide examples of the decisions we made throughout this chapter.

Going forward, in developing the FBP, we will give due consideration to stakeholders' requirements and strive to find a masterplan that finds the right balance to meet a wide range of stakeholders' needs.

There are three important aspects of developing our plan:

- Setting up a well-defined process that ensures we will find the right solution and enables us to discard suboptimal options;
- Drawing on consumer and stakeholder insights to ensure our preferred masterplan delivers what is most important to them;
- Ensuring that our investment plan is sustainable, affordable, deliverable and financeable.

5.1.1 Setting a well-defined process

The Scheme Development Process (SDP)¹⁰⁹ has enabled us to follow a structured approach to finding the solution that meets the key needs of the stakeholders involved in developing and operating an expanded Heathrow (see Figure 8 below).

¹⁰⁹ Scheme Development Process: <https://www.heathrowexpansion.com/documents/heathrow-expansion-masterplan-scheme-development-manual-v5/>

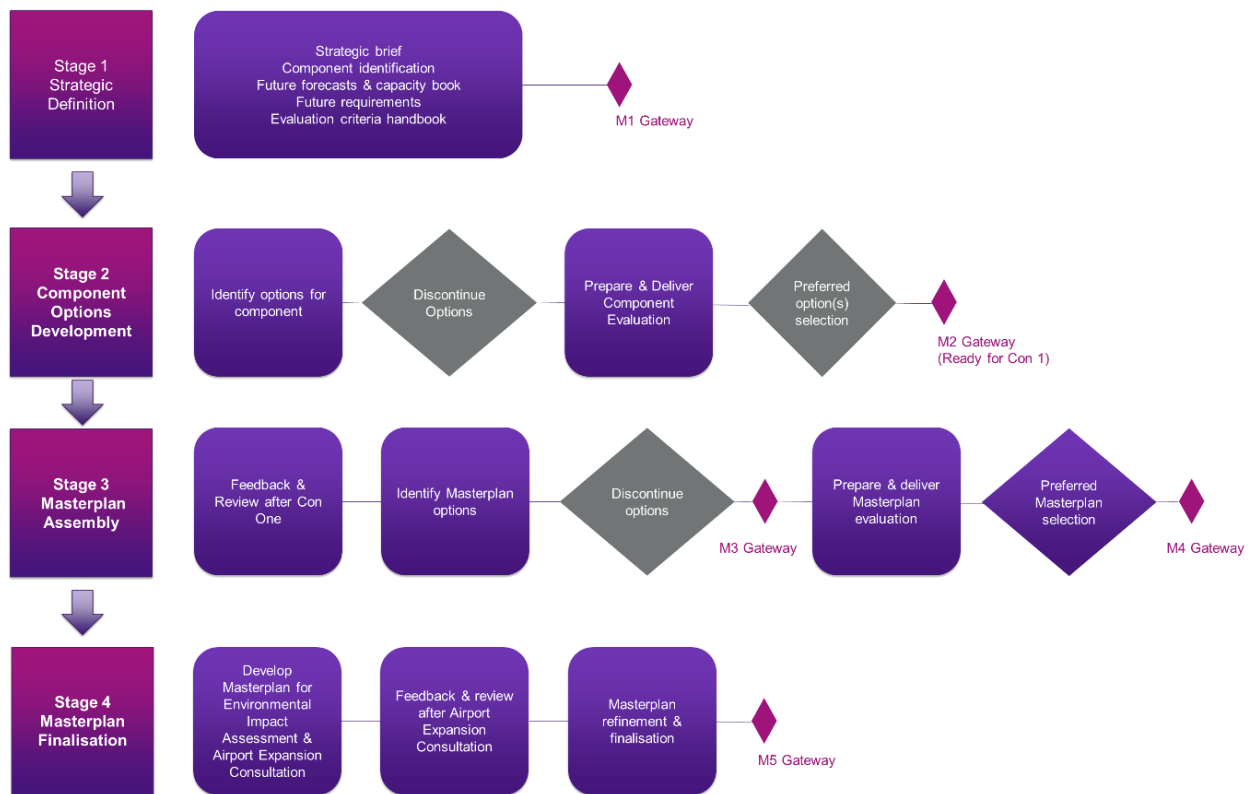


Figure 8: Scheme Development Process

We summarise below the stages that form part of this process:

- **Stage 1 – Strategic Definition:** this stage set objectives, defined key inputs, and set evaluation criteria. This ensured our work was and continues to be focused in the right areas, and the evaluation criteria used to assess which option best met our objectives.
- **Stage 2 – Component Options Development:** our overall investment plan is highly complex, made up of many components. Before we began working on the overall investment plan, we first identified a long list of individual components and assessed these against our evaluation criteria.
- **Stage 3 – Masterplan Assembly:** once we had our preferred individual components, we then needed to consider how best to assemble these preferred components together to comprise the overall masterplan. This step takes account of the interdependencies between the individual components so that our overall masterplan is the most effective and efficient it can be. We created masterplan options and assessed these against an updated set of evaluation criteria.
- **Stage 4 – Masterplan Finalisation:** The preferred masterplan from Stage 3 will be developed more, supported by further stakeholder engagement and the feedback from the AEC. This stage will conclude with the submission of our DCO application in 2020.

Ensuring that we were able to take into account insights from consumer and stakeholder engagement has been a key determinant of the design and structure of our SDP. The milestone and gateway approach to our SDP ensures that appropriate engagement took place with internal and external stakeholders before we moved onto the next stage. We are confident that the M4 exit plan and therefore the H7 plan is robust since it has been developed following a logical, systematic and consultative approach.

The SDP included seven disciplines for assessing masterplan assemblies and evaluations. These were Operations and Service, Business Case, Delivery, Sustainability, Community,

Planning and Property, for evaluation against five different propositions, one for each stakeholder; Consumers, Investors, Airlines, Community and Environment; and Colleagues. The propositions, as originally defined in the Strategic Brief, are described in Figure 9 below.



Figure 9: Heathrow Strategic Brief

Each discipline had individual subjects for assessment with well-defined evaluation criteria. For example, for Operations and Service as a discipline, we defined Passenger Experience as a subject for evaluation against a set of criteria such as the landside passenger journey experience¹¹⁰. Subsequently, we have assessed different components and masterplan options against each of the criteria from each of our stakeholders' perspective. This has led to a considerable number of components and assembly options being reviewed and subsequently discarded, an example of this is provided below.

Assembly options example – T5X piers: we examined the position of new piers to Terminal 5X, where we created four different options. Two of them included piers to Terminal 5X in between the current Northern Runway and the new north-west runway known as “Northerly assembly options,” and two of which included piers for Terminal 5X next to or towards the west of T5X known as “Westerly assembly options”. Using the evaluation process as described above, from a passenger perspective, we concluded that the “Northerly assembly options” were preferred. Therefore “Westerly assembly options” were discontinued. This is described in Figure 10 below.

¹¹⁰ Further details can be found in the Scheme Development Process for Heathrow Expansion: <https://www.heathrowexpansion.com/documents/heathrow-expansion-masterplan-scheme-development-manual-v5/>

EVALUATION: CONSUMERS / PASSENGERS



- ✓ Marginally better connection times for passengers and bags
- ✓ Marginally better inter-terminal connectivity
- ✗ Potential to create more split passenger areas and level changes
- ✗ Potential to constrain ability to provide mobility infrastructure e.g. travellers
- ✗ Longer walking distances
- ✗ Space constraints in terminal may cause congestion
- ✗ Removes ability to create optimised public transport interchange
- ✗ Removes all terminal adjacent short stay parking

- ✗ **Neither option supports 60min connection time – both require expedite solutions for pax and bags**



North (preferred)

- ✓ Overall better passenger experience e.g. northern satellite having single level IDL
- ✓ Consumer preference is for transit system to be before IDL dwell (informed by Horizon)
- ✓ Centralised vertical circulation
- ✓ Enables airline partner consolidation in the West (enables intuitive access for passengers)
- ✓ Supports high connectivity level in the West/North campus
- ✓ Minimised level changes across the passenger journey
- ✓ Layering to support visual connections, natural light, views of the airfield and double height space
- ✓ Optimised front door in western LTZ with public transport interchange
- ✓ Highest proportion of pier served stands
- ✗ Marginally worse for connection times and inter-terminal connectivity

Figure 10: Main findings on Assembly Option assessment from a Passenger proposition perspective

5.1.2 Drawing on consumer insights

Our consumer insights have had an increasingly large and specific impact on the masterplan as it has developed through each gateway. This includes research and engagement specifically related to our IBP, which defined the consumers outcomes that our plan aims to deliver. Our investment plan is a crucial way in which we can deliver on our outcome commitments. Below, we highlight a number of ways consumer insight has been fed back into the development of our masterplan¹¹¹: These are likewise described in Chapter 2 – Consumer Engagement.

M25 access junctions: Currently, a significant proportion of airport consumers use cars to get to the airport (whether parking, being dropped off, or using taxi/ride hailing services). For many, it represents a more convenient option, and for some passenger groups there is no feasible alternative at all. The performance of the M25 and supporting infrastructure (slip roads, feeder roundabouts, access to parkways/terminals) is crucial to the resilience of consumer accessibility to Heathrow and overall journey experience. Increased access points to the M25 through multiple junctions aids the recovery of delayed journeys in the case of congestion or an incident. Design components throughout the masterplan development process have explored several options for M25 junctions. At one point, the masterplan considered a single entry from the M25.

¹¹¹ More detail is provided in: Expansion Consumer Benefit Report: How has our understanding of consumer needs been integrated within the programme and evidenced within the proposed Preferred Assembly? Heathrow Airport, 2019

Ease of access is the second biggest reason why passengers chose Heathrow after their choice of destination and airline¹¹² and uncertainty over traffic unsettles the feeling of control¹¹³.

Recognising the importance of supporting infrastructure that can enable consumer access, a preference for two junctions to the M25 to support the Western Campus and Southern Parkway was highlighted to the design team. Their analysis was supported by consumer insight on and expert analysis of ease of access for drivers, supported by consumer insight on cites the importance of resilient surface access points. The inclusion of Junction 14 and the Stanwell Moor Junction in the M4 Exit masterplan is evidence of our action in response to this insight.

Semi-stacked Terminals – T5X: T5X is a 20mppa extension to Terminal 5 with pier-served stands on the Western Apron. T5X has a predominantly single level processing floorplate with gates accessible to and from the terminal. The single level permits clear sight lines and intuitive wayfinding, in a similar way to the T2, T4 and T5A design. The configuration of the T5 Landside Terminal Zone (LTZ) allows for a mixed Departures and Arrivals concourse on a single level, providing greater operational resilience and an enhanced commercial offering. Consumers are clear in prioritising intuitive wayfinding and shorter walking distances. The semi-stacked design of T5X was the first element of our masterplan redesigned to reflect this. It responds to consumers’ needs, providing minimal level changes, seamless public transport, and a sense of place.

“Key thing for me is, less is more in this space (terminal design); easy to navigate, easy to meet people, easy to get the things you need to get that have been removed from arrivals”¹¹⁴

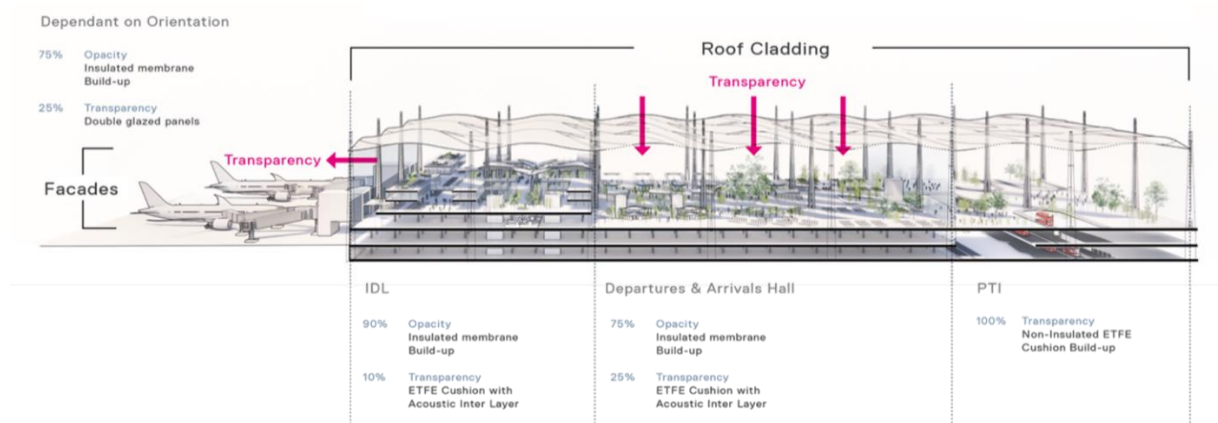


Figure 11: T5X cutaway

Creation of Public Transport Interchanges (PTIs): An expanded Heathrow will be an inter-modal transport hub not just for aviation but for all modes of public transport. Public transport that is easy to use, reliable and in close proximity to the airport has a number of key consumer benefits. Reliable and multi-modal public transport options will allow consumers to have increased surface access choice, including more affordable travel options. Engagement and

¹¹² Internal Heathrow Research and Insights

¹¹³ Heathrow Surface Access: Final Report

¹¹⁴ Direct feedback (verbatim) from Consumers on T5X design – Join the Dots, *Horizon workshop*

research illustrates simplicity and integration are key considerations for passengers when coming to the airport through public transport modes.

What Matters the most in terms of accessing the airport by public transport? – *“Simplicity: One Mode, Direct Route, Minimum no. of changes”*¹¹⁵

*“important to have open spaces... making everything a bit smoother, seamless and more enjoyable”*¹¹⁶



Figure 12: T5X-T5A PTI

Our PTI design has continued to evolve in response to consumer insight. Our M4 Exit masterplan had separate forecourts for the existing T5 and the new T5X. Based on this further insight we now propose a single combined forecourt serving a single integrated terminal. It will encourage the use of more sustainable modes of transport. This reduces the complexity of the road network, making drop off and pick-ups more intuitive, shortens walking distances and allows for an integrated commercial zone with an improved commercial offering. This change means that all public transport for the integrated terminal will be at one location, provides additional green space options, and an opportunity to create a sense of place.

Consumers will continue to be, at the heart of our decision making in further iterations of our masterplan at M5 and beyond the DCO.

5.2 Affordability and Deliverability

Our masterplan must be affordable for our passengers and airlines. Investment significantly drives overall airport charges under our RAB model. Managing our investment appropriately will enable us to provide value for money for all, ensuring that our investment plan is affordable. We have worked very hard to get to a masterplan at the M4 Exit Gateway that remains affordable. Our M4 Exit masterplan is consistent with the initial aspiration of delivering runway capacity within a cost envelope of £14.4bn in 2014 prices.

We have had to overcome significant capital cost challenges. At M3 Exit Gateway in 2018, we developed different assembly options for the masterplan, enabling us to test masterplan options for the first time for ANPS compliance and DCO consent. All of the assembly options

¹¹⁵ Caroline Thompson Associates: Willingness to Pay, 2017

¹¹⁶ Direct feedback (verbatim) from Consumers on T5X design – Join the Dots, *Horizon workshop*

represented a £5-6bn capital cost challenge compared with the Westerly Option Dashboard Case (WODC)¹¹⁷. Since then, we have tested all capital levers from first principles, working with our airline customers to successfully address the capital cost challenge. Among the steps we have taken are:

- Making more efficient use of existing assets, especially T5 (“T5+”) and occupancy
- Re-engineering landfill and other civils works (e.g. roads) to realise savings
- Benchmarking and adjusting assumptions on terminal size and space
- Reducing / phasing property land take, particularly along the northern perimeter of the current airport boundary
- Robustly benchmarking cost estimates and risk allowances using best practice and Independent Fund Surveyor (IFS) recommendations

A preliminary view on affordability was presented to the airline community and the CAA in February 2019 alongside the M4 recommendation of the preferred masterplan. This reflected an increased maturity level of the scheme, and a risk allowance validated as ‘realistic’ by the IFS. In addition, following the M4 gateway, the CAA performed an affordability and financeability assessment. The CAA concluded that, *“The analysis indicates that there are a range of credible scenarios that are both affordable and financeable.”*¹¹⁸

Affordability is not only about the costs of the masterplan. Affordability is also materially influenced by capacity and the ability of existing and new airlines to introduce more choice and accelerate traffic growth. We therefore want to make sure that early capacity within the current boundaries of the airport is provided to support affordable expansion.

We have developed the phasing of the infrastructure investment to ensure that it is deliverable and are currently working the construction approach to minimise the impact on local communities and environment.

An expanded Heathrow must also be operable for airlines and others. Our Future Heathrow team is now focused on ensuring our expansion plans are fully integrated into our existing operation.

5.3 Costing the plan

In this section we outline how we have followed industry best practice estimating methodology to cost our M4 Exit masterplan and how we will continue to do so for our M5 masterplan. We describe the methodology, the process and the benchmarks that we have used to develop the plan.

5.3.1 Cost Maturity Model

The estimating maturity model was established at the outset of the expansion programme. It articulates the masterplan milestones and links these to the estimate type, level of expected scope information and cost planning outputs with associated estimating tolerance levels at the various stages of maturity. This establishes the plan to provide a robust estimate for delivery.

¹¹⁷ And early illustrative assembly of the masterplan used by Heathrow to support airport and airline engagement

¹¹⁸ CAP1812. Working paper summarising affordability and financeability modelling for capacity expansion at Heathrow airport, June 2019

According to the estimating maturity model, the cost estimate at each milestone would serve a different purpose. This is described below:

Strategic definition stage, Milestone 1 (M1): to establish an order of magnitude for the scheme. It reflected the strategic brief which was broadly aligned to large, undefined scopes of work relating to the future requirements.

Milestone 2 (M2): to review the key components of the masterplan, whilst paying limited attention to the secondary and tertiary assets which remained undeveloped in terms of scope.

Milestone 3 (M3): to enable testing of different masterplans and assembly options with various strategic objectives.

Milestone 4 (M4): to establish the cost baseline for the first time in the programme once a preferred masterplan had been established with all components and choices understood at that point in time.

Milestone 5 (M5): to establish the capex “should cost” for the basis of DCO submission. It should be noted that M5 develops the design to include areas of risk / concern in relation to scope unknowns and learnings from the ANPS and statutory consultations. This is not a cost estimate that is mature enough for procurement or ready to work towards a delivery solution, but the “should cost” will contain sufficient allowances within it to develop the assets contained within the masterplan, to be managed in a controlled and sequenced manner.

The cost maturity model established a different tolerance range. Most infrastructure owners and developers, globally and in the UK, set out their own requirements for ‘Estimate Tolerance’. The majority of these are based on the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice for the Process Industries. The estimating maturity matrix sets out a maximum permissible tolerance range for each masterplan gateway, with Gateway M3C at -20% / +40% reducing to -15% / +30% at Gateway M5. This is deemed to be a good range to aspire to and sits within the expected ranges set out in the AACE Practice for an Estimate as design definition progresses towards 15% (Class 4 Study/Feasibility phase). Heathrow has adopted this approach for our process.

5.3.2 Cost plan process

Our cost estimate is constructed based on industry best practice processes. The steps are explained below.



Figure 13: Cost Plan Construct

Firstly, the design information is formally received by the design team. This made up of drawn information, written scope and / or performance related requirements, and any assumptions / clarifications the designers wish to be considered in the cost plan.

The design information is then quantified, measured and understood. Queries will be raised if required and formal requests for information submitted back to designers. Cost plans are then prepared.

The quantified cost plans are then priced. Depending on the level of design detail, appropriate benchmarks will be applied. Heathrow has a number of facility-level benchmarks that have been reviewed and accepted by the IFS for many on-airport assets, such as terminal buildings and airfield pavement. Where design is in greater detail, unit rate benchmarks are applied. The estimating team also price check specifications and costing information with the supply chain, where appropriate, to ensure completeness in costing.

This will then establish the direct costs and base costs for the works. Base costs are defined as the standard cost of production designing, manufacturing, assembling, delivering, installing, testing and commissioning during normal working hours to suit suppliers' usual work programme. They include Heathrow standard specification supplier system, sub-system or components based on a variety of factors, including standard working hours, an unrestrained programme, ready availability of labour and materials, landside working, current day costs and greenfield site location.

In addition to base costs, the actual cost of delivering the work must be factored into the cost plan. 'Project Specifics' are defined as factors that are identified as differentiating a base build project from a unique project. They include phasing or waiting time, abnormal working hours, airside working, airport safety and security requirements, site logistical constraints, revisions to standards required and additional costs for site specifics such as diversions to existing services or the removal of asbestos. Further to this, allowances are made for the Contractor's Preliminaries (the cost of fixed and time related infrastructure and management required by the Main Contractor in delivering the works), contractor's overheads and profits and project costs such as the design fees and Heathrow Leadership and Logistics (L&L). These are outlined in the table below:

Table 4: Indirect Cost adjustments

Indirect cost adjustments	Which include...
Project specifics	Costs specific to a location/operation of construction
Preliminaries	Cost of site establishment, contractor management and consumables during construction
Overheads & profit	Margin made by main contractor
Leadership & logistics	Heathrow management, client PM / CM, Programme logistics
Design	Design fees (architectural, structural, civil, M&E etc.)
Risk / contingency	Programme / project risk allowances

5.3 3 Risk/Contingency

The M4 Exit masterplan estimate includes [REDACTED]

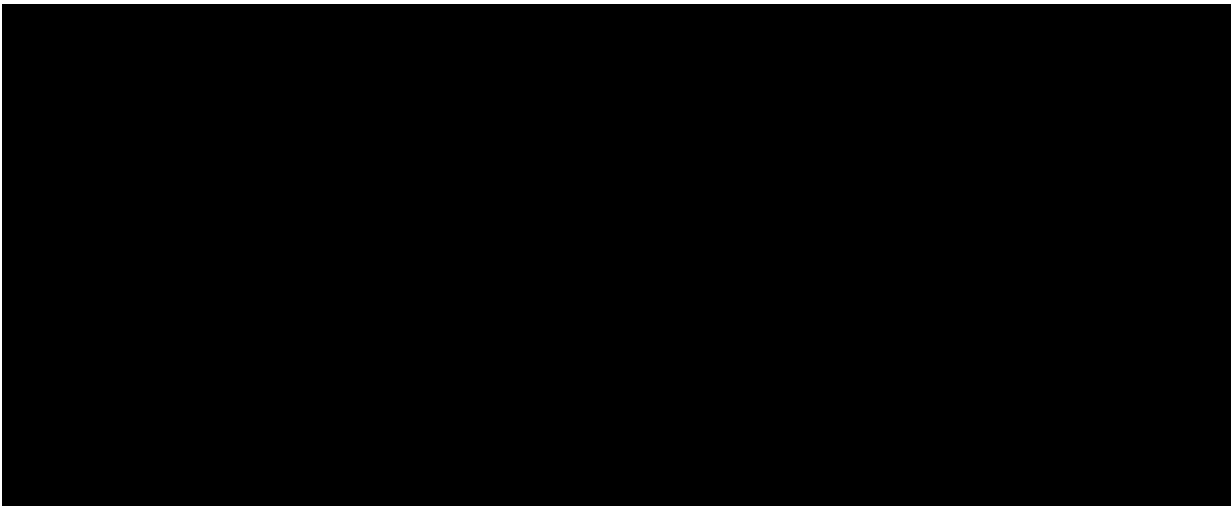
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



The Risk Reserve allowance was introduced at the M4 Gateway, following [REDACTED] advice. The [REDACTED] has reviewed the M4 Exit masterplan and concluded that Heathrow's approach to estimating risk and the resulting risk/contingency allowance at M4 to be reasonable.

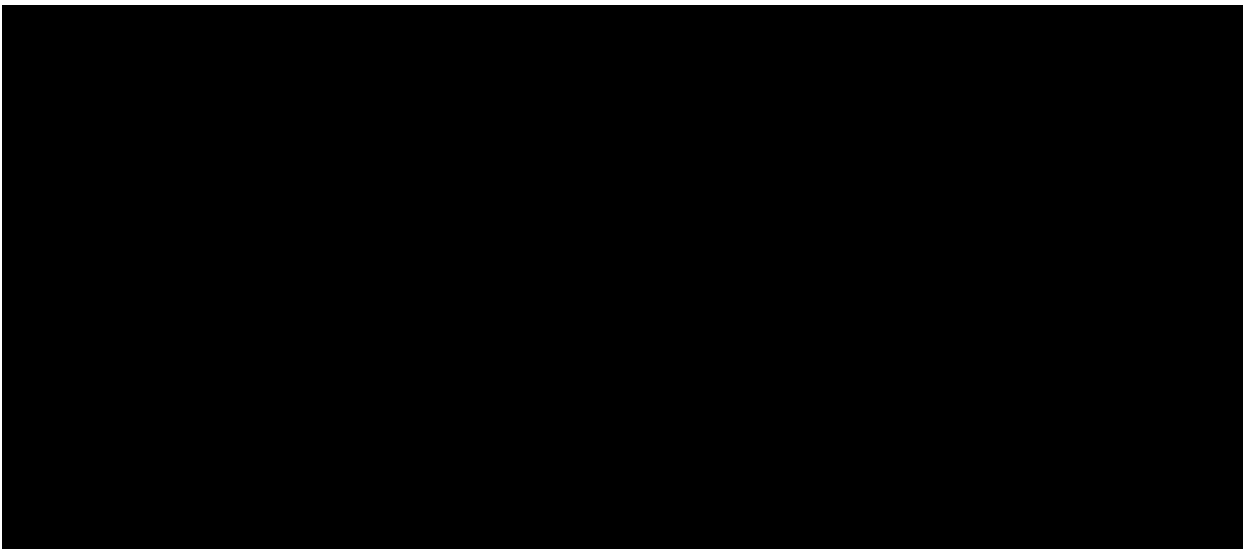
[REDACTED]
[REDACTED]
[REDACTED] 119

Further discussion on risk is outlined in the Chapter 12 where we discuss the H7 WACC. In order to support the M5 masterplan consolidation and the following DCO submission, Heathrow is currently enhancing its risk management capability. A new team is being setup with the aim of extending existing practices and combining them with state of the art methodologies. In the coming months, a thorough risk update campaign, involving all relevant parties, will commence with the aim of identifying and quantifying the risk scenario associated with our expansion plans. This will form the base of the subsequent overall quantitative evaluation exercise aimed at determining the risk and contingency provision to be included in the DCO application in 2020.

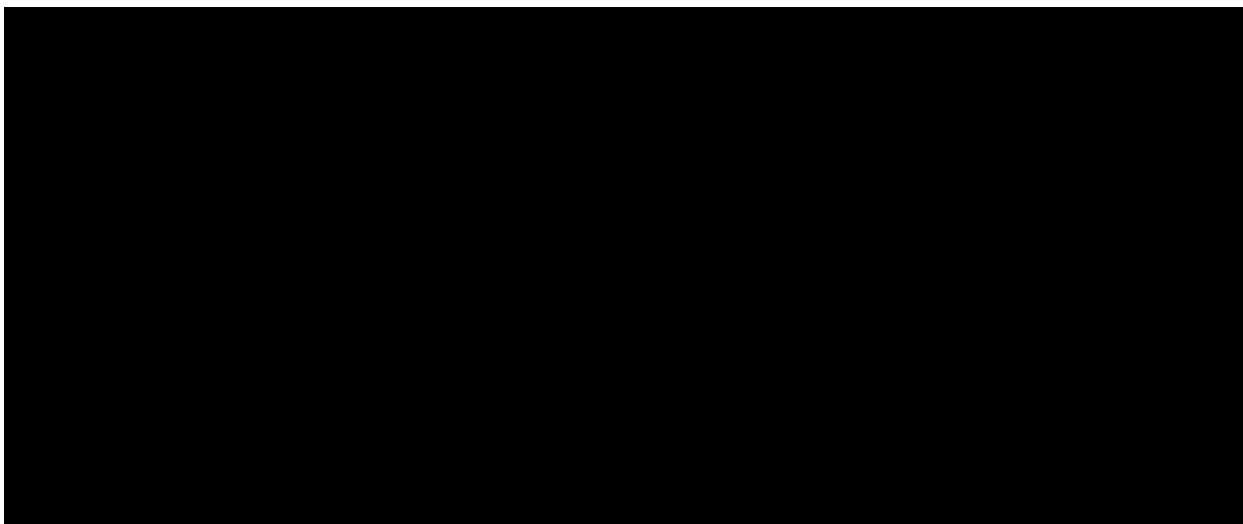
5.3.4 Benchmarking

The benchmarking process is aligned to the Royal Institution of Chartered Surveyors NRM (New Rules of Measurement) standards. Heathrow On-Costs, Risk and Project Specific allowances are removed from the benchmarks to provide a Net Construction cost (a clean cost) for benchmarking accuracy. Inflation can be considered against a pre-agreed base date. We continuously compare our costs relative to other industries and our past performance. This supports and informs our cost estimation methodology and provides us with confidence that our forecast is set at efficient levels. Over Q6 and since the start of the expansion programme we have developed a number of benchmarking exercises. In addition, the [REDACTED] has carried out independent benchmark reviews. We outline below key findings of these exercises, supported by evidence as shared with the airline community throughout 2019.

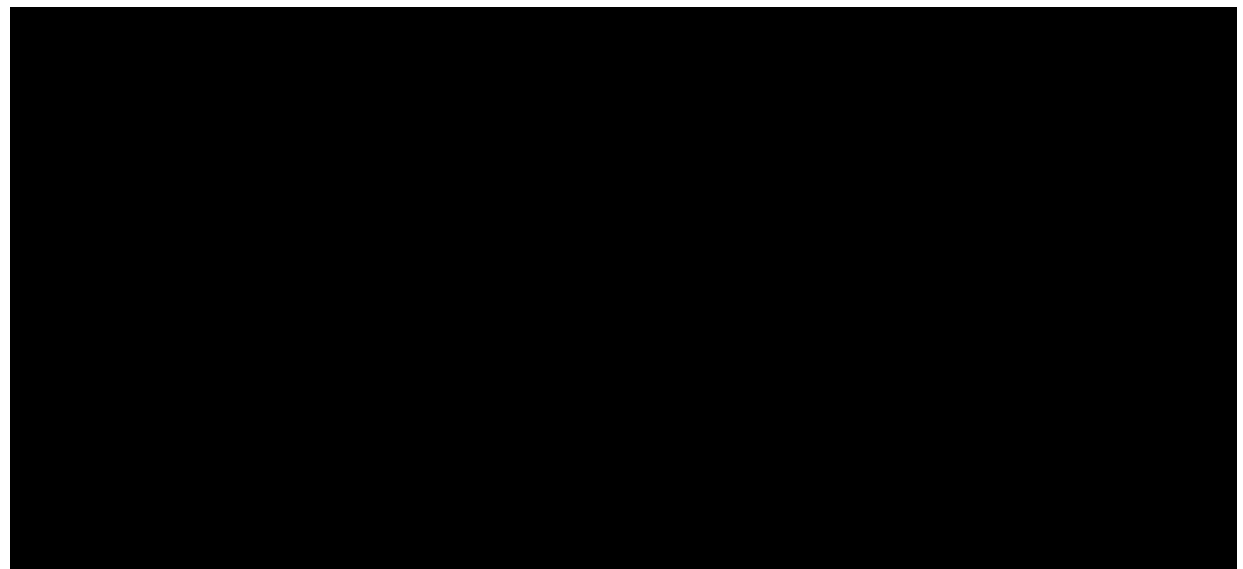
1. Heathrow expansion design costs, assumed at [REDACTED], are below the average industry benchmark of [REDACTED]



2. Heathrow expansion Overhead and Profit (OHP), assumed at [REDACTED], is below the industry benchmark of [REDACTED]



3. Heathrow expansion preliminaries for Civils, assumed at [REDACTED], are below an industry benchmark of [REDACTED], whereas preliminaries for buildings are above it, assumed at [REDACTED]



4. Heathrow expansion L&L is based on the Q6 model with an additional efficiency target of [REDACTED], resulting in a [REDACTED] provision. The [REDACTED] has confirmed that the L&L charge for Q6 is within the industry range, as demonstrated by its own analysis: **“HAL’s level of on-costs appeared comparable with those in other regulated utilities, and considerably lower than some (for example, some rail projects appeared to have on-costs of 25%)”**. (Figure 17)

In addition, the CAA concluded, as part of the Q6 review, that **“Based on the ASA study and responses received, the CAA considered that the level of on-costs incurred and projected by HAL was consistent with industry benchmarks”**. It therefore did not propose changes to the forecast for L&L in its Q6 decision.

Our estimates for an expanded Heathrow are based on our Q6 definition of L&L. Our new delivery model will introduce additional elements that will need to be considered as part of our L&L definition, including the operation of our logistics hubs, construction support sites and control centre.

5.3.5 Efficiency assumption

Figure 18 illustrates construction industry productivity (i.e. capital investment productivity) growth since 2000¹²⁰. It illustrates that there has not been any productivity improvement since the start of the millennium. Heathrow depends on the construction sector. This combined with the comparatively early stages of design of the masterplan means that, at this stage, it would be premature to assume further productivity gains above those seen in the market as a whole over the last 17 years. We are therefore assuming no explicit efficiency assumptions within our capital investment estimates.

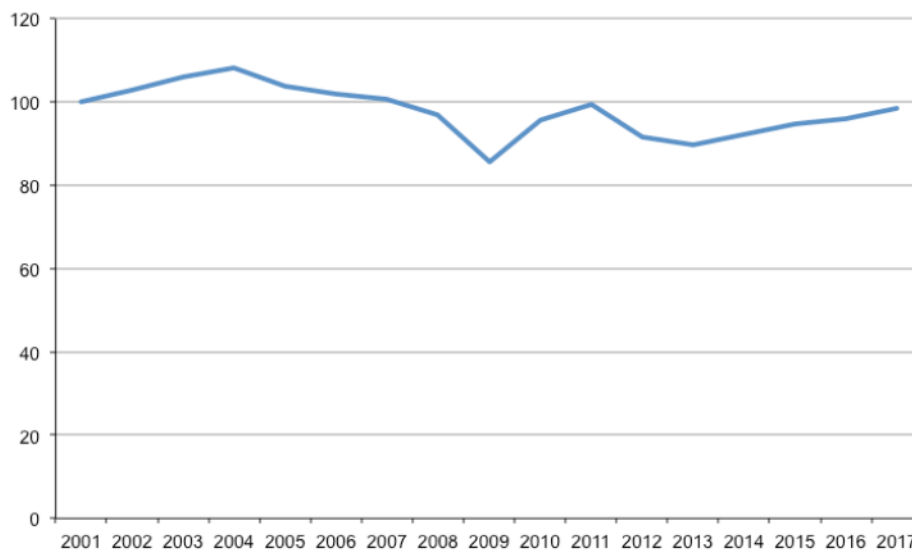


Figure 18: Construction industry total factor productivity - Source ONS

The [REDACTED]¹²¹, and its conclusion is clear; **“the [REDACTED] support the overall budget as realistic for the scope presented”**. This gives us confidence that the M4 estimates (the majority of those included within this plan) are robust and represent an efficient investment envelope at this stage.

¹²⁰ Frontier Shift, Input Price Inflation and Productivity Growth, First Economics, August 2019

¹²¹ [REDACTED]

5.4 Delivering the plan

We have developed robust capital development processes and standards through the Q6 and iH7 periods. These alone will not be sufficient to deliver the scale and complexity of an expanded Heathrow or to deliver the outcomes we want. We need to evolve a different and improved model to address complexities such as:

- Ensuring we minimise the impact on the many local communities surrounding Heathrow through construction;
- Ensuring compliance with the commitments we are making through consultation and the DCO consenting process;
- Ensuring that the integration of the works across both geographical areas and into existing systems is successful;
- Ensuring we can source the required capability from a market with skills that are already in high demand from other mega programmes; and
- Ensuring the construction programme does not impact the day-to-day operation or high service standards of the airport.

5.4.1 Industry learning and Project 13

The whole industry has recognised productivity in construction has not increased in line with other industries. The industry collectively must think through how to deliver works differently to drive productivity. Project 13, an initiative led by the Institution of Civil Engineers (ICE), was developed through collaboration of industry partners (clients, suppliers and academics) to address this¹²². Heathrow is an active member of the initiative, with the Expansion Programme being a Project 13 ‘exemplar programme’. As a result, many of Project 13 principles have been incorporated into the future delivery model for our investment plan.

Firstly, the concept and importance of achieving an increase in productivity is heavily emphasised in our delivery ambition. This will support the goal of affordability whilst maximising the value we can deliver from our site works.

Secondly, we recognise that exploiting digital capability not only drives improved productivity and lowers the cost of delivery but enables an improved handover process into operation. The vision to have a “digital twin” of all assets being created that will be transferred into the operation to be used by engineering throughout the life of the asset means a quicker delivery into use and quicker delivery of benefits.

Our procurement strategies also incorporate the Project 13 principles of creating an ecosystem of suppliers. This allows us to draw on the wide range of capabilities we need, together with creating projects, where appropriate, with an outcome-based procurement arrangement rather than traditional transactional relationships. This can create commercial incentives for collaboration to jointly mitigate risk, not transfer it.

5.4.2 Sustainability and Safety

In addition to meeting the tough sustainability targets in the ANPS, we have designed the masterplan to be as sustainable as possible. For example, with a green loop around the airport providing better connectivity for local communities. We also have included measures on airport to reduce carbon emissions by building as much of the expansion as possible offsite we minimise our environmental footprint. In addition, we are exploring low carbon cement and steel.

¹²² <http://www.p13.org.uk/>

We are unwaveringly committed to growing and operating our airport, with health, safety and wellbeing at the heart of our delivery. As part of this, we have developed a new behavioural safety and wellbeing programme called EPiC based on the industry learning programme developed by TTT. In line with our #worksafehomesafe campaign and our Service Signatures, EPiC is an innovative and fully immersive experience that allows all of our colleagues to explore why we do the things we do when it comes to keeping ourselves safe and well and to challenge unsafe ways of working. Our ambition is to roll out this programme to all Team Heathrow colleagues including supplier partners in the future

5.4.2.1 Delivery Ambition

Our delivery ambition for H7 and beyond is centred around the philosophy of **Lead, Live and Learn**. We will lead by setting the ambition and direction. We will live by delivering on our principles, setting the ways of working, processes and culture by which everyone who works on the programme will align to, and we will learn to improve and mature our capability over the life of the programme.

The delivery ambition is a foundation for our programme planning. It defines the principles that we will expect our teams and suppliers to align to. Our delivery model will need to be far more flexible than in previous price control periods to allow us to respond to the diverse nature of the portfolio and secure the efficiencies we need to deliver an affordable and financeable programme.

Lead: The key component elements of the lead section are centred around ensuring our delivery plans can be traced back to our Strategic Brief and consumer outcomes. This protects the outcomes we want to achieve over the multi-year programme. We will then define the delivery principles by which we expect everyone to align to. We also need to recognise that the outcomes we want stretch beyond traditional time/cost/quality trade-offs so we need to embed a more value-driven culture to enable us to deliver wider consumer, social and economic benefit. This defines the metrics we will measure the construction and programme against, not only affordability and schedule, but our ambitions to deliver for consumers, reduce capital carbon, increase productivity, be a responsible neighbour and provide more jobs and apprentices.

Live: How we live through the programme will be depend on us setting up standardised processes, tools, and behaviours across the team. That drives efficiency and productivity. This includes amendments to our current processes to drive more consideration on using standard products in our design, and moving to a production mindset where delivery activity is taken offsite. Offsite production lowers health and safety risks, enables quicker delivery outside of the constraints of the operating airport, and can reduce maintenance costs from standardised products.

Learn: The scale and length of our investment will enable us to drive the culture of learning harder. We can learn from both the decisions and work delivered as well as the industry as a whole. We will exploit the opportunities of technology by providing tools and systems across the delivery team. This common platform should create efficiencies from data collection to feed our governance decisions, reporting and assurance. It will also allow us to establish a 'control centre' approach to our delivery, based upon real-time information.

5.4.3 Portfolio delivery

We plan to deliver our investment plan by separating the scope across On-Airport Delivery (all projects falling within the current airport boundary), Off-Airport Delivery (all projects outside the current airport boundary) and other projects where they may be carried out by third parties.

We will retain oversight of cost and programme across all three areas to maintain the overall integrity of the investment plan.

We will design different delivery strategies for each area depending on the scope being delivered, the risk to the programme, the potential impact to the existing operation and level of airport expertise required. These dimensions will also define our operating strategies, procurement approach and risk transfer. All will be aligned to our delivery ambition.

For example, we are likely to have less involvement in areas where there is less risk to the airport operation and less need for airport expertise e.g. service diversions off-airport. In these instances, our integration activities will centre on the integration of these services into the existing system, and our client interaction will focus on reporting and assurance to assure a successful delivery.

In other areas, e.g. terminal development, we are likely to take a more traditional approach. We may appoint a delivery integrator to ensure all the different systems and trades are fully aligned to an integrated solution and schedule. We are likely to retain more of the risk for these projects, as the realisation of any risks would have a far greater impact on our operation, given these projects importance to our consumer and passenger outcomes, both in construction and once complete, we see the benefit of greater involvement across the programme or project lifecycle.

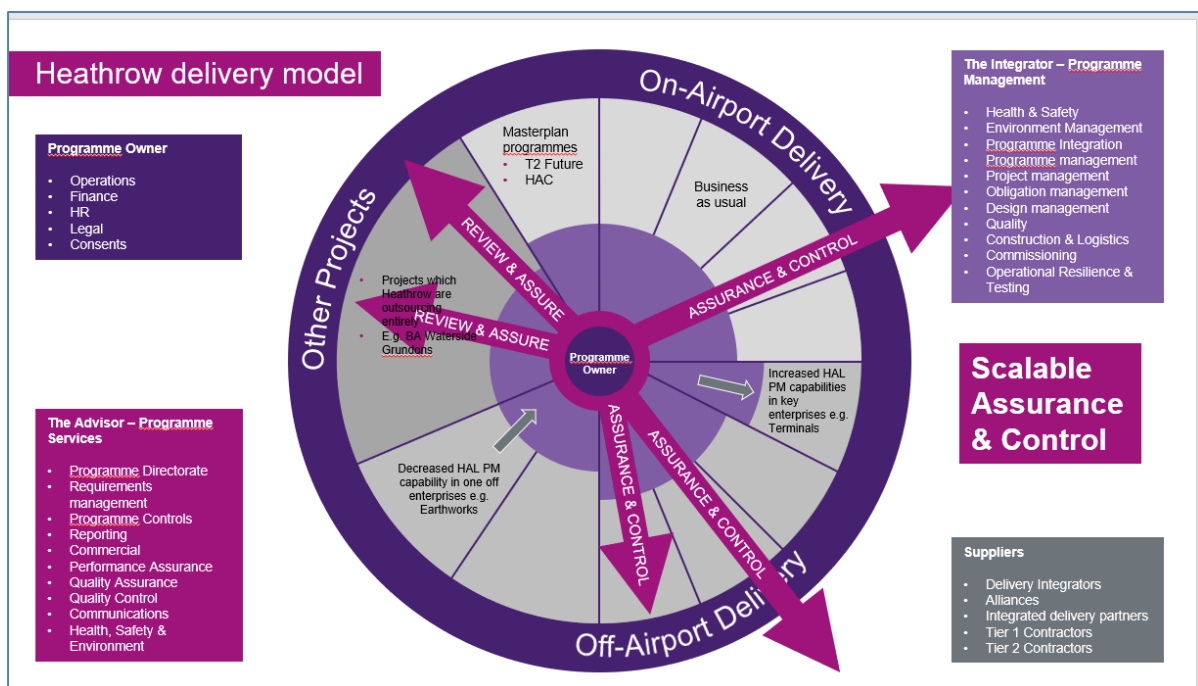


Figure 53: Outline Heathrow delivery model

5.4.4 Next steps on delivery ambition

The delivery model will continue to develop over the next six months with key strategies – procurement strategies, enterprise models, governance frameworks, controls strategy and digital strategies all required to be in place by Gateway M5. We will engage and discuss the delivery model with the airline community throughout the Constructive Engagement period and beyond.

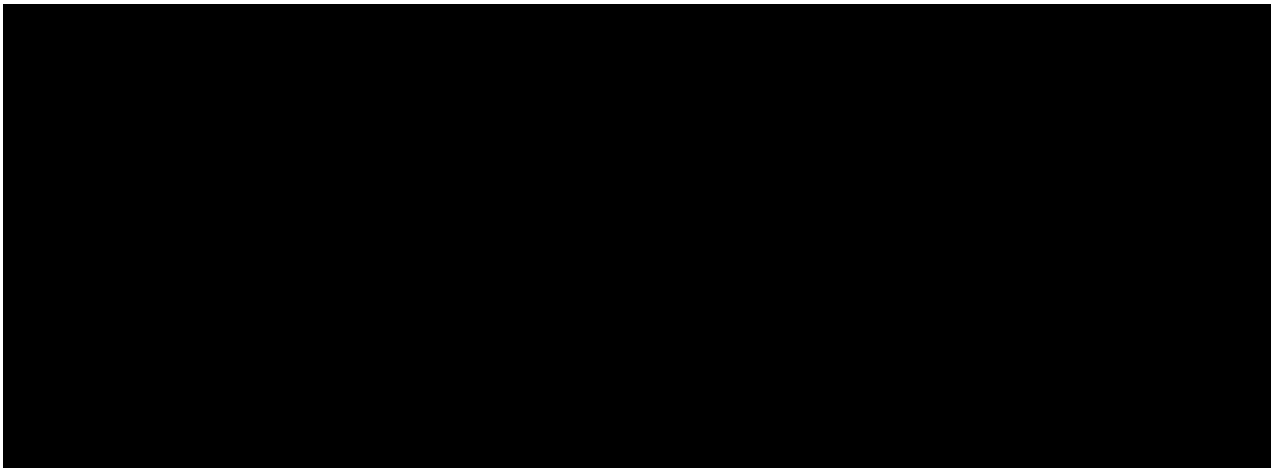
5.5 Innovation Partners

Heathrow launched its Innovation Partners process in April 2018 by inviting UK businesses, entrepreneurs and leaders to enter an Expression of Interest (EOI) to participate in an open, inclusive and evidence-based process to develop alternative and innovative ideas to deliver expansion.

In line with our vision to give passengers the best airport service in the world, Heathrow promoted the Innovation Partners as widely as possible to any company who could help Heathrow create the most successful hub airport in the world in a way that is sustainable, affordable and financeable. This provides the opportunities for new partners with better technology or smarter ways to deliver service and efficiency with Heathrow. The partners bring demonstrable expertise, knowledge, commitment and innovation capability to implement their proposals with Heathrow.

Innovation Partner proposals must align with our vision and strategic objectives to improve passenger experience, drive cost efficiency, grow commercial revenues and deliver sustainability targets. Proposals must also align with Heathrow's regulatory and planning constraints, and the Government's ANPS, recognising that Heathrow will continue to own and operate our hub airport as a single entity.

The Innovation Partners process was planned in three phases to allow for wide early participation and open dialogue to support proposal development and then down-selection through rigorous evaluation based on clear and consistent criteria. The first stage of the three-part process asked potential partners to complete a short EOI to outline their ideas and the benefits for the expansion programme; the second phase comprised a business case and financial model; and the final phase comprised a pitch to senior Heathrow colleagues and the relevant business experts.



Heathrow has presented the range of ideas to the airline community and received support for the concepts. No potential Innovation Partner company names were mentioned during stakeholder engagement as contract negotiations remain ongoing.

We will now provide seed funding to implement a series of trials and feasibility studies with the nine Innovation Partners, the outcomes of which will determine whether there is a business case to implement the innovations fully. It is anticipated that the trials will take place across 2020, however each workstream will now work separately at its own pace, so that it can be incorporated into our expansion plans at the appropriate time if the trial or feasibility study is successful.

5.6 Governance and regulatory treatment of capital investment

At the outset of Q6, Heathrow and the airline community agreed on what efficient delivery of capital investment meant:

“Efficient capex is the delivery of an asset in a manner which optimises and balances scope, time, cost and risk, provided in an appropriate manner having followed a structured development process with appropriate decision points and governance”¹²³

We jointly developed the Development and Core framework, and together we have successfully delivered it. Over Q6, Heathrow welcomed record levels of passengers together with record levels of passenger satisfaction. We have done so by investing below the allowed envelope of investment in the Q6 determination, thereby delivering efficiently. In Q6, the Development and Core framework has seen over 600 separate business cases go through governance. Heathrow, together with the airline community, have developed a collaborative commercial relationship that has enabled us to focus its efforts in developing a programme of work to the benefit of all, while jointly adjusting the plan to unforeseen circumstances. This collaborative approach has meant that no formal escalation to the CAA on Q6 investment has been necessary.

The airline community and Heathrow have worked together to improve the effectiveness and efficiency of the framework through Q6 by, for example, making sure that the airlines and IFS have more visibility at early gateways of project development. Equally the airlines, Arcadis and CEPA have been complimentary of the positive impact that the Development and Core framework has had over project delivery and our joint relationship.

The scale of H7 investment requires a robust and tested governance and regulatory framework in place that allows us to further design and adapt business cases during the price control through the gateway process. This approach allows us to make decisions about business cases in a timely way, when we have all the relevant information available. Further, the flexibility that comes from this ex-ante governance setting and ex-post review of efficiency is even more important in H7 due to the unprecedented scale of the expansion programme and the timings for the consenting process.

The Development and Core framework is key to ensuring we are only able to make investments when it is right to do so. It provides flexibility to adapt the investment plan to the particular realities of our airport. It enables projected investment assumed as part of the H7 price determination to be governed and tailored to stakeholders’ requirements within the price control, allowing us and the airline community to progress business cases in a systematic way once information becomes available.

The following key aspects of the process make it effective for us and our stakeholders:

- **A well-defined governance framework codified in the Enhanced Engagement Protocol and Capital Efficiency Handbook:** with a particular view of getting early airline engagement on the most relevant business cases. This has been a successful development that has taken place in Q6.
- **Gateway process:** our investment decisions go through a gateway process known as the Heathrow Gateway Lifecycle, which means that our business cases are reviewed at key points in their life. Gateway 3 (G3) represents a key milestone where the airline community agree to the business case proceeding into implementation, and where triggers (where relevant) are defined. The G3 business case value represents the cost

¹²³ Capital Efficiency Handbook, April 2015

allowance for Heathrow to recover through airport charges setting strong ex-ante cost incentives for delivery. In addition, G3 sets ex-ante costs incentives for Heathrow in the form of trigger payment definition for timely delivery of investment. We would continue to see this form of ex-ante incentive playing a role in H7.

- **Ex-post evaluations of expenditure:** at the end of the price control period, the CAA reviews whether Heathrow has efficiently delivered projects. Any expenditure that is considered inefficient is removed from the RAB and therefore not allowed to be recovered through airport charges in subsequent price control periods.
- **Independent Fund Surveyor (IFS):** the IFS is jointly commissioned by Heathrow and the airline community to guide, review and scrutinise our spending decisions. The IFS play a role throughout the majority of the gateway process. Its input is also used in the ex-post evaluation of final expenditure by providing impartial records and judgements of decisions at the time they were taken as opposed to years afterwards.

In addition to the characteristics of the Development and Core framework defined at the beginning of Q6, we have incorporated new elements of governance and cost incentivisation and control to the framework. Important elements such as independent reviews of our Category B costs by the Independent Planning Cost Reviewer (IPCR), and potential extension to pre-DCO Category C costs, increased scope of the IFS to earlier gateways and expansion-related investment. These elements are now well embedded within the framework and we propose to maintain them insofar as they remain relevant.

We have completed significant work on understanding what is the best regulatory and governance model to deliver an expanded Heathrow, while a) meeting the efficiency definition set out above and b) meeting affordability and financeability considerations. We have sought independent advice from Steer¹²⁴, the main conclusions of which are outlined below:

1. *Given the apparent success in cost control and acceptance of the process amongst the stakeholders, the status quo should remain i.e. that the current Gateway/ex-post approach to capital expenditure should be maintained for the next regulatory period.*
2. *We consider that the 'Regulatory Model' as consulted on by the CAA provides too much rigidity and has the potential to weaken the involvement of stakeholder airlines, reduce the flexibility of the programme of works, and could adversely impact on financeability of the programme through the increase in risk of returns to the shareholders and lenders. We therefore believe that this model is not considered any further.*
3. *We do, however see some merits in the 'Governance Model', as consulted on by the CAA, and that consideration could be given to some aspects of this model. We recognise that there still appears to be several variations of the model, but the principle of providing a more rigid ex-ante approach to a ring-fenced suite of projects in the areas covering routine maintenance and repairs only (i.e. those projects where costs are known and not contentious) is sound. For this reason, we consider that further dialogue should continue regarding the inclusion of such a model, but specifically only for routine maintenance/repair projects where costs are known in advance, scope is not likely to change, and that there is no contention with stakeholders over the delivery of the project.*

Heathrow believes that given all the other risks, uncertainties and challenges of a major investment programme it is worth building on successful approaches. We therefore propose evolution not revolution in capital governance. Therefore, building on the current Development and Core framework, we wish to work with the airline community on how we can evolve the framework to ensure a fit for purpose governance framework is in place for 2022. The starting

¹²⁴ Steer Review, LHR Capital allowances, December 2019

point for this engagement should be the particular characteristics of the investment ahead and the governance fora already in place. As the Enhanced Engagement Protocol and the Efficiency Handbook are current and live documents, therefore the H7 plan is built around them. We note that radical changes from current governance will result in different costs, schedules and engagement.

9 - OPERATING COSTS

Overview

- Heathrow has delivered the CAA's Q6 challenging cost efficiency targets
- Benchmarking demonstrates that we enter H7 with an efficient cost base
- We have set stretching operating cost targets based on benchmarked elasticities linked to passenger numbers tested against terminal size
- We have assumed ongoing productivity gains to deliver cost savings
- Our plans will deliver an on-going reduction in costs per passenger of 1.6% per annum

1. Introduction

In this chapter we set out our plans for efficient operating costs at Heathrow from 2022 to 2036. We highlight how we have delivered efficiencies during Q6 and we provide details of our benchmarking activities which show that Heathrow enters H7 with an efficient cost base. We provide details of our forecasting methodology for our plan based on each operating cost category. We discuss the key elements of our H7-H9 plan that will support an on-going reduction in costs per passenger.

Efficiency in our operating costs is fundamental to achieving Heathrow's outcomes and giving passengers the best airport service in world. Continually driving down like-for-like costs is a given for any private business. Our base plan delivers a 21% reduction in operating costs per passenger from 2022 to 2036. This equates to a 1.6% reduction in real terms per passenger per year. Our target is based on combined external benchmarks.

Choices in our operating costs directly impact our outcomes to:

- "feel safe and secure at the airport"
- "have a predictable and reliable journey"
- "feel cared for and supported"
- "have an enjoyable experience at the airport"
- "provide efficient, reliable and affordable airport services"
- "make Heathrow a great place to work"

Our operating cost forecast aims to deliver these outcomes in an efficient way. Our base plan focuses on maintaining service through expansion while reducing operating costs per passenger to support affordability. We have not included options which reduce service because consumer engagement shows that consumers want to see the service levels Heathrow offers maintained or improved. For example, the H7 Choice Research¹²⁵ showed that 67% of users preferred plans which offered improvements in service and in the willingness to pay research¹²⁶ only 2% of passengers were willing to accept a reduction in service in return for fares decreasing slightly. We have set out an option for higher service levels in our

¹²⁵ Accent, H7 service package choice research, 2019

¹²⁶ Systra, *Heathrow Airport Customer Valuation Research*, November 2018

Prioritising Service strategic option. This enables some areas of service to be improved but with a slightly higher airport charge.

Our efficiency targets are stretching. We are starting H7 in a materially better efficiency position than we started Q6. We reduced operating costs by a total of over £600 million between 2014 and 2018. This cut operating cost per passenger by 16%, from £16.79 in 2014 (9 months) to £14.12 in 2018. We have also managed to do this while improving passenger satisfaction.

This progress means that we are starting from an efficient position. External reviews of our operational cost performance provide robust evidence confirming this efficient starting point. Heathrow is now at the frontier efficiency for an airport with its characteristics, and broadly in line with the average costs per passenger of similar global hubs over the last decade. Notably, this has been delivered whilst delivering the relatively higher passenger service levels Heathrow passengers enjoy.

We have estimated efficient costs to 2036 based on both economies of scale, as we grow, and further productivity efficiency challenge. Both factors have been grounded in broad and robust external benchmarking evidence. Within benchmarking ranges and wider efficiency ranges we have aimed for the more challenging targets in order to keep airport charges as competitive as possible. Our operating cost forecast accounts for growth in numbers of passengers and the opening of new infrastructure.

Expansion would mean our real cost base grows in total, even as it falls per passenger, as shown in Figures 1 and 2 below. However, despite a 42% increase in passengers and 37% increase in terminal floor space, we forecast a cost increase of only 13%. Figure 3 shows the factors driving the cost reductions in our plan.

Our cost estimate should be considered in the context of what is a reasonable allowance for an efficient airport of Heathrow's size and characteristics, rather than a detailed bottom-up forecast of how we will run the business. In later years, plans are more speculative and unforeseen opportunities and headwinds will appear. Consumers also are primarily focused on end results in terms of cost and service. We have focused on evidence-based forecasts rather than bottom-up totals in the interests of transparency, simplicity and producing the incentives for the airport to focus on agile delivery of ongoing efficiency. We have described the core initiatives we expect to drive efficiency. These focus on our main cost areas – people, our security operation, our facilities and utilities costs, support services and procurement.

Total operating costs
£m, (2018p)

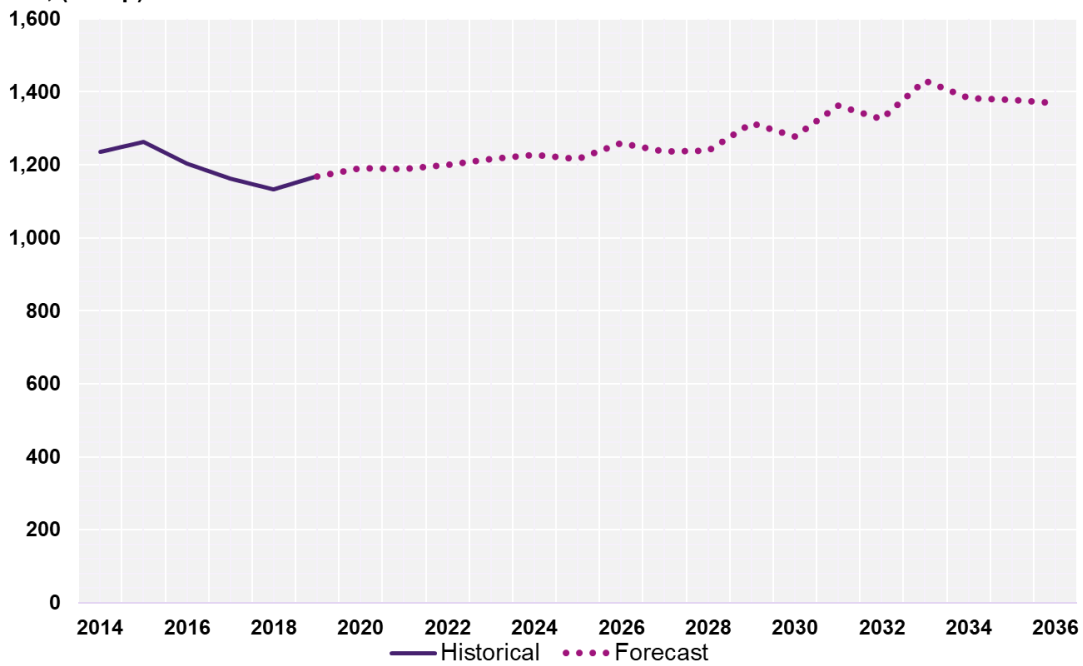


Figure 54: Total operating costs (£m 2018 prices)

Operating costs per passenger
£/Passenger, (2018p)

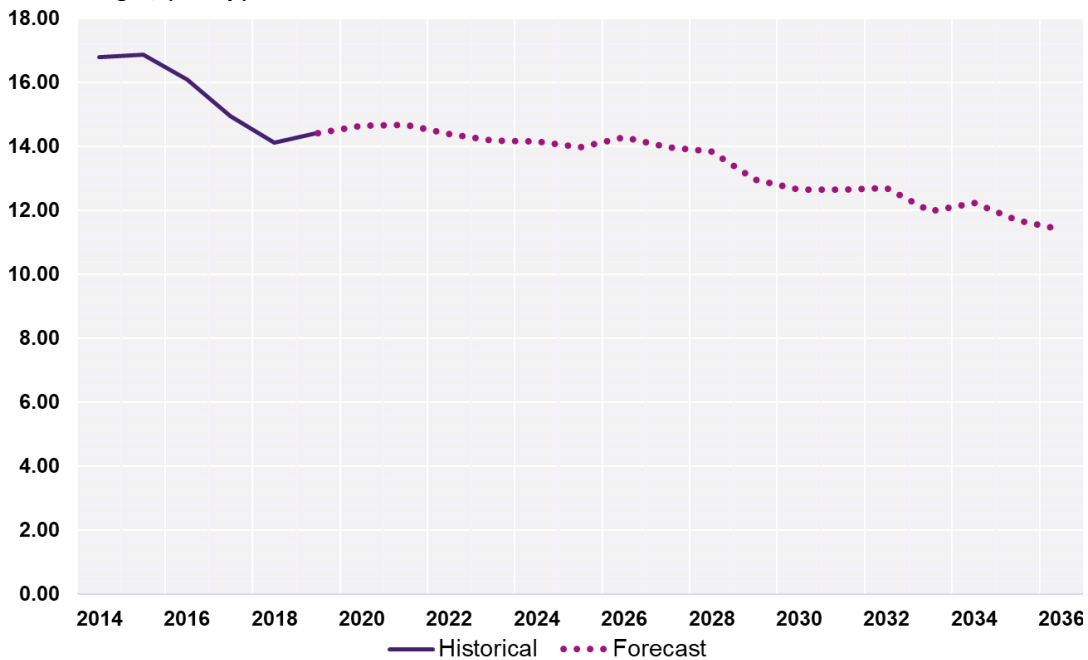


Figure 55: Operating costs per passenger (£ 2018 prices)

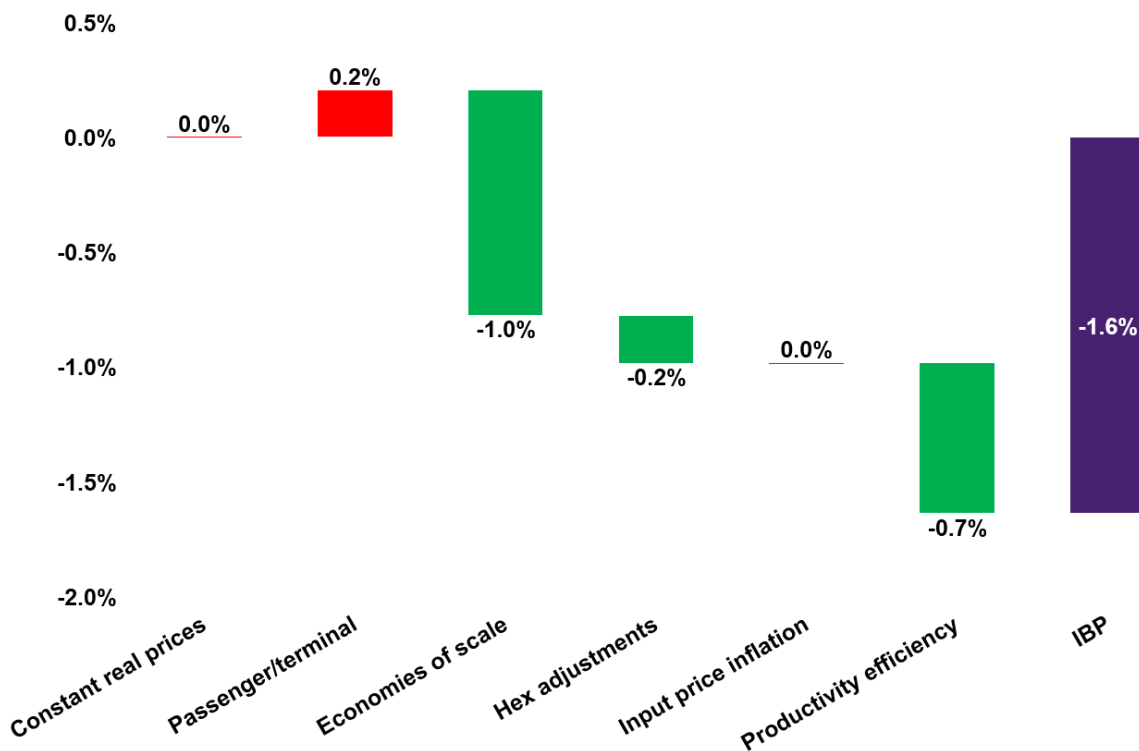


Figure 56: Components of annual reduction in operating costs per passenger

2. Heathrow starts H7 with efficient costs

Throughout Q6, we have worked hard to become a more efficient and competitive organisation. As a result, we have achieved a reduction in operating cost per passenger of 16% whilst delivering record levels of service. We achieved significant efficiency gains in a challenging environment where passenger growth has been higher than forecast.

Our efforts throughout Q6 mean that we are in a strong starting position for H7. The figure below shows that we have undertaken an in-depth review of our efficiency and considered a wide range of evidence

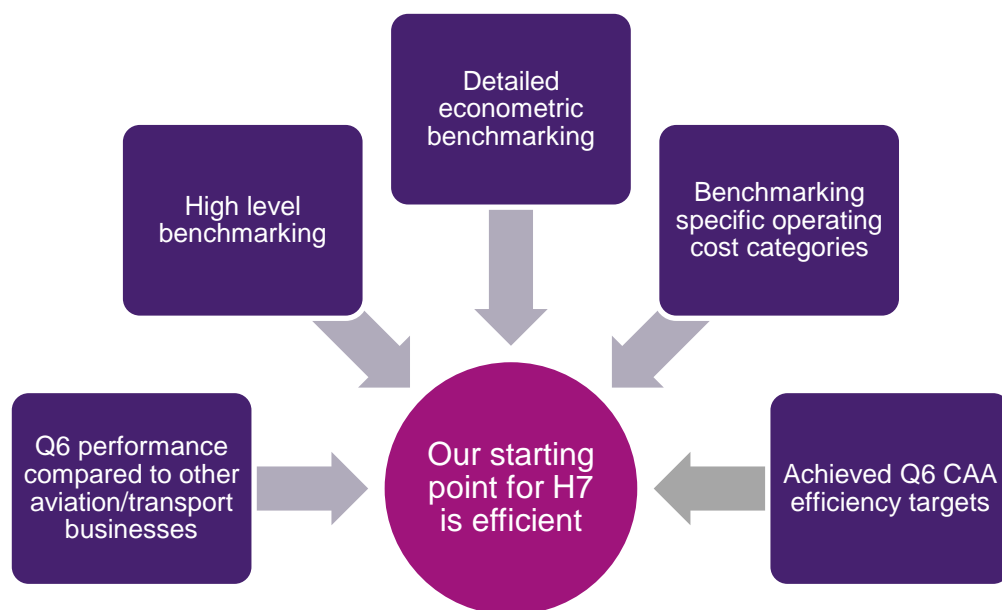


Figure 57: Overview of evidence for efficient starting point for H7

High level benchmarking is useful to provide a simple comparison with our hub competitors. However, when comparing our efficiency to other airports it is essential to consider the unique characteristics of Heathrow and the costs we incur that other airports may not, or are outside of our control. Examples of such costs include:

- Rates and other taxes
- Surface access costs
- Police costs including counter terrorism and drone security

The detailed econometric benchmarking compares only like for like costs and takes into account the characteristics of airports that drive costs. It provides a measure of the level of efficiency that would be expected from an airport with the characteristics of Heathrow. This approach is commonly used by regulators as the primary way of assessing efficiency.¹²⁷

Benchmarking specific operating cost categories provides useful insight into the performance of different areas of our business. When reviewing the efficiency of specific costs, it is important to note that an airport operating as an efficient business would not necessarily be best in class in all areas. It is the overall cost base that is most important. In addition, econometric methods cannot capture all efficient drivers of cost. Therefore, we have followed regulatory precedent to consider companies with operating costs at the 75th cost percentile to represent an efficient business.

This review concluded that our overall operating cost is efficient and consequently our operating cost forecasts do not include an allowance for catch-up efficiency. This section provides an overview of the evidence that underpins our conclusion.

¹²⁷ Both Ofgem and Ofwat have used econometric benchmarking in their price reviews. (Ofgem, RIIO-ED1: Final determinations for the slow-track electricity distribution companies, Business plan expenditure assessment, November 2014; Ofwat, PR19 draft determinations: Securing cost efficiency technical appendix, July 2019)

2.1 Reduction of operating cost per passenger in Q6

During Q6, we delivered a material reduction in our operating cost per passenger from £16.79 in 2014 (9 months) to £14.12 in 2018. In percentage terms this represents an annual productivity improvement of 4.2%. The operating cost savings we have achieved have contributed to delivering reductions in the overall airport charge.

Operating cost and maximum allowable yield £/passenger, (2018p)

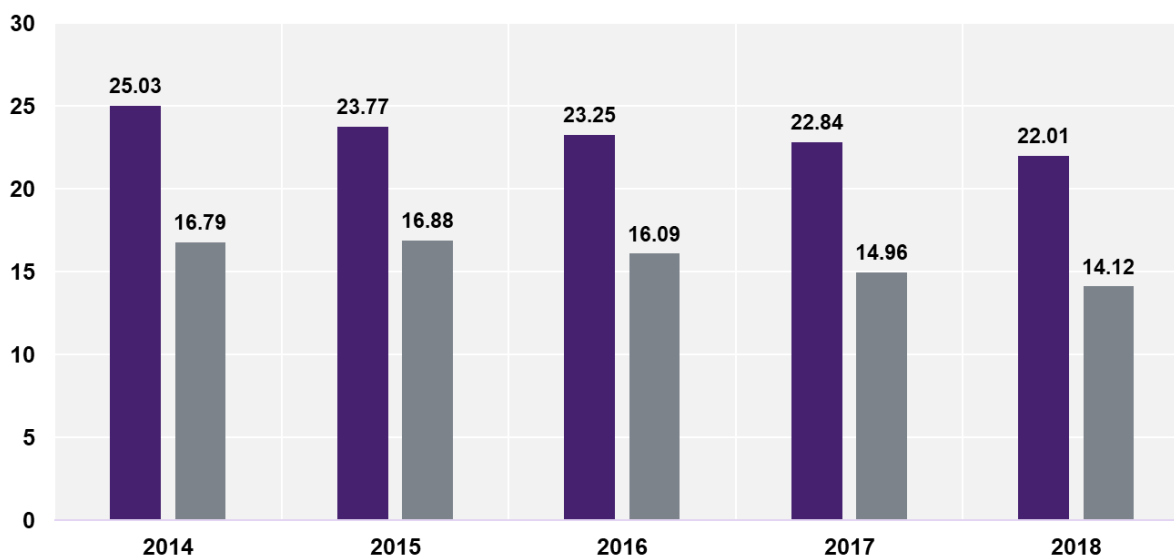


Figure 58: Q6 operating costs per passenger and overall passenger charge (£ 2018 prices)

As discussed in Chapter 1 – Setting the Scene, we achieved these savings through a number of initiatives across all operating cost categories. The most significant savings were made in the people, operational, utilities and maintenance cost categories. Within people, we achieved efficiency through targeting security, organisational structure, pay deals and pensions, resulting in total cost savings across Q6 of over £300m. Renegotiation of contracts has reduced operating costs by £150m, and combined with a reduction in energy consumption, has led to utilities savings of over £30m. We have implemented all of these changes in a way that has still enabled us to reach record levels of service. Some areas have been particularly challenging, such as people cost savings, where despite real progress we have prioritised service, resilience and skills. In other areas we have pushed further to exploit one-off market opportunities, such as additional utilities savings, to seize one off opportunities for efficiency.

2.2 Comparison of Q6 efficiencies to other aviation businesses

We have compared our own performance against other aviation businesses. The table below shows that we have considered various productivity metrics in the aviation and transport sectors.

Table 22: Heathrow Q6 efficiency gains compared to aviation and transport benchmarks

Sector	Source	Productivity improvement	Measure	Period
Heathrow	Heathrow	4.2%	Operating cost per passenger	2014 to 2018
Transport	EU KLEMS ¹²⁸	1%	Value added per hour worked	2009 to 2015
	EU KLEMS ¹²⁹	1%	Value added per worker	2009 to 2015
Airlines	IAG ¹³⁰	2%	Change in operating cost per revenue passenger km	2011 to 2018
	IATA ¹³¹	2.63%	Gross value added per worker	2015 to 2018

Source: Heathrow, KLEMS, IAG, IATA

Our comparison shows that our efficiency gains are:

- Four times as high, compared to the transport sector across the EU. This suggests that we outperform the average transport business across Europe.
- Our efficiency gains are higher than IAG and general efficiency improvements in the airline sector as indicated by IATA.

During Q6 we recognised that we needed to address areas of inefficiency. The comparison above shows the actions we have taken to cut costs have led to greater efficiency gains than other aviation businesses and are starting H7 with efficient costs. We show below that the savings we have made have moved Heathrow from a position of relative inefficiency to the efficiency frontier. This means that the level of savings deliverable in the future is smaller than those delivered during Q6.

2.3 High-level benchmarking

As a high-level comparison, our overall operating cost per passenger is broadly in line with the average for large airports around the world. However, we note that simple benchmarks of this kind do not take into account all the factors that impact airport costs. In particular, KPMG¹³² found that the volume of non-aeronautical revenues, proportion of international passengers and scale of airport infrastructure are significant in driving operational costs. There are unique

¹²⁸ <http://www.euklems.net/>, UK Basic 2017 file, table *TFPIp1_l*.

¹²⁹ <http://www.euklems.net/>, UK Basic 2017 file, table *TFPIp2_l*.

¹³⁰ IAG Annual Report and Accounts 2012, p.84, 2014, p.98, 2016 p.100 and 2018, p.116.

¹³¹ <https://www.iata.org/publications/economics/Reports/Industry-Econ-Performance/IATA-Economic-Performance-of-the-Industry-mid-year-2018-report-final-v1.pdf>, Economic performance of the airline industry, p.5.

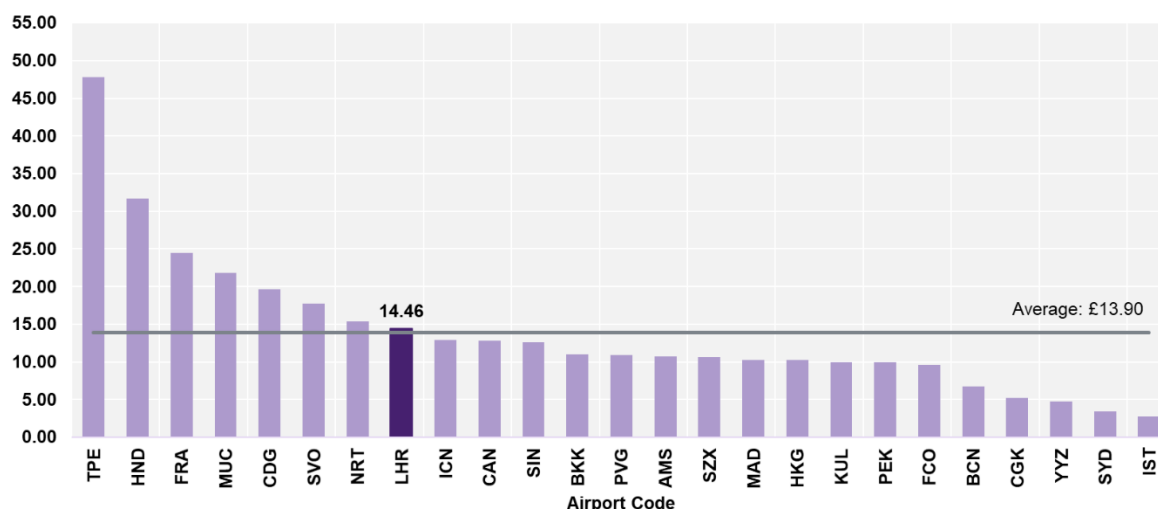
¹³² KPMG, Airport Operating Cost Efficiency Benchmarking, October 2019

operational dynamics for Heathrow, where we set a global benchmark for airports in generating non-aeronautical revenues and we have the second highest volume of international passengers in the world.

Service is another factor, where delivering a higher level of service may lead to higher costs. As an objective measure of our service quality, in each year since 2013, we have appeared in the Top 10 of Skytrax’s World’s Top 100 Airports, which demonstrates that passengers are increasingly satisfied with Heathrow’s service.¹³³ Our 2018 Airport Service Quality (ASQ) score of 4.15 is also above the European average of 4.03¹³⁴.

Frontier Economics reviewed cost and passenger data from ATRS¹³⁵ and reported operating cost per passenger for a sample of 25 large airports around the world. This covered all comparable airports¹³⁶ in the dataset which handled at least 40 million passengers in 2017 (i.e. they are at least around half the size of Heathrow) and for which there is complete data on total operating costs and total passengers. The figure below reports the results, converted into GBP and adjusted for purchasing power. The figures show that our operating cost per passenger is very close to the average. Of the major hubs in Europe, we note that Frankfurt and Paris Charles de Gaulle have higher operating costs per passenger than us, while Amsterdam and Madrid have lower figures. Compared to those airports, we perform best in Skytrax’s service quality rankings.

**Total operating cost per passenger (2017)
PPP-adjusted GBP**



Source: Frontier Economics

Figure 59: Global hubs total operating costs per passenger in 2017 in PPP-adjusted GBP

The chart below repeats the analysis but focuses only on European airports which served more than 40 million passengers in 2017 (i.e. a subset of the chart above) plus all UK airports which were included in the ATRS data. The results show that we are slightly above the average. Of the sample below, we have the highest volume of international passengers, the

¹³³ <https://www.worldairportawards.com/worlds-top-100-airports-2018/>

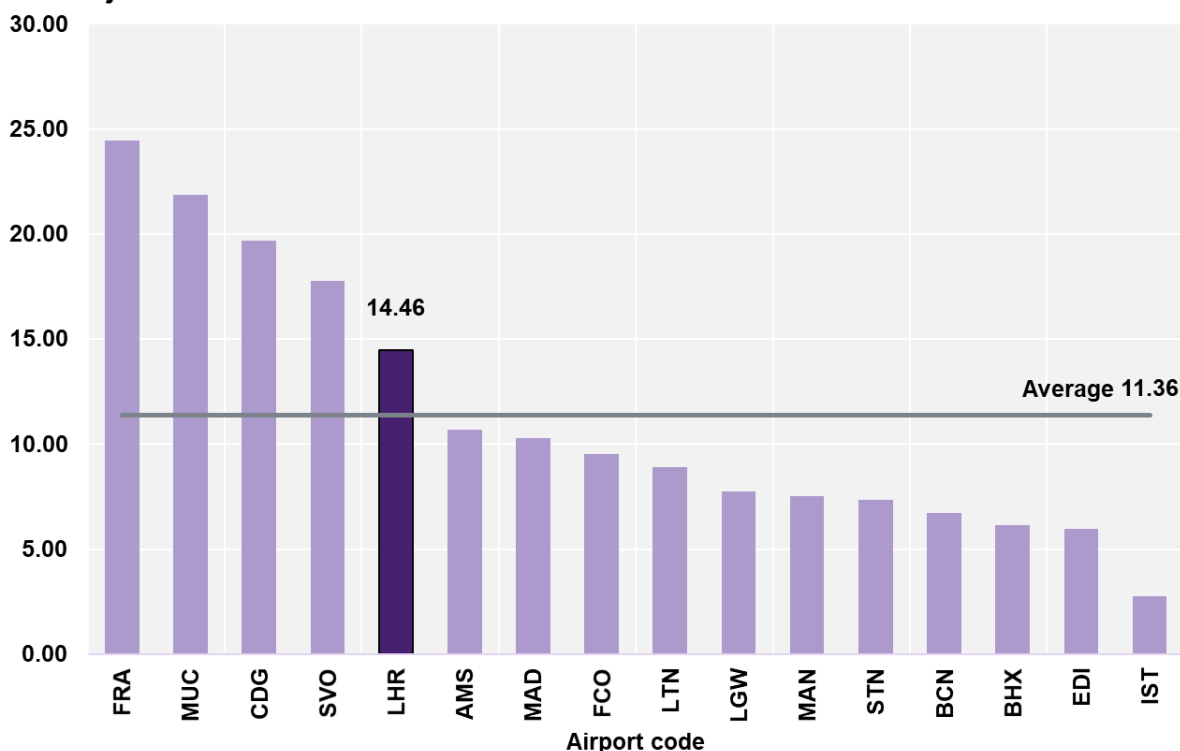
¹³⁴ Average of participating European airports handling over 40m passengers in 2018

¹³⁵ Air Transport Research Society (ATRS), <http://www.atrsworld.org/Database.html>

¹³⁶ Excludes US airports which only operate the airfield and therefore do not have comparable cost bases.

highest non-aeronautical revenue per passenger and the second best Skytrax ranking in 2018 (8th best airport in the world), all of which lead to higher operating costs. Only Munich had a higher ranking (7th) and its operating cost per passenger is also greater than ours.

**Total operating cost per passenger (2017)
PPP-adjusted GBP**



Source: Frontier Economics

Figure 60: European hubs and UK airports operating costs per passenger in 2017 in PPP-adjusted GBP

2.4 Econometric benchmarking

High-level benchmarking on an operating cost per passenger basis as set out in Section 2.3 has limitations as it does not consider the multiple factors that drive costs. As discussed above, airports deliver differing levels of service; however, there are many other factors that may impact costs. For example, airports have different proportions of international passengers, process varying volumes of freight, have different infrastructure provision, operate in different markets and have different ownership models. The relationship between passenger volume and costs may also not be static, as a result of economies/diseconomies of scale as airports grow.

To address these issues, we commissioned KPMG to undertake a detailed econometric benchmarking analysis of our operating costs. This approach is widely used by regulators to compare the relative cost efficiency of companies. KPMG’s independent and thorough analysis involved¹³⁷:

- Identifying key factors that influence airport operating costs;
- Using a large dataset comprising of 28 UK and international airports from 2000 to 2018;

¹³⁷ KPMG, *Airport Operating Cost Efficiency Benchmarking*, October 2019

- Normalising the data across different airports by removing inflation and making adjustments that make the data more comparable, such as excluding business rates and other local taxes;
- Adjusting for differences in operating environments such as utility prices that are outside the airports' control;
- Analysing a large number of potential models using different cost drivers, 1,727 possible combinations of cost drivers were reduced to 94 models using quantitative and qualitative criteria, further analysis filtered the models to 5 preferred cost functions; and
- Applying the selected 5 econometric models to historical data to quantify the gap between the operating costs if Heathrow performed as an average or upper quartile airport and our actual operating costs.

KPMG identified different types of operating cost drivers and analysed their impact on costs:

- **Airport size** - this is the key driver of cost. The main measure of airport size is the number of passengers it serves. However, the number of flights, amount of cargo and the volume of non-aeronautical revenue it produces are all measures of the scale of the operation. KPMG found that using a composite measure of passenger and cargo volume combined with non-aeronautical revenues produced the strongest relationship with operating costs.
- **Airport characteristics** - the characteristics of an airport included service quality measured by ASQ and the proportion of international passengers served. KPMG's analysis found that that higher service quality usually comes at a higher cost. However, the results were not statistically significant and therefore not included in the preferred set of models. KPMG did find that airports with a higher proportion of international passengers require more operating costs relating to additional security, customs and immigration arrangements and this factor was included in the preferred models.
- **Airport congestion** - KPMG attempted to measure the level of congestion at an airport by considering the number of runways and the number of gates. However, they did not find a statistically significant relationship with operating costs for either. It was difficult to find a relationship with the number of runways, as few airports in the dataset had built additional runways. For gates, there could be two factors influencing costs, a higher number of gates means that there are more assets to operate increasing costs or more gates could lead to less congestion and lower costs.
- **Airport infrastructure** - the scale of airport infrastructure was measured by the overall value of total or core assets or by their depreciation. KPMG found that the larger the asset base of an airport the higher its operating costs and used the value of core assets as a driver in the preferred models.

Table 2 below shows the preferred models used by KPMG¹³⁸. The coefficients show the estimated percentage change in core operating costs from a 1% change in the cost driver variable.

¹³⁸ All variables were regressed in log form except the proportions of international passengers

Table 23: KPMG preferred models specifications

	Model 1	Model 2	Model 3	Model 4	Model 5
Number of Passengers	0.76				
Number of workload Units (WLU)		0.95	0.65	0.51	0.40
Asset size (as measured by core assets)					0.12
Non-aero revenues (NAR)			0.31	0.24	0.25
Proportion of International Passengers (IP%)				0.88	0.85
Model specification	RE	RE	FE	RE	RE
Airport-Term for Heathrow	0.73	0.44	2.23	0.39	0.27
Intercept	5.91	2.69		4.95	4.27
Scale term (sum of scale coefficients)	0.76	0.95	0.96	0.75	0.77
Adjusted R ²	66%	73%	83%	92%	92%
Number of observations in sample	445	416	396	334	334
Number of airports in sample	28	26	26	26	26

Note: No variables have a significance level higher than 5%.

Source: KPMG analysis

Note: No variables have a significance level higher than 5%

Source: KPMG

Using the preferred models, KPMG concluded that Heathrow's relative efficiency has changed over time as shown in the figures below.



Source: KPMG

Figure 61: Heathrow operating cost gap against the average and top performing airport operation (£ 2016)

- Prior to 2008, we outperformed the average airport in the sample and were close to the top performing airports in terms of operating cost efficiency.
- In 2008, our unit operating costs increased above the average airport, due to the additional costs of opening Terminal 5 and the decline in passenger volumes due to the global financial crisis.

- Since 2010, our operating cost performance has improved as passenger throughput, revenue generation and the scale of airport infrastructure have risen while total operating costs have remained relatively constant. This trend accelerated between 2014 and 2018.
- In 2016, operating costs were 2.5% lower than the average airport and in 2017 they were 6.9% lower than the average airport.

KPMG have also calculated the preliminary cost efficiency gap for 2018 (preliminary as not all the comparator airports have reported data for 2018). The table below shows the estimated cost gap to the average and frontier airport base on the assumption that the 2018 frontier is equal to the 2017 frontier.

Table 24: Heathrow efficiency results (2016 prices)

	Cost gap to the average					Cost gap to the frontier				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
£ per passenger (2016 prices)	1.27	1.3	-0.29	-0.79	-1.21	2.2	1.82	0.92	0.16	-0.19
%	11.4%	11.4%	-2.5%	-6.9%	-10.7%	21.4%	16.7%	8.8%	1.6%	-1.9%

Source: KPMG

In 2018, KPMG's analysis shows that we were 10.7% more efficient than the average airport and 1.9% more efficient than the frontier airport.

KPMG concluded that our operating costs are relatively low, given the number of passengers and cargo we handle and our commercial revenues, compared to what might be expected for a representative airport of this scale and type.¹³⁹

2.5 Benchmarking specific operating costs

We commissioned Steer¹⁴⁰ to undertake an Operating Cost Benchmarking Study to identify how our operating costs improved in Q6, compared to relevant comparator airports, for a number of cost lines. This study also sought to understand the reason for differences and any subsequent considerations for cost drivers.

Comparator airports were selected on the level of comparability (major hub, large UK airport, large European airport, major world airport). Based on that criteria, the following airports we used in the comparison:

- London Gatwick (LGW)
- Amsterdam Schiphol (AMS)
- Aeroports de Paris (AdP)
- Frankfurt (FRA)
- Aeroporti di Roma (ADR)
- Dublin (DUB)
- Copenhagen (CPH)
- Hong Kong (HKG)

¹³⁹ KPMG, *Airport Operating Cost Efficiency Benchmarking*, October 2019

¹⁴⁰ Steer, *Operating Cost Benchmarking Study*, December 2019

- Beijing Airport (PEK)
- Singapore (SIN)
- Chicago O'Hare (ORD) and
- Sydney (SYD)

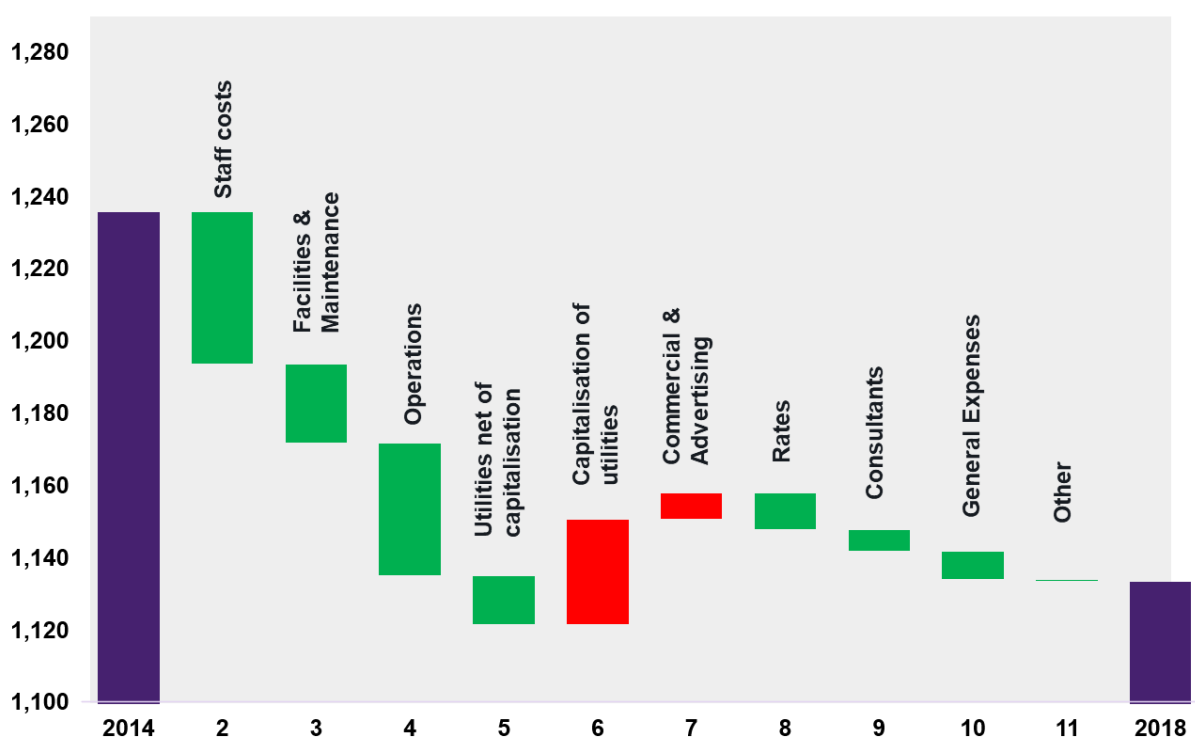
Steer confirmed our operating costs per passenger reduced in all years apart from 2015, when Terminal 1 was closed. While our operating costs per passenger are higher than those of the comparator airports, costs at these airports have remained stable or increased.

The chart below shows how our operating costs have fallen between 2014 and 2018.

Cost trends by function

£m, 2018

1,300



Source:

Figure 62: Cost trends by function 2014-2018 (£ 2018 prices, RPI deflator)

The key findings of the benchmarking were:

- We have reduced the costs per Full-time Equivalent (FTE) by 11% by cutting pension and other people costs. A number of initiatives have driven these improvements, namely; the introduction of new starter rates, voluntary severance schemes, security fixed post removal and other workforce initiatives.
- Our security costs are below Amsterdam and are now comparable to Paris. We have reduced our security costs per passenger by 21% during Q6 by reducing the number of security colleagues by 0.5% (increasing passengers per security colleague FTE) and by reducing the average monthly costs for security officers by 8.3%.
- We perform well in comparison to other airports for engineering costs. We have delivered efficiencies in our engineering performance through contract negotiations, reduced scope

of Terminal 1 and revised asset maintenance plans. Additionally, organisational redesign and efficiency improvements have provided savings across the period.

- Cleaning costs are lower than Paris and Amsterdam.
- We have made the greatest improvements in electricity usage per passenger and our electricity consumption per terminal area is lower than most of the benchmarked comparators. We have increased efficiency in energy usage through Energy Demand Management projects and achievement of no-net-increase in consumption for development projects. Our electricity consumption has also decreased following the closure of Terminal 1 to passengers.

2.6 Ongoing benchmarking initiatives

Heathrow alongside Hong Kong Airport established an Airport Benchmarking Group in 2017 to provide a platform for major global hub airports to learn from each other by comparing performance, sharing experiences, and identifying best practices. There are nine member airports, Heathrow, Hong Kong International Airport, Toronto Pearson, Los Angeles Airport, San Francisco Airport, Munich Airport, Aeroports de Paris, Schiphol Airport, and Sydney Airport. The ultimate aim is to achieve improved performance of the participating airports in a way which benefits passengers and the wider public, in areas such as safety, security, quality, environment, productivity and efficiency.

The objectives of the Airport Benchmarking Group are:

- To facilitate the sharing of knowledge and best or otherwise interesting practices in a confidential environment.
- To develop a concise, well-balanced and comparable Key Performance Indicator system for performance measurement for use by members that will: determine strengths and weaknesses, prioritise areas for improvement and support dialogue with stakeholders (e.g. senior management, board, government)
- To provide benefits to all members by understanding the reasons for performance levels and trends and by identifying best practices.

The group is administered and facilitated by the Transport Strategy Centre (TSC) at Imperial College London, a world leader in public transport benchmarking. The TSC was set up in 1992 as a centre of excellence serving the transport industry on strategic, technology, economic and policy issues. Because this analysis is carried out using internal data the adjustments can be made for different regulatory standards, it is a superior benchmark to anything that is based solely on publicly available numbers.

The Airport Benchmarking Group builds upon the years of experience in the Community of Metros benchmarking group, the International Bus Benchmarking Group, the International Suburban Rail Benchmarking Group, the American Bus Benchmarking Group, the Benchmarking Group of American Light Rail Systems, and the Mainline Rail Group facilitated by TSC since 1994, 2004, 2010, 2011, 2016 and 2016 respectively.

The Airport Benchmarking Group reviewed the financial performance of comparator airports and determined that Heathrow has a strong performance for non-aeronautical revenues per passenger for all categories including Retail, Car Parking, Fashion and Food and Beverage. The KPMG econometric modelling, described in Section 2.4, showed that higher non-aeronautical revenues are associated with higher operating costs.

Our passenger security costs and terminal cleaning costs per passenger are considered to be at the average compared to the benchmarked group as set out below.

Table 25: Overview of benchmarking performance 2018: Financial (LHR compared to Airport Benchmarking Group)

Overview of Benchmarking Performance 2018: Financial (LHR compared to ABG)
 Decreasing costs; increasing commercial and car parking revenues

KPIs	LHR (with rank)	EU Airports	Non-EU Airports
NON-AERO REVENUES			
Retail concession revenue per pax	2 nd / 9		
Car parking revenue per pax	3 rd / 9		
PASSENGER SPEND			
Airside core business spend per pax	1 st / 9		
Fashion retail spend per pax	1 st / 9		
Food & beverage spend per pax	2 nd / 9		
COSTS			
Passenger security costs per pax	3 rd / 5		
Terminal cleaning costs per pax	4 th / 8		

EU = European Airports
 Non-EU = All Other Non-European ABG Airports

AIRPORT BENCHMARKING GROUP # LHR Rank Trend
 Improving Flat/No Trend Worsening

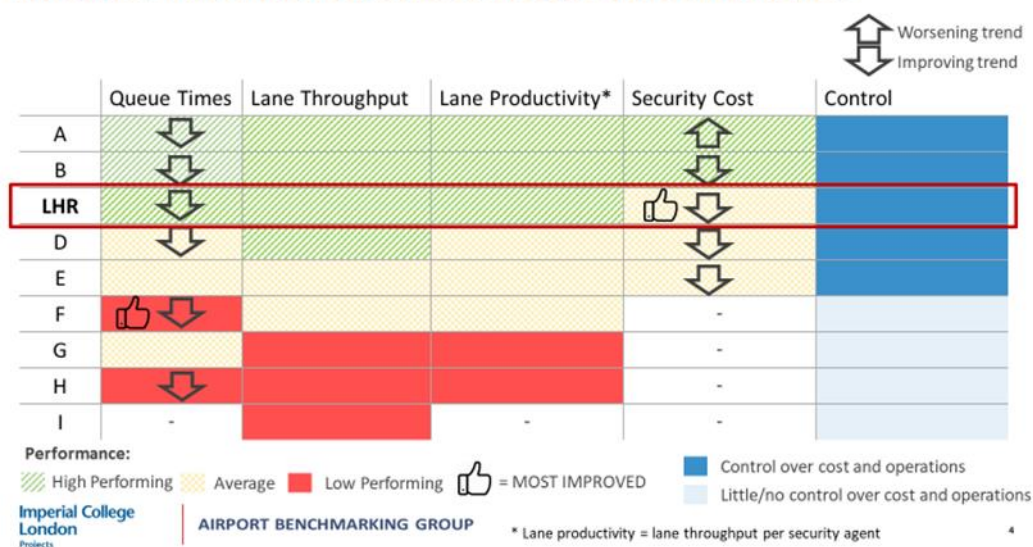
Source: Airport Benchmarking Group

Our security operating costs on a per-passenger basis are at the average of the group and have shown the most significant improvement in 2018 compared to the other airports. We perform better than average on queue time, lane throughput and lane productivity (lane throughput per security agent). One of the contributing factors for this is our maximum lane capacity and having multiple passenger divestment points. This provides benefit to our customers travelling through Heathrow, where we aim to minimise our wait times.

Table 26: Benchmarking the passenger security process

Benchmarking the Passenger Security Process

Those airports with control over operations and costs are better on all measures



Source: Airport Benchmarking Group

As discussed later in this chapter, our Next Generation Security aims to improve efficiency further and reduce the operational cost of our security. We will continue our benchmarking programmes through H7 to ensure that we maintain our efficiency.

3. Our H7 operating cost forecast

As set out in Section 2, we consider that our current level of operating costs is efficient. Taking this efficient starting point, for H7 we are forecasting our operating costs over a 15-year horizon and have developed a robust top-down methodology based on the following steps:

- Used the 2020 Management Business Plan (budget) as a base for the efficient starting point.
- For each cost category assessed any elements that require specific treatment, identifying insurance, the electricity distribution network fee and Heathrow Express.
- Applied a short run passenger volume elasticity to our passenger forecast and combined with an overlay to account for the opening of additional infrastructure.
- Adjusted costs in each category to reflect the forecast real cost input price inflation.
- Made specific adjustments to reflect the expected one-off pre-opening costs related to operational readiness testing for new infrastructure.
- Applied an efficiency challenge that reflects forecast frontier efficiency improvements on an ongoing basis.
- Cross-checked our total operational costs using a long run passenger volume elasticity applied to our passenger forecast.

Our operating costs are primarily driven by passenger volumes, as a significant share of our costs are based on providing passenger services in-terminal. For example, increases in passenger volume lead to increases in the number of colleagues required to process those passengers through security. However, operating costs are also related to infrastructure and therefore impacted by expansion. The opening of the proposed new runway and terminal buildings will lead to step changes in our cost base. For example, the opening of a new terminal will require a minimum level of additional cost regardless of the volume of passengers served.

Our operating cost forecast consists of the following categories:

1. People
2. Operational Costs
3. Facilities and Maintenance
4. Rates
5. Utility Costs
6. General Expenses

Our approach is the most appropriate for producing a long-term forecast as it has the following benefits:

- **Transparency** – our approach is transparent as the final calculations are relatively simple so stakeholders that engage with our IBP can see how we developed our numbers;
- **Avoids spurious accuracy** – detailed cost drivers have been considered rather than a “one-size fits all approach” which may be used for all cost categories in a line-by-line or detailed forecasting approach;
- **Allows focus on the bigger picture** – our approach enables effective constructive engagement as we can focus on the key assumptions that have an impact on our overall forecasts; and

- **Aligned with regulatory precedent in other sectors** – other regulators such as Ofgem and Ofwat have been using this type of approach since the 1990s as they focus on benchmarking total expenditure using a top-down approach.

Although we have produced our operating cost forecast for the high-level cost categories, we have provided a more detailed breakdown for 2019 and our 2020 forecast starting point. The more detailed breakdown is aligned to the detail provided in the regulatory accounts and can be found in Annex 11 – 2019/2020 Base Data in Detailed Categories.

We have developed a robust and detailed evidence base to produce an elasticity which links a change in passenger volumes to a change in total operating costs both in the short and long run. In addition, we have used historical data to forecast the impact of additional infrastructure. Details of our approach are set out in this section.

3.1 Elasticity evidence base

As the passenger volume elasticity is a key input into this analysis, we commissioned Frontier Economics to develop a robust, independent evidence base. The figure below summarises the different evidence sources that Frontier Economics¹⁴¹ included in its analysis.

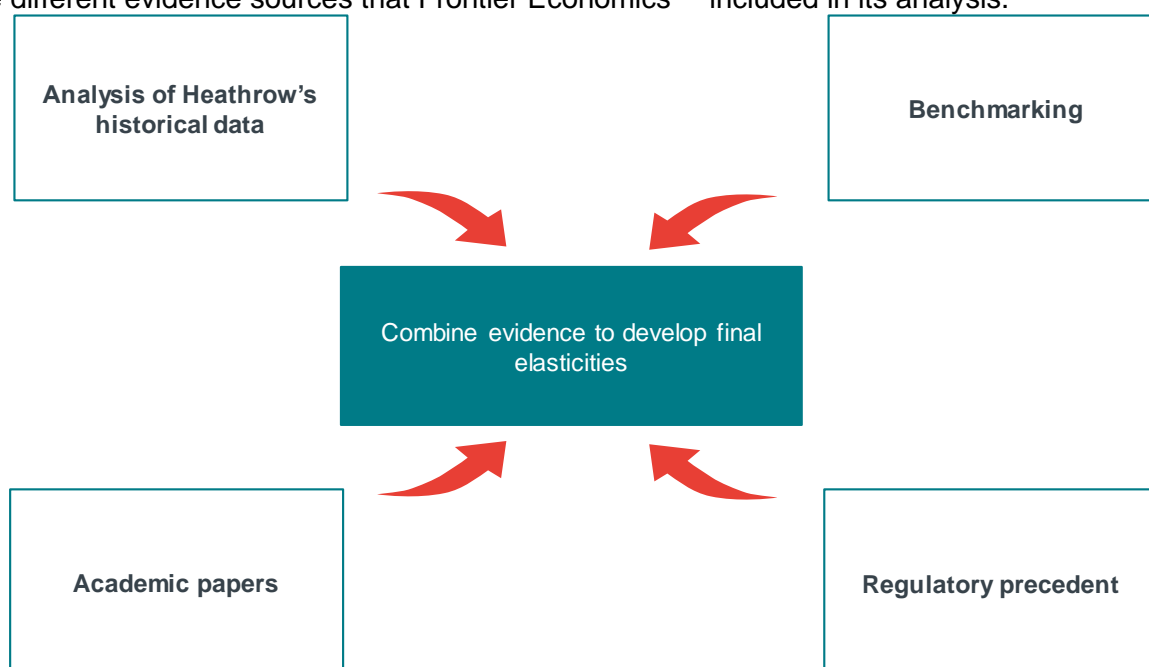


Figure 63: Summary of evidence used to develop operating cost elasticity

Frontier found that analysing our own historical data did not yield robust forward-looking elasticity estimates, due to moving from a constrained to growth environment. This is because of:

- **Negative elasticities:** the efficiency gains we have made during Q6 mean that we have reduced our operating costs while passenger volumes have grown, resulting in a negative elasticity. It was not possible for Frontier to robustly strip out our high productivity gains in recent years to determine a meaningful cost volume relationship for H7.

¹⁴¹ Frontier Economics, *Developing opex and commercial revenue elasticities for H7*, October 2019

- Capacity constraints: We have been operating at runway capacity for over 15 years. Given that we are proposing to deliver a new runway during H7, using our historical data to produce an elasticity estimate would not fully reflect our future costs.

[REDACTED]

The short run elasticity reflects the incremental cost increases experienced with passenger growth and limited increases in infrastructure. The long run elasticity reflects the increases in costs resulting from long term passenger growth supported by capacity increases. It therefore implicitly includes the operating cost impact of new infrastructure.

[REDACTED]

KPMG's work on airport operating cost efficiency benchmarking used an econometric approach and as such analysed a number of operating cost driver models. Whilst the aim of their analysis was not to produce an elasticity estimate, one of the cost models used for the analysis was purely using passenger volume as a driver of operating costs where the coefficient could be interpreted as the passenger volume elasticity. [REDACTED]

[REDACTED]

3.2 The cost impact of additional infrastructure

The long run passenger volume elasticity discussed in the section above provides a robust estimate of the total level of our operating costs following expansion. However, using this approach alone to produce our forecast for H7 would not reflect the expected profile of step change cost increases as new infrastructure is delivered. Therefore, we have used appropriate historical data to estimate the cost impact of infrastructure increases on each of the following operating cost categories:

- [REDACTED]
- [REDACTED]
- [REDACTED]

¹⁴² KPMG, *Airport Operating Cost Efficiency Benchmarking*, October 2019, Table 8

- Rates – Increases directly in line with terminal floorspace. The actual business rates will be set following re-valuations during the plan period.
- [REDACTED]

3.3 Specific treatment of cost category elements

We assessed if any elements of our cost categories require specific treatment by reviewing if passenger volumes or infrastructure increases are not the most appropriate cost drivers. Insurance and electricity distribution fee were determined to need specific treatment. We also need to make a specific adjustment for Heathrow Express costs.

Insurance

Our insurance costs are directly linked to the size of the Regulated Asset Base (RAB). Therefore, we have removed insurance costs from the Operational Costs category and forecast it based on directly on changes in the closing RAB, i.e. a 1% increase in the RAB leads to a 1% increase in our insurance costs.

Electricity distribution fee

The electricity distribution fee is a negotiated price between Heathrow and the UK Power Networks (UKPNS) to gain access to the power supply networks through which we receive our electricity. The contract was renewed in 2016 and forms the basis for the forecast for H7.

Heathrow Express

HEX's current track access rights expire in 2023, we have agreed that they will be extended to 2028 at this time. Although it is possible that this will be extended further, we have made a specific adjustment from 2029 to exclude costs associated with Heathrow Express to reflect the length of the current agreement.

3.4 Real input price inflation

Macroeconomic influences such as inflation affect our costs in the future. We have assumed that the H7-H9 regulatory framework applies an RPI adjustment to reflect the general level of price increases in the economy. However, the rate at which prices for labour and materials changes over time is not necessarily the same as RPI. We have commissioned First Economics¹⁴³ to determine appropriate real input price adjustments to be applied to H7 operating costs. First Economics recommends using forecasts prepared by the Office for Budget Responsibility (OBR). The table below shows the recommended real input price inflation forecasts relative to RPI and the corresponding RPI forecasts.

¹⁴³ First Economics, Frontier shift, input price inflation and productivity growth, August 2019

Table 27: Real input price inflation forecasts relative to RPI

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Labour – general	0.1%	0.3%	0%	0.1%	0.2%	0.35
Materials – machinery	(0.4%)	(0.3%)	(0.6%)	(0.6%)	(0.6%)	(0.5%)
Materials – general/civils	1.1%	1.2%	0.9%	0.9%	0.9%	1.0%
Power	2.3%	(0.6%)	(0.9%)	(1.4%)	(0.1%)	2.4%
Plant & equipment	(0.4%)	(0.3%)	(0.6%)	(0.6%)	(0.6%)	(0.5%)

Source: First Economics, Frontier shift, input price inflation and productivity growth, August 2019

Table 28: RPI forecasts

Year	RPI - measured inflation
2019/20	2.9%
2020/21	2.8%
2021/22	3.1%
2022/23	3.1%
2023/24	3.1%
2024/25 and thereafter	3.0%

Source: First Economics, Frontier shift, input price inflation and productivity growth, August 2019

The figures in the Table 6 have been weighted together in accordance with the share that each input type has within the H7 operating cost categories and applied annually. For forecast years 2025 and beyond, the average value for 2021-2024 has been used with the exception of power, where an average of 2021-2023 has been used to exclude the impact of the spike in costs forecast for 2024.

3.5 Specific adjustments for infrastructure operational readiness

Our operating cost forecast for H7 includes specific adjustments for the one-off costs associated with operational readiness testing before opening new infrastructure. The experience of planning and preparing for the opening of Terminal 2 shows the value of investing in pre-opening costs in avoiding unnecessary disruption and reducing the likelihood of greater costs after opening. The adjustments included in the forecast are [REDACTED] of additional terminal floorspace, applied in the year of opening, and are based on the Terminal 2 pre-opening costs.

We have also taken into account the pre-opening disruption relating to the loss in commercial revenues resulting from constructing new terminal areas, such that passengers would reduce their spending. The disruption impact is calculated as the total retail revenue multiplied by the share of retail income disrupted, assumed to be 50%, multiplied by the amount of disruption, assumed to be 2.5%, applied in the year of opening.

There is currently no allowance in the forecast for any operational costs associated with the opening of the proposed new runway. This will be addressed ahead of the Final Business Plan.

3.6 Ongoing efficiency assumptions

Our approach already factors in that we will become more efficient over time by achieving ongoing efficiency gains. Efficiency gains are implicitly included within the passenger volume elasticity because it was estimated using historical cost data at other airports over a period when those airports would have made efficiency gains. By not stripping out efficiency gains from the elasticity estimate, this also effectively assumes that the gains made historically can be expected to continue into the future.

Nevertheless, we have also commissioned First Economics¹⁴⁴ to develop an independent and robust productivity efficiency challenge for H7. First Economics note that the regulatory precedent of ~1% per annum productivity growth is primarily based on pre-financial crisis data. However, the Bank of England February 2019 inflation report shows that the average annual total factor productivity growth for 2015-2018 Q3 was 0.2%.

The failure of the UK and other western economies to revert back to pre-crisis levels of productivity after recovering from recession is a well discussed economic issue. The literature review carried out by First Economics suggests that this is unlikely to be a temporary phenomenon and this view is supported by the Bank of England and OBR's economic forecasts. The Bank of England is forecasting a 0.3% average annual total factor productivity growth for 2018 Q4-2022 Q1. First Economics is of the view that it would not be unreasonable to assume a 0.5% annual productivity growth over the period of 2022 to 2036.

Based on the evidence presented by First Economics, we have applied the following ongoing efficiency assumptions to our H7-H9 operating cost forecast:

- 2021 – 2022: 0.3% per annum
- 2023 – 2026: 0.5% per annum
- 2027 – 2031: 0.7% per annum
- 2032 – 2036: 1.0% per annum

This forecast reflects the Bank of England and First Economics estimates in the near term. Over the longer period we have factored in increases back towards the long-term trend.

It is important to note that the productivity assumptions in the plan for 2022-2026 are consistent with the assumptions on wage inflation. Higher productivity growth would be expected to lead to higher real wage increases.

3.7 Cross-checking our total operating costs

We have applied the long run passenger volume elasticity [REDACTED] by Frontier Economics¹⁴⁵ to our passenger forecast as a cross-check of our total operational costs. The graph below shows that our forecast excluding our ongoing efficiencies is below that which would be expected based on the long run passenger elasticity, with ongoing efficiency assumptions reducing our forecast further. This demonstrates that we have taken a conservative approach to forecasting our operational costs and set ourselves a challenging ongoing efficiency target.

¹⁴⁴ First Economics, Frontier shift, input price inflation and productivity growth, August 2019

¹⁴⁵ Frontier Economics, Developing opex and commercial revenue elasticities for H7, October 2019

**Total operating costs
£m, (2018p)**

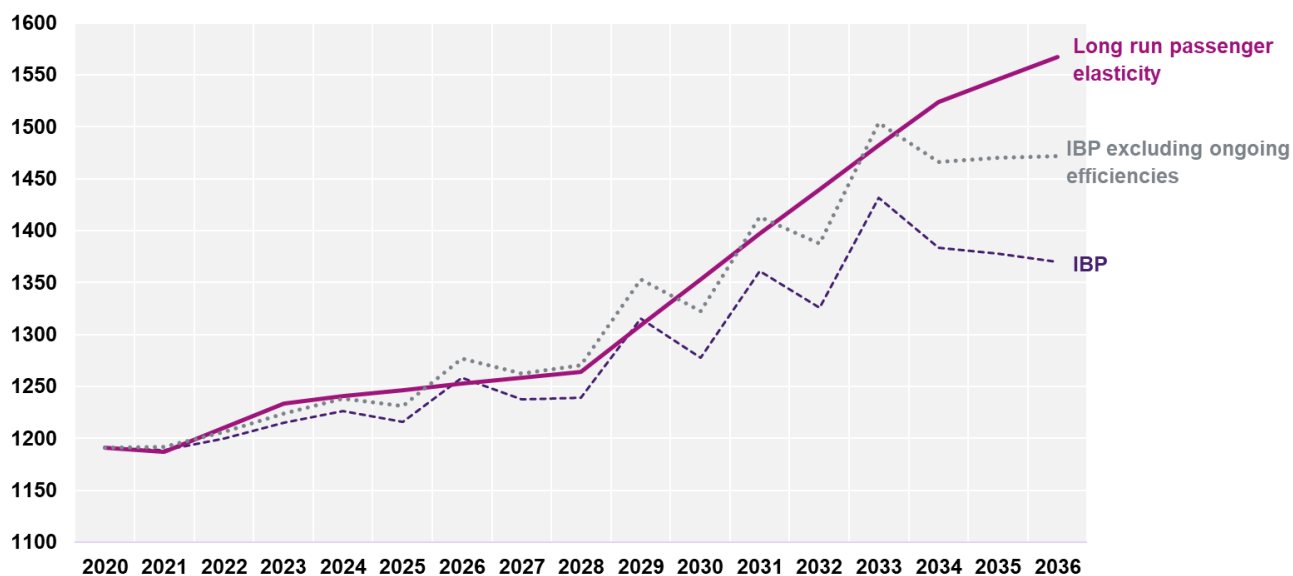


Figure 64: Total operating costs cross-check (£m 2018 prices)

In their analysis of our historical data, Frontier Economics found a relationship between terminal floorspace and operating costs, with an elasticity of 0.26 . We have used this as a cross-check to the assumptions we have made for the impact of additional terminal infrastructure. As shown in the table below, the increases in costs included in our IBP are slightly below with those that would be expected by the Frontier Economics analysis.

Table 29: Terminal adjustment cross-check

Terminal adjustment	2022-2036
Increase in terminal floorspace	37%
Terminal floorspace elasticity	0.26
Implied increase in operating costs	9.5%
Increase in IBP due to terminal adjustments	9.2%

Source: Frontier Economics, *Developing Opex and commercial revenue elasticities for H7, October 2019 / Heathrow*

As an additional cross-check, KPMG's¹⁴⁶ analysis also looked at the impact of adding additional terminals on operating costs. They found adding an additional terminal increases operating costs by 6.9%, over and above any volume related impacts. Alternative model specifications show a range of values from 2% to 15%. In 2031, the opening of T5X will be similar to opening a new terminal. The cost increase included the plan is only 2.7%. In fact, if we were to consider all the proposed increases in terminal floorspace during 2022-2036 as

¹⁴⁶ KPMG, Influence of the number of airport terminals on airport operating costs, December 2019

the equivalent of opening one new terminal, the 9.2% increase in costs included in our H7-H9 business plan would still be within the range found by KPMG.

3.8 Impact of wider government decisions

Through our application for DCO consent for our expansion proposals, we must demonstrate how we will comply with the requirements of the Airports National Policy Statement (ANPS). This means that we are anticipating a higher operating cost than we would have had without the ANPS requirements placed on us. The two areas where this is more impactful are surface access and our community fund.

Surface access

In order to meet our ANPS mode share targets and to reduce the number of car trips, we are investing in improving surface access links to the airport. This directly impacts the outcome of “I am confident I can get to and from the airport.” Whilst there is a capital expenditure consideration, there will also be an operational expenditure impact from the initiatives. Key considerations include:

- With the expected advancement of new rail routes, it is anticipated that the Heathrow Express will be absorbed by a franchised rail operator. However, if there is failure to deliver key projects (Western Rail, Southern Rail, Piccadilly Line and Elizabeth Line) in a timely way, a decision could be made to extend Heathrow Express to help meet the surface access targets.
- Linked to the above, should the key government surface access project be delayed, an additional operational cost for other interventions may be required.
- An administration and implementation cost for the proposed Heathrow Ultra Low Emission Zone (HULEZ) and Vehicle Access Charge to ensure that those who ought to pay, do pay.

The costs associated with our surface access initiatives are detailed in Section 4 and more detail is included in Annex 16 – Surface Access.

Community compensation requirements

The ANPS sets out a package of compensation for local communities that should be provided by Heathrow to compensate for the negative impacts of expansion on local communities. It is anticipated that a significant proportion of these costs will be to compensate for the acquisition of properties that are in the compulsory purchase zone, and therefore would be a capital expenditure.

However, it is likely that there would be an additional operational cost linked to the following initiatives, albeit this will be determined in more detail during the DCO process:

- Full noise insulation for eligible properties that will be most affected by aircraft noise, a package of noise insulation for properties to address noise from construction, road or rail sources and a contribution to a package of noise insulation for those further away from the airport.
- Noise insulation for community buildings, including schools, impacted by expansion.

3.9 Our approach to business rates

As one of the highest rates payers in the UK, rates represent a significant cost category for Heathrow as they make up 10% of operating cost. As Heathrow's footprint grows with expansion, the total amount that we pay in rates will increase even further.

During Q6 we proposed to share the difference between the allowed and outturn business rates with airlines through an 80:20 pain/gain sharing mechanism. As the 2017 revaluation resulted in lower business rates costs, airlines were £34.8m better off as we shared the lower costs arising from the business rates renegotiation. The major political parties are proposing a review of business rates that could lead to significant changes to the level of charges.

As we have very limited control of business rates, it is appropriate that we should not benefit from windfall gains from reductions in rates. In this business plan, we propose going further than in Q6 in line with this principle and making business rates an ORC. This will ensure 100% sharing, immediately, of any savings with consumers. It will also provide airlines with a higher degree of transparency over measures to reduce business rate costs even as government policy may shift. We therefore reflect the business rates forecast in our plan in our forecast of ORCs.

3.10 Reducing costs for our airlines

We are committed to working with airlines on reducing the costs of operating at Heathrow, both through delivering increased value for money in the airport charge and making efficiency improvements that directly reduce the airline cost base.

Increased automation across the airport is reducing the number of airline colleagues required across all stages of the passenger journey. One of the recent successful implementations of automation has been self-service bag drop. There are now 188 self-service bag drop machines installed across all four terminals, reducing the number of check-in colleagues required to resource desks and enabling 66% of our departing passengers to use a self-service bag drop in 2019, increasing to 80% in 2020, and ultimately 100%. This has improved check-in transactions time by up to 20%. Similarly, 60% of gates now have self-service boarding gates enabling 75% of passengers to use the self-service facilities. This will increase to 80% of gates with self-service in 2020 and ultimately 100%. This reduces the number of airline colleagues required to carry out transactional processes, enabling them to focus on supporting passengers who require assistance, manage exceptions and get the aircraft away on time. Self-service has delivered boarding times which are up to 30% faster with less queuing time for our passengers. Our future operating strategy will continue to increase automation and reduce costs for our airline partners. However, in order to maintain resilience, it may be necessary for the airport to develop a multiskilled team of people who can provide check-in, PRM support or security service. This has not been allowed for in the plan and may need to be charged to airlines.

The decisions our airlines make can also have an impact on our costs. For example, when airlines decided to no longer provide passenger ambassadors to support passengers in check-in and immigration. Passengers require support at these critical points of the journey to relieve stress and maintain flow. We therefore stepped in to provide this service. However, this increased our operating costs by £7m per year whilst benefitting the airline cost base. Despite repeated requests over many years for these operating cost benefits to be made transparent we have failed to make progress. There is a risk that further opportunities to reduce costs are missed as a result.

4. Operating cost forecast and summary of key assumptions

Tables 9 and 10 and Figures 12 and 13 below provide our operating cost and operating cost per passenger forecast for the base case. The results show that our total operating cost is forecast to increase by 13% between 2022 and 2036 (excluding surface access), which is driven by the fact that our passenger volumes will increase by 42% and terminal floor space will increase by 37%. However, our costs on a per passenger basis will decrease by 21% over the same period.

Table 30: Total operating costs (£m 2018 prices)

Total operating costs (£m, 2018p)	2019	2020	2021	2022-2026 Average	2027-2031 Average	2032-2036 Average
Total	1,165.20	1,193.60	1,191.20	1,217.30	1,226.90	1,351.80

Table 31: Total operating costs per passenger (£ 2018 prices)

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Total operating costs
£m, (2018p)

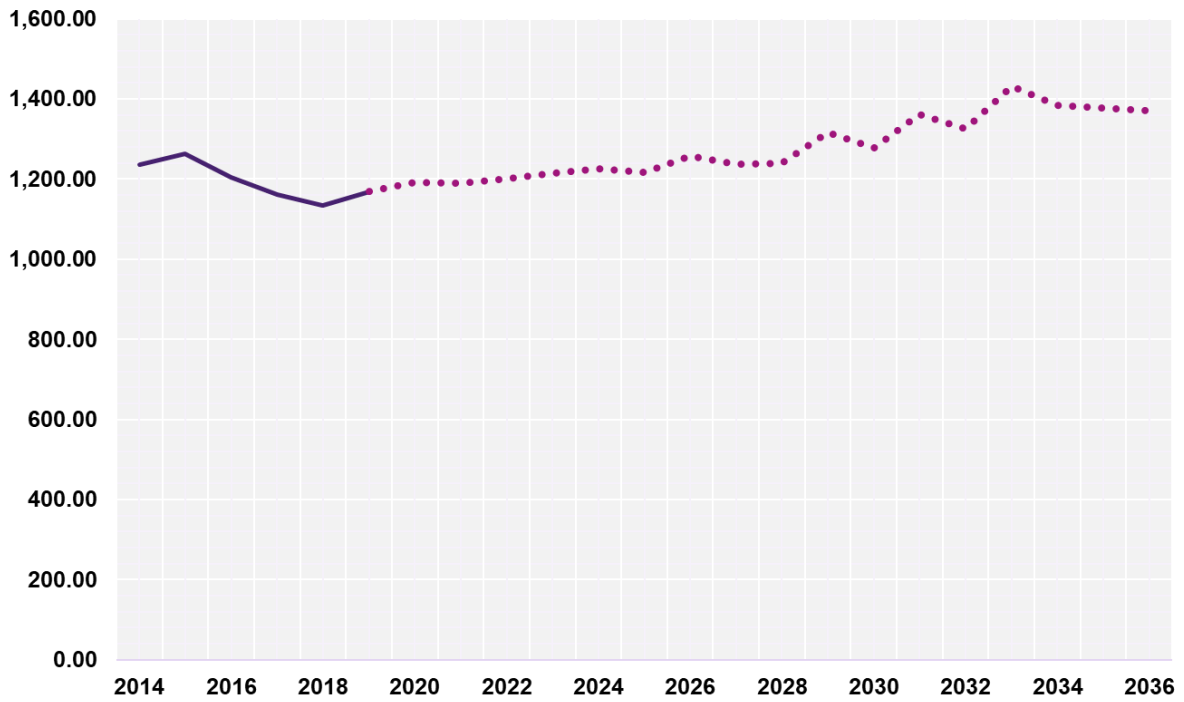


Figure 65: Total operating costs (£m 2018 prices)

Operating costs per passenger
£/Passenger, (2018p)

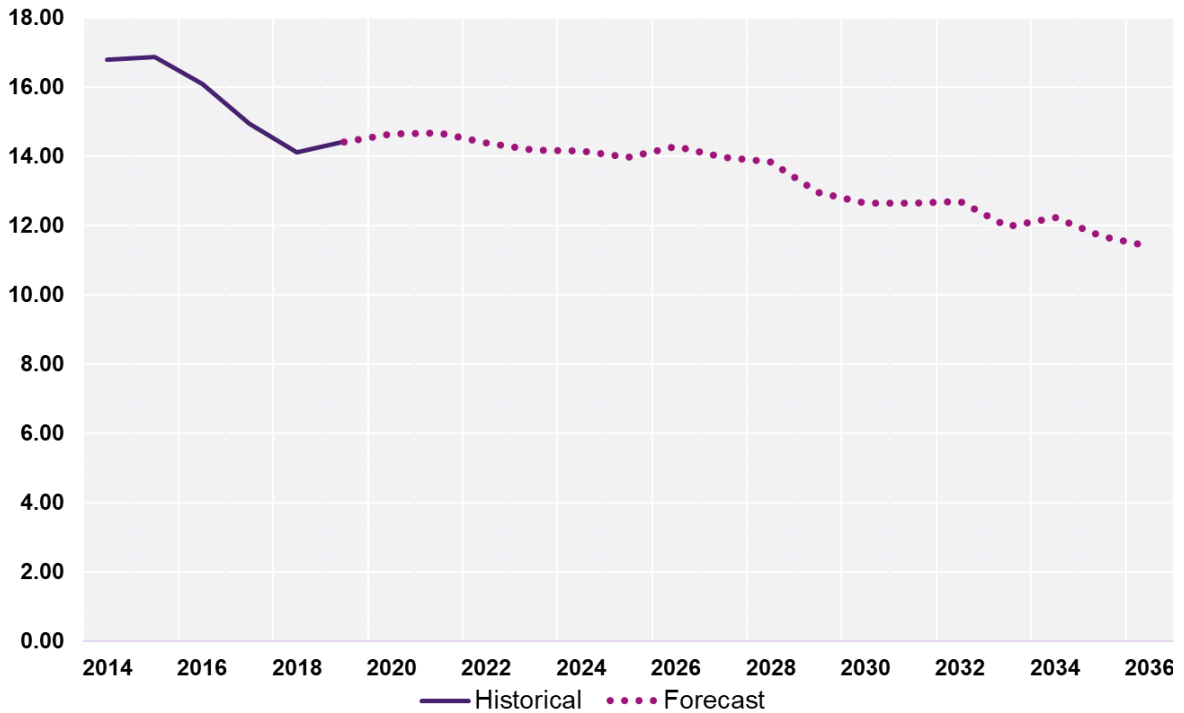


Figure 66: Operating costs per passenger (£ 2018 prices)

Our straight forward, transparent and robust approach to forecasting operating cost for H7-H9 is based on a broad evidence base. Table 11 below summarises the key assumptions that have a material impact on our operating cost forecast and demonstrates why our approach is robust.

Table 32: Summary of key assumptions

Key assumption	Value	How it impacts on the forecast	Why our approach is robust
Starting point year	2020 Management Business Plan Forecast	Operating costs in the “base year” has an impact on all the forecasts as it is the starting point to which elasticities are applied	KPMG’s analysis demonstrates that we have delivered significant catch up efficiencies in recent years
Elasticity of passengers with respect to operating cost	[REDACTED] [REDACTED]	Short run elasticity applied to People, Operational, Utility and General Expenses cost categories. Long run applied to General Expenses from 2029 and used as a cross-check for overall Operating Costs forecast	This is based on Frontier Economics’ analysis of cost and passenger data at over 30 large airports (40 million+ pax in 2017) over the period 2001-2017. The lower quartile (i.e. 25 th percentile of best performance) short run passenger elasticity in the sample was [REDACTED] [REDACTED] [REDACTED] [REDACTED].
Elasticity of terminal size with respect to Facilities and Maintenance costs	[REDACTED]	Applied to Facilities and Maintenance costs.	Frontier’s analysis of our historical costs found a statistically significant relationship for terminal size and Facilities and Maintenance costs.
Cost impacts of additional infrastructure	[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]		Based on analysis of our 2016-2018 average historical costs directly related to terminal size or airfield operation. We have used the most recent efficient costs and taken a conservative lower end estimate.
Elasticity of terminal size with respect to total operating costs	[REDACTED]	Used as a cross-check to cost impacts of additional terminal area from historical costs.	Frontier’s analysis of our historical costs found a relationship between terminal size and total operating costs. KPMG’s analysis found that the opening an additional terminal increases costs by 6.9%.

Elasticity of terminal size with respect to Rates	■	■■■■■■■■■■ ■■■■■■■■■■ ■■■■	Business rates are linked to terminal size and actual value will be as a result of re-valuations during the plan period.
Elasticity of RAB size with respect to Insurance costs	■	■■■■■■■■■■ ■■■■■■■■■■ ■■■■	Our insurance costs are directly linked to the size of the RAB rather than passenger volumes or terminal size. Therefore, we have removed insurance costs from the Operational Costs category and forecast it based on changes in the closing RAB.
Electricity distribution fee contract	Forecast based on contract		The contract was renewed in 2016 and forms the basis for the forecast for H7-H9.
Heathrow Express costs	£17m excluded from General Expenses from 2029 onwards ■■■■ reduction to People costs in 2029		Based on 2018 costs associated with Heathrow Express
Pre-opening costs	■■■■■■■■■■ for operational readiness and 2.5% disruption impact applied to 50% of retail revenue in opening years only.		Costs based on our experience from Terminal 2.
Real input price inflation	See Section 3.5 for adjustments relative to RPI		Study completed by First Economics recommends using the OBR forecasts.
Frontier efficiency	2021 – 2022: 0.3% 2023 – 2026: 0.5% 2027 – 2031: 0.7% 2032 – 2036: 1.0%	Applied to all cost categories	Based on evidence presented by First Economics.
Passenger numbers	Key interdependency (see Chapter 7 - Passenger Forecasts)		
Terminal Size	Key interdependency (see Chapter 8 - Capital Investment)		

5. Our plans to deliver efficiencies

Our plan assumes we meet our efficiency targets irrespective of the success of particular projects

- Consumers care about the end results of cost reductions not the internal steps the airport takes to achieve them so like all competitive companies Heathrow must make sure to deliver the necessary efficiencies

- Our cost estimate reflects what is a reasonable allowance for an efficient airport of Heathrow's size and characteristics, rather than a forecast of how we will run the business
- Beyond the early 2020s it becomes increasingly hard to be specific on changes and initiatives, so we rely on the top down view for our 15 year plan
- Anchoring the plan on overall efficiencies creates the right incentives for Heathrow as well as flexibility to adjust delivery based on opportunities over time
- Increasingly routine processes at the airport will be automated, freeing up colleagues to focus on service. Further cost efficiencies will come from looking across the airport value chain and will require greater collaboration and resource sharing between airport, airlines and handlers.

Nevertheless, for the early years we can describe the major initiatives we will use to drive the efficiencies in our business across the big areas of expenditure:

- People change and efficiency
- Next Generation Security improvements to operational costs
- Heathrow Additional Capacity programme for efficient use of facilities
- Utilities efficiencies as we transition to carbon neutral airport infrastructure
- Magenta to transform our support services efficiency
- Strategic partnerships to reduce overhead

In addition to undertaking major initiatives, we will also continue our benchmarking programmes to ensure that remain at the leading edge of being cost competitive among hub airports.

5.1 People change and efficiency

Heathrow's culture transformed in Q6 to become a values and service-led, cost-conscious and competitive business for the future. Our people efficiency savings were achieved by organisational re-design, security colleague initiatives, broad-banding and pension changes.

Further cost changes become progressively more difficult to deliver and must be carefully balanced with delivering our outcomes, particularly in the context of our heavily unionised workforce. Going forward, our focus for reducing our people cost base is to drive productivity improvements by increasing engagement and transforming the way we work.

Reward Strategy and our legacy pay challenge

We are committed to offering market competitive reward packages to attract the best talent and ensure we retain and motivate our colleagues. We are committed to the London Living Wage and expect our supply chain to pay on this basis, despite the impact it has on costs in the short-term. Our rewards package recognises and rewards excellent passenger-led performance, driving a high-performance culture.

As part of our reward strategy, we are committed to delivering long term sustainable wage efficiency changes. We will continue to assess options to tackle the challenge of legacy contracts, working within the context of a unionised workforce. This means that change programmes take a number of years to implement and may involve upfront investment for long term gains.

Ongoing reviews of our pension schemes

We currently operate two pension schemes: Defined Benefit (DB) scheme and Defined Contribution (DC) scheme. Following a collective agreement with the relevant unions, our DB

scheme ceased to be offered to new members from June 2008, at which point all new hires were enrolled onto the DC scheme¹⁴⁷. As part of this agreement, it was determined that we could only make further changes to the DB scheme if the funding deficit for the scheme was to exceed £250million. This happened in 2014 and resulted in further changes to the DB scheme that came into effect in 2015. In particular, we proposed that our contributions should fall from 33% to 23% of active members' total remuneration (salaries and any bonuses). The CAA and airlines accepted this proposal. The following changes were made to the DB scheme to deliver this reduction in costs:

- the accrual rate (the rate at which an individual's pension is built up based on each year of working) was reduced from 1/54th to 1/60th of final pay;
- salary increases that counted towards final pay were capped at 2% per year; and
- it was agreed that any pensionable amounts that were accrued from 1 October 2015 would be indexed by RPI up to a maximum of 2.5% per year.

At this time, it was also agreed that:

- no further changes would be made before 1 January 2019;
- between 1 January 2019 and 31 December 2020, changes could only be made if one or both of the following two events occurred:
 - pension costs were fully or partially excluded from allowed costs; and
 - a formal review undertaken by the Trustee found that the actual employer contributions were 28% or more of active members' total remuneration.

The most recent Actuarial Valuation¹⁴⁸ of the DB scheme undertaken by the Scheme Trustee has resulted in an increase in the employer contribution to 25.6% (applied against basic salaries and shift pay). This change was effective from October 2019. As a result, it will not be possible to propose any amendments to the DB scheme design until 2021.

During Q6, we have shown we can run our pension schemes responsibly and make effective changes when appropriate. Going forward we have three options for the DB scheme:

1. Leave the scheme unchanged and let it continue in its current form;
2. Close the scheme and replace it with another pension arrangement; or
3. Make further adjustments to the scheme which would reduce costs either through reducing the accrual rate, increasing member contributions, fixing the pensionable salary or fixing the value of pension payments.

Any material changes would require agreement with our unions and consultation with individual members. We are committed to doing the right thing for our people and we know that pensions are the second most valued benefit behind base salary. During H7, we will continue to review the cost implications of each option to ensure we make the most cost-effective choice which also delivers on our outcome for our colleagues by making Heathrow a great place to work.

Project 2023

We are building on the cultural transformation to date and creating an environment that is a great place to work and is geared up to deliver growth. We want to continue building a diverse

¹⁴⁷ There were some exceptions to this, such as in the case of apprentices who could join the scheme after gaining a permanent job (if they had begun employment as an apprentice prior to the June 2008), but generally the DB scheme has been phased out since June 2008.

¹⁴⁸ Mercer, Scheme funding report of the actuarial valuation BAA pension scheme as at 30 September 2018, December 2019

and inclusive culture that can attract and develop the best talent. Investing in our people is key to addressing the challenge of improving productivity, reducing costs and delivering world class service. We are committed to being a great place to work, with colleagues who feel empowered, service focused and connected to the operation.

Increased engagement creates greater resilience throughout the business through greater discretionary effort and reduced absence. We know that fully engaging colleagues can make a real difference to the level of service our passengers' experience. Airport staff helpfulness is the highest ranked driver of passenger satisfaction for departing passengers (except for families where it is second behind cleanliness).¹⁴⁹

*"You want them [Heathrow Support Staff] to want to help you, not just that they have to help you."*¹⁵⁰(UK, Leisure, Direct)

Employment, Education and Skills Strategy

We recognise that a skilled and agile workforce is crucial to successfully delivering our growth ambitions, increasing productivity and achieving our vision. We are investing in our colleagues so that they have the skills required today and for the future, enabling them to reach their full potential and increasing productivity across the business. This includes centralising our training and creating career pathways. Furthermore, with the support of Team Heathrow, we have committed to training 5,000 additional apprentices, bringing the total to 10,000 apprentices by 2030, helping to develop a pipeline of talent for the future. We are making good progress on this through the Team Heathrow People Leadership Forum.

5.2 Next generation security improvements

Heathrow's security processes are a major part of the consumer experience. While instinctively discussion can focus on the more visible passenger screening, we now take a more holistic approach to security. For consumers to 'feel comfortable and secure at the airport', Heathrow must achieve the highest global levels of security screening for not only passengers, but colleagues, cargo and protecting the physical airfield perimeter and virtual data and information environments. The comfort aspect of this outcome means that we ensure that the passenger screening process is not too intrusive, creates confidence and is quick. Speed of 'processing' also links directly to the 'predictable and reliable journey' outcome – not only for passengers but also for crew and supplies to ensure passengers and cargo travel reliably on time. [REDACTED]

our total operating costs in 2018. To achieve our efficiencies and the 'efficient, reliable and affordable airport service' outcome it is one of the major focuses for efficiency and value for money. Security team colleagues make up over 60% of Heathrow colleagues, so how we organise and operate our security teams has a disproportionate impact on the 'Heathrow is a great place to work' outcome within the Heathrow company.

We know that speed and security colleague helpfulness are the key areas our passengers value in security. Security, and particularly wait times, can be a point of stress for many passengers¹⁵¹.

¹⁴⁹ Truth Consulting, *DNA Integrated Analysis: The way forward*, May 2017

¹⁵⁰ Systra, *Heathrow Airport Customer Valuation Research*, April 2019

¹⁵¹ The September 2018 Horizon Assembly Options Workshop found that for departing passengers the key stress point is getting through security.

“I think the important thing for an airport is to have a clean environment, good processes that take the passengers from check-in to the plane and offer a possibility of a good meal and seating spaces. Just make it simple.”¹⁵² (Non-EU, Premium Passenger,)

*[REDACTED]*¹⁵³ This can be translated into passengers being more likely to rate Heathrow as excellent when they have minimal to no waiting time and a clear, seamless route through security.

“If you could get through the airport in 2 minutes, it would be a dream. The ideal would be if you can walk straight in and you get to the plane and go”¹⁵⁴

For connecting passengers, improving waiting time at security was the second most valued improvement they were willing to pay for (sixth most valued for direct passengers).¹⁵⁵ Security colleague helpfulness is in the top 5 drivers of satisfaction for departing passengers¹⁵⁶, and is particularly important for families:

“I was a bit worried about travelling with a baby but everyone was so helpful and friendly. There wasn’t much of a queue at security so that was really quick and easy. Sometimes security can be a bit of a flap, taking phones out, baby milk etc. Everyone this time round was so helpful that I didn’t feel rushed which actually made me far speedier.” Passenger travelling to New Zealand for a family visit and holiday¹⁵⁷

The Next Generation Security programme will rethink the way security operates from first principles. We can see a new generation of technology and operating concepts that will transform how security at airports works in the 2020s. These new approaches are still emerging, so will require a phased approach, but are increasingly proving to be feasible. This next generation approach will enable growth by delivering additional capacity within our existing infrastructure, improve comfort, reliability and speed for consumers, ensure a higher level of security against new and emerging threats and improve the cost efficiency of our processes

A range of new technologies create possibilities for Next Generation Security. New CT scanners with C3 and other advanced algorithms can remove the need to separate liquids and electronic items from hand luggage for screening. Advances in software and digital tools also increase the scope for remote and parallel image screening. Biometric tracking is also advancing rapidly allowing more automated screening and identification for people. Artificial intelligence technologies also offer the potential for continual improvement in software accuracy, speed and effectiveness.

Potentially significant step changes in aviation security operating concepts have also emerged in recent years. Working with international partners, we have identified a number of promising changes which we are seeking to explore further. These include international recognition of screening measures to reduce demand at transfer screening posts, increased automation, and procedural changes to search lane and control post layouts. We are working to both

¹⁵² Systra, *Heathrow Airport Customer Valuation Research*, April 2019

¹⁵³ Truth Consulting, *DNA Integrated Analysis: The way forward*, May 2017

¹⁵⁴ Caroline Thompson Associates, *Willingness to Pay: Qualitative Research Findings*, November 2017

¹⁵⁵ Systra, *Heathrow Airport Customer Valuation Research*, April 2019

¹⁵⁶ Truth Consulting, *DNA Integrated Analysis: The way forward*, May 2017

¹⁵⁷ Ibid

adhere to existing and also help inform future cutting edge DfT and CAA Aviation Security requirements and those of other key operators such as the TSA and EC that impact on Heathrow operations.

As of 2019 we have trialled a number of these technologies and concepts at Heathrow with positive results in terms of security, service, speed and efficiency. We are continuing to optimise the package for passenger search, perimeter security and cargo.

Building on those lessons we plan to phase the [REDACTED] across the airport in line with the DfT target of December 2022. In doing so we will also be looking for opportunities, linked to the Early Growth and terminal capacity programmes to lengthen lanes, which have been shown to increase efficient throughput. In the second phase, these new layouts will create opportunities for different ways of working. We will engage with colleagues and unions around the evolution of colleague tasks to create more specialised and skilled roles. This will be a move away from the general tasks security officers perform toward roles that focus on service or aspects of the new passenger search process. A third phase will then optimise the new technology, operating processes and software to drive efficiency. This could include options around parallel image screening and wider use of algorithmic screening. We believe that these changes will allow us to accommodate the extra passengers from Early growth into the mid-2020s without any net increase in security colleagues and a material reduction in cost per passenger searched, in line with our overall efficiency targets.

In parallel, we plan to invest to change the way perimeter and cargo security operates. The current control post operation is sub-optimal for airlines, handlers and others in terms of safety, reliability and speed. Across the airfield, particularly within terminals, we will eliminate 'fixed' posts in security through infrastructure redesign and automation. During Q6 we have saved £25m from fixed post removal. In addition, we are working to design a Next Generation Control Post. We plan to focus on cargo operations in the first instance. Some other airports have instituted 'airlock' designs where pre-screened cargo and supplies are moved from landside to airside without a vehicle or person movement over the boundary. This could eliminate or radically reduce activity at some control posts, while also making it more efficient and competitive to operate at Heathrow. We are also exploring opportunities to reduce other demand to cross the boundary and potentially consolidate control posts into fewer, more efficient, larger posts.

Next Generation Security will also involve increased costs in some areas with targeted investments in the effectiveness and service of our security activity. This plays to both the 'safe and secure' and the 'cared for and supported' outcomes. We will continue to invest in landside and perimeter security and patrolling. We will also invest more in service training and support, and more specialised service roles. The operating costs for these investments are captured within our overall operating cost forecasts.

The overall direction for Next Generation Security, and potential for technology, will benefit consumers and drive cost efficiency in all cases. However, we will face choices about the exact processes implemented and the speed of introduction of these changes. We plan for the first two phases to run to 2024/5, although consumers will see positive changes in their journeys before the beginning of H7 in 2022. We will seek opportunities to accelerate efficiencies, technology and improved security service. We will need to balance acceleration with the time to demonstrate new technology works robustly and is approved, the pace and risk of change for customers and colleagues, and the logical scheduling of infrastructure in terminals and controls posts.

5.3 Heathrow Additional Capacity programme

Maximising our existing terminal capacity

To deliver early growth (i.e. the additional 25,000 ATMs) ahead of the opening of the proposed new runway, it is necessary to increase the capacity of our terminals. The T5+ project aims to improve the efficiency of Terminal 5, to maximise the use of the existing terminal footprint. Initiatives to make the most use of the capacity will include balancing demand between the main building and the satellites; moving to multi-user occupancy; increasing automation and passenger self-service; and delivering next generation security as outlined above. Further details on T5+ can be found in Section 3 of Chapter 8 – Capital Investment.

Passenger Automation Programme

Our passenger automation programme includes self-service check-in, self-service bag drop, automated ticket presentation, self-boarding gates and E-gates to support immigration. Passengers are increasingly expecting the efficiency that automation can provide:

“It’d be good to see LHR use technology and innovation to manage people flows better to reduce the delays and bottlenecks.” User, British, UK, Male, 45-54¹⁵⁸

The increasing use of automation will be essential to keep pace with our international competitors. For example, passengers are surprised and delighted by the efficiency at Changi, proving that investment in technology that supports speed and efficiency can make a significant impact on customer satisfaction.¹⁵⁹

Colleagues will remain available for support, to give passengers choice and will mean they are delivering passenger service rather than carrying out transactional activities.

*“It does sound more efficient and hassle free but will never replace a human presence - which doubles as making one feel safer.”*¹⁶⁰

An example of where this balance is vital is in the increased use of E-gates. For non-EEA passengers, it is the second highest improvement passengers are willing to pay for. The 2018 Horizon Arrivals¹⁶¹ workshop found ████████ of passengers prefer e-gates but some passengers still see manual gates as easier to use and more reliable, and will need extra support and information to convert.

Alongside automation, we will increasingly leverage data analytics for continuous improvement of the operation. For example, queues will be minimised by the use of predictive analytics, personalised notifications and enhanced dynamic resource allocation of colleagues and assets. There will also be increased information sharing across Team Heathrow, so we can deliver consistently high levels of service.

We know the use of data and real-time information is something our passengers value. The provision of real-time information on waiting times at security, immigration and passport control was the fourth most valued improvement for direct passengers in our Willingness to Pay research¹⁶². Where passengers are provided real-time information on baggage reclaim, their

¹⁵⁸ Join the dots, Innovations, January 2019

¹⁵⁹ Blue marble, Synthesis of Consumer Insights - Stage 2 (Horizon Arrivals report v1.0.pptx), April 2019

¹⁶⁰ Join the Dots, Horizon Biometric Report, March 2019

¹⁶¹ Join the dots, Horizon Arrivals, September 2018

¹⁶² Systra, Heathrow airport customer valuation research, April 2019

satisfaction is ██████████¹⁶³ Passengers will increasingly come to expect the availability of real time information, the 2019 IATA Global Passenger Survey found that 72% of passengers want to be kept informed throughout their journey on their personal devices¹⁶⁴.

“Given today’s technology, I’m at a loss as to why the Heathrow app doesn’t provide all the flight departure and gate data in real time, with alerts when one’s flight status changes -why do we rely on information boards nowadays?” User, British, UK, Male, 45-54¹⁶⁵

Key themes for passenger satisfaction from the Horizon Assembly Options Workshop¹⁶⁶ were “Give me information” and “Keep me in control”. Where passengers demand timely information at all stages, ideally before they reach the airport. Regular informative and real time updates about progress and waiting times help passengers manage their expectations so they can plan their time wisely:

*“Help me manage my time at the airport by equipping me with the necessary information at the right time to make an informed decision”*¹⁶⁷

Eventually, we anticipate that biometrics can be used for a seamless passenger experience, which will allow a greater integration of service delivery, with the use of data to enable personalisation of the passengers’ journey.

To give passengers the end-to-end visibility of their journey will require significant collaboration between all 2,100 companies at the airport, which Heathrow will need to co-ordinate.

Automated Airfield Operations

Our direct passengers most valued improvements in departure punctuality (third most valued for connecting passengers) in our Willingness To Pay (WTP) research¹⁶⁸. Improving the efficiency of our airfield operations through automation will help to deliver those improvements.

We are already assessing automated stand and gate allocation, and the introduction of smart stand automation. This is where airbridges, foreign object debris detection and stand entry guidance are all automated to improve efficiency and safety. This will be followed by automating prepositioning, docking and undocking, push back and elements of ground clearance. Over time the introduction of enhanced taxiing services, such as electric landing gear drives and remotely controlled tugs, will make a push-back service unnecessary. Around and within the airfield, all security and safety patrols will be replaced by a mixture of autonomous vehicles and smart cameras. A study is underway to assess the potential of introducing autonomous vehicles on the airfield. Automation will improve the efficiency of the airfield, increase resilience, safety and reduce costs for our airline partners. Our airline partners have told us how important an efficient operation is:¹⁶⁹

¹⁶³ Blue marble, Synthesis of Consumer Insights - Stage 2 (passenger-it-insights-2019.pdf), April 2019

¹⁶⁴ IATA, IATA Global Passenger Survey 2019 Infographic, <https://www.iata.org/publications/store/Documents/GPS-2019-Highlights-infographic.pdf>

¹⁶⁵ Join the dots, Innovations, January 2019

¹⁶⁶ Join the dots, Horizon Assembly Options Workshop, September 2018

¹⁶⁷ Join the dots, Horizon Assembly Options Workshop, September 2018

¹⁶⁸ Systra, Heathrow airport customer valuation research, April 2019

¹⁶⁹ B2B international, Delivering a sky-high partner experience, July 2018

“The most important things for me is their stand allocation, just because they are the ones telling us what stand we can go on. It’s a complex job, which they do very well”.
Anonymous airline, Terminal 3

“I would say the main challenge is the fact it’s a time sensitive operation that we run. Aircraft’s operate to strict time schedules”. Anonymous airline, Terminal 4

Below wing, we will move to the IATA Ground Operations Manual (IGOM) to allow better safety and more efficient use of capacity. This could allow the introduction of shared Ground Service Equipment, improving efficient use of scarce resources and reducing barriers to entry for ground handling. Standardisation of airside operations should allow increasing automation of processes such as push back, baggage operations and bussing.

Baggage Automation

Baggage is a clear area where innovation can deliver significant efficiency improvements, increased resilience, improved working conditions for our colleagues and reduce costs for our airline partners.

The IATA 2019 Global Passenger Survey identified bag collection as the main point of attention for the industry¹⁷⁰.

Improvements in ‘time waiting at baggage reclaim’ was the third most valued improvement for direct passengers in our WTP research¹⁷¹ and ‘reduced baggage delay’ was the most important aspect of the H7 service packages in the Choices research¹⁷². Our aim is to move to a fully automated baggage system. Work is underway to increase automation in the baggage make-up halls. Full automation would quadruple the volume of bags that could be loaded per hour and reduce the footprint required in the baggage make up hall by up to 50%, providing additional headroom for growth and improved resilience. We are also working on utilising Autonomous Guided Vehicles (AGVs) to replace the tugs to transport bags around the airport, reducing delays and minimising the footprint required.

Potential further measures to improve baggage performance include reducing the complexity of the baggage screening process by removing the requirement to rescreen bags and implementing additional bag scanners to improve the efficiency of baggage tracing.

We are also looking at developing an off-airport baggage pick-up, drop-off and delivery service. Providing a home-airport baggage transfer service appeared in the top 10 of propositions that would improve the Heathrow experience a lot for all passenger types¹⁷³. This could contribute to achieving our surface access targets; 84% of passengers thought it was a good idea for Heathrow to develop ways to make using public transport easier including a baggage transfer service¹⁷⁴:

“As an older person with limited mobility, if I can get to the coach station by taxi and have help with baggage transfer, I’m willing to try it”. User, 65-74 years, Female, British, UK¹⁷⁵

¹⁷⁰ IATA, IATA Global Passenger Survey 2019 highlights,
<https://www.iata.org/publications/store/Documents/IATA-2019-GPS-Highlights.pdf>

¹⁷¹ Systra, Heathrow airport customer valuation research, April 2019

¹⁷² Accent, H7 service package choice research, 2019

¹⁷³ Truth Consulting, DNA Integrated Analysis: The way forward, May 2017

¹⁷⁴ Join the dots, Surface Access Interventions, April 2019

¹⁷⁵ Join the dots, Surface Access Interventions, April 2019

In addition, this will enable us to smooth the peak periods of baggage processing, optimising the baggage system, reducing the space required and increasing resilience. Close working with airlines will be essential to deliver successfully.

5.4 Utilities efficiencies as we transition to carbon neutral

Heathrow 2.0 has a stated goal to “Operate zero carbon airport infrastructure (buildings and other fixed assets) by 2050 with clear interim targets”. Our energy strategy is to decarbonise the heat generation by investing in heat pump technology to provide both heating and cooling to replace gas and gas oil. As an interim step we are moving to biogas.

Electrification of the heat infrastructure will increase our electricity demand. Energy market prices are volatile with an upwards trajectory in both wholesale and “pass through” costs. This is partly due to government policies to green the electricity grid and reduce the UK’s carbon emissions.

Solar power is one of the very few ways that we can locally generate zero carbon energy. We are learning from a proof of concept site and have identified up to 22 roof spaces across terminal buildings and other prominent Heathrow properties in the central terminal area and on the perimeter road. The large-scale installation of solar panels can ring-fence a proportion of the electricity we consume from price fluctuations and the forecast 15 – 20% increases in the price of electricity. We currently consume around 460GWh of electricity a year, each MW of solar panel installed will generate circa 0.9 GWh pa. Initially we will install 20MW of solar power across all terminals, resulting in a saving of around £1.2m per year.

Our preferred masterplan for the Heathrow expansion includes a number of initiatives to minimise our energy demand as we grow. In alignment with our sustainability and zero carbon commitments we will seek to use new technologies as they become available. More information can be found in Chapter 4 - Sustainable Growth.

In parallel, we will invest in our electric charging infrastructure to enable the on-airport vehicle fleet to switch to electric and hybrid. This will increase our overall green electricity usage. We have not made any explicit allowance for electric charging for aircraft.

5.5 Transforming our support services efficiency

We are investing for the future to ensure our systems and processes are fit for growth, with flexible and maintainable solutions that allow us to evolve and grow. We call this project ‘Magenta’.

Magenta is the biggest transformational change programme ever undertaken by Heathrow support services. We are developing a modern system with straightforward, intuitive processes that allows our support functions to operate efficiently, to provide insights and to add value to decision makers. The scope of the programme will include:

- our core finance process areas
- the people lifecycle
- asset management
- business intelligence

We will use new and proven technology to enable us to upskill our colleagues, bringing innovation to our support roles and modernise the way we work.

Magenta will bring benefits across the whole business, enabling colleagues to make their own informed decisions. Support service colleagues will have end-to-end better ways of working with improved processes, tools and data, and our operational colleagues will benefit from direct access to better information. The changes will also make it easier for our supply chain to work in partnership with us, allowing our colleagues to concentrate on core business.

In alignment with Magenta, we are also ensuring our practices are simple and standardised (i.e. risk assessment and policies and legislation). This will minimise the need for internal alignment and enable more focus on delivering a great service to our customers.

5.6 Strategic partnerships to reduce overhead

Strategic partners form part of our procurement strategy

During Q6 we made a number of savings through contract re-negotiations, our baggage operations contract with ██████████ and Baggage Contingency support contract with ██████████ were renegotiated to introduce these provisions using a collaborative approach which resulted in no cost increase to the business.

There was also a full tender of all our car park and bussing services to create the first of our new Partnership Agreements which see our suppliers take an active role in defining their services to achieve the required outcomes. This has seen service improvements (shorter waiting times, more customer service colleagues) as well as operating cost reduction.

This move to developing strategic partners requires Heathrow to move our collective thinking and spend more time establishing output requirements, before going to tender and then running collaborative engagement with the suppliers to ensure they understand the key elements of these requirements and how their innovation can deliver safety, service and cost benefits. Collaboration and engagement with our supply chain will be essential to ensuring that we can drive service and cost improvements in H7.

We are working more closely with all our key suppliers, using constructive discussions to understand what works well and what techniques and processes are used at other hub airports which keep operating costs low, whilst ensuring that we continue to deliver the highest standard of service quality.

We have introduced the Innovation Partners

Thinking more widely for H7, we are also continuing with our focus on ground-breaking innovation. We have recently completed our initial Innovation Partners competition, which invited businesses to approach Heathrow with new ideas on how to run the airport. The competition in itself was innovative as for the first time we invited bids against the way Heathrow goes about operating the airport, rather than bidding against each other, with no area that wasn't open for review.

This has introduced a transformational approach to how we work with the market, where the competition is with the current way Heathrow operates and acts as a powerful benchmark of everything the airport does. This allows us to use newly developed technology that we might not have been aware of otherwise. For example, Ocado are developing new logistic and storage solutions underpinned by British technology that are highly relevant to baggage handling and car park efficiency.

We will continue to undertake market reviews, which prove beneficial from a cost and process perspective. Recently our luggage trolley management service (which is currently delivered

by around 150 directly employed colleagues) was put to competitive market tender. Whilst the market initially offered a more cost-effective approach, working with our colleagues we were able to improve the way the service was delivered in-house to reduce cost and therefore retain the service as directly employed.

5.7 How our efficiency initiatives deliver against our outcomes

The programme of initiatives described above is still evolving, however, we expect it to deliver against our outcomes as below in Table 12:

Table 33: Summary of how our initiatives deliver our outcomes

Outcome	
I have more choice of flights and destinations	<ul style="list-style-type: none"> • T5+ will enable us to deliver early growth ahead of the proposed new runway and additional terminals opening • Magenta will ensure our systems and processes are fit for growth
I am confident I can get to and from the airport	<ul style="list-style-type: none"> • Real time onward travel information • Digital and physical wayfinding to guide passengers to and from terminals • Baggage transfer service makes using public transport easier
I have a predictable and reliable journey	<ul style="list-style-type: none"> • Next generation security will deliver 10-30% increases in flow rates averaged across Heathrow • Our automation programmes will cut waiting times at all stages of the passenger journey, improve baggage performance and increase flight punctuality • Increasing use of data analytics to reduce queues and deploy colleagues where they are most needed • Increased levels of real-time and personalised information to keep passengers informed about their journey
I feel comfortable and secure at the airport	<ul style="list-style-type: none"> • Maintaining world class security • Sealed boundary – deploying or having the option to deploy the world’s most advanced protective security measures by 2026 • Simpler security, liquids and electronic items allowed in hand luggage through screening by 2023 • Colleagues focussed on supporting passengers who need it • Enhanced resilience and agile response to risk and threat • Delivering brilliant basics by maintaining spend on cleaning, trolleys and maintenance and investing in automation of core processes
I feel cared for and supported	<ul style="list-style-type: none"> • Service signatures across Team Heathrow delivering consistently high service across the airport • Multi-skilled colleagues with service focused roles, additional training and able to provide care where most needed in times of disruption • Enhanced level of engagement, communication and personalisation of services to passengers • Increased use of data to provide personalised passenger journeys
Heathrow provides efficient, affordable and reliable airport services for airlines	<ul style="list-style-type: none"> • Year-on-year reductions in security cost per passenger in line with wider operational cost efficiencies • Increased automation to reduce airline costs, improve reliability and increase punctuality

	<ul style="list-style-type: none"> • Improved baggage performance to increase resilience and reduce airline baggage repatriation costs • Strategic procurement partnerships to deliver service and cost improvements
Heathrow is a great place to work	<ul style="list-style-type: none"> • Higher skilled roles and improved career pathway options • Greater colleague work satisfaction and engagement • Enthuse and enable colleagues to embrace new ways of working and develop new capabilities • Automation to reduce manual handling and increase airfield safety • Increase the number of apprenticeships to a total of 10,000 by 2030 • Reflect diversity of our local community by 2025
Commitments made by Heathrow for sustainable growth are met	<ul style="list-style-type: none"> • Large-scale installation of solar panels supports commitment to be a zero-carbon airport by 2050

6. The impact of our strategic options on our operating costs

Throughout our plan we have presented two strategic options, 'Prioritising Savings' and 'Prioritising Service', characterised by the extent to which they meet the affordability challenge. The options assume a different phasing of our preferred masterplan and delivery of passenger growth. Both options will impact our operating cost forecasts. The speed at which our passenger volumes grow and the phasing of our delivery of new infrastructure will increase or decrease our operational costs over the plan period.

We have a choice to invest differently in the service aspects identified by consumers as priorities to improve. These service aspects have an impact on operational expenditure. As outlined earlier in Chapter 3 - H7 Plans and Choices, these can be categorised by four pillars and initiatives:

- Championing Service; Dynamic Resource Deployment, Distinctively British service
- Best environment; Iconic Walkways, Stylish Washrooms, Gate Enhancements- Sense of Place
- Leading product; Premium Lounges/ VAT Facilities, Automation, Sponsored Smoking Facilities, Rest & Relaxation Zones, Dedicated Work Areas
- Open communications; Live Journey Information, Real Time Feedback, Dynamic Signage/ Mega FIDs, Information Points/ Digital Signage

This is in addition to the service options driven by cost benefit analysis and additional surface access contribution that we can make. It is estimated these investments could have a positive impact on ASQ score, but the package has around £1 impact on the charge over the 15-year period.

Operating Costs for scenarios Prioritising Savings and Prioritising Costs are set out in Table 13 and 14 below. These are in the 2018 price base year.

Table 34: Prioritising Savings

Total operating costs (£m, 2018p)	2019	2020	2021	2022–2026 Average	2027–2031 Average	2032–2036 Average
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Total	1,165.2	1,193.6	1,192.2	1219.9	1277.0	1376.3
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Table 35: Prioritising Service

Total operating costs (£m, 2018p)	2019	2020	2021	2022–2026 Average	2027–2031 Average	2032–2036 Average
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Total	1,165.2	1,193.6	1,189.1	1241.5	1242.9	1342.7
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10 – COMMERCIAL REVENUES

Overview

- Heathrow sets the global benchmark for airport commercial revenue
- Our H7 plans are grounded in consumer research
- Commercial income faces headwinds from increased digitisation and limited space per passenger
- Consumer requirements and our ANPS mode share targets mean that we will need to make big changes to our surface access provision, impacting our current revenue streams, such as car parking, and creating new ones, such as road user charging
- We have set challenging targets for commercial revenues based on benchmarked elasticities and Heathrow's historic performance

1. Introduction

In this chapter we set out our plans for commercial revenues at Heathrow from 2022 to 2036. We present international benchmarks of Heathrow's commercial performance. We set out the key drivers of commercial revenue. We detail our key focus for commercial revenues in H7 and how this is underpinned by consumer research and discuss the challenges that we face. We provide details of our forecasting methodology for H7 based on each category of commercial revenue.

Heathrow's commercial offering relates to a wide range of products and services available across the airport, from car parking to telecoms and lounges to retail stores. The revenues from these products and services fall within the single till regulatory framework, supporting keeping airport charges affordable.

Commercial revenues, a total of £964m in 2018¹⁷⁶, are a very significant component of the single till, representing approximately a third of Heathrow's total revenues. Heathrow already achieves the highest non-aeronautical revenue per passenger and the second highest commercial revenue per passenger, as set out in the independent airport benchmarking report carried out by ██████████, reflecting the quality of the commercial proposition on offer and the mix of passengers flying through the airport. Passengers have recognised our success in this area, voting Heathrow to have the "World's best airport shopping" for the last 10 years in the annual Skytrax awards.

Importantly, commercial products and services do much more than simply help to reduce airport charges: they play a key role in the overall airport experience, driving Heathrow's vision **to give passengers the best airport service in the world** and support the delivery of consumer and airline outcomes.

¹⁷⁶ Heathrow regulatory accounts, 2018, this takes into account retail, property, rail and other revenue categories and excludes revenues from ORCs and airport charges

¹⁷⁷ ██████████
██████████

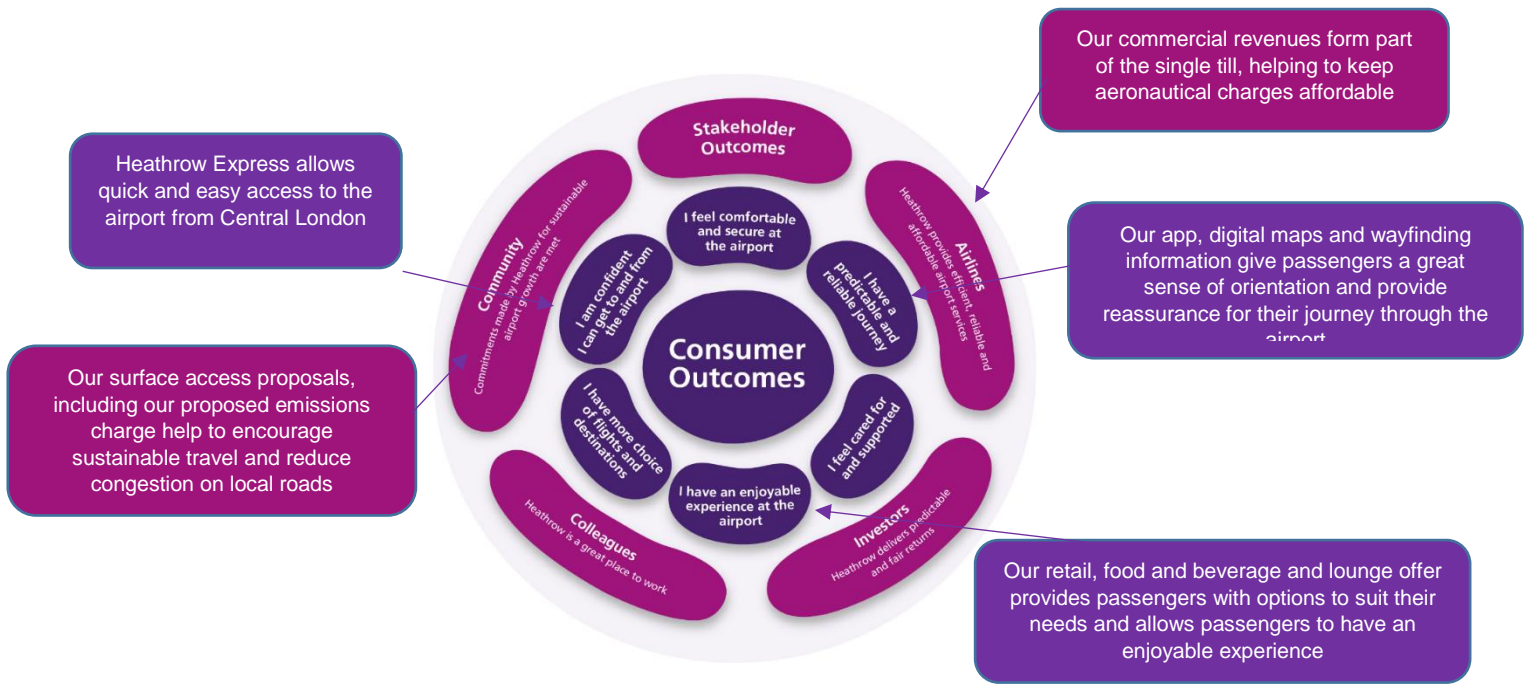


Figure 67: Consumer outcomes driven by commercial

Heathrow outperformed the CAA settlement for commercial revenue on a total level by 8% in 2018. Commercial revenues per passenger in 2018 were £12.03 per passenger.¹⁷⁸

Higher than expected passenger growth has contributed to this increase in revenue, alongside favourable exchange rate movements and the implementation of Heathrow management initiatives. For example, in Q6 we implemented our new 'Meet & Greet' affordable parking product, which has allowed us to both become more competitive on price and achieve higher levels of car storage.¹⁷⁹

An independent benchmark study carried out in 2019 for Heathrow by retail and commercial strategy consultants, ██████████ confirmed that Heathrow continues to set a global benchmark for airports in generating non-aeronautical revenues:¹⁸⁰

¹⁷⁸ Heathrow regulatory accounts, 2018, this takes into account retail, property, rail and other revenue categories and excludes revenues from ORCs and airport charges

¹⁷⁹ Further information on our Q6 performance in Chapter 1 – Setting the Scene

¹⁸⁰ ██████████
██████████

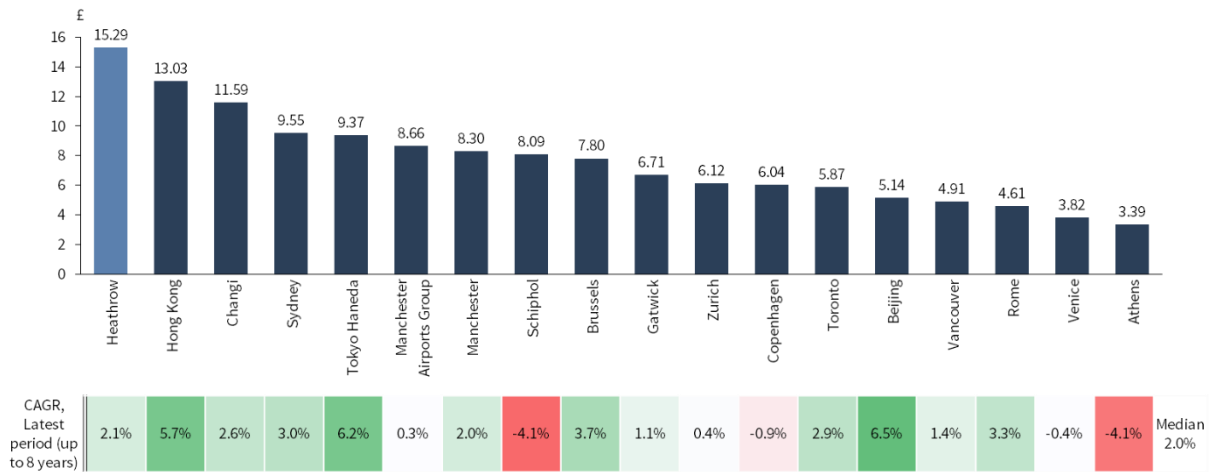


Figure 68: Non-aeronautical revenue per passenger, latest year available and CAGR latest period

When looking at Heathrow’s retail and food and beverage revenues, Heathrow benchmarks in second place in ██████ benchmark set:¹⁸¹

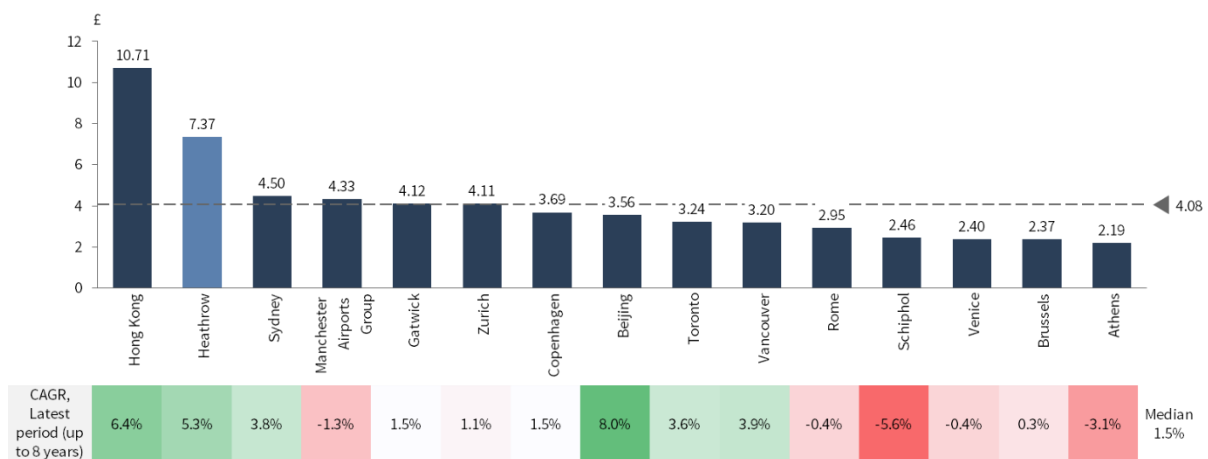


Figure 69: Retail and food and beverage revenue per passenger, latest year available and CAGR latest period

There has continued to be strong growth in Heathrow’s commercial revenues over recent years at a compound annual growth at (CAGR) of 5.3% for retail and food and beverage revenues and 2.1% for total non-aeronautical revenues.¹⁸² Other airports, primarily in the Asia-Pacific region, have experienced greater growth in recent years. ██████ review suggests that these airports are likely to be benefitting from growth in high spending Asian traffic, as well as the development of new commercial space focusing on the food and beverage offering and a unique approach to passenger experience in the presentation of the offering.¹⁸³ The picture is different in Europe, with European airports being among the lower performing airports. According to ██████, this is likely to be due higher volumes of short-haul low cost carrier traffic, challenges in consumer confidence and the rise of disruptors, such as Uber and

181 ██████

182 Ibid

183 Ibid, page 18, paragraph 3.4

online shopping. This aligns with work carried out by KPMG, showing that airports with an increased presence of long-haul passengers are likely to see a higher spend per passenger.¹⁸⁴ This will be a key consideration for Heathrow going forward with the likely change in passenger profile expected as the airport expands, in particular if we were to see the entry of a low cost carrier at scale.

Benchmarking work carried out by Imperial College and Airports Council International (ACI) also highlight recent trends in commercial revenue:

- The Imperial College work cites limited growth in retail revenues among the benchmark set of airports.¹⁸⁵ Their study highlights that, in 2018, retail concession revenues per passenger were generally flat, with revenues from car parking and fashion retail generally declining across both EU and non-EU airports. There was however universal growth in food and beverage revenues, aligning to Heathrow’s growth in food and beverage revenues as highlighted by [REDACTED]

Table 36: Overview of Benchmarking Performance 2018: Financial (LHR compared to Airport Benchmarking Group (ABG))

Overview of Benchmarking Performance 2018: Financial (LHR compared to ABG)
Decreasing costs; increasing commercial and car parking revenues

KPIs	LHR (with rank)	EU Airports	Non-EU Airports
NON-AERO REVENUES			
Retail concession revenue per pax	2 nd / 9	Flat/No Trend	Flat/No Trend
Car parking revenue per pax	3 rd / 9	Worsening	Worsening
PASSENGER SPEND			
Airside core business spend per pax	1 st / 9	Worsening	Improving
Fashion retail spend per pax	1 st / 9	Worsening	Worsening
Food & beverage spend per pax	2 nd / 9	Improving	Improving
COSTS			
Passenger security costs per pax	3 rd / 5	Improving	Worsening
Terminal cleaning costs per pax	4 th / 8	Improving	Worsening

EU = European Airports
Non-EU = All Other Non-European ABG Airports

AIRPORT BENCHMARKING GROUP # LHR Rank Trend
Improving Flat/No Trend Worsening

- Latest ACI Europe data on non-aeronautical revenues also shows per passenger declining trends in most areas of revenue since 2013, other than food and beverage, which grew by 19.8% per passenger.¹⁸⁶

In addition, the wider retail sector has experienced rapid and significant change over recent years, with the rise of online shopping. Currently 18% of total retail sales are made online by shoppers in the UK and growing at a rate of 12.6% per year, putting pressure on the

¹⁸⁴ KPMG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, section 4.4.1, figure 5

¹⁸⁵ The Imperial College Airport Benchmarking Group was established in 2017 to provide a platform for major hub airports around the world to learn from each other by comparing performance, sharing experiences, and identifying best practices.

¹⁸⁶ Latest ACI Europe data on non-aeronautical revenues since 2013

performance of physical retail.¹⁸⁷ This change in the wider retail environment sets different expectations amongst consumers regarding how they will be able to access retail. We are already seeing some examples of this preference for increasing digitisation, such as the decline in Bureaux de Change transactions due to a preference for electronic payments and currency cards¹⁸⁸, the large take up of Uber as a surface access mode¹⁸⁹ and the launch of the Elizabeth Line in competition with Heathrow Express. In this changing retail environment, Heathrow will need to respond to new challenges and take advantage of new opportunities. We are committed to continuing to leverage our considerable commercial knowledge and expertise throughout the H7 period to maintain and grow our commercial performance and provide the facilities and services expected by consumers. This chapter sets out our forecast and plan to both mitigate these threats and take advantage of any opportunities in H7.

2. Key drivers of commercial revenue

Commercial revenues include the following areas:

- Retail (duty free, catering, bureaux de change and other specialist shops),
- Property (rental income from property or office space);
- Surface access (car parking, car rental and rail (Heathrow Express); and
- Other services (advertising revenue, fast track security options, VIP charges, etc).

To develop a robust forecast and plan for H7, we have considered the key drivers of commercial activities and how we can manage and influence these. Our understanding of the key drivers is informed by our experience; the findings of the [REDACTED] study; and the econometric analysis carried out by KPMG. Our consumer outcomes also provide insight into what passengers want to see from our commercial offering to increase their satisfaction and drive participation.

¹⁸⁷ [REDACTED]

¹⁸⁸ 2018 banking industry figures showed that debit card payments have overtaken cash as the most popular form of payment in the UK, with the number of cash payments falling by 15%

¹⁸⁹ Since 2015, Heathrow's surface access survey has shown the proportion of trips made by Uber increase. In 2015 10% of journeys made by taxi/minicab were Uber journeys, rising to 35% in Q2 2019

The [REDACTED] report specifically identifies the following key drivers of commercial income¹⁹⁰ based on a review of Heathrow's historic performance and benchmarking of the commercial performance of other airports and retail destinations based on publicly available data:

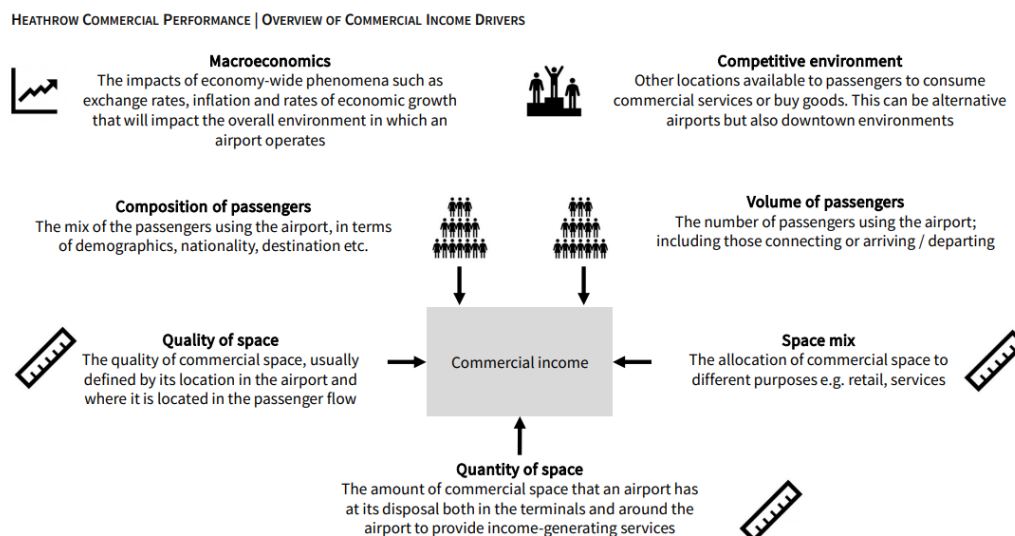


Figure 70: Drivers of commercial income in airports

KPMG's work also points to passenger numbers as a key driver of commercial revenue, in particular for retail revenue and car parking revenues. The work identified the proportion of international passengers as a significant factor. Macro-economic factors, including local wages and GDP per capita were also identified as key drivers.

Historic experience shows that ensuring we meet consumer needs and the implementation of effective management initiatives are also key drivers of commercial revenue.

2.1 Consumer needs

As set out in Chapter 2 – Consumer Engagement, our approach to H7 has put consumer requirements firmly at the heart of our plans. This is no different in our approach to commercial revenues.

We know from our synthesis of consumer insights that consumers:

- Expect to have seating and food and beverage facilities in terminals to meet their basic needs.¹⁹¹ In addition, consumers value an enhanced range of food and beverage options to further improve their airport experience;¹⁹²
- Want access to a range of different seating and lounge options;¹⁹³
- Want access to facilities, such as retail or experiential activities, that give them a sense of place and enhance their experience.¹⁹⁴

We know that if we don't get the right mix of surface access options, shops, places to eat, places to relax and experiences within the airport, it will have a negative impact on our passengers' enjoyment and satisfaction and could cause them not to choose to fly from Heathrow at all. Not meeting consumer requirements will also have a negative impact on our

¹⁹⁰ [REDACTED]

¹⁹¹ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, page 36

¹⁹² Ibid, page 51

¹⁹³ Ibid, page 51

¹⁹⁴ Ibid, page 49

commercial revenues as they choose not to engage with our commercial offering, leading to lower penetration and spend rates.

2.2 Passenger volume and mix

As well as driving airport charges revenue, passenger volume growth is also an important driver of non-aeronautical revenue. The more passengers flying through Heathrow the more consumers participate in our wider products and services.

It is not only the total volume of passengers but also the mix of passengers that impacts our commercial proposition and associated revenues, with different passenger groups having different wants and needs and different average spends. For example:

- Car parking revenues are closely linked to the percentage of UK-based passengers as they are more likely to be travelling to the airport in their own car. Benchmarking from KPMG confirms that the level of car parking revenues achieved by airports is negatively impacted by the proportion of international passengers, with a one percentage point increase in the share of international passengers being associated with a 3.7% reduction in car park revenue.¹⁹⁵
- The ██████ study found that passengers from East Asia and the UK are more likely to spend at Heathrow than those from other destinations.¹⁹⁶ The graphs below show the indexed spend per passenger growth plotted on the y axis for different passenger groups:

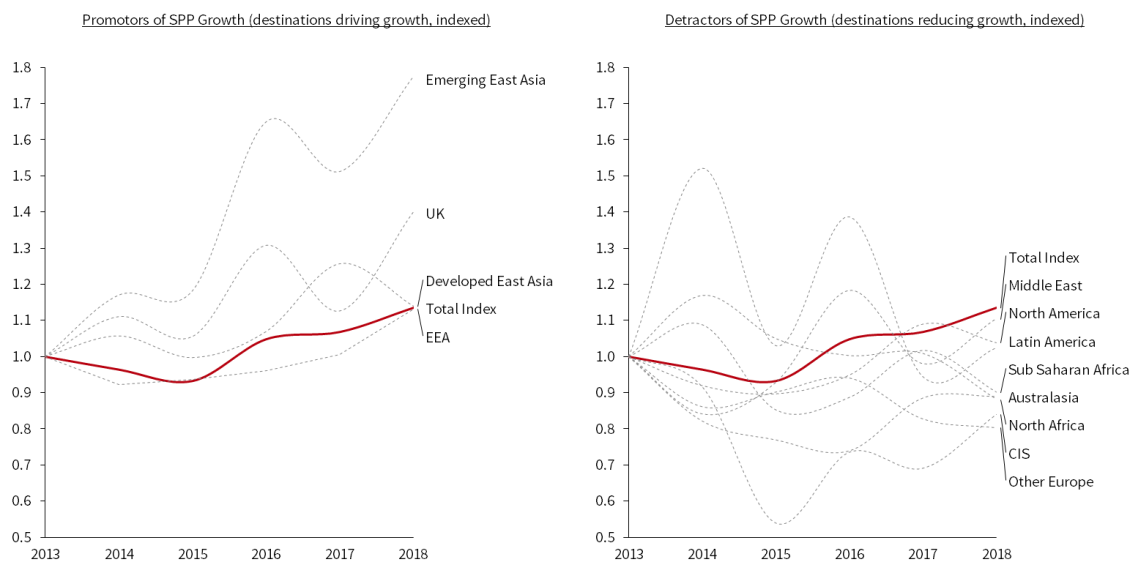


Figure 71: Promotors and detractors of Spend Per Passenger (SPP) growth, indexed

The importance of passenger mix is also evidenced by KPMG's econometric analysis of the key drivers of commercial revenue, showing that airports which serve relatively more international passengers often have the highest retail income.¹⁹⁷ There is also support for this

¹⁹⁵ KPMG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, page 14

¹⁹⁶ ██████

¹⁹⁷ KPMG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, page 12

proposition in academic papers, which conclude that passenger mix has a large influence on commercial revenues at airports: leisure passengers have a higher propensity to spend relative to business passengers, as do international passengers relative to domestic passengers, especially at hub airports.¹⁹⁸

This driver will become increasingly important throughout the period of Heathrow expansion, where we expect the mix of passengers to change, impacting future revenue possibilities.

2.3 Terminal space

Terminal space has a large impact on Heathrow's commercial revenues for a number of reasons. In its work, ██████ highlighted that there are three drivers linked to terminal space that impact commercial revenues. These are:

Quantity of space

The amount of space in a terminal impacts the variety of shops and facilities that can be provided to meet consumer needs and encourage participation in commercial activities

Quality of space

The quality of the space impacts how the space available can be used to drive commercial revenues, space located in the main areas of passenger flow is more likely to generate a better return as retail space

Space mix

What the space is used for impacts the level of commercial revenues achieved, in particular in regard to property revenues, which are closely linked to the quantum of space made available for property use.

██████ found that airports which have experienced growth have done so largely from opening additional space.¹⁹⁹ Heathrow has less space compared to industry standards. There is a risk, therefore that, as passenger numbers continue to rise but total commercial space remains static, it will become increasingly difficult for Heathrow to achieve real growth in spend as the commercial space becomes constrained and trading densities become too high to support increased sales. The chart below from ██████ benchmarking work shows m2 of commercial space per million passengers at airports within the benchmarking set identified by ██████²⁰⁰

¹⁹⁸ Fuerst and Gross, 2017, *The commercial performance of global airports*, Table 1.

¹⁹⁹ ██████

²⁰⁰ Ibid, page 20, figure 24

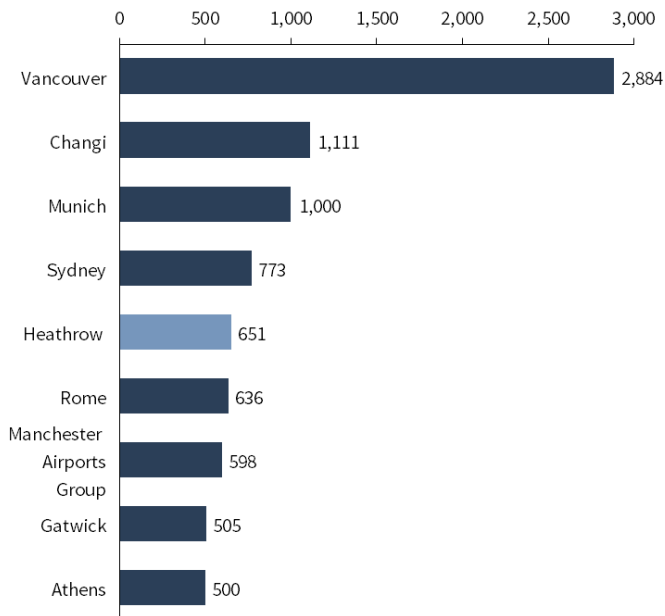


Figure 72: Commercial space per million passengers, latest year available

2.4 Macroeconomic factors

Wider economic developments have an impact on commercial revenue as they influence passengers' and businesses' willingness to spend. The retail price index (RPI) significantly affects all categories of commercial revenue, impacting performance in Q6 by around 12%, and KPMG have highlighted that GDP also has a close relationship with levels of retail revenue.²⁰¹

Both regulatory precedent and academic papers take the view that the wider macroeconomic environment is one of the main drivers of growth in commercial revenues. The Irish Commission for Aviation Regulation for example, noted in Dublin Airport's 2020-2024 draft determination that commercial revenues are expected to grow in line with passenger numbers and Irish GDP.²⁰² Our commercial revenues for H7 are therefore also likely to be influenced by the wider economic outlook.

In the past we have considered income growth (Gross Domestic Product, GDP) and exchange rate movements in our forecasts. However, given the uncertainty in GDP and exchange rates, particularly when forecasting more than 2-3 years ahead, we reviewed our approach for H7 and decided not to include detailed changes in GDP and exchange rates. This can be seen from the outturn of the Q6 period, where outturn was different from the forecast provided due to a number of unforeseeable events such as the Brexit referendum, extreme fluctuations in GDP and exchange rates. As part of their benchmarking review, [REDACTED] carried out a comparison of forecast and outturn exchange rates showing the extent of the difference.²⁰³

²⁰¹ KMPG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, page 12

²⁰² CAR, *Maximum level of airport charges at Dublin Airport*, p.26:
https://www.dublinairport.com/docs/default-source/cip-2020/draft-determination.pdf?sfvrsn=dd60701c_2

²⁰³ [REDACTED]

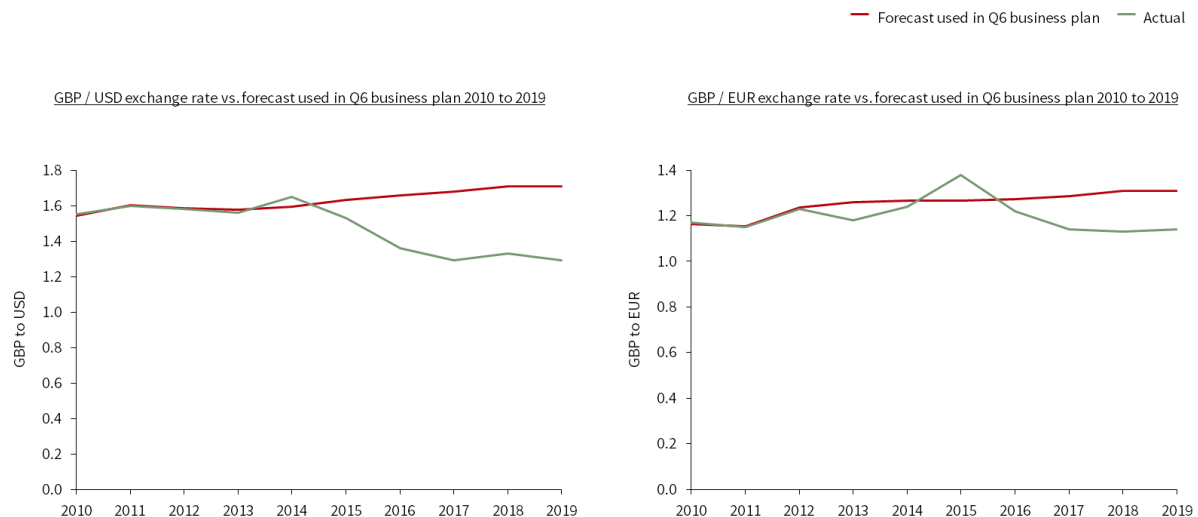


Figure 73: GBP / USD and EUR exchange rate vs. forecast used in Q6 business plan 2010-2019

Our forecasts instead use historical data to establish the key drivers of commercial revenues and the relationship between these drivers and our commercial revenue performance. Therefore, any historical impact of exchange rates on our performance will be included in our forecast. However, if there are large movements in the foreign exchange rate over the coming period, then there will likely be a material, potentially adverse effect on our retail income versus our forecast.

The unforeseen changes in these factors has been a large contributor to our performance in Q6, with commercial revenues increasing from 2017 onwards following the outcome of the Brexit vote and the devaluation of Sterling.

2.5 Management initiatives

In addition to the “external” factors that drive commercial revenue such as passenger numbers and inflation, effective and efficient management is a key driver. We need to ensure we are best placed to be resilient and ready to maximise any opportunities they may present through management initiatives. These can include investment in new facilities and retail units, as well as non-capital projects such as contract negotiations, marketing, opex driven activities like service improvements and other operational changes.

Understanding the views and requirements of consumers and airlines informs our decision-making and management initiatives. To identify the most valuable management initiatives and projects for H7, we have continued to focus on understanding the views and requirements of consumers and airlines. In addition to our programme of consumer engagement, we have held workshops with airlines to understand how we can best work together to grow commercial revenues for our mutual benefit. Our process for identifying the appropriate management initiatives is set out in section 3 of this chapter.

For H7, we have based our forecasts on historical data inclusive of the impact of past management initiatives.

2.6 Key interdependencies

Commercial revenue cannot be analysed in isolation from other parts of our Initial Business Plan (IBP). KPMG's analysis shows a link between the level of operating expenditure at airports and the level of commercial revenue generated.²⁰⁴

Our revenue forecasts are based on the levels of operating and capital expenditure we plan to incur during H7. If assumptions or levels of expenditure change, it will impact our revenue projections and delivery for H7.

3. Our plan considers the needs of our passengers and stakeholders

Our H7 forecast has been developed alongside our commercial plan. The commercial plan provides an overview of how we will approach commercial revenue for H7. Our H7 commercial plan has been developed using both bottom up and top down approaches:

- As part of the H7 planning process we carried out a detailed bottom up assessment, using our consumer insights and commercial knowledge to identify over £1bn worth of potential capital projects and other, service-based improvements which could influence our ability to protect and generate commercial revenues and improve passenger experience. To drive the development of these initiatives, the outputs from our synthesis of consumer insights was communicated to our commercial teams, allowing them to develop service and product initiatives that would meet these identified consumer requirements. Additionally, our Insights and Analysis team have regularly shared the outputs of our specific consumer engagement work packages with our commercial teams where these are particularly relevant to the work of our commercial teams. For example, insights from our bus and coach user survey have been shared with our Surface Access team to inform the steps they can take to improve coach travel and insights from our independent lounge project and Caroline Thompson qualitative work were shared with our Retail team to inform potential initiatives regarding what consumers want from lounge space.
- This was followed by a top down prioritisation process, where the options that were identified were mapped back against our consumer outcomes, created through the process set out in Chapter 2 – Consumer Engagement. This ensures that the initiatives implemented are those that could have the most impact on the delivery of our consumer outcomes and provide the correct commercial and service offering to optimise revenues and create a service proposition to allow and encourage passengers to participate.

Through H7, we are focusing on a number of key areas that make up our overall commercial strategy.

Service Transformation



²⁰⁴ KPMG, *Airport Operating Cost Efficiency Benchmarking*, September 2019, chapter 7

²⁰⁵ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, page 67

²⁰⁶ Alex Walley Research, *AW169 Presentation.ppt final*, 2009

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²⁰⁷ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, page 51

²⁰⁸ Caroline Thompson Associates, *Willingness to Pay: Qualitative Research Findings*, November 2017

²⁰⁹ Join the Dots, *Horizon Update*, July 2018

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[Redacted]

[Redacted]

²¹⁰ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, page 52

²¹¹ Join the dots, *Horizon Retail Report*, July 2018

²¹² Quadrangle, *Independent lounge development: Final presentation*, September 2017

²¹³ [Redacted]

²¹⁴ 'It would be a risk for HAL not to continue investing in e-commerce as they would cease to fulfil customer expectations and they will find other ways (and channels) to shop.', Steer Davies Gleave, *Heathrow Airport – Review of Commercial Revenues*, April 2017
https://publicapps.caa.co.uk/docs/33/1563b_H7_Commercial_Revenues_report_by_SDG.pdf, paragraph 3.53

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²¹⁵ Blue Marble Research, *Synthesis of Consumer Insights – Need Areas*, July 2019, page 24

²¹⁶ [Redacted]

[REDACTED]

[REDACTED]

Surface Access Strategy

Surface access is a vital part of Heathrow’s offering for its consumers and colleagues. To expand Heathrow, we need to manage surface access to ensure it is high quality, efficient and reliable and does not give rise to unacceptable congestion or environmental impacts. We also need to ensure that the catchment provided by our surface access links maximises the number of passengers who can access the airport quickly and easily for our airline customers.

We know from our synthesis of surface access consumer insights that speed, ease, and trust, are key considerations for consumers when considering (i) which airport to fly from and (ii) how to access the airport.²¹⁷ Our strategy therefore must provide surface access options that meet these consumers’ needs.

“8 miles from Heathrow, time by public transport 2+ hours, 36 miles from Gatwick, half the time by public transport.”²¹⁸
“I would get a taxi if I had a lot of luggage, unless it was at such a time of the day where traffic would be really prohibitive. Today was marginal, but some days it can take hours”²¹⁹

In addition to consumer requirements, the Airports National Policy Statement (ANPS) sets out a number of surface access obligations and commitments that Heathrow has made to support sustainable growth. These requirements and more information about our vision for surface access are set out in more detail in Annex 16 – surface access.

We will set out our plans to balance both consumer requirements and the obligations put on us by the ANPS in our Surface Access Strategy (SAS), to be submitted as part of the Development Consent Order (DCO). For our Airport Expansion Consultation in 2019, we produced our Surface Access Proposals document. This document, provided as a supporting document to our plan, explains how we developed our Surface Access Proposals and the consumer insight and planning policies that shaped the proposals, and how we have tested the proposals to ensure that our SAS will be capable of meeting the ANPS targets. It sets out the policies and initiatives that Heathrow will draw upon to meet these targets and commitments and demonstrate that these can be met.

²¹⁷ Ipsos, *Heathrow Surface Access Insights Synthesis*, April 2019

²¹⁸ Join the Dots, *Horizon Report Surface Access*, October 2018

²¹⁹ Ipsos, *Heathrow express Brand Tracker: Customer Journeys*, 2018

4.1 Our forecasts are based on robust methodology

Our H7 forecast is derived from a flow forward of our 2020 plan with elasticities calculated using an evidenced-based methodology. Our forecasting methodology is supported by independent advice, regulatory precedent and engagement with our stakeholders.

This represents a change of approach from the bottom-up approach taken in Q6. Following investigation of the model, which appeared to produce a counter intuitive drop in commercial revenues over the period, it was apparent that this detailed approach would not be appropriate for forecasting revenue for a longer time period, as required in this plan. In contrast, this simpler forecasting methodology allows us to forecast for a longer time period using proven drivers of commercial revenue and avoids introducing complications from the addition of spurious detail.

This section provides a brief outline of the structure of our forecast models and demonstrates why our key assumptions are robust. More detailed information on the specific assumptions and methodology used can be found in the annexes accompanying this chapter.²²²

Management initiatives

We have based forecasts on historical data inclusive of past management initiatives. This therefore includes the previous impact of past management initiatives in our forward-looking forecast for H7.

As we already set a global benchmark for airports in generating commercial revenues, our forecasting assumption that commercial revenue will continue to increase in line with Heathrow's historic performance is an ambitious target. Through H7, we will need to be increasingly innovative in our approach to driving commercial revenues through management initiatives, in order to maintain historic levels of performance.

Retail

In the past, we have used a detailed line-by-line approach to forecast retail revenue. This approach tried to model a large number of specific factors that may influence retail revenue such as the call to gate time, congestion in the terminals and/or changes in specific exchange rates. For H7, we have developed a simpler approach that is based on three key inputs:

- An elasticity of passenger numbers with respect to retail revenues – [REDACTED].
- RPI adjustment – we have adjusted our retail revenue using OBR RPI forecasts.
- One-off adjustments – where it is clear that material items within the retail revenue category are not driven by passenger growth and are expected to change materially over the coming period we have made a one-off adjustment

We consider this approach more appropriate than a bottom-up approach. First, the detailed approach is more complex and therefore less transparent. This makes it harder to assess the reasonableness of our assumptions. Our approach for H7 means that we have been able to test, cross-check and validate our key assumptions using external benchmarking evidence so we can be confident that our forecasts are based on a solid evidence. Second, the detailed approach requires a number of inputs that are forecasts. This means that there is a considerable range of plausible forecasts for the overall revenue figure, leading to a spurious level of detail. Third, evidence from Heathrow's historical data shows that drivers other than passenger volume do not have robust predictive power. A study carried out by Frontier for

²²² Frontier report, KPMG report, Surface Access Proposals

Heathrow examined a wide evidence base on elasticities. Frontier have investigated the historical relationship between retail revenue and other traffic drivers, such as ATMs and floorspace. They found that these alternative drivers did not have robust historical relationships with retail revenue. This suggests that including these variables would not increase the accuracy of the retail revenue forecasts.²²³

Frontier found a robust, stable relationship between retail revenue and passenger volume in Heathrow's historical data. [REDACTED]

For the forecast, we have decided to make a one-off adjustment for revenues related to bureaux de change operations. [REDACTED]

[REDACTED] Our forecast therefore does not add any growth beyond RPI inflation impacts to our projected bureaux revenues for the H7 period.

While the approach taken by Frontier highlights a robust and stable relationship between passenger numbers and commercial revenues, there are a number of considerations around the future trends in retail that mean that the developments of the past won't necessarily hold true for the future. This means that our forecast for H7 is inherently challenging by incorporating the impact of these historical relationships in future forecasting. In regard to retail revenues, work from [REDACTED] and KPMG highlight a number of areas where the relationship between passenger numbers and revenues are likely to change going forward:

- Passenger mix – currently Heathrow's passenger mix allows its luxury offering to thrive. If this were to change due to new routes or new airlines, in particular low cost carriers, bringing in passengers that are not looking to spend in our luxury stores, spend per passenger would decrease, and Heathrow would potentially have to decrease the footprint of its luxury stores making more space available for a range of stores at alternative price points²²⁶
- Terminal space – Heathrow is currently operating close to capacity. As seen by the benchmarking data, as passenger numbers grow for many airports, limitations on space reduce the ability to increase spend per pax as sales densities are limited. Heathrow is space-constrained with limited opportunity to add space and it is likely that this will continue to limit Heathrow's ability to grow commercial revenue across categories²²⁷

²²³ Frontier Economics, *Developing opex and commercial revenue elasticities for H7*, October 2019, page 29, Figure 24

²²⁴ Ibid, pages 48-51

²²⁵ KMPG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, page 12

²²⁶ [REDACTED]

²²⁷ Ibid, page 35, paragraph 7.5

- Departure lounge versus satellite offerings for dwellers – As passenger numbers increase, a higher volume of passengers depart from satellites at Heathrow meaning that less time is spent within the departure lounges, therefore reducing potential revenues.
- The programme of improvements to our retail stores in order to deliver our Next Generation Retail strategy will result in a rolling short-term revenue impact which is expected to stunt retail income growth.
- VAT refunds - Schemes such as Bicester Village or even stores in London are now offering tax-free shopping directly i.e. allowing the claiming back of tax at point of sale, which is a direct threat to passenger spending habits, particularly in the luxury stores.

In addition, there are a number of Political, Environmental, Social and Technological trends identified by ██████████ that will also have an impact on commercial revenues:²²⁸

- Brexit recession / uncertainty – in particular for business passenger traffic if the UK's power as a global business destination declines.
- Exchange rates – the pound reached a ten-year low in August, maintenance at this level, or further weakening could continue to make Heathrow's products relatively cheaper and therefore more attractive to passengers from abroad, leading to higher revenue growth
- Sustainability – changing habits leading to, for example, re-filling water bottles rather than choosing to buy bottled water at the airport.
- Smartphones – the ability to compare prices using smartphones could result in Heathrow retailers having to price-match or beat the prices of high street and online competitors.

Our plans for addressing some of these challenges is set out in section 3.2.

Surface Access

As set out in section 3 of this chapter and in Annex 16 – surface access, we have developed a surface access strategy in order to ensure that consumers can access Heathrow quickly and easily and that we can meet the requirements of the ANPS. Our approach to developing our Surface Access Proposals has followed the CAA's surface access policy, the requirements of the ANPS and the guidance contained in the Aviation Policy Framework published by the Government in 2013. We have also followed the three-stage approach set out in the Department for Transport's (DfT) WebTAG guidance.²²⁹ We have also undertaken large amounts of consumer research to understand consumer requirements and ensure our proposals meet these.

Our expected case of surface access interventions is set out Annex 16 – surface access. Our revenue projections forecast below are based on this scenario, which does not include the delivery of third party rail schemes such as Western and Southern Rail.

We have again used a drivers-based approach to forecast our surface access revenues for the H7 period. In order to do so, we have taken our assumptions on the proportion of passengers using the relevant surface access modes, i.e. car parking, car rental, kiss and fly, taxi and Heathrow Express, for each year, in order to identify the proportion of passengers that would be using our surface access offering. These passenger number outputs are provided by our London Airports Surface Access Model (LASAM), as set out in our AEC

²²⁸ ██████████

²²⁹ WebTAG is the DfT's transport analysis guidance: <https://www.gov.uk/guidance/transport-analysis-guidance-webtag>

documentation.²³⁰ We then take this number and apply it in the following way for each section of revenue:

Vehicle Access Charge

Today, our public transport mode share is 41% with the rest of our non-transfer passenger base choosing either private car or taxi and private hire as their preferred mode for travelling to Heathrow. This propensity to drive can lead to congestion on the roads and has an adverse effect on air quality around Heathrow. Alongside our plans to make public transport easier and more attractive to use for our passengers and colleagues, our surface access modelling has shown that we need to implement a 'push' measure in order to encourage passengers to use more sustainable modes of transport to access the airport. We are therefore proposing to implement a road user charging scheme to both improve air quality and reduce congestion around the airport for passengers and the local community as well as help to ensure that we can meet the mode share targets set out in the ANPS.

In addition to influencing consumer behaviour, the revenue generated from the charge will also help to offset the costs of implementing our surface access strategy, helping to keep the airport charge more affordable, providing a greater choice of public transport modes to better suit consumer needs and meet their key requirements of speed, ease and trust.

Our proposed charging mechanism will be split into two phases:

- Phase 1: The Heathrow Ultra Low Emissions Zone (HULEZ). This mirrors the standards put in place by the London ULEZ and places a charge on the most polluting vehicles. We plan for this to be in place from 2022, following the granting of powers through the DCO, until 2026
- Phase 2: The Heathrow Vehicle Access Charge. This charge would apply to all private vehicles accessing Heathrow to tackle congestion on the surrounding roads. It's assumed that this would apply from 2026.

There will be exemptions to both of these schemes for certain groups of vehicles, including for passengers requiring support. Further information on how this could be implemented is given in our surface access proposals document as part of our AEC documentation and will continue to be developed as we move towards DCO.

To forecast the expected revenues from these charges, we have used the outputs from our suite of transport models, alongside outputs from our consumer engagement work packages in order to forecast an appropriate level of vehicle access charge to change passenger behaviours while minimising any potential impact on passenger demand for the airport. This level of charge directly correlates to implementation of our expected surface access case which does not include investment in the Western Rail scheme, but includes a host of other measures designed to increase take-up of public transport and a move away from private transport. If these assumptions or other external aspects not currently factored into our models change, the level of access charge will need to be revised in order to remain compliant with our ANPS Surface Access requirements.

We will seek the powers to levy the charging scheme through the DCO process. We will propose that these powers allow us to implement the charge flexibly, allowing us to change the level of charge as required in response to consumer behaviour. For example, should the surface access interventions we have put in place allow us to meet our ANPS targets without

²³⁰ Further information on the application of these models can be found in the Preliminary Transport Information Reports (PTIR) from our AEC. These are provided as supporting documentation to the plan

an access charge, we will not implement the charging regime. However, should the interventions not produce the desired shift to public transport and more sustainable travel, we may choose to implement a higher than forecast charge as a mechanism to stimulate the required behaviours.

Regulatory treatment of charging revenues

The proposed HULEZ and vehicle access charge constitute new and unknown income streams for Heathrow in H7 and beyond. The HULEZ will in fact be the world's first airport Ultra Low Emission Zone. It is, therefore, important that the regulatory framework is able to deal with these novel income streams and can provide the flexibility required to ensure that the charging schemes, in particular the vehicle access charge, can be implemented to best effect throughout the coming years in order to truly influence consumer behaviour.

It is also the case that the level of expansion premium applied to Heathrow's WACC does not include an allowance for Heathrow taking risk on the level of vehicle access charge revenue. Meaning that Heathrow is not being compensated for taking this level of risk on the level of vehicle access charge revenue it generates.

Ensuring that the framework provides the required flexibility and the right incentives and level of risk for Heathrow to manage the charge effectively is a complex task in itself. Additionally, Heathrow has received a large amount of feedback on how the charge should be managed and used through engagement with consumers and stakeholders:

- Populus carried out research with consumers on the proposed vehicle access charging regimes, getting consumer reactions to the idea of the charge and what the potential level of the charge meant to them.²³¹ This work highlighted that the concept of a road charging scheme was not of considerable concern to consumers. However, consumer expressed some scepticism about the collection of the charge and wanted to know where the money would be used. They wanted to see funds going to improving public transport access to Heathrow
- Many respondents to our AEC including local authorities and transport bodies requested a commitment from Heathrow to use revenues from the vehicle access charge to fund public transport improvements.
- Airlines have been clear in both their responses to AEC and in airline governance forums, that they would expect to see the revenues from the vehicle access charge forming part of the single till and, therefore, being used to reduce the levels of airport charge.

The CAA has also set guidance on how revenue for road user charging could be used by Heathrow:

Direct charges from one mode of surface access may be used to offset the costs of another, particularly where this would support measures to encourage modal shift from car to public transport which may be required for the efficient operation of the airport and /or to support obtaining planning permission for airport expansion

Taking into account this policy guidance, the competing views of our stakeholders and the requirements to ensure the charge can be implemented effectively, there are a number of alternative treatment options for this revenue. These range from options which impact only the regulatory treatment of the charge revenue itself, to fundamentally different treatment of

²³¹ Populus, *Exploring potential impact of an Access Charge and Emission Charge to Heathrow*, February 2019

surface access costs and revenues within the regulatory framework. There are also a number of sub-options to be explored, for example, the treatment of revenues within the single till does not preclude allocating the revenues from road user charging solely to the costs of providing surface access improvements:

- **Regulatory treatment of revenues within the single till:**
 - Revenues from the access charge can be included within the single till as usual, offsetting the costs of surface access investments but with no specific ring-fence to guarantee this.
- **Pass-through of net access charge revenues within the airport charge:**
 - Revenues from the access charge, minus the costs incurred for administering the charging schemes, are subject to a pass-through mechanism, allowing for an adjustment against forecast within the period. This ensures that Heathrow is unable to earn windfall gains should an increased access charge be required to meet mode share targets and allows the access charge revenues to lower the level of the airport charge. There are a number of options regarding sharing levels and true-up timescales within this mechanism
- **Pass through of surface access costs and revenues within the single till:**
 - Revenues from the vehicle access charge and the costs incurred in implementing our surface access strategy are coupled to provide a net surface access position which is passed through to airport users through the airport charge. This, again, ensures that Heathrow does not make windfall gains from the revenues and also provides a clearer picture of how the revenue are being used to improve Heathrow's public transport offering, responding to the concerns of consumers and AEC respondents. It also allows for any additional revenues, above the level of surface access expenditure, to reduce the level of the airport charge.
- **Dual-till treatment of surface access costs and revenues:**
 - All surface access revenues, including revenue from the vehicle access charge, and surface access costs are removed from the regulated till and placed into a non-aeronautical till. This allows the revenues from all surface access revenues, such as parking and rail, to subsidise the costs of providing the required surface access interventions outside of the airport charge calculation.

More analysis of these options is required as our surface access strategy is developed to ensure that we choose the right mechanism to provide the right incentives and required level of flexibility. We welcome views from stakeholders ahead of the final business plan.

For the purposes of the IBP, we have opted to include the revenue from the access charge in the single till and have proposed an annual pass-through of the access charge revenues, minus the costs of administering the scheme, relative to forecast as part of our regulatory framework. This option was judged to be most appropriate at this stage as it:

- Allows for revenues from the charge to subsidise our investment in surface access initiatives through the single till as set out in the CAA's surface access policy.
- Any revenue from the charge, over and above that used to fund surface access initiatives will be used to reduce the airport charge for the benefit of all passengers. Consequently, should revenues from the vehicle access charge not be included within the single till, this will have a material impact on the level of the overall airport charge, raising the level of the charge.

- Ensures that Heathrow has the flexibility to vary the charge to influence consumer behaviours and prevents Heathrow from being incentivised to hold the charge at a level that is unnecessary to influence behaviours
- Does not expose Heathrow to risk that is not recognised in the proposed cost of capital for the period

Our vehicle access charge revenue assumes the following charges are applied to qualifying private vehicle trips to the airport:

Table 37: Vehicle access charge assumptions for qualifying private vehicle trips (2017p)

2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
£15			£15					£15-£23						
HULEZ			HVAC					HVAC						

We have forecast our current revenue assumptions for the vehicle access charge by taking the assumed average number of passengers per private vehicle trip and the outputs from our London Airports Surface Access Model (LASAM) to derive the number of annual vehicle trips for car parking, kiss and fly and private taxi modes. This has then been multiplied by the number of trips taken that would be impacted by the charge:

- For HULEZ, this is only vehicles which do not comply with the cleanest standards
- For both HULEZ and HVAC, an assumption has been made on the proportion of trips exempted from the charge

The volume of qualifying vehicle trips is then multiplied by the charge amount to produce the forecasts set out in the table in section 4.2. More information on assumptions on vehicle occupancy about this can be found in volume three of Annex 18 – Surface Access PTIR reports.

Travel Services – car parking and car rental

Our travel services category includes revenues from our passenger car parking and car rental products. As for our retail revenue forecast, we began by reviewing benchmarking evidence to understand the key drivers of our revenues for these categories in order to establish whether or not an elasticity-based approach would be appropriate for forecasting revenue for these categories.

In their analysis, Frontier found that, from reviewing historic performance an elasticity of around ■■■ in relation to passengers could be appropriate for forecasting car parking revenues, should the conditions around our car parking provision remain constant.²³² KPMG's econometric benchmarking approach found a relationship between car parking revenues and passenger growth, which could evidence an elasticity of ■ to passenger growth.²³³ KPMG's analysis also revealed a negative relationship between the percentage of international passengers at the airport and car park revenues, with each international passenger percentage point being associated with ■■■■ less car parking revenue.

²³² Frontier Economics, *Developing opex and commercial revenue elasticities for H7*, October 2019, page 29

²³³ KPMG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, pages 13-14

Going forward, we expect there to be a number of factors which will mean that the historic relationships impacting car parking revenues will change. These are:

- Our ANPS targets require us to increase our public transport mode share, thereby reducing the number of passengers arriving at Heathrow in private vehicles, in order to ensure we can grow;
- The current amount of Heathrow-related car parking will not increase significantly with expansion but will over time be reallocated from colleague to passenger parking. While this will allow some growth in parking spaces available for passengers, it will mean a reduction in the number of parking spaces per passenger from today's levels; and
- There is risk that passenger profile changes significantly through growth of non-parking markets (e.g. Asia, USA market).

Given that we do not anticipate being able to increase the provision of parking to meet passenger growth and that our need to meet ANPS targets for passenger mode share will inevitably lead to a lower proportion of passengers driving, we are not forecasting large growth in our car parking revenues. We are therefore proposing to use a high-level elasticity of \blacksquare , aligned to KPMG's econometric projection, to forecast forward our car parking revenues, instead of Frontier's approach based on historic performance trends. To forecast our revenues, we have therefore used:

- Our assumed proportion of passengers using car parking and car rental services, as calculated by LASAM
- An elasticity of \blacksquare applied to growth in passengers using the facilities
- RPI growth

This reflects our challenging ambition to continue to hold our car parking yield per passenger flat while both implementing our surface access strategy to reduce the number of passengers arriving by private vehicles and being unable to grow our car parking provision in line with passenger growth.

Rail revenues

Our rail revenues are made up of both income from Heathrow Express operations and income from track and station access charges. Heathrow Express revenues form the largest component of our rail revenue category.

In the coming period, Heathrow Express will face increasing competition from other rail and public transport services and, in particular, we expect that it will face significant revenue abstraction following the introduction of Crossrail. We expect the commencement of full Crossrail services from start of 2021. [REDACTED]

[REDACTED]. The impacts of much of this abstraction is seen in our 2020 baseline. We are putting in place actions to mitigate this abstraction, set out in section 3.2. HEx's current track access rights expire in 2023, we have agreed that they will be extended to 2028 at this time. Although it is possible that this will be extended further, we have made a specific adjustment from 2029 to exclude revenues associated with Heathrow Express to reflect the length of the current agreement.

The benchmarking work carried out by Frontier Economics did not find any robust relationships to evidence the potential drivers of rail revenues.²³⁴ Their analysis found that rail revenue has

²³⁴ Frontier Economics, *Developing opex and commercial revenue elasticities for H7*, October 2019, page 31

declined as passengers have increased, a relationship that they don't expect to hold in the long term and so would not be suitable for forecasting. We have therefore developed the following forecasting approach for rail revenues:

- Our assumed proportion passengers using Heathrow Express, as calculated by LASAM
- An elasticity of ■ applied to the growth in passengers using Heathrow Express
- Adjustments in 2026 and 2027 to reflect a drop in Heathrow Express fares from the current £25 to £12.10 in order to compete effectively with Crossrail²³⁵
- A cessation of Heathrow Express revenues post-2028 to align with the current agreement
- RPI inflation

A forecast based on continuing to achieve a flat Heathrow Express yield per passenger will be challenging given the increase in competition expected over the coming period. In order to respond to this challenge the strategic focus of Heathrow Express will be to protect its current customer base and identify the market segments it can attract to rail that aren't currently using public transport.

The other element of our rail revenue is our track access income. This income is formed of charges paid by rail operators to run trains on our Piccadilly line and heavy rail infrastructure. Our track and station access revenue assumption reflects our agreed charges set out in our published price list and the contractual amount agreed with TfL for Piccadilly line access.²³⁶ In [REDACTED]. From 2029 onwards, our rail revenue assumptions are based solely on this revenue source.

Property

Property revenue refers to revenue from office space, lounges, non-terminal properties and cargo but does not include revenues from development of commercial property.

Unlike Retail and Surface Access, Property revenues are considered to behave differently from other non-Aeronautical revenue streams which makes it difficult to adopt a single approach for forecasting revenues or benchmarking against different airports. Property revenues can be influenced by a number of factors, such as: the operating model for property development, availability of space (and priorities for that space), growth of passengers, airline mix (lounge development) and local competition (rental rates that could be achieved). This leads to difficulties in adopting a single approach for benchmarking or forecasting property revenues amongst different airports. In their work, Frontier were unable to identify a robust relationship between Heathrow's historic property revenues in order to provide a meaningful forward looking forecast.²³⁷

The key drivers of property revenues were reviewed as part of the external benchmarking work carried out by KPMG. In this piece of work KPMG reviewed the property revenues for a benchmark set of airports from 2012 to 2018 to identify the key drivers of property revenue and the impact that the drivers have on the levels of revenue reported. This exercise also showed that property revenue behaves differently to retail revenues and is less sensitive to observable drivers than revenues from retail activities. KPMG's report sets out that much of

²³⁵ Heathrow, *Preliminary Transport Information Report Volume 5 of 6 Public Transport*, June 2019, page 24, paragraph 3.3.4

²³⁶ <https://www.heathrow.com/company/about-heathrow/company-information/rail-regulation>

²³⁷ Frontier Economics, *Developing opex and commercial revenue elasticities for H7*, October 2019, page 31

Heathrow's property revenue is driven by characteristics specific to Heathrow, rather than observable changes in elements such as passenger numbers or ATMs. However, some link can be observed between passenger numbers and property revenues. KPMG's evidence shows that there is an elasticity of property revenue to passenger numbers of [REDACTED], meaning that for every [REDACTED] rise in passenger numbers, property revenues increase by [REDACTED].²³⁸ We have therefore chosen to use this evidence to create a forward looking forecast for our baseline property activity over the next regulatory period. Our forecasting approach uses:

- An elasticity of passenger numbers with respect to property revenues – for every [REDACTED] increase in passengers, we project that retail revenue will increase by [REDACTED].
- RPI adjustment

In H7 we expect:

- Ground rent from commercial space to continue as baseline
- Lounge revenue to continue

In H7 we will also explore new ways of generating property revenues through commercial property development. [REDACTED]

The regulatory framework chapter also sets the conditions that we consider could be put in place to increase benefits from these development opportunities, should the CAA provide the required regulatory assurance.

Services

Other services include commercial revenue from activities not captured by the other categories such as advertising revenue, Fast Track Income, VIP Charges or aviation fuel. Neither Frontier nor KPMG found a robust relationship to evidence the drivers of these revenues. Given the nature of the revenues and previous experience, we expect these to grow in line with passenger growth. We have therefore used the following assumptions in our forecast:

- An elasticity of passenger numbers with respect to service revenues – for every [REDACTED] increase in passengers, we project that retail revenue will increase by [REDACTED].
- RPI adjustment

4.2 Our forecast for H7

[REDACTED]

This forecast uses the assumptions in our base business plan, based on a P50 passenger forecast. This forecast is set out in Chapter 7 – Passenger Forecasts.

²³⁸ KPMG, *Airport Commercial Revenue Efficiency Benchmarking*, October 2019, pages 13

Table 38: H7 commercial revenue forecast

Commercial revenue forecast £2018p	Q6	iH7		H7						
	2019	2020	2021	2022	2023	2024	2025	2026	2027-2031	2032-2036
Retail Revenue										
Services Revenue										
Property Revenue										
Car Parking/ Car rental										
Rail										
Other Revenue										
Intercompany										
Total	949.2	936.3	928.3	947.1	964.2	965.7	966.6	969.3	4,815.6	5,496.5
HULEZ/HVAC										
Total	949.2	936.3	928.3	976.4	986.1	982.1	978.1	1,206.2	6,023.7	7,037.8

As explained above, achieving this forecast is dependent on our capex and opex assumptions being accepted by the CAA. In order to grow our commercial revenues, our plans require capital investment to implement our plans. [REDACTED]

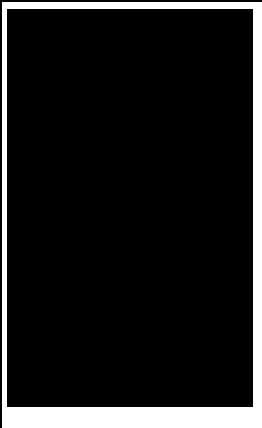

[REDACTED] Similarly, we have assessed the impact of decreasing the levels of opex spend related to commercial revenue throughout the period to assess the impact. Our review shows that a drop in opex would result in a drop in revenues as well as multiple other impacts on customer satisfaction and employee wellbeing.

4.3 Why our key assumptions are robust

The previous sections have shown that we have used a simple, robust and transparent approach for H7. To summarise why our forecast is robust, the table below summarises the key assumptions that have a material impact on our forecast and shows that each of these assumptions have been validated using external assurance, regulatory precedent or global best practice. The table below shows that we have developed a broad evidence base that underpins each of our assumptions.

Table 39: Key forecast assumptions and evidence base

Key assumption	Value	How it impacts on the forecast	Why our approach is robust
Starting point year	2020 Forecast	Revenue in the “base year” has an impact on all the forecasts as it provides the starting point for all forecasts.	██████ (2019) have shown that Heathrow sets a global benchmark for retail revenue, this suggests that the starting point retail revenue is efficient.
Elasticity of passengers with respect to retail revenue	[REDACTED]		
Management challenge	Assumed that the historical impact of management challenges at Heathrow will continue in H7		██████ have shown that Heathrow sets a global benchmark for retail revenue, which suggests that historical management challenges at Heathrow set the most relevant standard for future management challenges at Heathrow.
Elasticity of passengers with respect to property revenue	[REDACTED]		KPMG (2019) have carried out an econometric benchmarking exercise, reviewing the key drivers of commercial revenues at a number of international airports. While they find that the majority of property revenues are impacted by fixed airport effects, they also find a relationship between passenger growth and property revenues. This excludes revenues from commercial property development.
Elasticity of passengers	[REDACTED]		KPMG (2019) have carried out an econometric benchmarking

with respect to surface access (car parking and rental) revenue			exercise, reviewing the key drivers of commercial revenues at a number of international airports. Their review found a potential relationship between car parking revenues and passenger growth, which could evidence an elasticity of to passenger growth. This also reflects Heathrow's management judgement.
Elasticity of passengers with respect to Heathrow Express revenue			Although none of the independent benchmarking exercises found a robust relationship which could be used to forecast Heathrow Express revenues, our forecast assumes an elasticity of ■, reflecting our ambition to maintain Heathrow Express yield per passenger through the period even with passenger abstraction due to Crossrail.
Usage volumes for surface access modes	LASAM P50 mode share volumes	Revenues for surface access modes are forecasted taking the forecast proportion of origin/ destination passengers and then applying this number to the percentage mode share forecast by the LASAM model	Only origin/ destination passengers will use our surface access offer as transfer passengers will not be required to travel to/ from the airport. This means that forecasting using growth in origin/ destination passengers will give us a more accurate picture of the users that could use our surface access modes. Our LASAM model uses the assumptions set out in our AEC to estimate the percentage of O&D passengers that will be using each transport mode.
RPI	Annual inflation series reported by the ONS	OBR forecasts that from 2020 onwards ²³⁹	Nominal forecasts that are adjusted by RPI will be higher than those adjusted by CPI. Therefore RPI adjustment provides a more ambitious commercial revenue target than CPI adjustment. Moreover, this choice of inflation index is aligned

²³⁹ <https://obr.uk/forecasts-in-depth/the-economy-forecast/inflation/#rpi>

			with the large base of UK regulatory precedent that has used RPI.
Passenger numbers	Key interdependency (see passenger forecasting section)		

5.0 The impact of our strategic options on our commercial revenues

Throughout our plan we have presented two strategic options, 'Prioritising Savings' and 'Prioritising Service'. The options assume a different phasing of our masterplan and delivery of passenger growth. Both options will therefore impact our commercial revenue forecasts.

Using our drivers-based methodology, changes in the speed at which our passenger volumes grow will increase or decrease our commercial revenues over H7.

Table 40: 'Prioritising Savings' Commercial revenue forecast

Commercial revenue forecast - £2018p	Q6	iH7			H7					
	2019	2020	2021	2022	2023	2024	2025	2026	2027-2031	2032-2036
Retail Revenue										
Services Revenue										
Property Revenue										
Car Parking/ Car rental										
Rail										
Other Revenue										
Intercompany										
Total	949.2	936.3	930.7	955.1	966.0	968.2	970.2	974.4	5,046.8	5,734.8
HULEZ/HVAC										
Total	949.2	936.3	930.7	984.5	987.9	984.6	981.9	1,212.7	6,322.0	7,378.0

Table 41: 'Prioritising Service' commercial revenue forecast

Commercial revenue forecast - £2018p	Q6	iH7		H7						
	2019	2020	2021	2022	2023	2024	2025	2026	2027-2031	2032-2036
Retail Revenue										
Services Revenue										
Property Revenue										
Car Parking/ Car rental										
Rail										
Other Revenue										
Intercompany										
Commercial property	-	-	-	-	-	-	-	2.3	48.7	108.7
Total	949.2	936.3	923.3	937.4	949.2	955.1	957.5	962.2	4,720.3	5,381.3
HULEZ/HVAC										
Total	949.2	936.3	923.3	966.6	971.0	971.4	969.0	1,196.7	5,987.7	6,877.1

11 - OTHER CHARGES

Overview

- The ORC mechanism has been broadly effective in Q6 in driving efficiencies and better service in areas that are not appropriate to include in the airport charge or for Heathrow to seek to earn a profit upon
- We propose to continue with ORCs in H7 but adjust some elements of the pricing and scope of costs to better align with delivering our outcomes or the ORC principles.
- We propose to increase pricing incentives for sustainable use of electricity and colleague travel, introduce keener commercial incentives in ORC baggage pricing to drive performance and plan ORC pricing with airlines over a longer time horizon.
- Based on an assessment against consumer priorities and the ORC principles we propose to move PRM services and taxi and coach charges into the airport charge. We propose to remove check-in and PCA charging from ORCs and also move business rates and baggage annuities into a fully transparent ORC mechanism

1. Introduction

Other Regulated Charges (ORCs) are a mechanism to cover the costs of services provided by Heathrow that are not appropriate to include in the airport charge. The mechanism is designed to be a robust and transparent process. Heathrow does not earn any profit on ORCs other than where specific gainshare mechanisms are pre-defined. Through the ORC mechanism, the airport and its users can work together to drive efficiencies, incentivise the efficient use of scarce capacity and increase service levels for key elements of the passenger journey. The ORC mechanism is also important for the delivery of community and sustainability objectives.

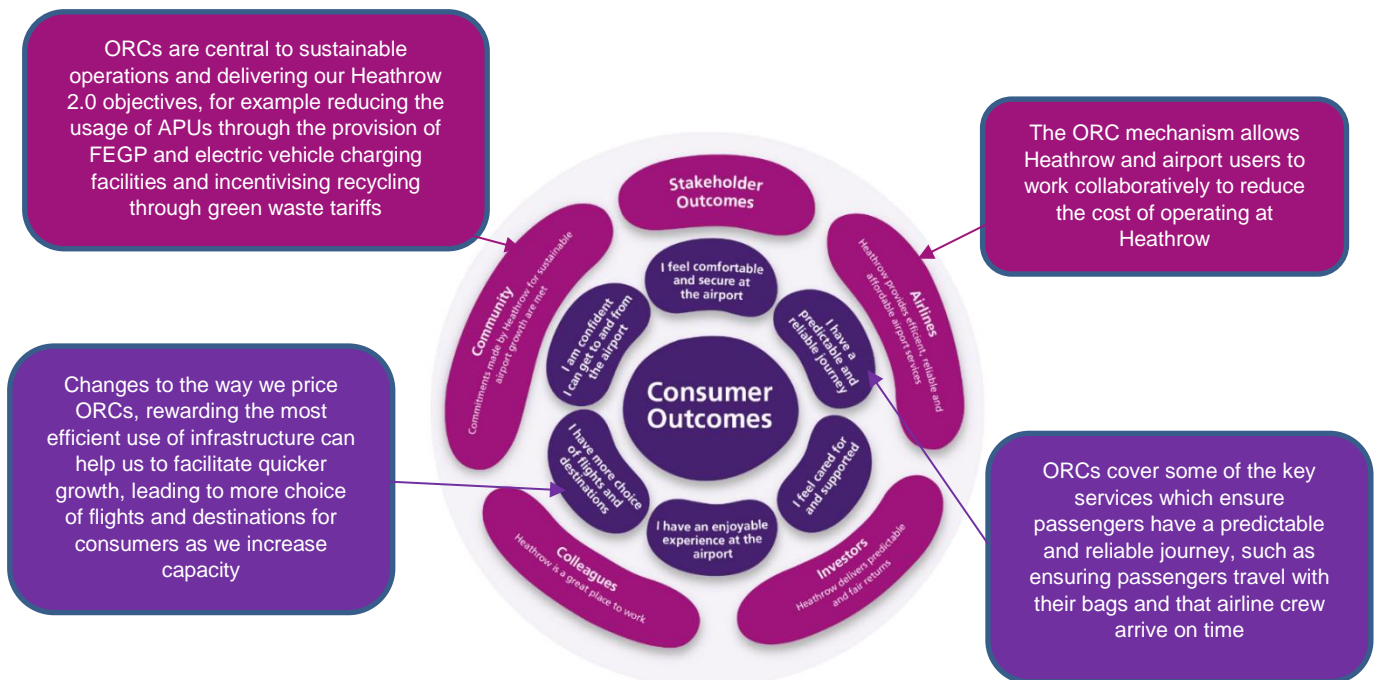


Figure 75: The ORC mechanism and consumer outcomes

Principles to define the cost items included in the ORC mechanism were decided with airlines and agreed by the CAA during the Q6 process. These principles are:

- Heathrow is the sole provider of the service;
- The service is necessary for airport users to fulfil their passenger proposition;
- The usage of the service varies between airport users, so a unit rate based on the user pays principle is appropriate;
- The driver of service usage is not purely related to passenger numbers;
- The usage volume can be measured; and
- Areas where Heathrow and the airlines can work together to drive efficiencies

We agreed with airlines that for Q6 charges for these areas would be levied on a purely cost recovery basis to incentivise collaboration in order to achieve efficiencies and to ensure that Heathrow did not benefit, or suffer, from out/under performance in these areas. We also agreed that ORC costs would be made up of two parts, the cost of providing the service and the related annuity for the required infrastructure. More information on agreement for the management of ORCs in Q6 can be found in Annex 20 – ORC consultation protocol.

Throughout Q6, in collaboration with the airport community (airlines, handlers and other parties operating at the airport), Heathrow has driven a number of improvements in areas recovered through the ORC mechanism:

- Driven over £25m of annualised savings in the Baggage and Electricity charges
- Supported Team Heathrow Baggage to reduce the misconnect rate from 18/1000 in 2014 to only 9.9/1000 in 2019.
- Implemented higher service levels for our passengers with reduced mobility (PRM)
- Led the implementation of self-bag drop and self-boarding gates
- Enhanced security ID procedures to protect against increasing threat

However, we have also seen areas where the implementation of ORCs has not led to the right outcomes, for example:

- Recovering the full cost of electricity, made-up of the unit price and infrastructure annuity, through ORCs can serve to disincentivise the use of sustainable alternatives, such as pre-conditioned air (PCA)
- The current structure does not include incentive mechanisms to recognise where the provision of the service is important to consumers, for example in the case of baggage

There have also been cases throughout Q6 which have demonstrated that changes in uncontrollable external policy costs can lead to windfall gains or losses for Heathrow when included within the cost base of the airport charge. It is therefore appropriate to consider whether these areas, such as business rates, can be better dealt with using the transparency and cost recovery principles of ORCs.

2. ORCs in H7

We continue to see ORCs as having an important role in the delivery of efficient services for consumers and airport users. We also understand from the airport community that they value the collaborative nature of the ORC mechanism. We therefore propose to retain the ORC mechanism and continue to provide transparency and opportunities for collaboration on costs.

We also propose retaining the existing principles for ORC classification in H7 but we are proposing adjustments to some of the principles, such as removing the strict cost recovery principle for some cost items and including a more explicit principle that Heathrow seeks to

include cost items where Heathrow may be able to earn windfall gains through impacts outside of our control. We also see that there could be benefit from adopting a longer term, multi-year planning approach to ORCs in order to help airlines plan and manage their costs more effectively over the long term.

We also see an opportunity to review which specific categories are included in ORCs to better align to the agreed principles and our wider consumer and stakeholder outcomes. This also allows us to respond to new areas of consumer and stakeholder need, such as properly reflecting the requirements of passengers requiring support or surface access requirements.

2.1 New challenges

Efficient use of capacity to ensure predictable and reliable journeys

Airport capacity will be under pressure as we grow. At points through the development of Heathrow expansion, in particular in the earlier period, passenger numbers are likely to increase without the corresponding increased provision of infrastructure. This will result in the need for increased efficiency in the use of our capacity to ensure that operating at Heathrow remains affordable, efficient and predictable for airport users and consumers.

Our outcomes, as set out at the start of the chapter, show that a key area of consumer need is a predictable and reliable airport experience. This need came out strongly from our synthesis of consumer insights²⁴⁰ and improvements to ensure a predictable and reliable airport experience have constantly been valued highly by consumers in our research. For example, our willingness to pay and choices research both show that ensuring passengers, in particular connecting passengers, can travel with their bags through the provision of a reliable baggage system is valuable to them.²⁴¹

It is therefore more important than ever that the ORC mechanism incentivises efficient use of these systems and services.

Supporting sustainable growth and new policy obligations

We must ensure that the airport operates sustainably and this includes improving the take-up of sustainable operating alternatives. As set out in our sustainability chapter, the sustainability agenda has evolved rapidly since the start of Q6 with policy developments, regulation and public opinion shifting markedly over recent years. The pace of change continues to accelerate. Our consumer research has also shown that consumers are concerned about sustainability and ensuring that their choice of airport reflects their values when it comes to sustainable behaviour.²⁴²

There is also an increased priority to deliver sustainable growth through policy requirements set out in the Airports National Policy Statement (ANPS), in particular in regard to surface access. The ANPS sets out surface access targets and requirements that Heathrow needs to meet in order to secure growth. These include, achieving a passenger public transport mode share of at least 50% by 2030, and at least 55% by 2040 and achieving a 25% reduction in colleague car trips by 2030 and a reduction of 50% by 2040 from a 2013 baseline level. More information on our surface access requirements is set out in Annex 16 – Surface Access.

²⁴⁰ Blue Marble Research, *Heathrow Synthesis of evidence to support outcomes: Stages 1 & 2*, 2019, pages 21-34

²⁴¹ Systra, *Heathrow Airport Customer Valuation Research*, November 2018, page 52, table 17

²⁴² Blue Marble Research, *Heathrow Synthesis of evidence to support outcomes: Stages 1 & 2*, 2019, pages 14-15

To support sustainable growth, it is important that the ORC mechanism is adapted to incentivise sustainable behaviours, for example by changing the cost recovery principle and implementing pricing structures to incentivise more sustainable behaviours by airlines and airport users.

Improving service

Our consumer engagement has highlighted the importance of services such as check-in and assistance for passengers requiring support as key elements of the passenger journey. Passengers expect a predictable and reliable experience throughout their airport journey as well as feeling cared for and treated like an individual.²⁴³

“Obviously I want accuracy - my baggage arriving in the same place that I do - but subject to that, the thing that would most delight me is cutting all your check-in times by half an hour. That might well involve innovation, particularly in baggage handling and security, but I am happy for that innovation to be unseen by me.”²⁴⁴

It is necessary to ensure that these consumer needs are being met and, in some cases, this sensibly involves Heathrow taking a leading role and having clear incentives on it to ensure that these services are provided to the standard required by consumers. It is therefore appropriate to review whether the ORC mechanism is the best way to achieve the required outcomes for some of these services.

Proposals for ORC changes

We are proposing some evolutionary changes to both the principles of the ORC mechanism and the cost items covered to meet the above challenges. The proposals in this chapter are intended to be the beginning of a process of consultation and discussion with the airport community. We will engage with airlines on these proposals through the constructive engagement process to understand their views on what changes need to be made and how we can best implement these while maintaining transparency and collaborative working and ensuring that we can meet our outcomes to consumers and the community. We will also continue to listen to what consumers are telling us about the services they value and how we can best ensure these are delivered efficiently and at the right level of service.

2.2 Pricing

We see three evolutions in ORC pricing which would be allow us to better deliver our outcomes:

1. Charging differently for services and infrastructure which create a more sustainable operation
2. More sharply incentivising efficient use of infrastructure, in particular baggage
3. Increased long term planning and visibility on pricing

Incentivising sustainable behaviours

The way we price services delivered by ORCs plays a key part in influencing the behaviour of users. Throughout Q6, we have seen that the current, primarily cost-based, mechanism has not always been effective in encouraging the most sustainable behaviours. The Other Regulated Charges Group (ORCG) has been engaged during Q6 in supporting PCA, Fixed Electrical Ground Power (FEGP) and Electric Vehicle Charging Points; all green alternatives to aircraft or vehicle fuel usage. However, a pure cost pass through of these charges can

243 Ibid

244 Join the Dots, Innovation at Heathrow report v1.0, 2019

sometimes result in prices which disincentivise the use of these environmentally friendly services. For example, the current cost recovery pricing principle does not allow us to charge below the cost of providing the service where we may want to drive greater usage of the service, such as FEGP or electric vehicle charging. It has also not allowed us to invest in the infrastructure for sustainable operations at the required scale to build the volume of use needed to recover our costs on a commercially attractive basis.

Another similar aspect of encouraging sustainable behaviours is incentivising the use of sustainable transport for colleagues. It is essential to Heathrow's growth that colleague travel becomes more sustainable with fewer single occupancy car trips. We therefore need to ensure that the way we structure ORCs in relation to colleague car parking is aligned with this objective and encourages those who would usually drive in a single occupancy vehicle but have the option of travelling to work using sustainable modes to use these alternatives.

We are therefore proposing to move away from the cost recovery principle for H7 in some cases. We would instead implement a pricing structure that better reflects the behaviours we are trying to encourage. Specifically, we propose to:

- Reduce the impact of infrastructure costs on FEGP and electric vehicle charging infrastructure. The first way we could do this, and the way we have shown in this plan, is moving annuities from the pricing calculation for such activities into airport charges and charge only for the electricity consumed for these activities through a commercial pricing model. This is consistent with these services becoming the standard for operating at Heathrow, rather than being charged solely based on use by airport users
- Incentivise the use of sustainable transport modes by colleagues by creating a colleague transport fund, funded through increasing the price of colleague car parking passes in line with market prices for annual parking passes.

Incentivising efficient use of infrastructure

In addition to encouraging sustainable behaviour, we also need to ensure that our pricing structure incentivises efficient use of the infrastructure and services available. As passenger numbers grow and infrastructure becomes more constrained through H7 ahead of new terminal capacity, we need to become increasingly efficient in our use of existing infrastructure. This is vital to ensure a predictable and reliable journey as well as to reduce costs.

We believe that there is an opportunity to develop and agree alternative models with the airline community to either better incentivise improvements in service to passengers or provide alternative levels of service, better aligned to the business models of different airlines. This will allow us to better meet the needs of passengers and the airline community, while continuing to drive efficiencies in the services we provide.

Baggage is the prime example of where changes to pricing structure could improve efficiency and employing increasingly commercial pricing models could improve passenger service. For example, we could implement a performance incentive in the baggage pricing, resulting in Heathrow returning funds to the airline community if the agreed service level agreement (SLA) target is missed and allowing Heathrow to earn an incentive if the agreed SLA target is exceeded. We know from our consumer research that consumers value improvements in service to ensure that their baggage travels with them²⁴⁵ and, therefore, putting a performance incentive on this will help to reinforce the importance of providing this service. When Heathrow delivers outperformance of the SLA, consumers and airlines benefit from fewer bags missing their flight, and therefore lower repatriation costs.

²⁴⁵ Systra, *Heathrow Airport Customer Valuation Research*, November 2018, page 52, table 17

We also see that a longer-term planning horizon could be beneficial for airlines and consumers by providing greater certainty of the prices for using infrastructure and services. Moving away from an annual charges review could allow us to give clarity to airlines on infrastructure costs, allow for a smoother profile of ORCs and also drive long-term incentives for efficient use of infrastructure.

2.3 Scope of ORCs

We propose to retain the core principles used to define ORCs in Q6 through the agreed decision tree. More information on the ORC decision tree can be found in Annex 19 – ORCs in Q6 and Annex 20 – ORC consultation protocol. In addition we propose to make explicit the focus on external policy impacts, which may be outside of our control and thus cover areas where Heathrow should not be incentivised to earn a return over cost. This is important to make clearer the increased prominence of planning and policy constraints in the wider context of expansion. The principles are:

- Heathrow is the sole provider of the service
- The service is necessary for airport users to fulfil their passenger proposition
- The usage of the service varies between airport users, so a unit rate based on the user pays principle is appropriate.
- The driver of service usage is not purely related to passenger numbers
- The usage volume can be measured
- Areas where Heathrow and the airlines can work together to drive efficiencies
- External policy impacts over which Heathrow has limited control and therefore should not be able to earn windfall gains

We propose to make the following changes to the services covered under the scope of the ORC mechanism for H7:

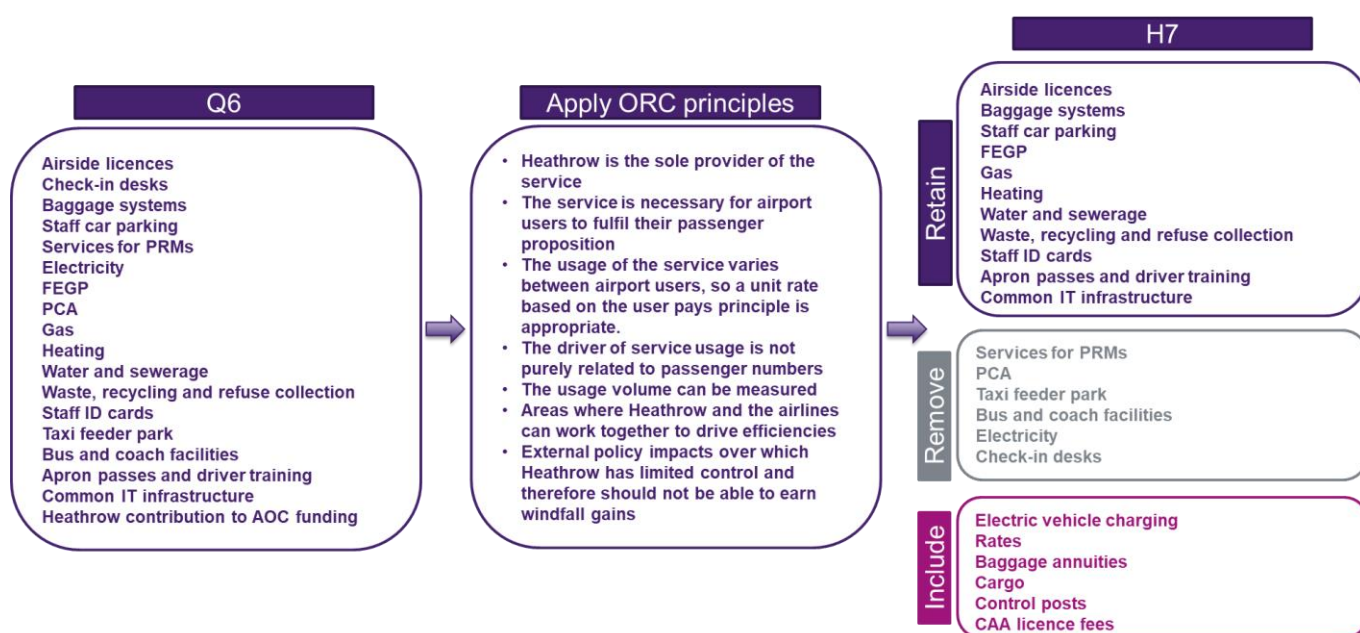


Figure 76: Proposed changes to ORC services for H7

Our review showed that the majority of the current ORC items were in line with the existing principles of recovery through the ORC mechanism. Some services move from ORCs to the airport charge (“remove”), others from the airport charge to ORCs (“include”). Where we have proposed to remove or include new items we have set out the reasons for our view below.

Remove

PRM services

We are proposing to move the costs for the provision of PRM services from ORCs into airport charges. Ensuring we provide the right level of service for all passengers requiring support is critical to our consumer outcome to ensure that passengers feel cared for and supported.²⁴⁶

“I expect the staff to be genuinely friendly, knowledgeable, and human. I want to feel like an individual not just another customer. Just a simple genuine smile and interaction can do that.”²⁴⁷

It is therefore important that this key aspect of service is fully embedded with the other actions we are taking to improve our service provision.

When reviewing this item against the principles of ORCs, it became clear that services for passengers requiring support are largely driven by passenger numbers and the current charging mechanism charges for the service per passenger. This allows the cost of the service to be transitioned more easily to airport charges. Including the costs of providing this service within our airport charge retains the incentive on Heathrow to deliver the services efficiently and effectively. It also ensures that the risk of over or underperformance against our forecast sits with Heathrow and indeed we believe we are best placed to manage the contract. We also believe it is right for Heathrow to take greater control of this vital service in line with CAA reporting responsibilities, which hold Heathrow accountable for the levels of service provided. In moving the costs of the contract into airport charges, we will continue to engage closely with airlines and the CAA regarding the levels of service provided and maintain the required levels of transparency regarding the level of charge, as set out under EC 1107/2006.

Electricity

As set out above, the pricing mechanism for electricity is becoming increasingly important for incentivising sustainable behaviours, in particular in incentivising the use of services such as FEGP and electric vehicle charging. In order to allow this, we are proposing to recover the infrastructure costs of electricity, i.e. the annuities, through the airport charge. This would then allow the unit price of services such as FEGP and electric vehicle charge to reflect only the unit cost of the electricity used, making the services more attractive to users and facilitating more sustainable behaviours.

It is also the case that users at the airport are free to contract with any provider for the provision of electricity at Heathrow. This means that, rather than recovering the electricity unit cost through ORCs, we instead propose to recover these costs through a commercial pricing model.

Pre-conditioned air (PCA)

During Q6 airline usage of Heathrow-provided PCA declined for the reasons set out above, with the inclusion of the costs of infrastructure driving up the price of the service. Using PCA

²⁴⁶ Blue Marble Research, *Heathrow Synthesis of evidence to support outcomes: Stages 1 & 2*, 2019, pages 64-81

²⁴⁷ Join the Dots, *Horizon Autumn 2018 Summary incl Topic Summaries*

rather than an aircraft's auxiliary power unit reduces emissions to positively impact local air quality. Heathrow is already working together with airlines to explore an alternative commercial service model with a third-party provider(s). Should this commercial service model be implemented, PCA would no longer meet the principles of the ORC framework and would transition to a commercial model outside of both ORCs and the airport charge.

Should the commercial model not be implemented in advance of the period, we propose that PCA be treated in the same way as other electricity charges, with the annuities instead being recovered through the airport charge.

Check-in

The ORC for check-in also covers the provision of automated services, such as self-bag drop and self-boarding gates. Increasing the use of these services is important to deliver on our outcome to provide a predictable and reliable journey for passengers. We also know that some groups of passengers, in particular those who do not speak English, favour the use of increased automation in their airport journey.²⁴⁸ In order to best incentivise the efficient use of this infrastructure, changes to the structure of the charge are required. There are two possibilities for implementing this change:

- Moving all of these elements into airport charges. This service is used only by airlines and, in its totality, is influenced by the number of passengers using the airport. This will allow Heathrow to better manage our provision of check-in facilities and automation facilities going forward in order to meet consumer requirements and the desire for increased automation; Or
- Introducing separate charges for each type of infrastructure, levied according to a behavioural pricing mechanism to incentivise efficient use of the check-in and automated infrastructure.

Through Constructive Engagement we want to understand from airlines whether either of these approaches or any alternative mechanisms would best complement their operating models and so be most effective to incentivise efficiencies. In this plan, we have removed the costs of these facilities from ORCs and added them to the airport charge.

Taxi feeder park and bus and coach facilities

Given the increased importance of Heathrow's surface access provision in ensuring Heathrow is able to grow, we propose that passenger related surface access costs and revenues be moved from ORCs to a commercial pricing model. This provides Heathrow with an increased ability to manage the costs and revenues of these services within its proposed toolbox of surface access measures. This improves our ability to deliver on our consumer outcome "I am confident I can get to and from the airport" and our local community outcome of meeting our commitments to sustainable airport growth.

This change is also supported by the fact that the costs of these services are largely driven by passenger numbers and Heathrow is better placed to manage and secure efficiencies for direct users because the scope for collaboration between Heathrow and airlines (who are not direct users) to drive efficiencies is necessarily limited.

Include

²⁴⁸ Blue Marble Research, *Heathrow Synthesis of evidence to support outcomes: Stages 1 & 2*, 2019, page 31

Sustainable colleague travel contributions

In order to meet the requirements on colleague travel set out in the ANPS, Heathrow is proposing to include the costs for the provision of sustainable colleague travel initiatives within the scope of the ORC mechanism alongside the costs of colleague parking. This will allow us to manage colleague travel as a package through robust governance arrangements with airport users. It will also ensure that any revenue recovered over and above the cost of providing colleague parking, as a consequence of moving towards a more behavioural pricing model, is used solely to fund improvements in colleague travel.

Rates

Business rates are an external factor driven mainly by external rates reassessments which cannot be fully managed by Heathrow. In Q6, this was addressed through a pass-through in the airport charge formula to reflect the impact of the rates revaluation with an 80/20 sharing mechanism. This was a step in the right direction. Heathrow has handed back money to airlines (and indirectly, therefore, to consumers) to reflect the decrease in Heathrow's rates bill through the period. This would not have happened without a pass-through mechanism. For H7, we are proposing that rate costs can be managed most transparently and consistently through the ORC mechanism. This will allow Heathrow to pass on the costs of rates through a transparent process and minimise the risk of forecasting errors which could lead to Heathrow making windfall gains from changes to the rates valuation throughout the regulatory period. The ORC mechanism will also allow increased opportunities for Heathrow and the airlines to work together to look for opportunities to reduce the rates bill.

CAA licence fees

CAA licence fees are levied for the operation of the airport. As with rates, Heathrow has little control over the costs of these fees. Moving the costs to ORCs therefore prevents Heathrow from earning windfall gains on any changes to CAA fees against our business plan forecast.

Baggage annuities

Annuities for baggage operations are currently included within the calculation of the airport charge, rather than alongside the other baggage costs in the ORC mechanism. We do not believe that this incentivises the right behaviours in terms of ensuring efficient use of infrastructure. We are therefore proposing that these move into the calculations for the baggage costs passed on through ORCs in order to manage the costs of the baggage system in one place. This will allow us to charge a price per bag that is fully reflective of the use of the infrastructure, reflecting the user pays principle, and ensure that we can better incentivise efficient use of the system and work to drive efficiencies while providing consumers with a predictable and reliable journey.

Future cargo costs

Through Heathrow expansion, we will be developing our cargo infrastructure and related security provision at control posts. In order to ensure that we can charge on an appropriate user-pays basis, we would like to explore how the ORC mechanism could best be used to transparently allocate these costs as the service provision develops. Through constructive engagement, we will engage with airlines on how these costs could be successfully managed within the ORC framework in order to drive more efficient use of the infrastructure. For avoidance of doubt, we have not included any control post or cargo costs in our ORC forecasts in the plan given the forward-looking nature of these developments.

3. ORC revenues in H7

Our ORC forecasts for the H7 period use the same driver-based methodology as set out in our Opex chapter to forecast costs for providing the services. This is then apportioned between opex and ORCs based on the proportion of costs that are passed through as ORCs. This forecast is based on 25% of Opex in H7 being treated as ORCs.

This 25% figure has been calculated by looking at ORC revenues in 2019 and 2020 and then making an adjustment based on the potential impact of the proposed scope changes using 2018 actuals for line items such as PRM service, check-in and baggage. This shows the new scope of ORCs would represent around 25% of our opex going forward.

In addition to the 25%, we have also included the cost of rates within the ORC mechanism. This change has been applied by looking at the current proportion of rates that are not recovered through property rent and rate charges or existing ORCs. This is around 83%. The rates currently recovered through property charges or existing ORCs, such as baggage, will continue to be recovered in that way.

Table 42: ORC revenues forecast for H7

ORC forecast - £2018p	Q6	iH7		H7						
	2019	2020	2021	2022	2023	2024	2025	2026	2027-2031	2032-2036
ORC revenue										

12 - WACC

Overview

- The cost of capital is set by international markets
- It is important to set an efficient WACC that creates the right incentives for investment
- We set out estimates of the cost of equity and cost of debt of Heathrow based on extensive market evidence
- We present robust evidence on the uplift to WACC that is required to remunerate the additional risk from expansion
- We set out the overall efficient WACC required to deliver the plan which is forecast to fall in headline terms over 2022 to 2036.

1. Introduction

In this chapter we set out Heathrow's approach to WACC in H7. We provide our thinking on the appropriate WACC required for H7 considering current market evidence on the cost of finance. We provide our views on the cost of equity, cost of debt and expansion risk premium. Finally, we set out our overall conclusions for the WACC required in two runway and three runway scenarios.

1.1. Context

To deliver our H7 Initial Business Plan (IBP), Heathrow as a private business needs to obtain debt and equity finance from the international capital markets. Participants in these markets will only provide finance to Heathrow if the price they receive (their return) adequately compensates them for the risks that they perceive in their investment. The price of finance for a particular level of risk depends upon the interplay of different factors within global markets and can vary over time. Investors will not provide finance for a return below the market rate available to them for an equivalent level of perceived risk. This means that the price Heathrow will have to pay for its finance is set by global capital markets, just like the price it must pay for power costs is set by energy markets. Given this, it is critical that the cost of finance assumed in the plan, the weighted average cost of capital (WACC), is set at a level commensurate with the requirements of capital markets. If not, Heathrow will not be able to access the finance it requires.

In practice, setting the WACC in line with capital market requirements is not a precise process and requires careful calibration. In making this calibration in a regulated setting there needs to be a balance between setting the WACC too low and too high. If the WACC is set too low, for example to target specific charges, then although customers may benefit from the lower charges in the short term, investment levels will fall as the cost of financing them cannot be met. This will result over time in deteriorating service and increased risk, and the consequent loss of value to consumers from this may outweigh the benefits of the short term lower charge. Alternatively, if the WACC is set too high, customers will have higher bills in the short term but may also benefit from additional investment delivering better services and lower risk. The appropriate balance within a plausible range should reflect the specific likely impact of over/under investment for consumers at the time.

In the context of H7 and Heathrow expansion, this balance is stark. Currently, congestion at Heathrow means that airlines operating here extract a significant fare premium compared to other London or European hub airports. The magnitude of this premium has been estimated by Frontier Economics²⁴⁹ to be between £2.0bn and £2.6bn per annum currently, equivalent to around £34 and £217 on short-haul and long-haul return flights respectively. A key consequence of this premium is that whilst the airport remains congested, increases in airport charges will not be passed onto the ticket price paid by consumers, and consumers will not benefit from reductions in airport charges.

In contrast, investment in expansion will deliver huge benefits to consumers and the wider economy. These benefits are estimated to have a net present value (NPV) of £187bn²⁵⁰. For Heathrow the risk of setting WACC too low is that the benefits of expansion are not delivered at all. Without access to sufficient finance there will be no new capacity. Therefore, the downside impact of setting WACC too low vastly outweighs the potential harm from setting WACC too high. Consequently, the balance in setting the WACC for H7 should be firmly such as to encourage Heathrow expansion.

This need for balance in choosing the point in the range for WACC has been reflected in many previous regulatory decisions, including those by the Consumers and Markets Authority (CMA). For example, this was discussed in its 2007 assessment of the WACC for BAA²⁵¹, and in its 2014 NIE determination, the CMA stated that it wished to avoid the cost of capital being too low and selected a point estimate towards the top of the range²⁵². These decisions describe situations where the risks to consumers of low investment arising from too low a WACC are disproportionate to the risks to them from too high a WACC. This has led to regulators choosing a balance towards the top of the plausible range. The UK Regulators Network (UKRN) has also recommended that when significant investment is required, the WACC should be set at the 90-%ile of the potential range²⁵³.

The importance of getting this balance right, in particular for airports, has likewise been recognised in other countries. For example, the Australian Productivity Commission specifically points to the risks of over-regulation and of regulators systematically looking to exert a downward pressure on airport charges. It notes its *“chilling effect on investment, leading to a long-term risk of increased congestion and falling quality of service”* and the prospect of *“incumbent airlines being able to use the system to stymie investment that would facilitate increased (airline) competition, potentially leading to higher air fares”*.²⁵⁴

Chapter 13 -Financing sets out the challenge faced by Heathrow in financing expansion and the need for additional equity. Expansion represents a significant commitment from shareholders who are making a new investment decision to inject equity to support the company’s cash requirements during the peak expansion years. The profile of cashflows is such that returns to shareholders are pushed well into the future. Shareholders consider that this results in a far riskier proposition than Heathrow during Q6, and do not consider that the risk mitigation measures set out in Chapter 14 - Regulatory Framework fundamentally reduce this additional risk.

²⁴⁹ Frontier Economics, Competition and Choice, Estimating the Congestion Premium at Heathrow, May 2019

²⁵⁰ Frontier Economics, Competition and Choice, A report prepared for Heathrow, Dec 2017

²⁵¹ Competition Commission, A report on the economic regulation of the London airports companies (Heathrow Airport Ltd and Gatwick Airport Ltd), 2007

²⁵² CMA, Northern Ireland Electricity Limited price determination, final determination, March 2014, p. 13-39

²⁵³ UK Regulators Network (2018), Estimating the cost of capital for implementation of price controls by UK Regulators, March 2018, Section 8.2

²⁵⁴ Australian Government Productivity Commission, Economic Regulation of Airports Inquiry Report, October 2019

Therefore, the WACC needs to be sufficiently large to attract significant new investment from equity investors. We have based our view of the required return on carefully tested and cross-checked market evidence. We have also reflected the long established regulatory and economic principles in setting the balance described above.

1.2. Approach to WACC at H7

In considering the appropriate level of WACC for H7, we have considered carefully the impact of expansion on the cost of finance for Heathrow and the appropriate way to include this in our IBP. Our approach is to:

- Set out our view of the WACC excluding the specific risks and other impacts of expansion (referred to as the 2R WACC);
- Set out our view of the changes to financing and the WACC that would be required once the decision to proceed with expansion is confirmed by Heathrow. These changes include changes to the cost of debt arising from expansion in addition to a specific expansion risk premium. This overall expansion WACC is referred to as the 3R WACC.

As set out in Chapter 14 - Regulatory framework, our proposed approach for implementation in H7 is that provided Heathrow was progressing Category C expenditure and the DCO application the 3R WACC would be applied from the start of the period. The 3R WACC and 15-year price control would be confirmed once the Heathrow Board has made a commercial decision to proceed with expansion and notified the CAA. If expansion does not go ahead, the 2R WACC would apply.

For the purposes of our IBP we have assumed the decision to invest is made, and therefore the 3R WACC is applied through the whole of the period.

It is important to note that the calculation of the expansion risk premium is sensitive to the regulatory framework. The premium set out below is based on the regulatory framework proposals set out in Chapter 14 and in particular reflects assumptions on:

- A fifteen-year regulatory period with tramline or periodic reopeners for traffic, opex, commercial revenue and corporation tax;
- Continuation of a largely ex-post approach to capital expenditure efficiency; and
- The specific risk adjustment mechanisms proposed (e.g. adjustment for early ATM impact on passenger numbers).

For the purposes of the IBP we have assumed that the gearing of the notional company is 60%. This is consistent with the approach of the CAA at previous reviews and the approach of their consultants. Maintaining stability in this assumption contributes to regulatory stability. Heathrow's actual gearing is currently above 60%, however additional equity will reduce gearing during H7.

In assessing the appropriate WACC for Heathrow we have primarily focussed on market evidence. However, we have also taken note of recent regulatory precedent. In some areas we consider that recent regulatory precedent is not consistent with market evidence. Where this occurs, we have noted the difference and set out our approach clearly in relation to the appropriate evidence.

2. Cost of Equity for Heathrow

2.1. Introduction

In line with current UK regulatory practice we have used the Capital Asset Pricing Model (CAPM) to estimate the cost of equity for Heathrow. The CAPM sets out that the investor's required return on equity can be calculated from a risk-free rate (RFR), equity risk premium (ERP) and the systematic risk of the company (beta). Consistent with current regulatory practice we have used a decomposition approach to estimate the ERP. This approach recognises the long-term stability of the total market return (TMR) of equities and the inverse correlation between the RFR and ERP. It therefore calculates the ERP as the difference between the TMR and the RFR. This approach avoids the risk of producing an erroneous estimate from combining inconsistent estimates of ERP and RFR.

Algebraically, CAPM can be written as:

$$Re = RFR + \beta * (TMR - RFR)$$

where Re is the return on equity, RFR is the risk-free rate, β is beta, the measure of the systematic risk of the company's equity and TMR is the total return on the market portfolio.

In the sections below, we set out evidence on:

- Total Market Return (TMR);
- Risk Free Rate (RFR);
- Asset beta of Heathrow; and
- Our overall view on the cost of equity for Heathrow.

2.2. Total Market Return

The TMR is not directly observable from market data. As a result, there are two main approaches to estimating an appropriate real TMR:

1. Historical approach – this uses historical returns adjusted for inflation to obtain a real TMR. This approach assumes that the historical TMR is a reliable estimate of current investors' expectation of market returns.
2. Forward-looking approach – this uses a dividend discounting model to estimate current investors' expectation of market returns. The estimates of this approach however, are dominated by assumptions about dividend growth that are not readily observable. As such this approach is generally considered less reliable than the historical approach.

In the past regulators and the CMA have tended to apply more weight to the historical approach as this requires far fewer assumptions than the forward-looking approach and is therefore widely viewed as being more reliable.

In the following subsections we set out:

- CMA regulatory precedence and evidence of subsequent market movements;
- Evidence on the TMR based on historical approaches;
- Evidence on the TMR based on forward-looking approaches; and
- Our overall conclusions on TMR.

2.2.1. CMA regulatory precedent and subsequent market movements.

An important precedent on TMR is the value determined by the CMA in the 2014 Northern Ireland Electricity (NIE) and 2015 Bristol Water appeals of 6.5%.

In February the CAA asserted that “expected returns have fallen since previous price reviews”²⁵⁵. Similar assertions have been made by other regulators in recent regulatory consultations. However, Regulators have not provided robust evidence to support these assertions.

In contrast, NERA show that there is no evidence that expected returns have fallen since these decisions in 2014/15²⁵⁶. In particular:

- Realised returns from major equity markets do not support a trend decline in expected returns. NERA show that across five global equity markets, three show an upward trend, whilst those in the UK and France do not display a discernible trend. Moreover, they note that for all countries the realised return over the recent period is not statistically different from the long-run average (see Figure 77 for US and Germany returns);

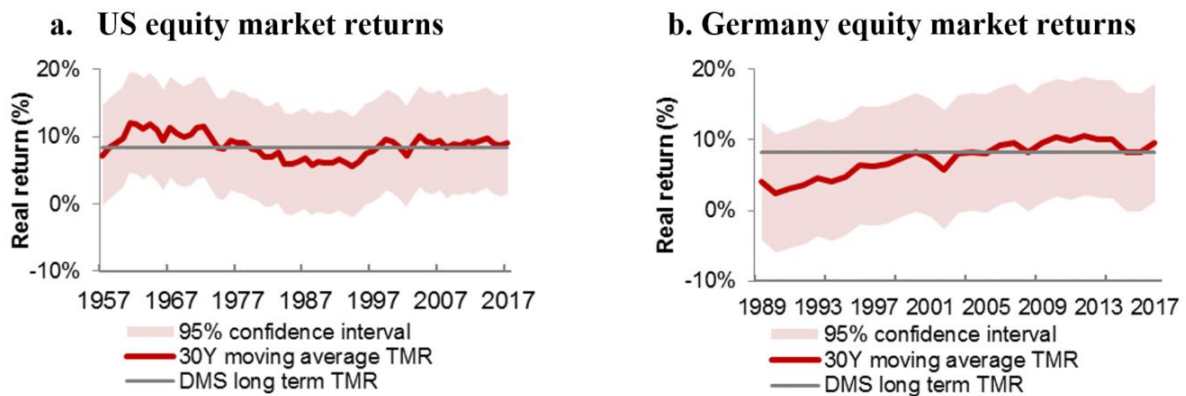


Figure 77: Long term trends in non-UK markets

Source: NERA

- Forward looking evidence from BoE and PwC shows that TMR is stable (Figure 78);



Figure 78: DDM evidence shows no decline in returns since 2014

- Forward looking survey evidence does not show a reduction in TMR since 2012; and

²⁵⁵ CAA, Appendices to Draft UK Reference Period 3 – Performance Plan Proposals, Consultation, February 2019, para D47

²⁵⁶ NERA, Cost of Equity for HAL at H7, April 2019, Section 4.2

- Regulatory precedent from North America shows stable cost of equity allowances for companies subject to economic regulation despite reductions in treasury yields (Figure 79).

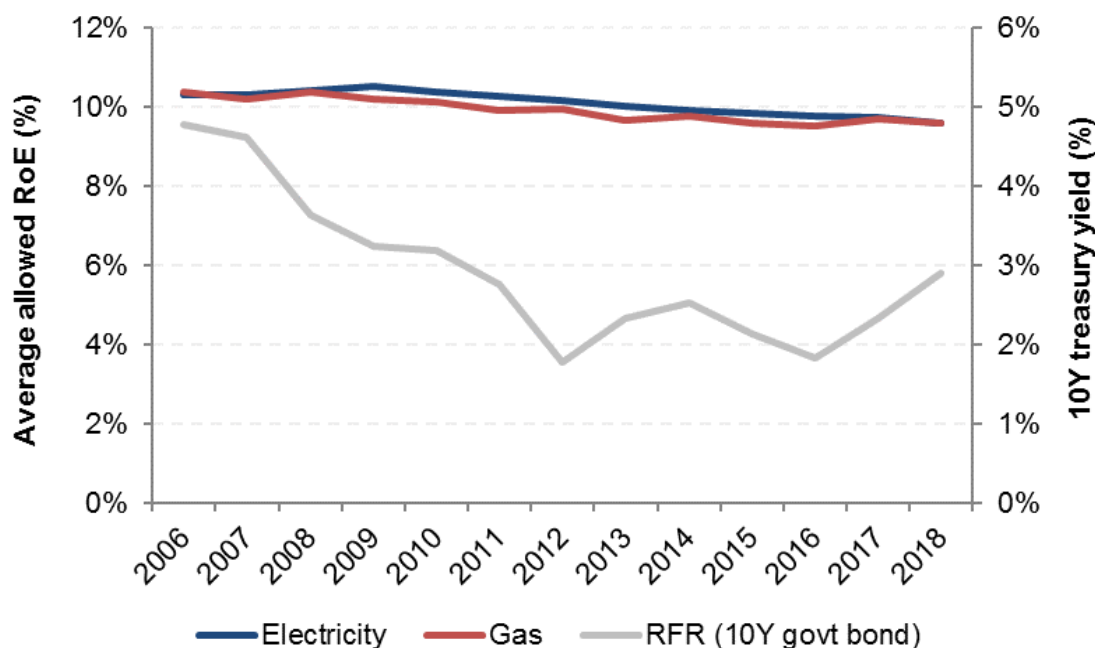


Figure 79: US regulatory decisions do not show reduction in returns since 2014

Source: NERA

In combination these findings strongly demonstrate that the market expectation of returns has not reduced since the CMA last made its decision in 2015. Therefore, we consider that the previous CMA estimate of TMR is an important reference point.

2.2.2. Estimate of TMR based on historical approaches

The standard approach to estimating the TMR is to draw on historical realised returns. This approach assumes that historical returns provide an unbiased estimate of the expected return over long time periods and is supported by the relative long-term stability of the TMR over time. This is demonstrated to be a global phenomenon in a National Bureau of Economic Research (NBER)²⁵⁷ paper analysing returns from 16 advanced countries between 1870 and 2015. This report shows that real equity returns globally have averaged 7.0% per annum and been relatively stable over that period.

Recent regulatory estimates of the historic TMR for the UK have started to diverge from previous values. Most of the different sources draw on the Credit Suisse Returns Yearbook²⁵⁸ (DMS) series of nominal returns, but use different approaches for treating inflation, and adjusting for the balance between arithmetic and geometric averages.

In the following sections we discuss:

- The appropriate way to adjust historic returns to obtain a real TMR estimate; and
- The appropriate historical average to use.

²⁵⁷ Jorda et al, The rate of return on everything 1870-2015, NBER working paper, December 2017

²⁵⁸ Dimson, E., Marsh, P., and Staunton, M., Credit Suisse Global Investment Returns Yearbook 2018, February 2019

2.2.2.1. Adjusting Historic Returns to obtain a real TMR

The nominal returns identified by DMS need to be adjusted by an appropriate inflation estimate to obtain a real estimate of returns. A range of different approaches can be used to make this adjustment. Two important criteria in selecting an approach include:

1. The index chosen should be robustly estimated and appropriate for the purpose; and
2. Appropriate account needs to be made of the likely difference between this index and the future path of RPI.

In the following subsections we set out evidence on six potential approaches to adjusting the historical return series for inflation. We then summarise the findings of these approaches. The six approaches are:

1. Using historical estimates of CPI to adjust historical returns to obtain a CPI stripped TMR and then apply a forward-looking RPI-CPI wedge to estimate future RPI stripped TMR. This is the approach adopted by UKRN;
2. Using historical estimates of RPI to adjust historical returns to obtain an estimate of future RPI stripped TMR directly. This is the approach previously adopted by regulators;
3. Using historical estimates of CPI adjusted to correct for errors in the formula effect in historic data to obtain a CPI stripped TMR and then apply a forward-looking RPI-CPI wedge to estimate future RPI stripped TMR. This approach was investigated by Oxera;
4. Using historical estimates of CPI derived from RPI adjusted for changes to the historical wedge between RPI and CPI to obtain a CPI stripped real TMR and then apply a forward looking RPI-CPI wedge to estimate a future RPI stripped TMR. This is an approach adopted by NERA²⁵⁹;
5. Using historical estimates of RPI adjusted for changes in the series at breaks to estimate the future RPI stripped TMR directly. This an approach taken by Oxera²⁶⁰; and
6. Using historical estimates of nominal market return and using an estimate of future RPI to estimate RPI stripped TMR. This approach was also investigated by Oxera.

2.2.2.1.1. Adjusting historical returns by CPI (Approach 1)

This approach adjusts historical returns by historical CPI to obtain an estimate of the CPI stripped real TMR. This is then converted to a RPI stripped estimate of the TMR by adjusting for the expected difference between RPI and CPI. This is effectively the approach taken by the UKRN²⁶¹.

The average annual return adjusted by CPI is 7.0%. Adjusting for an expected RPI-CPI difference of 1.0% results in a real (RPI stripped) TMR of 6.0%.

A key implicit assumption in this approach is that the historically imputed CPI series correctly reflects the formula effect that would have been in place if the series had been produced contemporaneously. If this is not the case, then the approach produces an incorrect estimate of the RPI stripped TMR. To date, we have not seen any evidence to support this assumption.

²⁵⁹ NERA, Cost of Equity for HAL at H7, April 2019

²⁶⁰ Oxera, Estimating RPI adjusted equity market returns, Aug 2019

²⁶¹ UK Regulators Network (2018), Estimating the cost of capital for implementation of price controls by UK Regulators, March 2018

There are a number of additional issues with this approach as demonstrated by NERA in their response to the UKRN report²⁶², and in their updated paper on the cost of equity for Heathrow²⁶³. In particular:

- Use of the ONS CPI backcast between 1950 and 1988 is problematic. Firstly, the series is not a national statistic, it is not considered robust and the ONS themselves state caution should be exercised when using it. Secondly, it is not clear that the relationship between the ONS CPI backcast for CPI and future RPI will be the same as the current relationship between CPI and RPI. As a result, it is not clear what adjustment should be applied to the RPI-CPI wedge for this data and there is no way of robustly deriving such an estimate;
- For the period 1915 to 1949 the CPI and RPI data in the BoE dataset is identical. UKRN have treated this data as though it is CPI and will have an identical wedge to RPI as the current CPI-RPI wedge. No evidence has been presented to support this assumption on the wedge for this period. Moreover, NERA show that this index is closer in nature to RPI than CPI as it was intended to replicate the approach to RPI calculations after 1947, (for example it includes expenditure by UK citizens abroad).²⁶⁴

NERA show²⁶⁵ that the BoE “CPI” data does not represent a historical series of CPI, but instead is a hybrid. By treating it as a CPI series, the CAA’s estimate of historical returns is underestimated.

Oxera also consider that the historic CPI series pre-1988 is not sufficiently robust to implement this approach. In addition, they are concerned that the use of CPI rests on the premise that it is possible to find a reliable estimate of the ‘formula effect’ before 1988²⁶⁶. They conclude that in the absence of a reliable estimate of the historical difference between RPI and CPI inflation, it is not robust to apply a forecast difference of 1.0% to the historical CPI series.

This analysis shows that Approach 1 fails both criteria set out in Section 0 above.

2.2.2.1.2. Adjusting historic returns by RPI (Approach 2)

This approach adjusts historical returns by historical RPI to obtain an estimate of the RPI stripped real TMR directly. This is the approach previously used by regulators.

The average annual return adjusted by RPI is 6.7% resulting in a real (RPI stripped) TMR of 6.7%.²⁶⁷

A significant advantage of this approach over using CPI is that there is a longer contemporaneous time-series available. The Historical RPI series starts in 1947, and earlier values are based on a contemporary historical series back to 1903. Consequently, this approach meets the first criteria set out above.

However, there have been significant changes to the RPI methodology over time which means that the measure itself may not be consistent. Therefore, ideally the reported RPI should be adjusted to reflect the current RPI methodology. Note that this concern also applies to the historical CPI series which, since it is derived from the RPI series, is exposed to the same methodological changes.

Therefore, we consider Approach 2 meets criteria 1 but fails criteria 2 from Section 0.

²⁶² NERA, Review of UKRN recommendations on the Real TMR, June 2018

²⁶³ NERA, Cost of Equity for HAL at H7, April 2019

²⁶⁴ NERA, Cost of Equity for HAL at H7, April 2019, Section 4.3

²⁶⁵ NERA, Cost of Equity for HAL in H7, April 2019, Section 4.3.1

²⁶⁶ Oxera, Estimating RPI-adjusted equity returns, August 2019

²⁶⁷ Oxera, Estimating RPI-adjusted equity returns, August 2019, Table 2.2

2.2.2.1.3. Adjusting historical returns by adjusted CPI (Approach 3)

This approach adjusts historical returns by historical CPI adjusted to reflect estimated errors in the formula effect in historic CPI data. An adjustment for the expected difference in RPI and CPI is then applied to obtain a real RPI stripped TMR. This is an approach investigated by Oxera²⁶⁸ on behalf of Energy Network Companies.

In its approach, Oxera showed that the true CPI inflation over the period 1899-2018 is likely to be lower than the average of the CPI series in the Millennium Data Book used by UKRN. They estimated separate corrections to CPI for the periods 1899 to 1949, and 1950-1988. This resulted in an average CPI estimate for the whole period of 3.61%, 0.45% lower than the series used by UKRN.

Applying this estimate of CPI to the nominal returns results in an estimate of the historical real CPI stripped TMR of between 7.4%. Adjusting for a forward looking RPI-CPI wedge of 1.0% results in an estimate of the RPI stripped historical TMR of 6.4%.

This approach by Oxera is more robust than that taken by UKRN in that it takes better account of the range of historical differences between RPI and CPI. However, its use of the Historical CPI series means it does not use the most robust historical series. This approach therefore fails to meet the first criteria set out in Section 0 above. As a result, Oxera consider it less robust than an approach adjusting historical returns for structural breaks.

2.2.2.1.4. Adjusting by CPI based on RPI and historical differences in RPI-CPI (Approach 4)

This approach adjusts historical returns by historical CPI derived from RPI adjusted to reflect changes in the RPI-CPI wedge to obtain an estimate of the CPI stripped real TMR. An adjustment for the expected difference in RPI and CPI is then applied to obtain a real RPI stripped TMR. This is the approach investigated by NERA²⁶⁹.

In its approach, NERA showed that the historical wedge between RPI and CPI was 0.72% since 1989, and 0.47% between 1950 and present. They apply these differences to estimates of TMR calculated directly from RPI to obtain an estimate of the historical real CPI stripped TMR of between 7.3% and 7.9%. Adjusting for a forward looking RPI-CPI wedge of 1.0% results in a range for the RPI stripped historical TMR of 6.24% to 6.8%²⁷⁰.

This approach by NERA is more robust than that taken by UKRN in that:

- It uses the most robust historical series for inflation;
- It takes account of the range of historical differences in CPI and RPI; and
- Addresses the structural change in RPI in 2010 by using the future RPI-CPI wedge to obtain a forward-looking estimate.

Approach 4 therefore meets both criteria set out in Section 0 above.

²⁶⁸ Oxera, The cost of equity for RIIO-2, Nov 2019

²⁶⁹ NERA, Cost of Equity for HAL in H7, April 2019, Section 4.3.3

²⁷⁰ NERA, Cost of Equity for HAL in H7, April 2019, Table 4.2

2.2.2.1.5. Adjusting historical RPI for structural breaks (Approach 5)

This approach adjusts historical returns by historical RPI adjusted to reflect historic changes in the series to obtain an estimate of the RPI stripped real TMR directly. This is the approach investigated by Oxera²⁷¹.

Effectively this approach attempts to restate the historical RPI series by applying a methodology that is more consistent with how RPI is calculated today. Oxera investigated structural breaks in the RPI series and explored two alternative approaches to correct for these; the first method involved estimating appropriate weights and prices of RPI components before they were introduced; and the second used evidence from the structural breaks series directly to build a counterfactual series. These approaches resulted in a range of real (RPI stripped) TMR estimates of between 6.4% and 6.8%.²⁷²

Approach 5 therefore meets both criteria set out in Section 0 above.

2.2.2.1.6. Using a nominal TMR approach (Approach 6)

This approach estimates the future real TMR by estimating a long-run average of the historical nominal TMR and then deflating this by a forward-looking inflation estimate. It makes no attempt to make adjustments using historical inflation and therefore avoids issues with the reliability of historical inflation rates.

Approach 6 is appropriate if the observed long-term stability of the TMR is true for nominal rather than real returns. It would not be appropriate if both average nominal equity returns were affected by inflation and forecast inflation differs from the historical average inflation.

One reason that stability of nominal returns might be expected is that investment appraisals by businesses focus on nominal rather than real hurdle rates. As a result, business outcomes are likely to reflect these nominal hurdle rates and not be correlated with inflation.

Oxera examined the relationship between historical returns and inflation. Their report showed there is indeed no consistent relationship between nominal TMR and inflation for either the UK or the US markets.²⁷³ They undertook a range of modelling and found that regressions of nominal returns on inflation mostly do not find a significant partial correlation. They also found that more general models consisting of both contemporaneous and lagged inflation variables do not have any statistically significant coefficients on inflation. Oxera therefore conclude that the considered evidence does not suggest that using nominal historical TMR less expected inflation is a biased estimator of the real expected TMR.

Oxera also reviewed the literature on nominal returns and inflation. Published research contains mixed results with some studies finding no relationship, whilst others find positive relationships over some periods. Another strand of research is consistent with investors basing decisions on nominal returns, and that equity investors expectations of future equity returns are driven by nominal returns.

Oxera conclude that given the evidence it is appropriate to augment the consideration of historical real approaches of TMR with a historical nominal approach.

The arithmetic average of the historical nominal return is 11.2%. Using a forward-looking inflation estimate of 3.0% results in a real RPI stripped TMR of 8.0%.

²⁷¹ Oxera, Estimating RPI-adjusted equity returns, August 2019, Section 6

²⁷² Oxera, Estimating RPI-adjusted equity returns, August 2019, Table 6.3

²⁷³ Oxera, Assessment of future Market returns (TMR), November 2019

Provided the assumption that the observed stability in historical returns applies to nominal returns this approach meets both criteria set out above in Section 0. Moreover, compared to the other approaches it avoids reliance on potentially inconsistent inflation data.

2.2.2.1.7. Summary of approaches

Table 43 sets out a summary of the conclusions on the different approaches. The assessment reflects whether the approach has failed one (amber) or two (red) of the criteria set out in Section 0. The nominal TMR approach (Approach 6) is assessed as amber as a result of uncertainty over the stability of nominal returns.

Table 43: Summary of approaches to estimate real (RPI) TMR

Approach	Approach to inflation					
	1	2	3	4	5	6
	CPI	RPI	CPI adjusted for formula effect in early data	CPI estimated from RPI adjusted for historic CPI wedge	RPI adjusted for historic breaks	Nominal TMR
Average arithmetic nominal return	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%
Adjustment for Inflation	4.0%	4.2%	3.6%	3.2%-3.7%	4.16%-4.47%	
Adjustment for future RPI-CPI wedge	1.0%		1.0%	1.0%		
Adjust for future RPI						3.0%
Estimate of real (RPI) TMR	6.0%	6.7%	6.4%	6.2%-6.8%	6.4%-6.8%	8.0%
Assessment						

Source: UKRN/NERA/Oxera/Heathrow Analysis

Table 43 shows that the different approaches to adjusting inflation lead to a wide range of TMR estimates of between 6.0% and 8.0%. However, the robust approaches converge on a range of 6.2% to 6.8% for the historical TMR.

2.2.2.2. Use of appropriate return

In Section 0 we have focused on returns derived from the arithmetic average of historical returns. The average arithmetic return obtained from historical data results in a higher estimate of TMR than the geometric estimate. As a result, there is a debate about the appropriate approach to determining the market TMR. This debate tends to focus on issues such as predictability of returns at longer time horizons and the return that might be expected for an investor with a specific time horizon for holding the stock and is framed around the question of determining the expected return over a specific future period. We show below that this is the wrong question. What should be being asked is what regulatory WACC should be set so that the resulting series of annual returns over a specific future period produce a return in line with that expected by the market.

In this section we discuss:

- The approach of UKRN/CAA in respect of the expected return over a future period and why, even if this were the right question, their approach is not supported by evidence; and

- Why the regulatory WACC should be based on the arithmetic average return in order to produce expected returns for different holding periods in line with the market.

2.2.2.2.1. UKRN/CAA approach to geometric Return

The UKRN approach explicitly sets out to estimate the return a company would achieve over a long holding period. The report included a downward adjustment of 100 bps from the arithmetic mean to adjust for alleged predictability at long horizons. NERA show²⁷⁴ that this adjustment is excessive as:

- There is no evidence that there is predictability of returns at longer horizons, and the most recent academic evidence does not support this;
- The UKRN does not specifically calculate the 100 bps reduction, and ignores more established methods developed by Blume²⁷⁵ or JKM that deal with this adjustment in a robust statistical manner and that would have produced a much smaller adjustment (10 to 40 bps for a 10-year holding period rather than 100 bps); and
- In any case, market evidence shows that typical investor holding periods are less than five years. NERA present evidence showing that retail investors typically hold shares for 3 years and pension investors typically have an average holding period of 4.7 years²⁷⁶.

NERA argue that the most appropriate approach to estimate likely returns over longer holding periods is to use the established methods developed by Blume and JKM for estimating unbiased estimates of the TMR for long investment horizons that also consider serial dependence. They show that such an approach is consistent with CMA practice and results in a much smaller adjustment than that applied by UKRN²⁷⁷.

In its RP3 proposals for NERL, the CAA does not explicitly address the appropriate process for adjusting for investment horizon. We consider that this is a serious weakness in the CAA's approach not only because of the omission, but because they have not justified why they have departed from the best practice approach adopted by the CMA on this issue in the Bristol Water and NIE and previous appeals.

In addition to the error in the estimating the likely return for a company over a longer period, we consider that the CAA approach is wrong in that it has asked the wrong question. Rather than ask what the expected return is for investors with a particular holding period, it should be asking what level of regulatory WACC should be set to ensure that investors obtain a return in line with market expectations. This is discussed below.

2.2.2.2.2. Why the arithmetic return should be used to set regulatory WACC

A key aspect that is often lost in the discussion of the appropriate use of geometric or average returns in estimating TMR, is the use to which the estimate is being put and the outcome that is intended. In the case of setting the WACC for a regulated company these are that:

- The estimate is being used to set the expected return for a series of annual returns; and

²⁷⁴ NERA, Cost of Equity for HAL at H7, April 2019, Section 4.3.2

²⁷⁵ For example Blume shows that an unbiased estimate of the expected return over a period of n years is a weighted average of the arithmetic and geometric returns, with the weight given to the arithmetic average being $(T+n)/(T-1)$, where T is the number of observations in the time series used to generate the arithmetic and geometric average and n is the period over which the return is to be estimated. For a 120-year series, estimations for periods of less than ten years are therefore very close to the arithmetic average.

²⁷⁶ NERA, Cost of Equity for HAL at H7, April 2019, Section 4.3.3

²⁷⁷ NERA, Cost of Equity for HAL at H7, April 2019, Section 4.3.2

- The outcome intended is that (adjusted for risk) the expected return for investors will be equal to the expected return they would achieve in the market.

Different investors will hold the investment for different lengths of time. To meet the second requirement, a regulator would want to ideally ensure that the expected return over the time horizon of each investor was consistent with the market expectation of returns for the investment over that specific time horizon.

The arithmetic mean return is an unbiased estimate of the return that would be expected in one year²⁷⁸. Consequently, an investor holding a share for 1-year would expect a market return equal to the arithmetic average return and therefore basing the WACC on the arithmetic average would result in the 1-year investor's expectations being met. An investor holding a share for a longer period would expect a slightly lower average cumulative return as the expected outturn geometric return achieved by the regulated company would be lower than the arithmetic average as a result of returns varying from year to year²⁷⁹. The question at issue is at what level the WACC should be set to achieve this expected cumulative return over the longer period.

Since the WACC is being set to produce a series of annual returns around which there is risk, the compounded geometric return will be less than the return used to set the WACC. Cooper shows that for longer time horizons, the level at which the WACC would need to be set to achieve market expected returns for that longer period must be greater than the arithmetic average and increases for longer periods²⁸⁰. In practice, for shorter holding periods of up to 5-years the required margin over the arithmetic mean is small and therefore the arithmetic mean remains an appropriate basis for setting WACC for holding periods up to five years.

Note that although the expected return over a longer period depends upon assumptions around predictability of returns or the specific time-horizon, this does not require a different approach to setting WACC. This is because a WACC based on the arithmetic average would produce the right expected return over longer periods irrespective of these issues. This is true unless the risk adjusted variability of returns of the company were different to the variability of the market. However, if this were the case, then CAPM would not be valid as the company would have a source of expected return risk not captured by beta.

Consider instead an approach where the WACC was based on the expected compounded return over a five-year period (i.e. lower than one based on the arithmetic average). This would result in an expected return that was too low for a 1-year investor as it would be below the expected market return for a 1-year holding. It would also be too low for an investor holding the share for five years. This is because variability in returns over five years means that the expected compounded return of the investment would be below the set WACC despite it being intended to reflect a five-year holding period. In other words, all investors irrespective of holding period would receive expected returns below expected market returns – i.e. the WACC is set too low. This demonstrates that the regulatory WACC should be based on the arithmetic average return.

²⁷⁸ Blume, Unbiased estimators of long-run expected rates of return, *Journal of the American Statistical Association*, Vol 69, No. 347, 1974

²⁷⁹ This is because variations in return around a mean always result in a lower geometric mean. This can be seen simply by considering two years where the returns are $(r+d)$ and $(r-d)$. The arithmetic return is r , but the geometric return is $\sqrt{(r^2 - d^2)}$ which is always less than r .

²⁸⁰ Ian Cooper, Arithmetic versus geometric mean estimators: Setting discount rates for capital budgeting, *European Financial Management*, Vol. 2, No. 2, 1996

2.2.3. Forward Looking Approaches

Forward looking approaches attempt to capture current market participant expectations of future equity returns by using current market data and forecasts. They can be produced to provide a cross-check with historically derived estimates. The standard approach to obtaining a forward-looking approach is to use dividend discount models.

In the NERL paper, the CAA sets out its view that forward-looking estimates of TMR lie in a range of 5-6% in RPI deflated terms, based on work it commissioned by PwC and by reference to a range of published sources since November 2017.²⁸¹

In coming to this view, the CAA has relied heavily on a range of estimates from a narrow set of economics consultants (PwC, Europe Economics (EE) and CEPA) that have been producing estimates for UK regulators. However, it has ignored estimates for ERP/TMR published by the BoE and Bloomberg that are widely used by market participants. NERA show that these sources indicate a forward looking TMR in the range 7.2% to 9.7%²⁸². A comparison of the rates produced by these estimates is set out in Table 44 below.

Table 44: Forward looking estimates of TMR

Source	Low	High
CAA	5.0%	6.0%
PwC for CAA	5.1%	5.6%
Bank of England	7.2%	8.1%
Bloomberg	8.0%	9.7%

Source: CAA/NERA

Table 44 shows that the broader market estimates of TMR estimated by the BoE and Bloomberg are at least 2% higher than the CAA's range. The BoE have stated that they regard their series produces accurate ERP estimates²⁸³, and therefore we are concerned that the CAA have excluded this evidence from their range. In addition, the higher Bloomberg estimates show that the BoE estimate is conservative compared to other market participants. The difference in the estimates arises because the different approaches make different assumptions about market expectations of future returns. In particular, we consider that each of the dividend discount approaches used by PwC, CEPA, and EE for Regulators suffer from a major weakness in that they do not use reasonable market expectations to produce their estimates. This in turn means that their estimates do not reflect market views and therefore cannot be regarded as a contemporaneous view of likely market returns. There are two key issues:

- Firstly, the PwC approach uses GDP growth estimates in the short term rather than analysts' expectations of dividends. There is no evidence that short run GDP growth rates are related to market expectations of dividend growth. However, dividend growth expectations are captured by analyst forecasts, and therefore investors will take them into account in their expectations of market returns. Consequently, an estimate of the expected dividend growth rate of the UK market must account for analysts' estimates of dividends in the short term;
- Secondly, PwC relies solely on UK GDP forecasts to estimate longer term dividend growth. However, over 70% of UK listed earnings come from overseas. Investors will

²⁸¹ CAP 1758A, Para D38 and Figure D.4

²⁸² NERA, Cost of Equity for HAL at H7, April 2019, Section 4.4.3

²⁸³ Bank of England (2017), Quarterly Bulletin 2017 Q2 – An improved model for understanding equity prices, p93

therefore consider that global growth rates are relevant for dividend growth in the UK and take it into account in their expectations of market returns. Consequently, an estimate of the expected dividend growth rate of the UK market must take account of global growth as well as UK growth. Oxera also agree this approach is incorrect²⁸⁴.

PwC argue that it is appropriate to use only UK GDP growth as they are producing estimates for UK companies. We consider this argument is flawed. We accept that using UK GDP growth might be appropriate in the event of undertaking a DDM calculation for a specific single UK company with little international exposure. However, it is not correct to use it for estimating the dividend growth of the UK market overall, which does have significant international exposure. It is irrational to assume that investors in the UK stock market will not take account of potential global growth in their return expectations. Similarly, it is not rational to assume that investors in Heathrow will consider that it is not affected by global growth as well as UK growth.

We consider that the flaws in the approach of PwC set out above are fundamental in nature and therefore that their estimate of the forward-looking TMR should be discounted. On the other hand, the approach by the BoE properly captures market expectations by taking account of analysts' forecasts in the short-term and account of global as well as UK growth in the long-term. We therefore consider that the BoE estimates are robust estimates of current market expectations of future returns.

In summary therefore, we conclude that the appropriate range of forward-looking estimates of a real (RPI stripped) TMR is 7.2% to 8.1%.

2.2.4. Overall Range of TMR

Our review of the historical evidence identified a range for real (RPI stripped) TMR of 6.0% to 8.0%. The forward-looking range of 7.2% to 8.1% overlaps the top end of this range and gives us comfort that the historical range we have identified is appropriate. The lower end of this range is also consistent with recent CMA precedent.

We acknowledge that the range is above that set out recently by some regulators including the CAA NERL RP3 proposals. The different view of Regulators and the evidence we have set out above are illustrated in Figure 80.

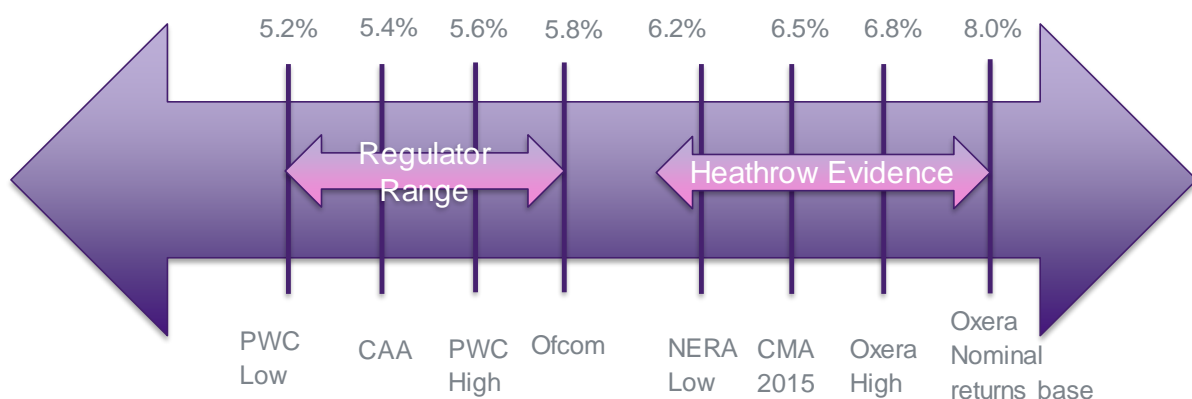


Figure 80: Range of Estimates for Total Market Return

We consider that the evidence presented above (in Sections 2.2.2 and 2.2.3) shows that the recent estimates of TMR by regulators are flawed in both their historical and forward-looking

²⁸⁴ Oxera, The cost of equity for RIIO-2, November 2019, Section 2.3

approaches. In addition, we note that these are now likely to be tested by the CMA through company appeals. We have therefore relied on our evidence for the estimated range in this plan.

For the IBP we are discounting the higher end of our range as we consider that further evidence is required before we can be confident in respect of the stability of nominal returns. We look to develop further evidence in this area and will reflect this in the FBP.

In addition, we consider that given the lack of any evidence for market movement since the previous CMA decision, that precedent remains a robust estimate of the TMR suitable for setting regulatory WACCs. We therefore conclude that an appropriate range for the TMR is 6.0% to 6.5%.

2.3. Risk Free Rate

Regulators have taken a range of different approaches to estimating the risk-free rate at previous price reviews. One (or a combination) of three approaches has been used:

1. Basing the risk-free rate on a judgement of an appropriate long-run value. This has been used extensively where regulators have been concerned that contemporary market data may be distorted or may not persist into future periods;
2. Using a trailing average of historic risk-free data; or
3. Using forward market data to calculate the average risk-free rate for the regulatory period in question.
- 4.

We consider that the first approach is no longer suitable for regulatory purposes as the current low risk-free rates have shown some persistence and it is not clear how to reconcile them with higher historical rates.

We also consider that the second of these approaches is not appropriate as recent risk-free rates have been distorted by short-term market effects such as quantitative easing. As such they are likely to be neither an appropriate estimate of long-run risk-free rates, nor representative of a future period that does not include such distortions.

Consequently, we have used the third approach to estimate the risk-free rate for the H7 period. Specifically, we have calculated the implied 10-year nominal gilt and averaged it over the period 2022-2026 and 2022-2036. The nominal gilt has been used as we consider it is less subject to market distortions. In addition, using the nominal gilt avoids introducing an implied inflation that is different to the 3.0% used elsewhere in the assessment of WACC. Table 45 below sets out our estimate of the risk-free rate based on average BoE spot data between June and September 2019. The table sets out a view of the risk-free rate for both a 5-year and 15-year forward average.

Table 45: Risk-free rate

	2022-2026	2022-2036
Inflation assumption	3.0%	3.0%
Average implied 10-year gilt	1.23%	1.76%
Real risk-free rate	-1.71%	-1.20%

Source: Bank of England/Heathrow Analysis

The estimate for the period 2022-2026 is consistent with the CAA's estimate of -1.7% for NERL over the period 2020 to 2024.

2.4. Heathrow Asset Beta

The CAPM beta measures the systematic risk of a stock, i.e. the portion of risk that is correlated with the market portfolio. For publicly listed companies, betas can be estimated directly by regressing the stock return against the return on the market portfolio. However, following the de-listing of BAA stock in 2006, this approach is not possible for Heathrow. Instead, we estimate beta for Heathrow based on empirical evidence on betas for relevant comparator companies.

In this section we set out:

- An estimate of the asset beta of Heathrow by NERA;
- A discussion of the approach by PwC and EE to estimating the asset beta of Heathrow;
- A brief discussion of debt beta; and
- Our conclusions on the appropriate range for Heathrow asset beta.

The asset beta captures the systematic risk of Heathrow, i.e. the risk that cannot be diversified. We set out analyses of the specific risk of Heathrow in two places within this plan. Section 4.3 sets out an analysis of the additional risks that arise from expansion. Chapter 13 -Financing sets out the results of a range of specific scenarios on Heathrow's ability to finance itself. We also plan to undertake an analysis of the range of return on regulatory equity (RoRE) that might arise from our plan and the proposed regulatory framework. These analyses given an estimate of the degree of overall risk for Heathrow. Allocating this risk between systematic risk and specific risk is not straightforward however. Therefore, the approach we have taken to estimate asset beta is to rely on market evidence from listed airports after assessing carefully the relative risk of these airports to Heathrow and the comparability to Heathrow.

There is a risk, however, that this approach underestimates the systematic risk of Heathrow. This is because the requirement for new equity and the long-time horizon over which this will be recovered (see Chapter 13 - Financing) mean that the characteristics of Heathrow are different from comparator airports. Investors will consider that this difference significantly increases the risk of investing in Heathrow. This additional risk is not reflected in the beta of comparator airports and very little of this difference is captured by the expansion risk premium set out in Section 4.

An additional concern is the political backdrop of Brexit and heightened political instability generally. Demand for regulated water, energy and telecoms utilities will be impaired now that a major political party has advocated for nationalisation. This has reduced investor appetite for the UK and increased the cost of capital for regulated utilities specifically. It is likely that this uncertainty will persist for a considerable period.

2.4.1. NERA estimate of Heathrow Asset Beta

On behalf of Heathrow, NERA undertook a study²⁸⁵ to determine the asset beta of a range of comparator airports around the world based on data up to the end of March 2019. The results are shown in Figure 81 below.

²⁸⁵ NERA, Cost of Equity for HAL at H7, April 2019

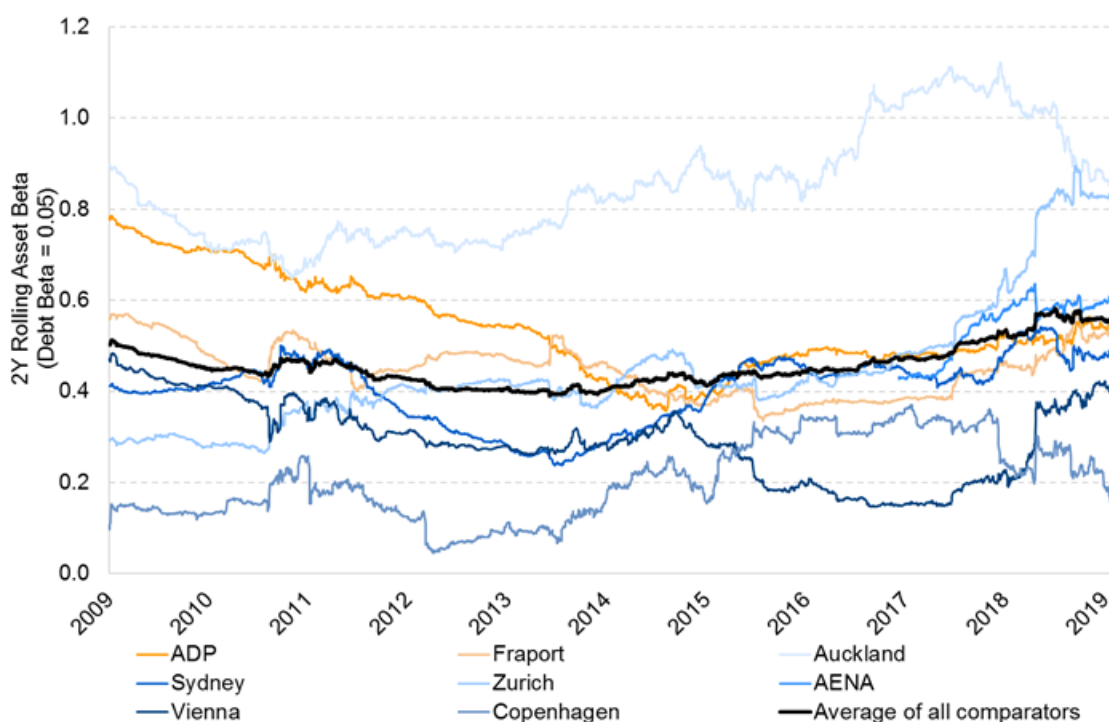


Figure 81: Asset betas of comparator airports

Source: NERA

Figure 81 shows that airport asset betas have been increasing over the last five years, and that the average asset beta for airports over the last two years has been 0.58.

The key comparators are Fraport and AdP (includes Paris Charles de Gaulle) as they are large regulated hub airports. AENA may also become a useful comparator in time, but it has not yet been listed for a sufficiently long period to obtain longer term average betas. Table 46 sets out the asset betas estimated by NERA for AdP and Fraport.²⁸⁶

Table 46: Estimated Asset Beta for AdP and Fraport

Asset Betas (debt beta 0.05)	1-year	2-year	5-year
AdP	0.51	0.60	0.54
Fraport	0.55	0.59	0.47

Source: NERA based on data to March 2019

The key airports for these companies are Frankfurt (for Fraport) and Charles de Gaulle (CDG) for AdP. These are both major hub airports and represent over 80% of the revenues of each group and therefore appear to be reasonable comparators for Heathrow.

In their 2018 report NERA set out a comparative risk assessment of Heathrow, Frankfurt and Charles de Gaulle (CDG) airports²⁸⁷. They showed that Heathrow was riskier than Frankfurt Airport, and at least as risky as CDG. PwC also assessed the relative risk of Heathrow to these airports²⁸⁸. It concluded that Heathrow is of comparable risk to CDG and Frankfurt. NERA concludes²⁸⁹ that the appropriate range for the asset beta of Heathrow is 0.55 to 0.6.

²⁸⁶ NERA, Cost of Equity for HAL at H7, April 2019, Table 2.6

²⁸⁷ NERA, Cost of Equity for Heathrow in H7, A report for Heathrow Airport, February 2018

²⁸⁸ PwC, Estimating the Cost of Capital for H7 – A Report Prepared for the CAA, February 2018

²⁸⁹ NERA, Cost of Equity for HAL at H7, April 2019, Section 2.4

2.4.2. Approach by PwC and EE to Heathrow Asset Beta

Both PwC and EE have produced estimates of the asset beta for Fraport and AdP.

In its February 2019 paper,²⁹⁰ PwC argues for maintaining an asset beta range for Heathrow of between 0.42 and 0.52 for H7, in line with the range used in the Q6 price control. PwC bases its estimate of Heathrow's asset beta on its estimated beta for AdP and Fraport, measured against both local and European indices. It takes an average of these values over both 2-year and 5-year estimation periods to derive an estimated beta of 0.43 for Fraport and 0.51 for AdP.²⁹¹

In its December 2018 report for the CAA,²⁹² EE estimates an asset beta of 0.48 for Fraport and 0.55 for AdP. EE calculates the airport betas based on the 2-years equally weighted average unlevered beta, where equal weight is given to betas calculated using a domestic index and a European index. These differences are summarised in Table 47 below.

Table 47: Alternate estimates of comparator asset betas

	PwC	EE (2-year)	NERA (2-year)
AdP	0.51	0.55	0.60
Fraport	0.43	0.48	0.59

Source: PwC/EE/NERA

Table 47 shows there is a divergence in the estimates of asset beta between the consultants. In the following sections we explain that:

- the differences in estimates arise principally from the inclusion of estimates based on large cap market indexes for PwC and EE; and
- using large cap indices for these shares is inappropriate.

2.4.2.1. Differences in Estimate arise from inclusion of large cap index estimates

Both PwC and EE use the domestic large-cap indices for France (CAC40 index) and Germany (DAX) as the respective domestic indices for AdP and Fraport, and use the Stoxx Europe 600 as the European index for both. They take an average of the beta estimates used in both approaches to obtain their beta estimate overall.

Table 48 below sets out the beta estimates by PwC, EE and NERA for Fraport and AdP based on a European Index²⁹³. It should be noted that for this estimate NERA used the same time-period as EE (to August 2018) and therefore the estimates differ slightly from those in Table 46 and Table 47.

Table 48: Estimates of 2-year asset betas

Comparator Airport	Estimator		
	PwC	EE	NERA

²⁹⁰ PwC (2019), Estimating the Cost of Capital for H7 - Response to Stakeholder Views, A Report Prepared for the Civil Aviation Authority, p.13.

²⁹¹ PwC (2019), p.71, para. 5.222.

²⁹² Europe Economics (December 2018), Components of the Cost of Capital for NERL, Appendix 8: Analysis of HAL's Beta, p.81.

²⁹³ NERA, Cost of Equity for HAL at H7, Table 2.1

AdP	0.51	0.56	0.56
Fraport	0.37	0.52	0.53

Source: NERA

Table 48 shows that NERA and EE produce similar estimates for asset beta over the same time period. PwC's estimate is significantly lower, reflecting shortfalls in the robustness and accuracy of PwC's approach more widely.

2.4.2.2. Use of Large Cap indices to estimate asset betas

EE and PwC base their range for asset beta for AdP and Fraport on the average of the betas obtained by reference to local Large Cap indices (CAC40 for France and DAX for Germany) and the betas obtained by reference to a Europe wide index (the Stoxx Europe 600).

The asset beta should be calculated using the investment universe of the marginal investor in the company. The marginal investor is defined as the investor who is most likely to buy/sell the asset, and hence whose behaviour affects the share price and, as a result, the beta of the asset. Once the marginal investor in the company is identified, the stock market index should represent the investment universe available to the marginal investor to diversify its portfolio of assets. NERA demonstrate that the local Large CAP indices are not representative of the investment universe of the marginal investor in these companies²⁹⁴:

- AdP and Fraport are not constituents of the local Large Cap indices used, and therefore by definition the indices do not represent the investment universe of the marginal investor; and
- The marginal investors in AdP and Fraport are international institutions holding a geographically diversified portfolio of assets. The appropriate investment universe for this type of investor is wider than just the country in which this specific asset is located. For this reason, local stock market indices are not representative of the investment universe of the marginal investors in the two companies.

Heathrow commissioned Economic Insight to examine the investment universe of the marginal investors in AdP and Fraport. Economic Insight showed²⁹⁵ that:

- AdP's equity holders are geographically dispersed and hold geographically dispersed portfolios. Other than the state, the majority of the shares are held by non-resident institutional investors, who are shown to have no bias in the allocation of their investments and demonstrate a large degree of switching between both countries and companies; and
- The same is true for Fraport; its equity investors are geographically dispersed and hold geographically diversified portfolios.

Since the local Large Cap indices are not representative of marginal investors in AdP and Fraport, these indices should not be used for estimating the beta of these companies. Economic Insight argue that the beta of these airports should be based on broader European or potentially global stock indexes²⁹⁶.

NERA also argue that since the purpose of using comparator airport betas is to assess the correct beta for Heathrow, it follows that the stock market that is being used as a reference market should be similar in terms of relative risk and stock composition to the UK stock market.

²⁹⁴ NERA, Cost of Equity for HAL at H7, April 2019, Section 2

²⁹⁵ Economic Insight, Local Large Cap vs Euro Indices for Beta estimation, December 2019

²⁹⁶ Economic Insight, Local Large Cap vs Euro Indices for Beta estimation, December 2019, p36

They show that the make-up of the Stoxx Europe 600 index is similar to the FTSE All Share index. In contrast, the CAC40 and DAX indices differ considerably from the FTSE All Share²⁹⁷. They conclude that to ensure that AdP and Fraport beta estimates are relevant to the beta risk faced by Heathrow investors, it is imperative to use the wider Stoxx Europe 600 index. We note that excluding the inclusion of asset betas based on the local index, EE and NERA produce similar estimates for asset beta.

2.4.3. Discussion on Debt beta

NERA derived its beta estimates assuming a debt beta of 0.05. In its determination for NERL, the CAA assumed a debt beta of 0.1.

NERA examined the issue of debt beta for Heathrow in its report on the cost of equity. It concluded that that the plausible value for the debt beta lies in a range of zero to 0.1.²⁹⁸

- A debt beta of 0.1 is consistent with PwC's own debt beta analysis and proposals by Ofwat and Ofcom;
- A debt beta of 0 is consistent with the empirical analysis presented by Professor Zalewska, Schaefer and Myers, as well as recent CMA decisions;
- NERA recommend a point estimate of 0.05 for Heathrow.

NERA considered that a debt beta estimate of 0.1 is at the upper end of evidence from regulatory precedent and empirical estimates.²⁹⁹

To be consistent with the CAA approach for NERL, we present the asset betas in our cost of equity assessment for the H7 business plan consistent with a debt beta of 0.1. The determination of asset beta should reflect the assumed debt beta. A higher debt beta will increase the assessed asset beta for a given set of market data, and therefore to be consistent with a debt beta of 0.1 the NERA estimates need to be adjusted. Consequently, we have adjusted the top end of our asset beta range to 0.62 to reflect the increase in debt beta from 0.05 to 0.1.

We understand debt beta will be an issue considered in the NERL CMA appeal. We will update our approach on debt beta for the FBP to reflect the conclusions of this appeal.

This results in an asset beta range for Heathrow of 0.54 to 0.62 based on a debt beta of 0.1.

2.4.4. Overall conclusions on Appropriate Asset Beta for Heathrow

Figure 82 sets out the range of estimates for Heathrow asset beta based on a debt beta of 0.1. It shows a significant divergence in the range from the CAA's advisors to the range identified by NERA.

²⁹⁷ NERA, Cost of Equity for HAL at H7, April 2019, Section 2.2.1.3

²⁹⁸ NERA, Cost of Equity for HAL at H7, April 2019, Section 3

²⁹⁹ NERA, Cost of Equity for HAL at H7, April 2019, Section 3

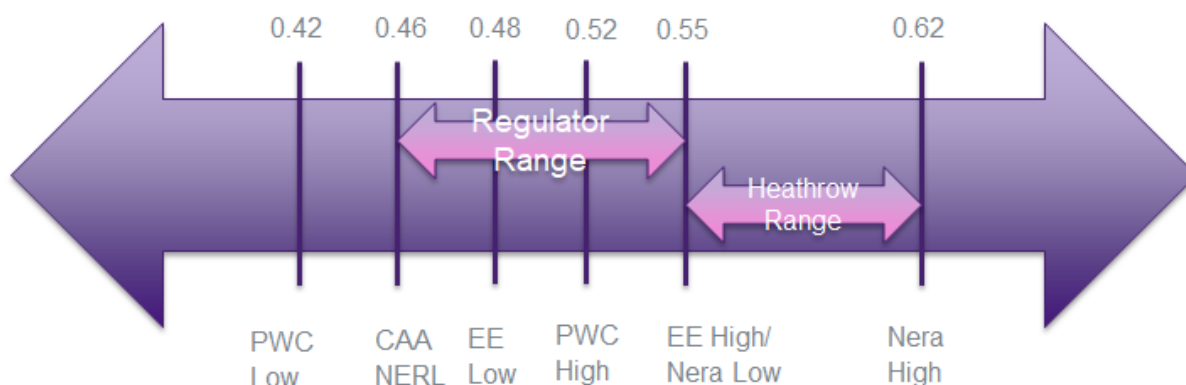


Figure 82: Range of views on asset beta

As set out above, we consider that the approach used by EE and PwC of giving weight to beta estimates derived from the Large Cap market indexes is fundamentally flawed. Therefore, we have not applied any weight to estimates arising from these indexes. We note that excluding the inclusion of asset betas based on the Large Cap index, EE and NERA produce similar estimates for asset beta. This gives us confidence that the NERA estimates are appropriate.

Overall, we consider that with a debt beta of 0.1, the appropriate range of asset beta for Heathrow is 0.54 to 0.62. At 60% gearing this range corresponds to an equity beta range of between 1.20 and 1.40.

2.5. Approach to Tax for the IBP

For the IBP we have assumed the continuation of a pre-tax approach to WACC consistent with CAA precedent for Heathrow (see Chapter 14 - Regulatory Framework).

For the IBP we have assumed a tax rate of 17% in line with published Government policy. We note that corporation tax rates have been the subject of political debate during the 2019 election campaign, and that both major parties are proposing to change the rate. We will reflect any developments in this area in our Final Business Plan (FBP).

2.6. Overall conclusion on CAPM range for cost of equity

Table 49 below sets out an estimate of the range Heathrow's cost of equity based on the conclusion on TMR, risk-free rate and asset beta set out above.

Table 49: Heathrow Estimate of cost of equity range

	Heathrow Low	Heathrow High
Total Market Return	6.00%	6.50%
Risk Free Rate	-1.70%	-1.20%
Asset Beta (debt beta =0.1)	0.54	0.62
Gearing	60%	60%
Equity beta	1.20	1.40
Post-tax cost of Equity	7.5%	9.6%
Tax rate	17%	17%
Pre-tax cost of equity	9.1%	11.5%

Source: Heathrow

Table 49 shows that Heathrow's range of the estimate of its post-tax cost of equity is 7.5% to 9.6% real on an RPI basis. On a pre-tax basis the range is 9.1% to 11.5%.

Heathrow's estimate of the cost of equity range is significantly higher than the range identified by PwC on behalf of the CAA.

Table 50 below sets out the different ranges.

Table 50: Comparison of Heathrow and PwC on Cost of Equity Range

	PwC Low	PwC High	Heathrow Low	Heathrow High
Post-tax cost of equity	4.4%	6.6%	7.5%	9.6%
Pre-tax cost of equity	5.3%	7.9%	9.1%	11.5%

Source: PwC/Heathrow

Table 50 shows that PwC's estimate of the cost of equity for Heathrow is over 3% lower on a post-tax basis and almost 4.0% lower on a post-tax basis. This is a material and significant difference. Around 1%-1.5% of the difference in post-tax cost of equity arises from the different estimates of TMR discussed in Section 2.2 above, and around 1.5%-2% of the difference arises from differences in estimates of asset beta discussed in Section 2.4 above. We show in these sections that the estimates made by PwC are subject to major potential flaws and are biased downwards. For this reason, we place no weight on the analysis by PwC.

2.7. Benchmarks for regulated cost of equity

As a cross-check, we have compared our estimated range of cost of equity to that of other regulated and infrastructure companies globally.

NERA has conducted a review of the international cost of equity decisions for regulated companies operating in the energy and airport sectors³⁰⁰. It shows that:

- US rate decisions for regulated utility companies have been stable over time, despite substantial reductions in US treasury yields. The median allowed return on equity was remarkably stable at around 10% (nominal, pre-tax, or around 7% real (RPI) on a post-tax basis);
- Decisions on regulated airports show an average real cost of equity of 9.1%. Asset betas have been increasing over this period, and this average does not reflect the latest values. This is equivalent to 8.1% on a RPI basis (9.8% on a pre-tax RPI basis).

These benchmarks demonstrate the level of returns available to international investors. Heathrow expansion will require additional equity from our shareholders. They will only invest in Heathrow if the risk adjusted returns from Heathrow are expected to be better than those available to them from other potential investments they might make elsewhere in the world. This means that these airport benchmark rates, adjusted for risk, should be considered a floor on the cost of equity for Heathrow.

Table 51 below sets out the real RPI stripped cost of equity for international comparators alongside the estimates of Heathrow and PwC. US regulated utility companies are widely regarded as relatively low risk and therefore their cost of equity would be expected to be well below that of an airport.

Table 51: Comparison of Benchmarks with Heathrow and PwC Estimates of cost of equity

	US Regulated Utility	International Airports	Heathrow Range	PwC Range
Estimated Range	7.0%	8.1%	7.5%-9.6%	4.4%-6.6%

³⁰⁰ NERA, International precedent on cost of equity, February 2018

Source: Heathrow/NERA/PwC

Table 51 shows that the Heathrow range is consistent with the international benchmarks. The bottom of the range is above the cost of equity of the lower risk US regulated utility companies, and the range brackets evidence for international airports.

Conversely, Table 51 shows that the PwC estimates of the cost of equity are well below the international comparators. Indeed, the top of the PwC range is well below the cost of equity for lower risk US regulated utility companies. This demonstrates that the PwC estimates are divorced from market reality and should be discounted.

2.8. Cost of Equity to Use in the IBP

Taking into account the evidence above, we consider that recent regulatory precedent in respect of TMR is based on flawed analysis and results in estimates of the cost of equity that are inconsistent with international cost of equity benchmarks. Moreover, recent regulatory decisions are being, or are likely to be, challenged through references to the CMA and these appeals may lead to substantial revisions to some of these parameters. For our IBP therefore, we are relying on the evidence from our advisors and from international benchmarks to estimate an appropriate cost of equity.

The evidence set out above identifies a CAPM range of pre-tax cost of equity for Heathrow of 9.1% to 11.5%. This is corroborated with evidence from international airports showing pre-tax cost of equity typically being over 9.75%. Taking these ranges into account we have adopted an estimate of 10.0% for the pre-tax cost of equity to use in the IBP. This is equivalent to 8.3% on a post-tax basis.

We will refine our estimate of Heathrow's cost of equity for the FBP. This estimate may be higher or lower than this working assumption of 10% depending upon the evolving debate on equity returns, the outcome of CMA appeals and movements in market parameters.

3. Cost of Debt for Heathrow

3.1. Introduction

The second important component of WACC is cost of debt. The key parameters in our estimate of the cost of debt are:

- Cost of new debt;
- Cost of embedded debt;
- Proportion of new debt; and
- Appropriate allowance for issuance and liquidity costs.

In this section we set out our estimates of each of these parameters. We take account that the cost and proportion of new debt and the cost of liquidity will be different in a 3R scenario to a 2R scenario and calculate appropriate debt costs in each case.

Consistent with CAA proposals, our approach assumes that the regulatory framework will include indexation of new debt costs based on the iBoxx 10+ non-financial indices. We have not therefore included any allowance for the risk of interest rates increasing above current market estimates.

3.2. Inflation

Our approach to the cost of debt is to estimate a nominal cost of debt and then adjust this to a real cost by using a fixed assumption of RPI over the period of 3.0%. This is consistent with the long-term BoE CPI target of 2.0% and a 1.0% RPI and CPI difference.

As a result of this approach we have used nominal gilts to estimate future changes in interest rate costs. These gilts produce future expectations of the nominal cost of debt that we can deflate using our RPI assumption of 3.0%. The alternative of using index linked gilts would be inconsistent as the implicit inflation in the index-linked gilts will not necessarily be consistent with this assumption of RPI at 3.0%. In addition, the use of index-linked gilts to predict future interest rates may be affected by liquidity and market capacity issues, which make them less reliable for this purpose.

3.3. Cost of new debt

We have estimated the cost of new debt in three steps:

1. Identifying a current basis from the average iBoxx 10+ non-financial A and BBB indices for the 3-months up to September 2019;
2. Making an adjustment for future debt costs based on the implied 20-year nominal gilt curve; and
3. Making an adjustment for the cost of Heathrow debt relative to the index.

3.3.1. Current basis

The estimate for the current index basis was calculated from the average of the iBoxx 10+ non-financial A and BBB indices between 25th June 2019 and 24th September 2019. This resulted in a current basis of 2.53% nominal, or -0.45% real assuming RPI of 3.0% (see Table 56 below).

3.3.2. Adjusting to reflect expected movements in interest rates

The expected movement in interest rates was determined using BoE spot rates for nominal gilts. The implied 20-year gilt cost was calculated in each year³⁰¹ and the current 20-year spot rate subtracted to derive a forward adjustment. This calculation used the average Bank of England spot rates between June and September 2019. Table 52 sets out the resulting uplift in interest rates assumed in each year and the corresponding prediction for the future average of the iBoxx index.

Table 52: Predicted iBoxx Average interest rate (nominal)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Uplift Required %	0.18	0.24	0.29	0.33	0.36	0.38	0.38	0.37	0.35	0.32	0.28	0.23	0.17	0.12	0.06
Predicted iBoxx %	2.71	2.77	2.82	2.86	2.89	2.91	2.91	2.90	2.88	2.85	2.81	2.76	2.71	2.65	2.59

Source: Bank of England/Heathrow Analysis

The future uplift was calculated using the 20-year implied nominal gilt. We consider it is appropriate to use the nominal gilt curve as this ensures that inflation assumptions used in the cost of capital calculations for converting between nominal and real returns are consistent with the underlying data. If instead the index-linked gilt was used then this would include its own explicit assumption of inflation that may not be the same as that used elsewhere (for example if the implied inflation in the index linked gilt was 2.0%, then it would not be consistent to forecast nominal rates using the movement in this gilt and then use 3.0% inflation to convert the nominal rate to a real rate). The 20-year forward curve was used as this reflects the average tenor of the iBoxx 10+ NFC A and BBB indices.

The predicted iBoxx line in Table 52 is key in respect of debt indexation. Future debt indexation adjustments would be determined from the difference in the outturn average iBoxx in each year and the estimate in the table above.

3.3.3. Adjusting for Heathrow specific costs relative to the iBoxx index

There are three adjustments that need to be made to the forecast iBoxx index to obtain the cost of new debt for Heathrow:

1. Make an adjustment to reflect the cost of Heathrow debt relative to the index;
2. Make an adjustment to reflect that a proportion of Heathrow debt will be index-linked and therefore have a higher cost than fixed debt; and
3. In the 3R scenario make an adjustment to reflect the proportion of new debt that is raised on non-sterling markets and the expected costs of these markets relative to Sterling.

3.3.3.1. Adjustments for cost of Heathrow Debt relative to the index

In the following Sections we set out:

- Evidence from NERA on the additional cost of debt for Heathrow;
- Evidence on the spread of Heathrow bonds compared to the iBoxx index;
- Evidence on the difference between spreads on Index-Linked and fixed debt; and
- An estimated the overall adjustment to the iBoxx index that needs to be made to reflect the higher costs of Heathrow debt.

³⁰¹ The implied 20-year rate for year n was calculated by appropriate discounting between the spot rates for year n and year n+20

3.3.3.1.1. Evidence from NERA analysis

We asked NERA to assess the market evidence on the cost of raising debt for Heathrow compared to the average yield of the iBoxx 10+ A/BBB indices. This analysis is set out in the accompanying report³⁰².

NERA considered a wide range of market evidence: it compared the spread on yields of traded bonds for Heathrow to energy and water bonds; it compared Heathrow's yield at issue directly with the iBoxx index; it compared water and energy bond yield at issued with the iBoxx index; and it compared Heathrow's yield at issue compared to the yield at issue of energy and water bonds. NERA shows that:

- The evidence on traded yield spreads for Heathrow's A rated bonds has a spread of 5-20 bps relative to comparable energy and water bonds;
- Heathrow's yield at issue spread relative to the iBoxx benchmark suggests a debt premium of 40 bps (see *Figure 83*); and
- Comparative analysis shows no evidence of a debt premium for energy or water bonds relative to iBoxx benchmark indices, whereas there is evidence that Heathrow's yield at issue is around 30 bps higher than energy and water bonds at issue.

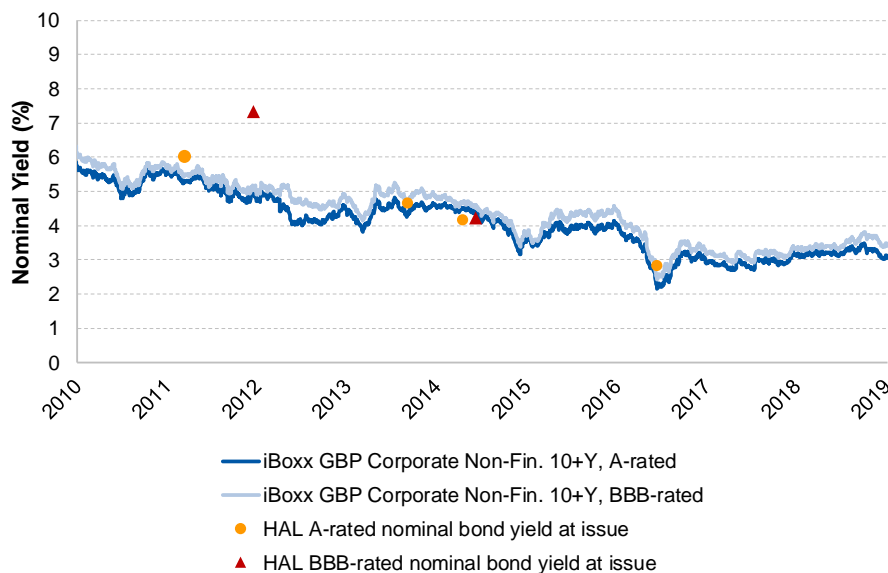


Figure 83: Heathrow Issuance costs compared to iBoxx indices
Source: NERA

The key evidence above relates to the yield at issue as this is the actual cost at which Heathrow issues debt. From this evidence, NERA concludes that the latest market evidence supports a premium of 10-20 bps for Heathrow's debt costs relative to the iBoxx benchmark indices³⁰³. The Heathrow specific evidence suggests that an estimate towards the top of the range is appropriate.

3.3.3.1.2. Spread of Heathrow Debt relative to iBoxx

An alternative approach to estimating the cost of Heathrow debt to the iBoxx index is to compare the actual spread of Heathrow debt with the spread of the index and adjust for an

³⁰² NERA, The cost of debt for HAL in H7, April 2019, Section 2

³⁰³ NERA, The cost of debt for HAL in H7, April 2019, p12

appropriate new issue premium (NIP). An adjustment needs to be made for the NIP as the cost of debt to Heathrow at issuance is greater than the market spread of the debt. This difference is the NIP. Therefore, without an adjustment for the NIP the cost of Heathrow debt relative to the iBoxx index would be underestimated.

In making such a comparison, the tenor of the bonds being compared should be similar to that of the iBoxx index otherwise differences arising from maturity will affect the comparison. Data from Bloomberg shows that the appropriate tenor for the iBoxx 10+ NFC A is around 23 years (c 2043), and for the iBoxx 10+ NFC B around 18 years (c 2038).

Figure 84 below compares the spread of Heathrow A rated bonds terminating in 2041 and 2046 with the iBoxx 10+ NFC A index over the last year. These bonds straddle the average tenor of the bonds in the index and are therefore of an appropriate tenor for the comparison. No comparisons were able to be made with B rated bonds as none had comparable tenors to the index (the majority of long-dated BBB debt is private placement).

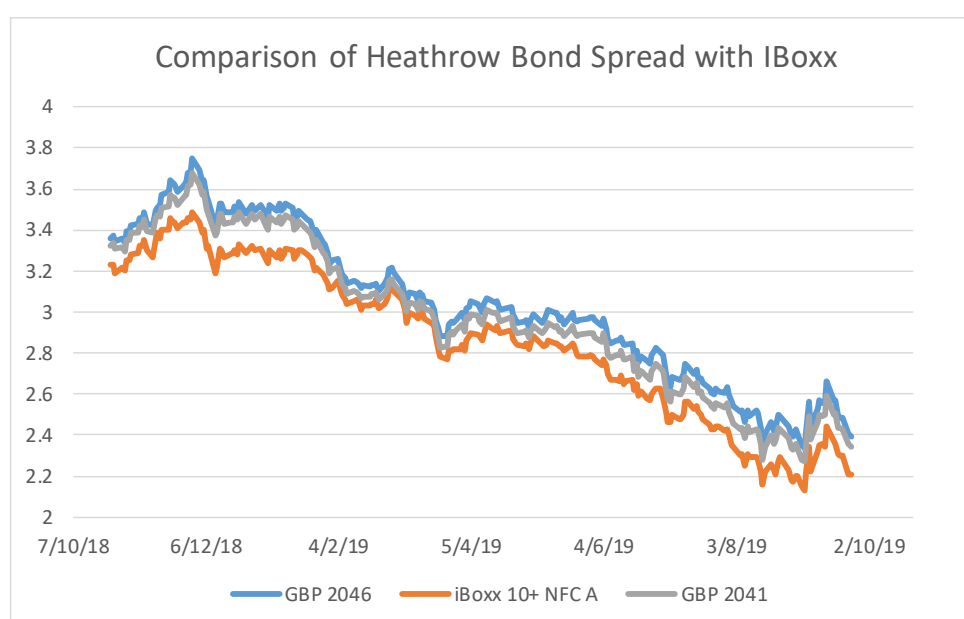


Figure 84: Spread of Heathrow Debt to iBoxx index

Source: Bloomberg/Heathrow analysis

Figure 84 shows that the spread of Heathrow debt was consistently above the iBoxx index. The average difference in cost between the Heathrow debt and the index over the period was 15 basis points.

Taking account of new issue premia of 5-10 bp, this evidence indicates that recently the cost of issuing debt for Heathrow is around 20-25 bp higher than the iBoxx index.

3.3.3.1.3. Evidence on relative costs of IL and Fixed debt

In previous determinations, the CAA has assumed that 30% of Heathrow debt is index-linked when undertaking financeability assessments. This assumption resulted in an improved financeability position and was critical in giving the CAA assurance that its determinations were financeable. In practice, the proportion of debt covered by index-linked swaps is higher at around two-thirds. The spread on index-linked debt is higher than that of the fixed debt used to construct the iBoxx index. Therefore, an adjustment needs to be made to reflect the proportion of the debt portfolio that incurs this higher cost.

Table 53 below sets out a comparison of the spread of Heathrow fixed and index-linked bonds. The bonds have been selected to have similar expiry dates, and an adjustment has been made to reflect the different iBoxx spreads on the issue dates for each bond.

Table 53: Comparison of Nominal and IL Spreads

Type	Expiry	Amount £m	Margin over Gilt bp	Issue date	iBoxx z spread on issue date	Adjusted nominal cost bp
Comparison A						
Nominal	Sep-49	400	142	09/08/2016	113.04	150.65
Index-Linked	Jan-49	75	166	28/01/2014	121.69	
Additional Spread			24			15.35
Comparison B						
Nominal	May-41	750	140	13/05/2011	126.07	143.53
Index-Linked	Mar-40	100	158	24/07/2014	129.6	
Additional Spread			18			14.47

Source: Heathrow

Table 53 shows that the typical difference in cost between fixed and index-linked debt for Heathrow is 15 bps. Applied to 30% of the debt portfolio, this results in a required adjustment for index-linked debt of 5 bp.

3.3.3.1.4. Overall conclusion on additional cost of Heathrow Debt

The sub-sections above show:

- NERA estimates the additional cost at issuance of Heathrow debt over the iBoxx index average to be 15-20bps;
- Examination of the spread of Heathrow debt compared to the index shows a spread of 15 bps. Including an allowance for new issue premia of 5-10 bps indicates an additional cost at issuance of 20-25 bps; and
- Index-linked debt has a spread around 15bp higher than fixed debt. Assuming a portfolio of 30% index-linked debt therefore adds 5 bp to the cost of debt.

Overall, we thus conclude that an allowance of 25bp above the iBoxx index average is appropriate to reflect the additional costs of debt incurred by Heathrow.

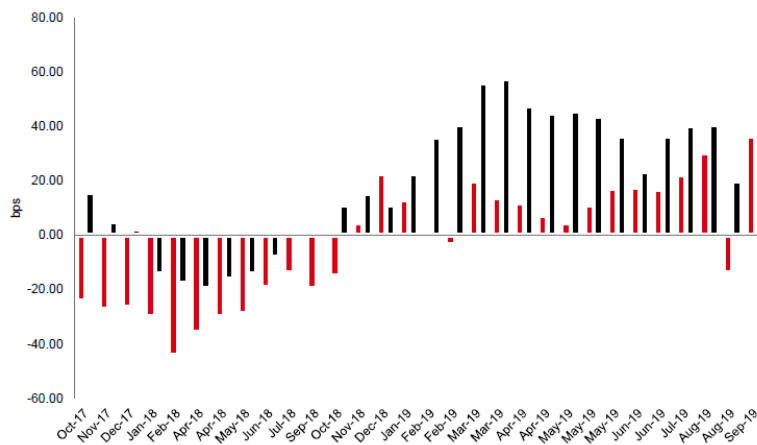
This estimate was based on observing historical debt issuances of Heathrow. Although there are variations for each specific issuance, we consider that this historical average is the best estimate for the likely relative costs of debt for Heathrow going forward. However, there is a risk that the high requirements for debt in the 3R scenario will result in the cost of debt for Heathrow increasing as lenders near the maximum limit of their allowed exposure to Heathrow.

3.3.3.2. Adjustments to reflect non-sterling debt costs

The quantity of debt required during Heathrow expansion is significant. Obtaining this debt solely from the UK market could result in significant pricing pressure for Heathrow and may simply not be possible. Therefore, Heathrow intends to raise the majority of debt for expansion from non-sterling markets.

Figure 85 below sets out an illustrative funding mix for the period up to 2026 and also sets out recent evidence on price differential of the dollar (black) and euro (red) markets relative to sterling.

Relative estimated new issue pricing to GBP (bps)



Illustrative funding mix during Expansion (2020 – 2026)¹

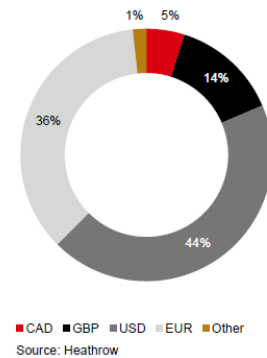


Figure 85: Currency proportion and cost illustration

Non-sterling debt raised will be fully currency hedged. The total cost of debt plus the hedge in different currencies varies with time, but for some markets the average all-in cost is higher than the cost of sterling debt. Table 54 below sets out the average premium to sterling costs for different currencies over the last two years.

Table 54: Currency Spreads Oct 17 to Sep 19

Basis points	EUR	USD	CHF	CAD	AUD
Average premium to GBP	(2.8)	18.8	(8.8)	7.1	1.3

Source: Heathrow

Table 54 shows that the cost of US dollar debt has been typically c 20 bp more expensive than Sterling debt, but that other markets are more comparable on average. Given that it is planned to raise almost half of the debt from the US market, we consider that an additional allowance of 10 basis points on the cost of new debt is appropriate for Heathrow expansion to reflect the requirement to access non-sterling markets.

3.3.4. Overall cost of new debt for Heathrow

Table 55 sets out the resulting 3R predicted cost of new debt for Heathrow. The cost is shown both on a nominal basis and a real basis (assuming RPI of 3.0%). The cost of new debt in a 2R scenario would be 0.1% lower as it would not include the currency adjustment.

Table 55: Predicted Heathrow cost of new debt

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Predicted iBoxx %	2.71	2.77	2.82	2.86	2.89	2.91	2.91	2.90	2.88	2.85	2.81	2.76	2.71	2.65	2.59
Heathrow cost	3.06	3.12	3.17	3.21	3.24	3.26	3.26	3.25	3.23	3.20	3.16	3.11	3.06	3.00	2.94
Real cost of debt	0.06	0.11	0.16	0.20	0.23	0.25	0.25	0.25	0.23	0.19	0.15	0.11	0.05	0.00	-0.06

Source: Heathrow

3.4. Cost of embedded debt

There are two potential approaches that can be taken to estimate the cost of embedded debt:

- Using Heathrow’s actual embedded cost of debt; or
- Constructing a notional cost of embedded debt for Heathrow based on historic corporate debt data and adjusting for Heathrow specific factors.

We consider that the CAA should use Heathrow's actual embedded cost of debt. This cost can be observed directly and unlike the alternative approach does not require a large number of assumptions to underpin the assessment. Using the actual cost of embedded debt is also consistent with CMA precedent in Regulatory Determinations for companies where a range of similar UK comparators do not exist. We consider that there is a significant danger that using a notional approach will result in an inaccurate assessment of Heathrow's embedded cost of debt. If the CAA were to assume a cost of debt below Heathrow's actual cost, it would not only result in an estimate of WACC below Heathrow's actual cost jeopardising investment beneficial to consumers but would also be inconsistent with the CAA's financing duty. Likewise, an estimate of the cost of debt that was too high would not be in the interests of consumers.

3.4.1. Heathrow's actual cost of debt

Heathrow has a sophisticated debt structure involving different classes of debt and a portfolio of swaps to manage interest rate and inflation risk (See Chapter 13 - Financing). This debt structure includes important protections for creditors that allow Heathrow to achieve a lower cost of debt than would otherwise be the case.

For Heathrow SP group as at 31st August 2019:

- The average cost of £8.735bn sterling debt is 5.37% nominal (assuming inflation of 3.0% for index-linked sterling debt)³⁰⁴. This is equivalent to a real rate of 2.30%.
- The average costs over the whole portfolio of £13.354bn post swaps is 5.29% (assuming inflation of 3.0% for index-linked debt and swaps)³⁰⁵. This is equivalent to a real rate of 2.22%.

Overall this shows a current embedded debt cost of between 2.22% to 2.30%. This is the correct measure to use and we have applied it in this plan.

3.4.2. Notional cost of embedded debt

We consider that using a notional cost of debt approach is not appropriate as there is a high risk that it will result in an incorrect estimate of the cost of embedded debt. However, in this Section we show that if done properly with the correct inputs it results in an estimate of the embedded cost of debt that is consistent with our actual cost of debt.

In order to calculate a notional cost of embedded debt we have taken the average of the iBoxx 10+ A and BBB non-financial indices for 20 years and then made an adjustment to reflect the actual cost of Heathrow debt relative to the index.

In the following sections we set out:

- Why 20-years is an appropriate averaging period;
- The average iBoxx cost of debt over this period;
- The relative cost of Heathrow debt to the index; and
- Our estimate of the cost of embedded debt for Heathrow using a notional approach.

³⁰⁴ Based on £1.280bn IL debt at 1.91%, £6.784bn class A, B and Hybrid at 5.71%, and £0.725bn private placement at 2.91%

³⁰⁵ Based on a cost pre-accretion of IL debt of 3.52%, post IL accretion of 4.93% based on actual inflation of 2.64% (Aug 19) then corrected for accretion based on inflation of 3.0%.

3.4.2.1. Averaging Period

It is important that a notional approach to the embedded cost of debt should reflect the treasury practice that would be expected from a well-run company. In particular, this requires that the approach should reflect the range of debt tenors appropriate for the business. These in turn will reflect the typical life of the assets the debt is used to finance.

In practice Heathrow has issued debt over a range of tenors from 10 to 30 years, with an average tenor at issue of around 20 years. This matches the range of its assets typical lives, and allows management of interest rate, refinancing and concentration risk in line with good treasury practice.

Given the range of tenors used by Heathrow, the most robust approach to take in estimating a notional cost of embedded debt would be to use different weights for a 30-year trailing average; a 20-year trailing average; a 15-year trailing average and a 10-year trailing average. Such a notional approach would distribute the weights appropriately so that the average tenor at issue was around 20 years in line with the typical average life of assets constructed. However, such an approach would be complex and reflect a number of assumptions that might be difficult to justify.

A simpler approach is to use a simple trailing average over an appropriate period. Given a typical mix of issuance at different tenors for a notional company, it is likely that at around a quarter of the debt will be older than 15 years, and the average age of the debt would be just over 10 years³⁰⁶. Given this, a 20-year period is a reasonable approximate approach for averaging the embedded debt.

An additional issue that needs to be considered is whether an adjustment needs to be made to the cost of embedded debt to reflect retirement of embedded debt during the period. We consider that such an approach is not appropriate because the embedded debt will have been issued at a range of tenors. This means that:

- Some older debt (e.g. of 30-year tenor) will remain in place during the period;
- Much of the debt of shorter tenor will be retired by the company during the period (e.g. 50% of 10-year debt, 33% of 15-year debt in a five-year period). This will reduce the relative weighting of the younger (and cheaper) debt during the period; and
- The weighting of embedded debt naturally reduces during the period due to the addition of new debt.

If the notional structure with different tenors used above is rolled forward for 5 years with no new additions, but taking account of the debt that is retired, then the average age of the debt outstanding will fall by only a year to around 9 years³⁰⁷. Note that this small change in average age of debt is not particularly sensitive to the specific mix of debt at different tenors, instead it is a feature of a debt portfolio with a range of different tenors and that will have debt of all ages retiring in any one period.

This shows that in practice the cost of embedded debt is not likely to change significantly and therefore no adjustment should be made. Such an approach is consistent with CMA regulatory

³⁰⁶ For example, a potential structure is debt issuance at 65% 30-years, 15% 20-years, 10% 15-years, and 10% 10-years, with the amounts of debt increasing by 6% per annum in nominal terms. This results in steady state a weighted time to maturity of 16.1 years (slightly less than Heathrow) and an average age of debt extant of 10.4 years.

³⁰⁷ In the example above, the average age of the debt after 5-years with no new additions would be 9.2 years.

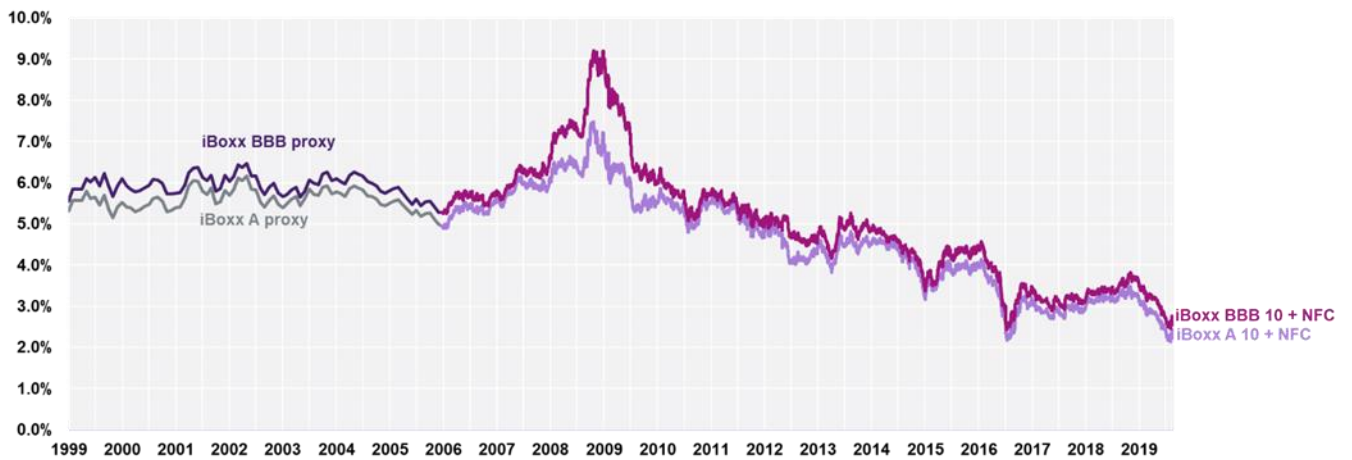
precedence in the Bristol Water case where no adjustment was made for debt retirements to the cost of embedded debt and instead the CMA applied a fixed value through the period³⁰⁸.

3.4.2.2. Average iBoxx index

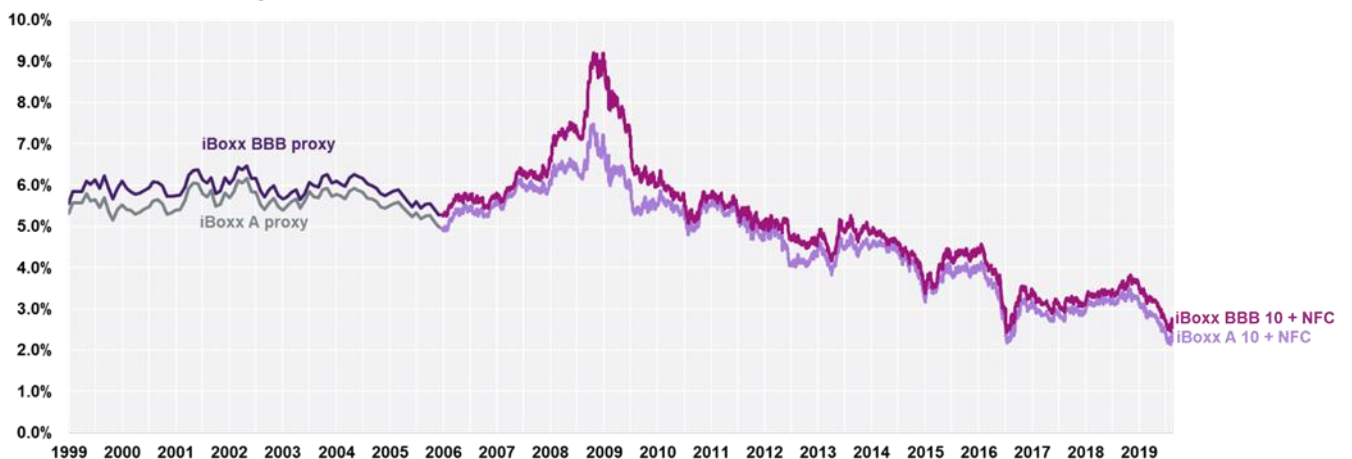
To assess a notional cost of debt we have used the iBoxx 10+ Non-financial A and BBB indices. These are appropriate indices as they match the tenor of Heathrow’s debt and are used by Ofwat and Ofgem in their assessment of company debt costs.

To construct a 20-year average, we used iBoxx data back to June 2006. Proxy earlier data series was obtained by using the spread between June and August 2006 and applying this to 20-year spot gilt rates in the earlier period. The resultant indices are shown in figure 10 below.

iBoxx indices over last 20 years



iBoxx indices over last 20 years



³⁰⁸ Specifically, Bristol Water proposed an approach that calculated the average cost of debt in each year based on the forecast cost and amounts of new debt in the year and the cost of embedded debt taking account of repayments during the period. Note in Bristol’s case the estimated cost of embedded debt was expected to increase as lower cost shorter-term debt was being retired. See paragraphs 10.125 – 10.136 of the 2015 Bristol Water CMA determination.

Figure 86: iBoxx 10+ NFC indices over last 20 years

Source: Bloomberg/Heathrow Analysis

Table 56 below sets out the average cost of the iBoxx indices over different periods up to the last 20-years (up to September 2019).

Table 56: Historic iBoxx 10+ NFC averages

iBoxx 10+ NFC	3-month	10-year	15-year	20-year
Average cost A	2.37%	4.04%	4.62%	4.88%
Average cost BBB	2.70%	4.35%	5.04%	5.28%
Average cost nominal	2.53%	4.20%	4.83%	5.08%
Average cost Real	-0.45%	1.16%	1.78%	2.02%

Source: Heathrow

Table 56 shows the current estimate of the 20-year average of the iBoxx index is 5.08% nominal (2.02% real). This is a representative basis for the cost of embedded debt for Heathrow today. In order to reflect the likely cost of embedded debt for Heathrow in 2021, we have made an adjustment to roll-forward the index for two years. This has been done by using the implied gilt forward curve to estimate the movement in the index over the next two years. This results in an adjustment of -0.29% to give a forecast 20-year average of the index in 2021 of 4.79% nominal (1.73% real).

3.4.2.3. Cost of Heathrow debt relative to the index

We set out our view on the appropriate adjustment for the higher cost of Heathrow debt relative to the index and the adjustment that needs to be made for index linked debt in Section 3.3.3.1 on the cost of embedded debt. In that section we identified that an upwards adjustment of 0.25% was appropriate for the two elements combined.

3.4.2.4. Overall notional cost of embedded debt

Table 57 below sets out our estimate of the notional cost of embedded debt.

Table 57: Notional cost of embedded debt

	Rate
Average iBoxx Sep 99 to Sep 19	5.08%
Heathrow spread	0.25%
Cost of embedded debt at Sep 2019	5.33%
Forward adjustment to 2021	-0.29%
Nominal cost of embedded debt in 2021	5.04%
Real cost of embedded debt in 2021	1.98%

Source: Heathrow analysis

3.4.3. Cost of embedded debt for H7

We consider that the cost of embedded debt should be based on Heathrow's actual cost of debt. However, we note that using correct inputs for the notional approach to the embedded cost of debt results in a similar estimate of the current cost. Heathrow's actual cost of debt at 31st August 2019 of 5.29% to 5.37% (assuming RPI of 3.0%). The notional approach produces an estimate for September 2019 of 5.33% in the centre of this range.

Heathrow's actual cost of embedded debt is likely to fall over the next year reflecting the lower cost of new debt. The notional approach allows us to estimate the likely reduction in the cost of debt by 2021 of 0.29%. We have therefore included this adjustment to reflect the anticipated cost of embedded debt in 2021. Our estimate for the cost in 2021 is 5.04% based on the mid-point of the range for our actual cost of debt adjusted for anticipated changes.

Based on inflation of 3.0% this is a real cost of embedded debt for H7 of 1.98%. This estimate will be updated ahead of the FBP to reflect the actual movements in our cost of debt.

3.5. Proportion of new debt

The cost of embedded debt calculation using the trailing index assumes a 20-year average tenor of debt. For a notional company in steady state therefore, it would be expected that the proportion of new debt at the end of a five-year period would be 25%, and therefore the appropriate weighting of new debt would be 12.5%. This is appropriate for the 2R scenario.

In the 3R scenario, the quantities of debt being raised are much higher and therefore a different approach needs to be used. We anticipate that around 60% of debt will be new by the end of 2026, around 80% new by the end of 2031, and 90% new by the end of 2036. For the cost of debt calculation, we have assumed that the debt drawn down evenly during each period (i.e. we have assumed a weight of 12% per year 2022-26, 4% pa 27-32 and 2% pa 33-36), and that the cost of new debt for that year is in line with Table 55 above. We have assumed that the debt is drawn down evenly through the year.

3.6. Liquidity and issuance costs

As well as the cost of debt related to the interest cost of the bonds raised, Heathrow incurs additional costs that are accounted for in the interest cost line rather than as opex. As such these need to be included in the total interest costs for Heathrow. These additional costs can be grouped into two areas:

- Issuance costs; and
- Liquidity costs.

3.6.1. Issuance Costs

Issuance costs are those costs, such as legal costs and bank fees, that are incurred in raising each issuance of debt. They are amortised over the life of the loan. In addition, there are other platform costs such as rating agency fees that are incurred annually but are not directly associated with any specific loan. Finally, there are occasionally one-off costs associated with the platform such as fees for updating covenants to reflect changes in accounting standards that are required in some years.

Overall, we estimate these costs for Heathrow to be 0.10% over the whole of the debt platform. This is consistent with CMA regulatory precedent in the Bristol Water³⁰⁹ case that allowed 0.1% for issuance costs and the NIE³¹⁰ case that included an allowance of 0.2% for issuance and liquidity costs in their calculation of the cost of debt.

3.6.2. Liquidity Costs

³⁰⁹ CMA, Bristol Water Final Determination: Appendix 10.1, 2015, Para 48

³¹⁰ CMA, NIE Final Determination, 2014, Para 13.77

Heathrow needs to maintain a liquidity facility to ensure that it has sufficient funds to meet its investment and debt repayment requirements over a reasonable future horizon. We have estimated the costs of such a facility for both a 2R and 3R notionally geared company.

The required size of the facility for the notional company is based on requiring 18 months liquidity cover for debt repayments and capex. This is in line with both Heathrow's policy and the typical requirements of rating agencies for liquidity cover. The debt repayments for the notional balance sheet are assumed to be 5% of 60% of the closing 2021 RAB in each year. Table 58 below sets out the assumed required size of the liquidity facility in the 2R and 3R situations. The significantly greater annual capex in the 3R situation means that the required size of the facility is much greater.

Table 58: Required size of liquidity facility

Facility Size		3R	2R
Closing RAB 2021	£m	19,237	19,237
Notional Debt	£m	11,542	11,542
Average debt tenor	Yr	20	20
Expected Repayments	£m	577	577
Average Capex 22-26	£m	4,245	715
Annual Requirement	£m	4,822	1,293
Time horizon	months	18	18
Facility Required	£m	7,233	1,938

Source: Heathrow

The costs of the facility are based on arrangement costs of 75bp for a five-year facility and commitment (non-use) fees of 44bp (based on typical current market costs). Table 59 below sets out the effective cost of the liquidity facility based on the costs compared to the overall level of debt.

Table 59: Interest cost of liquidity facility

Facility Costs		3R	2R
Facility size	£m	7,233	1,938
Set up costs		0.75%	0.75%
Non-utilisation fee		0.44%	0.44%
Life	Years	5	5
Annualised cost of facility	£m	42.7	11.4
H7 Average RAB	£m	28,888	19,237
Gearing		60%	60%
Assumed Debt	£m	17,333	11,542
Effective interest rate		0.25%	0.10%

Source: Heathrow

Therefore, we consider that the liquidity costs to be included in interest costs are 0.1% in the 2R scenario, and 0.25% in the 3R scenario. It should be noted that these costs make no allowance for any cost of carry that is likely to arise as a result of maintaining positive cash balances in the business. As such they are likely to underestimate the actual cost of maintaining liquidity.

Note that new issuance costs are separate from new issue premia (NIP). NIP are reflected in the actual cost of debt. New issuance costs relate to costs of raising debt and managing the debt platform that are not reflected in the interest costs of each specific debt instrument.

3.6.3. Issuance and Liquidity costs overall

Table 60 sets out our view of the total issuance and liquidity costs that need to be included in the overall cost of debt for the 2R and 3R scenarios.

Table 60: Total issuance and liquidity costs

	3R	2R
Issuance costs	0.10%	0.10%
Liquidity costs	0.25%	0.10%
Total costs	0.35%	0.20%

Source: Heathrow

3.7. Overall cost of debt

Figure 87 below sets out the cost of embedded debt, the cost of new debt and the overall cost of debt over the period up to 2036. It shows that the overall cost of debt falls as the proportion of new lower cost debt increases.

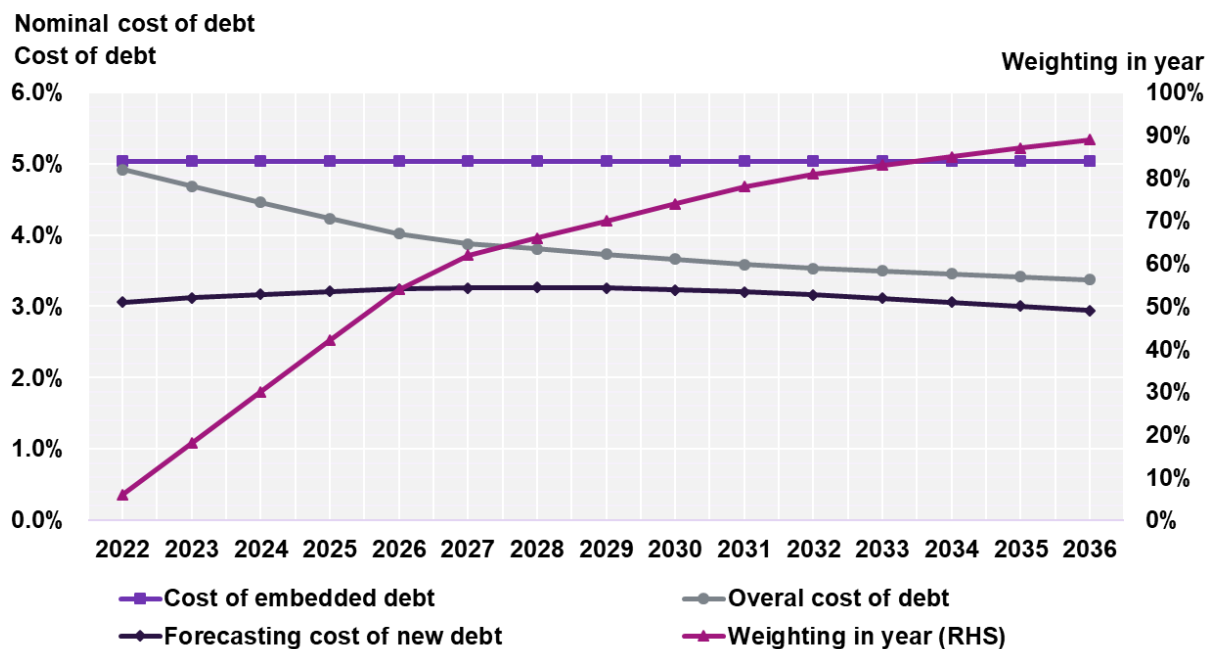


Figure 87: Cost of Debt

Source: Heathrow

Table 61 below sets out our estimates of the cost of debt for Heathrow in the 2R and 3R cases. For the 3R case the cost has been averaged over three five-year periods. The table shows the direct interest cost of the debt and the additional interest costs incurred for issuance and to maintain liquidity.

Table 61: Heathrow cost of debt

Combined Debt	2R Cost of Debt	3R Cost of Debt		
	22-26	22-26	27-31	32-36
Cost of Embedded debt	1.98%	1.98%	1.98%	1.98%
Cost of new debt	0.05%	0.15%	0.23%	0.05%
Weighting new debt	12.50%	30%	70%	85%

Cost of Debt	1.74%	1.42%	0.71%	0.44%
Issuance and liquidity costs	0.20%	0.35%	0.35%	0.35%
Overall cost of debt	1.93%	1.77%	1.06%	0.79%

Source: Heathrow

Table 61 shows that the 3R cost of debt is lower than the 2R cost and declines in later periods. This reflects the substantially larger amounts of new lower cost debt required in the 3R scenario, partially offset by slightly higher costs of new debt because of the allowance for non-sterling costs and the higher costs of the liquidity platform required for 3R.

4. Impact of expansion on Heathrow WACC

4.1. Introduction

Heathrow expansion represents a significant change to Heathrow's existing business model and risk profile. In particular, the scale of capital expenditure and the associated construction risk are significantly higher than in a business as usual 2R situation. In addition, the requirement for equity injection and the extended period of negative cashflow mean that expansion is not comparable to the situation of other regulated companies and investors will regard it as riskier. The additional risk arising from expansion needs to be recognised in the returns available to Heathrow.

We consider that expansion leads to additional financing costs because:

- The additional risk exposes Heathrow to material downside outcomes that are not accounted for by the capital asset pricing model. This downside risk necessitates an adjustment to either returns or cashflows; and
- The additional risk also increases Heathrow's systematic risk exposure. The level of risk implicit in the comparators used for setting the cost of equity for Heathrow does not reflect the additional systematic risk arising from expansion; and
- The need for an equity investment followed by an extended period of negative cashflow increases risk by deferring investment returns (see Chapter 13 - Financing). This profile is not typical of the comparator airports used to estimate asset beta.

This section sets out:

- A summary of the construction risk arising from expansion;
- A summary of an assessment by KPMG of the required WACC premium to recompense investors for the additional risk arising over a 2R situation;
- An analysis of benchmarks of risk premia; and
- Our overall views on the required risk premium.

The impact of expansion on the cost of new debt, cost of liquidity and proportion of new debt has been covered in the cost of debt section and is reflected in the 3R cost of debt.

4.2. Construction Risk Arising from Expansion

There is a long history around the world of large infrastructure projects taking longer and costing more than forecasts made early in scheme development. In order to provide a robust estimate of the construction risk of Heathrow expansion we asked KPMG to assess published data on infrastructure cost and time performance and use this to estimate the likely risk for Heathrow given the nature of expansion and the maturity of our cost estimates.

KPMG undertook a four-step process to the study³¹¹:

- Defining cost and schedule risk including reviewing existing evidence on cost and schedule overruns;
- Collecting data from public sources and identifying a comparable sample of infrastructure projects from different sectors;
- Reviewing data to define key elements of the Heathrow expansion plan and reviewing them against reference data; and
- Analysing cost and schedule to generate risk profiles for the elements of the scheme and the scheme overall.

KPMG reviewed data for 93 reference projects of greater than £200m. Projects were drawn from airports, rail, road, and complex buildings. There was a geographical spread with projects from the UK, Europe, Australia, USA, the Middle East, Japan and South Korea with a focus on developed nations. Following review, they identified 77 projects with suitable cost data.

A key requirement of the study was to understand how construction risk changes with maturity of the cost estimate. As a result, KPMG analysed cost variance compared to Outline Business Case (OBC) and Final Business case (i.e. contract award) (FBC) estimates. This allowed some account of the maturity of cost estimates to be made.

The various projects were mapped to key elements of the expansion programme, namely:

- New terminals, including baggage;
- Offsite works outside the existing boundary (excluding highways and rail);
- Expansion supporting infrastructure including car parks and airfield ancillaries;
- Highways and roads including diversions and realignments for the A4, A3044 and M25; and
- Rail

Figure 88 shows the cost overrun variance between OBC to final and FBC to final for each of the expansion programme elements based on the schemes mapped to each element. It also shows the mean and quartile variances.

³¹¹ KPMG, Heathrow Risk Analysis, Report for Heathrow Airport Limited, November 2019

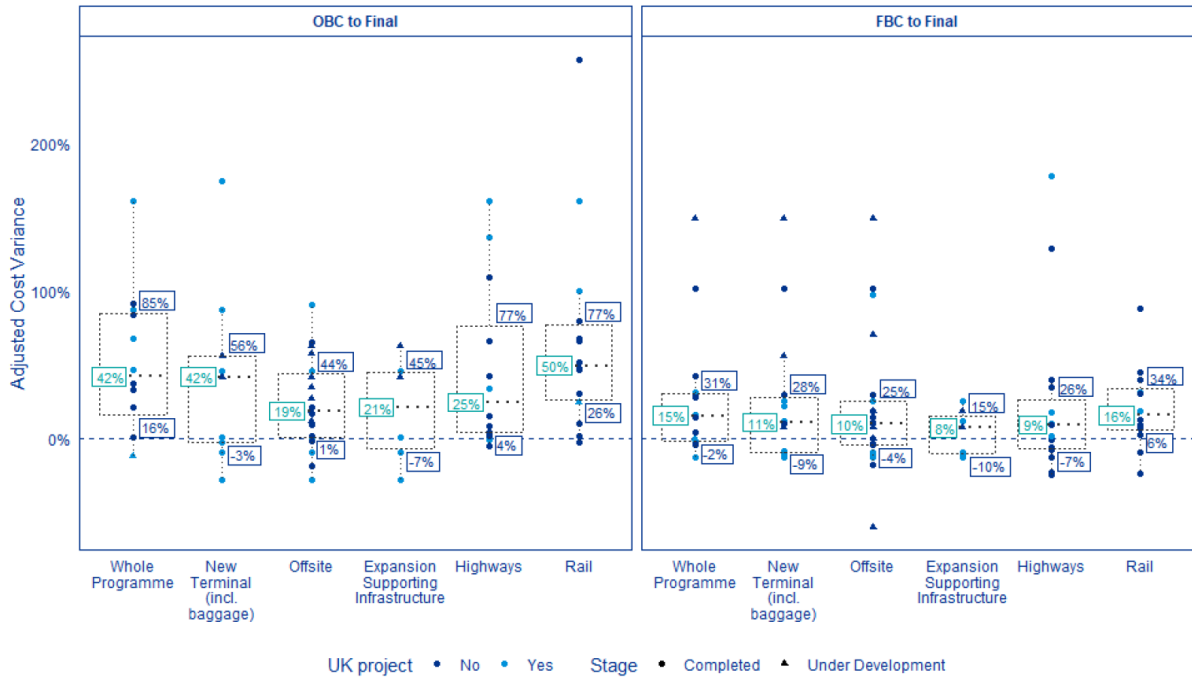


Figure 88: Cost variance by element of expansion

Figure 88 shows that the interquartile cost variances from OBC to final cost are much larger than those from FBC to final.

Cost distributions were estimated for each element of the programme. These distributions took account of the expected relative maturity of the cost estimates of the scheme at the stage of CAA H7 determinations in 2021. The offsite and new terminal elements are assessed to be still at OBC at that stage. The onsite and road programmes are assessed to be at FBC at that time. The resulting cost risk distributions are illustrated in Figure 89.

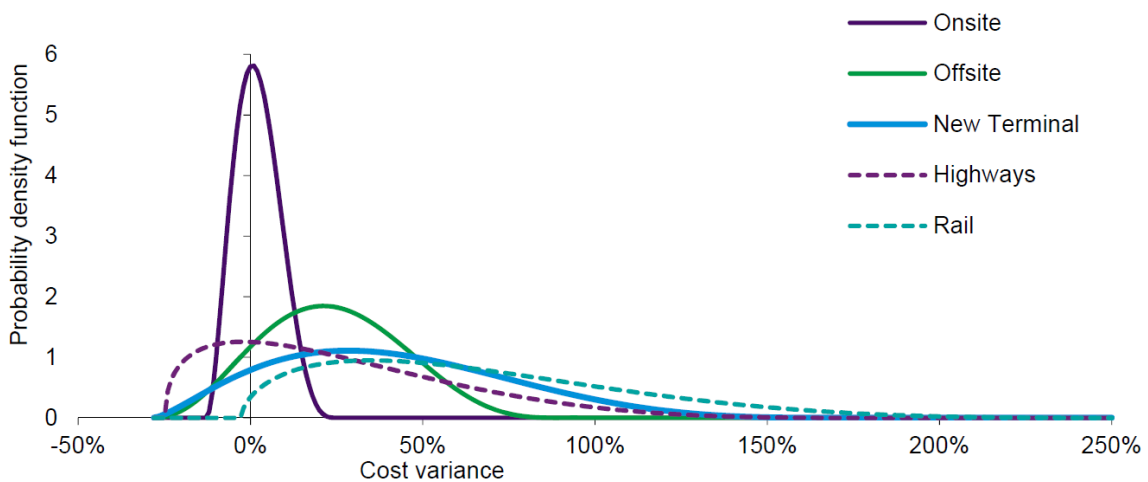


Figure 89: Comparison of Expansion Elements cost risk distributions

Figure 89 shows the largest risks were for offsite and new terminals reflecting the lower maturity of these schemes. The risk from rail is also very high, but this was not factored into the analysis as the current expectation is that Heathrow will pay a fixed contribution for rail schemes.

The elemental cost risk distributions were combined to give an overall programme risk using monte-carlo analysis. The results of the analysis show an expected cost distribution with a P50 overspend of 27% and a P80 overspend of 41% as set out in Table 62 below.

Table 62: Overall cost risk summary

	Mean	Min	P10	P50	P80	P90	Max
Element risk Independent	28%	-12%	9%	27%	41%	48%	78%
Element risk fully correlated	28%	-22%	8%	27%	41%	48%	106%

Source: KPMG

The factors leading to cost overruns in different elements of the programme could be correlated. For example, higher manpower costs would be expected to affect all elements. Table 62 sets out the cost risk assuming independence or full correlation. This shows that the p10 to p90 range is not significantly affected by this issue.

The cost variance modelled here is based on the estimates of the schemes reviewed. The OBC and FBC elements of these schemes would have included an element of contingency. Therefore, the cost variance set out above is relative to the current forecast including contingency.

Schedule variance was modelled slightly differently based on a sample of projects most comparable to the expansion programme overall. This analysis showed a schedule variance distribution with a P50 delay of 2.6 years and a P80 delay of 4 years as set out in Table 63.

Table 63: Overall schedule risk summary

	Mean	Min	P10	P50	P80	P90	Max
Delay (years)	2.8	0.0	1.0	2.6	4.0	4.9	9.0

Source: KPMG

4.3. WACC premium for additional risk

KPMG has undertaken an analysis of the risks arising from expansion and how they should be reflected in a premium to the cost of capital³¹². In its report, KPMG sets out a robust, quantifiable approach to estimate the risk premium appropriate for Heathrow expansion. It uses a Monte-Carlo analytical framework to quantify the risks and assess the compensating cost of capital premium required.

The results from direct modelling using Monte-Carlo analysis are sensitive to the input assumptions. Consequently, all the input assumptions used in the modelling have been rigorously evidenced and justified. The analysis was based on an early view of the opening schedule and reflects the runway opening in 2026. This will be updated for the FBP.

The analysis identified key drivers of increased risk exposure relative to the business as usual. These are set out in Table 64 alongside a brief description of the quantification of the risk.

Table 64: Key risks in KPMG analysis

Risk Category	Risk Variable	Description	Quantification
Construction	Additional Capex above forecast	Risk that capex is higher than forecast at determination	Construction risk assessment (Section 4.2)

³¹² KPMG, Analysis of Risk and Required Returns for R3, November 19

	Construction delay	Risk that programme is delivered later than assumed at determination leading to lower passenger numbers and revenues	Sourced from Greenbook
Revenues	Passenger Growth forecasting error	Risk that passenger numbers are lower than assumed at determination leading to lower revenues	R3 Forecasting model (Chapter 8)
Financing	Actual cost of debt	Cost of debt risk is largely mitigated through the debt indexation approach. However, residual effects remain around timing of recovery and Heathrow exposure relative to the index	Based on risk of financial disruptions increasing debt cost (covered by indexation) and additional cost (22bp) if downgraded (not covered by indexation)
Cost recovery	None	Risk that some capital expenditure is not recovered (ex-post or ex-ante disallowance)	Based on range of previous CAA ex-post judgements and CMA view on SONI appeal
Operating costs	Opex forecasting error	Risk that opex increases by more than forecast as the airport expands	Based on comparison of operating costs during expansion for six airports
Legislation	None	Risk from legislative changes or change is international agreements	Not modelled
Surface Access	None	Risk from changes in the contribution level required from Heathrow for surface access schemes	Not modelled

Source: KPMG/Heathrow

KPMG did not address any risks associated with commercial revenue. Nor did they assess the impact of additional risk arising from the financing profile of expansion in which cashflow remains negative for many years. The ranges of cost and schedule overrun for construction risk as derived from the analysis set out in Section 4.2. The actual risks for each of the cost elements were implemented separately within the monte-carlo framework.

The passenger number risk was based on the modelling range obtained from the R3 forecasting model (see Chapter 7- Passenger Forecast). The input to the monte-carlo analysis was a pert distribution for each year based on the min, mode and max from the forecast model. Financing risk reflected an 11% chance per year of a financial crisis increasing the cost of debt by 3.0%. This was then assumed to recovered later through the debt indexation process. Where the model calculated a 2-year trailing PMICR of less than 1.5, the cost of debt was assumed to increase by 0.22% to reflect a rating downgrade. This additional cost was not mitigated by debt-indexation.

The capex ex-post disallowance was implemented as a uniform random variable between 0.4% and 6.4% based on the highest and lowest observed ex-post disallowances by the CAA. This variable was correlated with cost overrun so that higher disallowances were more likely in cases of higher cost overrun. We note that the mean of this distribution at 3.4% is close to the CMA assessment of 3% as an appropriate risk allowance for an ex-post incentive regime in the SONI appeal³¹³.

³¹³ CMA, SONI Limited V Northern Ireland Authority for Utility Regulation, Final Determination, Nov 2017

The model ran for the period 2020 to 2036 using 10,000 iterations, with each iteration involving randomisation of all selected risks along their selected distribution. Three key outputs were obtained from the modelling:

- The average (expected) IRR;
- The P90 IRR, also referred to as value at risk; and
- The standard deviation of the IRRs.

The increase in standard deviation compared to the Q6 scenario was used to estimate the increase in systematic risk arising from the project resulting in an estimate of an additional cost of equity of between 0.34% to 0.38% for the seventeen years. This is equivalent to a WACC premium of 0.14% to 0.15%.

The average IRR impact and the P90 impact were used to identify a range for the required premia. The modelling identified the premia required for a 17-year period starting in 2020. This was adjusted to reflect the 15-year period for which the premia will apply. Table 65 sets out the resulting modelled range of risk premia.

Table 65: Modelled required risk premium ranges

	Risk Asymmetry and Value at Risk		Additional exposure to systematic risk		Total required premia on pre-tax WACC
Q6 to H7+R3 (17 years)	0.56% to 0.80%	+	0.19% to 0.22%	=	0.75% to 1.02%
Q6 to H7+R3 (15 years)	0.64% to 0.90%	+	0.21% to 0.25%	=	0.85% to 1.16%

Source: KPMG

Table 65 shows that the modelling indicates a premium of 0.85% to 1.16%. A key caveat around this analysis is that it has not considered whether each of the 10,000 scenarios are individually financeable. It is possible that some of them may not be and therefore in practice would require additional equity to be deliverable. Additional equity requirements in some downside scenarios could reduce equity IRRs and lead to the need for a higher equity premium. The potential impact of financeability constraints will be assessed for the FBP.

In addition, the modelling does not take into account the additional risk that arises due to the characteristics of expansion related to the need for an equity injection followed by an extended period of negative cashflow. This fundamentally changes the profile of the investment and increases investors perception of risk. This additional risk supports use of an estimate towards the top of the range identified.

KPMG also undertook a sensitivity analysis. The key findings of this were:

- Replacing the Heathrow specific construction risk with a profile derived from the Green Book or a sample of UK only infrastructure schemes resulted in broadly similar premia;
- Updating the maturity of the New Terminal and Offsite elements to FBC rather than OBC reduced the premia by around 3-5 bp;
- Using the maximum CAA disallowance of 6.4% (rather than a range between 0.4% and 6.4%) increased the premia by around 18 bp;
- Reducing the impact of a financial shock to 2% over 1 year (as opposed to 3% over 2 years) reduced the premia by around 8-11 bp.

In addition, KPMG undertook some sensitivities to reflect possible changes in the regulatory framework as set out in Table 66, which shows the impact on the risk asymmetry and value at

risk for the alternative regulatory options. Note the systematic risk element would need to be added to get the overall required risk premium.

Table 66: Sensitivity of premia to regulatory framework

Case	H7+R3 Required WACC premium (excluding systematic risk)	
Base Estimate	0.64% - 0.90%	
Ex-ante capex risk sharing	10% ex-ante incentive	0.54% - 0.74%
	20% ex-ante incentive	0.65% - 0.92%
	50% ex-ante incentive	1.02% - 1.57%
	100% capex cost risk	1.80% - 3.11%
Revenue Framework	50% volume pass through	0.60% - 0.85%
	100% volume pass through	0.55% - 0.80%

Source: KPMG

Heathrow currently has ex-ante risk from G3 for each project in that over or underspends relative to the G3 target are not included in RAB until the end of the period and are not remunerated during the period. The scale of the ex-ante incentive depends upon the timing of expenditure relative to the end of the period. For expenditure in year 3 of a 5-year period, the effective incentive rate is around 10%, and for year 1 around 20%. The KPMG modelling approach has not taken this into account. Table 66 shows the impact of replacing an ex-post ex-ante framework with different strengths of ex-ante framework. A 20% or higher sharing rate would lead to a significant increase in the required risk premium. Sharing volume risk however, only has a small downward impact on the required premia.

KPMG also assessed the separate premia that would be required for each 5-year period of H7 if it were set separately for each period based on the risks in that period alone. The results are set out in Table 67 excluding the systematic risk impact.

Table 67: Period Specific risk premia

	2020-36	2022-26	2027-2031	2032-2036
Required risk premium	0.85% - 1.16%	1.62% - 2.42%	0.27% - 0.49%	0.12% - 0.08%

Source: KPMG

Table 67 shows that using separate premiums for each period would result in a much higher premium for the period 2022-26, with a lower premium in 2027-2031 and much lower premia in 2032 to 2036. Using separate premia in each period would all else equal therefore lead to much higher airport charges in the first 5-year period and lower charges in the last 5-year period. This would make the charge profile more peaky than a fifteen year view.

We will update the KPMG analysis ahead of our FBP in 2020 to reflect updates in capital expenditure, the updated runway opening date and any developments in the regulatory framework. This may increase or decrease our estimate of the required expansion premium. In addition, we will also continue to assess the financeability and cash-flow profile characteristics of expansion that are currently not captured in the premium estimate.

4.4. Benchmarks for 3R Premium

Recognising and reflecting significant downside risks and special projects is standard market practice in UK economic and market regimes.

KPMG provided an analysis of benchmark evidence on the scale of required risk premium from high-risk projects in the UK. It examined nine relevant infrastructure projects considering

their different risk exposures and estimates that additional required returns of 156 bps over a 12-year period are required for Heathrow expansion project³¹⁴.

PwC also set out an analysis of benchmark premia for expansion risk in its 2018 report³¹⁵. This identified a range for a 5-year risk premium of between 0.25% and 1.0%. However, the PwC analysis was erroneous because it ignored risks other than construction and applied long-term premia from comparator projects only over a five-year period. KPMG has undertaken an analysis of PwC's benchmark approach to correct it for these errors and shows that the range of benchmarks identified by PwC as 0.25% to 1%, would have instead been 0.7% to 5.4%³¹⁶ for a five-year period.

KPMG updated its analysis of the benchmarks to take into account that Heathrow was not a greenfield site (and that therefore the comparable premia should be scaled down). They set out a summary table of the allowed WACC premiums in each case study and how long the premiums were available for³¹⁷. The benchmarks were scaled to reflect that they only apply to the new Heathrow RAB, and to adjust for a 15-year period for the premium. The resulting benchmarks are set out in Table 68.

Table 68: Benchmark Risk Premiums for 15-year period

Benchmarks	Premium in Case Study	Scaling for Heathrow not greenfield	Adjusted premium	Years of premium allowed	Equivalent 15-year premium
Offshore Wind	1.65%	55%	0.91%	15	0.91%
Hinkley Point C	2.80%	55%	1.54%	35	2.43%
Phoenix Natural Gas	1.50%	55%	0.83%	20	1.00%
PPP/PFI	1.12%	55%	0.62%	25	0.84%

Source: KPMG/Heathrow analysis

Table 68 shows that the range of WACC premia in the benchmark schemes for an equivalent 15-year period was 0.84% to 2.43%. The breadth of this range reflects that the projects differ considerably in their characteristics and risk exposure. This highlights the critical importance of developing a robust and systematic approach for determining the premium required for a specific project.

Heathrow has more volume risk than each of the comparators. Offshore wind, PPP/PFI and PNG have very little volume risk as they are regulated through revenue caps. Heathrow is also likely to have a greater construction risk than Offshore wind, PPP/PFI and PNG. However, the construction risk for Heathrow is mitigated by the ex-post capex regulatory framework compared the ex-ante frameworks in place for these benchmarks. We therefore consider that these premia (0.84% to 1.00%) represent a lower bound for the appropriate premium for Heathrow expansion.

We also consider that Heathrow expansion has higher volume risk and at least similar construction risk to Hinkley Point C. However, under an ex-post regulatory regime the net exposure of Heathrow is likely to be lower than HPC which has to bear the full cost of overruns.

³¹⁴ KPMG, Risks and Returns for R3, November 17

³¹⁵ PwC, Estimating the Cost of Capital for H7 – A Report Prepared for the CAA, February 2018

³¹⁶ KPMG, Heathrow Airport Limited, Economic Regulation of capacity expansion at Heathrow, Response to CAA consultation: estimate of required return premium, February 18

³¹⁷ KPMG, Heathrow Airport Limited, Economic Regulation of capacity expansion at Heathrow, Response

to CAA consultation: estimate of required return premium, February 18, Table 2

Therefore, Hinkley Point is likely to be a relevant comparator to Heathrow only in a highly incentivised ex-ante regulatory framework.

Overall, we consider that the benchmarks support a minimum premium of 1.0% for Heathrow expansion. This is within the range identified by the bottom-up analysis.

4.5. Our view on Appropriate 3R Premium

The risk analysis by KPMG identified an appropriate range for the expansion premium of 0.85% to 1.15% based on the proposed regulatory framework. The evidence from appropriate benchmarks also indicates that a premium of over 1.0% is required.

For the IBP we have adopted a point estimate of 1.05% for the expansion risk premium. This is consistent with the value at risk calculated from the detailed bottom-up analysis and consistent with the previous regulatory approach for Phoenix Natural Gas.

We will update our estimate for the FBP to take into account developments in the regulatory framework, the updated runway opening date, developing maturity in cost estimates and updates to volume risk. We will also take into account the potential impact of financing constraints.

5. Conclusion on overall WACC for Heathrow

In Section 0 we explained that setting the right level of WACC is important for encouraging investment and that this was especially true in the context of Heathrow expansion. Expansion would deliver £187bn benefit to the economy and give consumers more choice of flights and destinations. In addition, marginal increases in airport charges will not be passed on to consumers while Heathrow cannot meet the demand of all those who wish to use it.

Table 69 sets out Heathrow's estimate of the WACC required for H7 in 2R and 3R situations. For the 3R case, the WACC is set out in periods of 5-years and reflects the anticipated fall in debt costs over the period. The values set out are the average for each five year period. The estimates are soundly based on current market evidence and robust and transparent analysis. We consider that the level of WACC set out in Table 69 is the minimum efficient level required for H7.

Table 69: Heathrow WACC

Combined WACC	2R WACC	3R WACC		
	2R	22-26	27-31	32-36
Gearing	60%	60%	60%	60%
Post-tax cost of equity	8.3%	8.3%	8.3%	8.3%
Pre-tax cost of equity	10.0%	10.0%	10.0%	10.0%
Cost of debt	1.93%	1.77%	1.06%	0.79%
Vanilla WACC	4.48%	4.38%	3.95%	3.79%
Pre-tax WACC	5.2%	5.1%	4.6%	4.5%
Expansion Risk Premium		1.05%	1.05%	1.05%
Overall WACC	5.2%	6.1%	5.7%	5.5%

Source: Heathrow

Figure 90 and Table 70 set out the WACC estimated on a year by year basis, showing a fall from 6.4% at the start of the period to 5.5% at the end of the period. This reduction is as a result of the increasing weight of new, lower cost debt.

Year by Year WACC

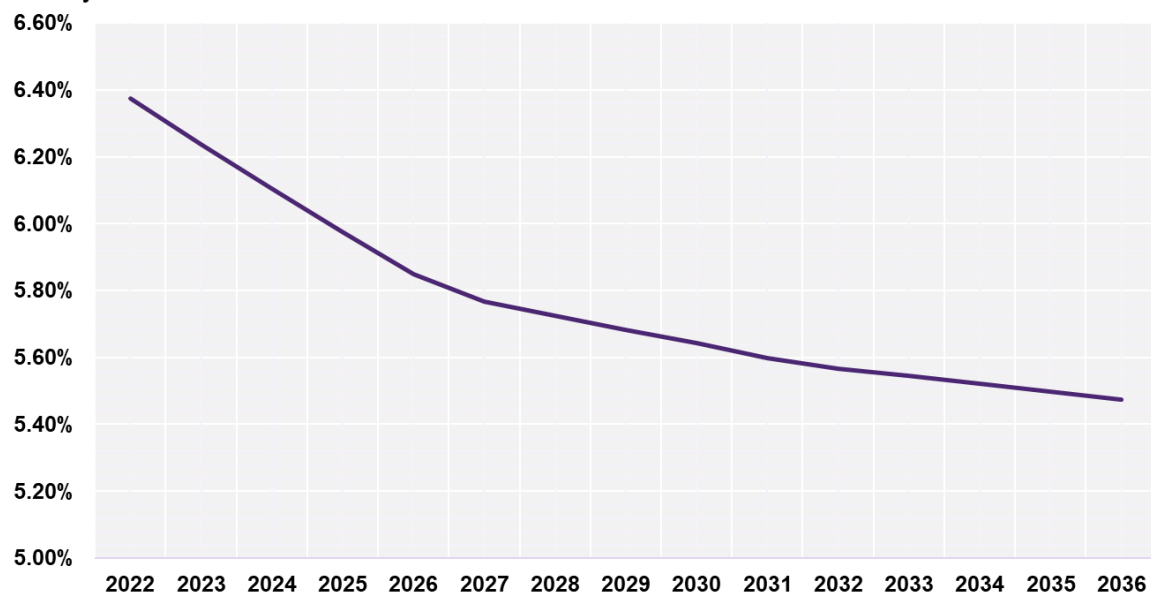


Figure 90 - Year by Year estimate of WACC

Table 70: Year by Year WACC

%	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Cost of debt	2.21	1.98	1.76	1.54	1.33	1.19	1.12	1.06	0.99	0.92	0.86	0.82	0.79	0.75	0.71
Vanilla WACC	4.64	4.51	4.38	4.25	4.12	4.04	3.99	3.95	3.91	3.87	3.84	3.81	3.79	3.77	3.74
Pre-tax WACC	5.32	5.19	5.06	4.93	4.80	4.72	4.67	4.63	4.59	4.55	4.52	4.49	4.47	4.45	4.42
WACC including expansion risk	6.37	6.24	6.11	5.98	5.85	5.77	5.72	5.68	5.64	5.60	5.57	5.54	5.52	5.50	5.47

Source: Heathrow

We will review our estimates of the cost of debt and equity ahead of our FBP submission next year:

- Our estimate of the cost of debt will be updated to reflect the latest market data;
- Our estimate of the expansion risk premium will reflect developments in the regulatory framework and any changes arising from the M5 masterplan; and
- Our estimate of the cost of equity will reflect any changes to market data and the ongoing debate on the appropriate way to estimate the TMR

13 - FINANCING

Overview

- Heathrow expansion is to be fully privately financed with no recourse to taxpayers while unlocking significant benefits for consumers by delivering expected airfare reductions of up to £140 per passenger
- These passenger benefits can only be delivered if expansion is financeable.
- The scale of financing required for expansion is much greater than previous UK private infrastructure investments
- Given the scale and duration of these risks, an A- rating is critical to the financeability of expansion
- Significant additional equity is required from our shareholders to maintain our existing A- credit ratings over the coming years of significant negative free cashflow
- In order to ensure that expansion is investable for shareholders, it is fundamental to have an appropriate WACC with long term visibility of the cost of equity as Shareholders bear significant long-term project specific and macro-economic risks. Small reductions in WACC lead to very large additional equity requirements
- Debt financeability is driven by the sustained confidence of debt investors who in turn rely on committed long term equity investment to enable us to maintain our debt credit metrics at appropriate levels through the construction period
- We welcome indexation for changes in cost of new debt over H7 as a more effective and affordable mechanism to manage growing refinancing risk amid the current record low interest rates environment
- Financing costs represent a significant portion of airport charges to passengers. We have implemented a robust financing strategy to mitigate risks to equity investability and debt financeability over the longer term
- The Initial Business Plan (IBP) is investable and financeable at the WACC included in the plan and is robust to reasonable downside scenarios. WACC levels below those included in this IBP may not be financeable

1. Introduction

In this chapter we provide an overview of Heathrow's existing financing arrangements and how we intend to fully privately finance the expansion of Heathrow Airport. This will unlock significant benefits for passengers by delivering airfare reductions of up to £140 per passenger. Delivering expansion will increase competition at Heathrow Airport by allowing new airlines to enter Heathrow and all airlines to operate new routes. This will significantly increase domestic connectivity and connect all of the United Kingdom to global growth.

Expansion will be entirely privately financed with no recourse to the taxpayer at any stage. The scale of the investment means financing costs will represent a significant portion of airport charges to passengers. Financeability is thus fundamental to affordably delivering expansion and unlocking lower airfares for consumers.

Expansion will be financed by a combination of operating cashflows from existing operations, new equity from our shareholders and significant amounts of new debt delivered through our existing debt platform.

Heathrow Airport Limited (HAL) is the regulated subsidiary of the Heathrow (SP) Group that funds the airport. The Heathrow (SP) Group finances its activities through a mix of senior (Class A) and junior (Class B) term debt including bonds and revolving credit and liquidity facilities in a variety of tenors, formats and currencies. We hedge a significant proportion of our interest rate and inflation exposure and all currency exposures under our approved hedging policy. The Heathrow SP Group also has access to subordinated debt raised by its parent company, Heathrow Finance Ltd, and holding companies above that level, although there is no external debt outstanding above Heathrow Finance PLC at present. This debt platform has raised around £14 billion to date and successfully financed the construction of Terminal 2 and Terminal 5.

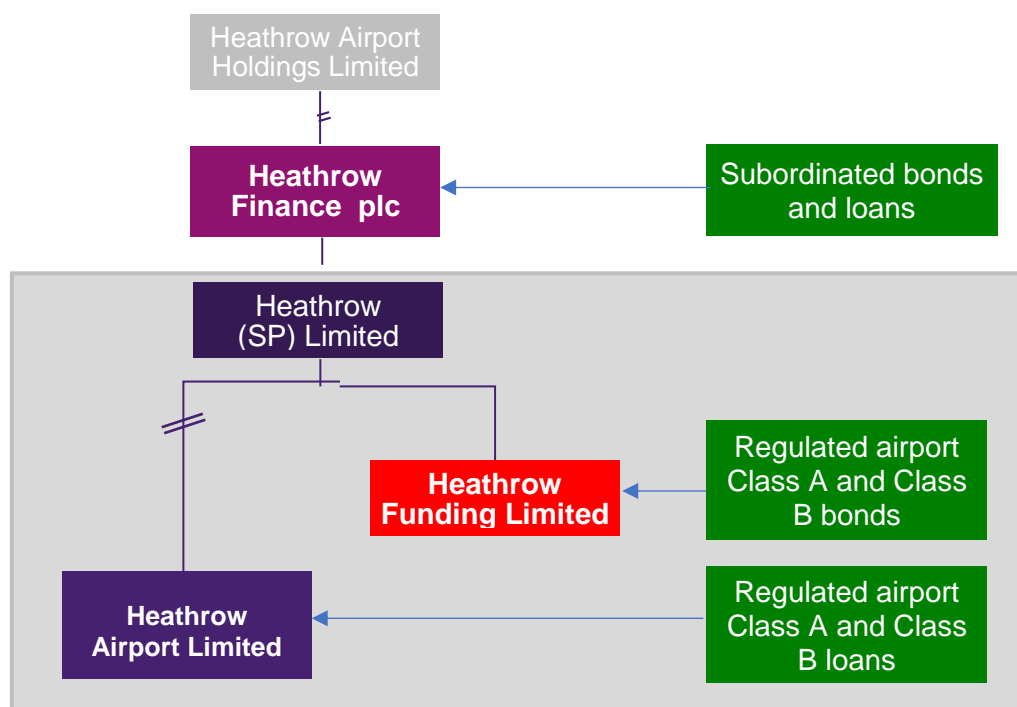
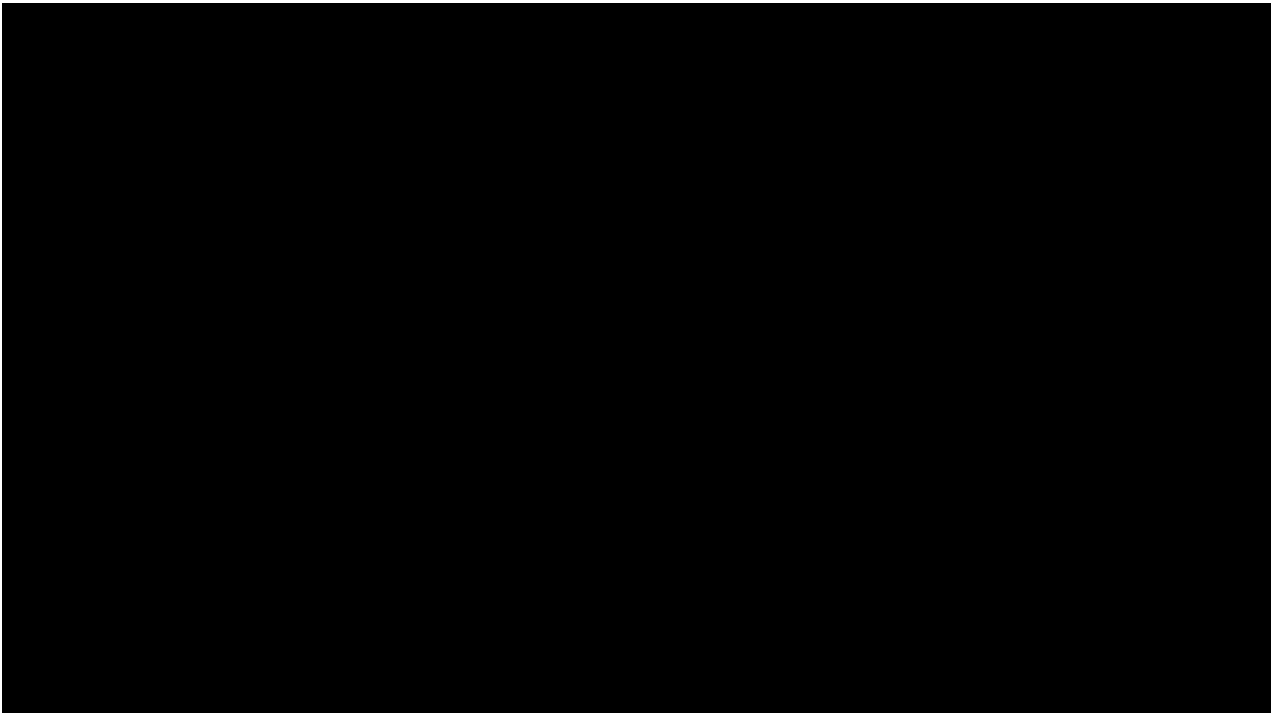


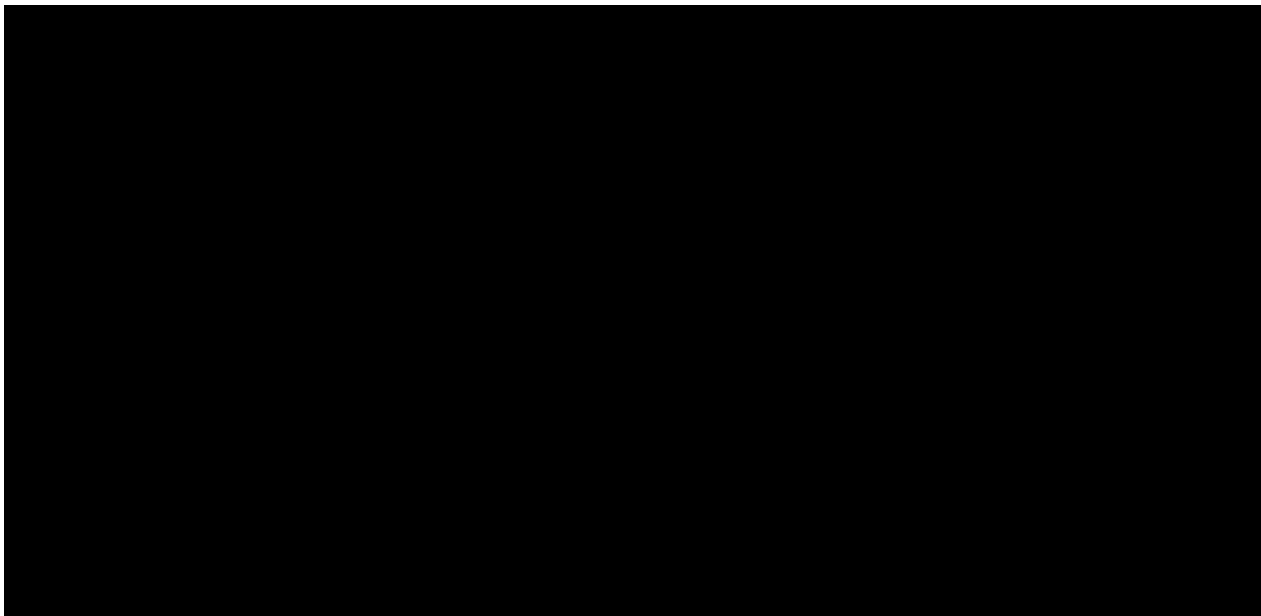
Figure 1: Heathrow debt platform

2. The financing challenge

Expansion will be one of the largest wholly privately financed capital projects undertaken in the United Kingdom. As set out in Figure 2 below, the capital value and the associated debt raising requirements of expansion far outstrip recent privately financed infrastructure financings in the UK. Our current total capital expenditure forecast between 2022 and 2036 in the Prioritising Service option is £35.0 billion (2014p). Based on the CAA's Price Control model (PCM) modelling accompanying this plan, this is expected to require additional equity of approximately £3.8 billion and debt issuance of £36.3 billion in nominal terms. From 2022 onwards, we forecast issuing around £3 billion of new debt each year.

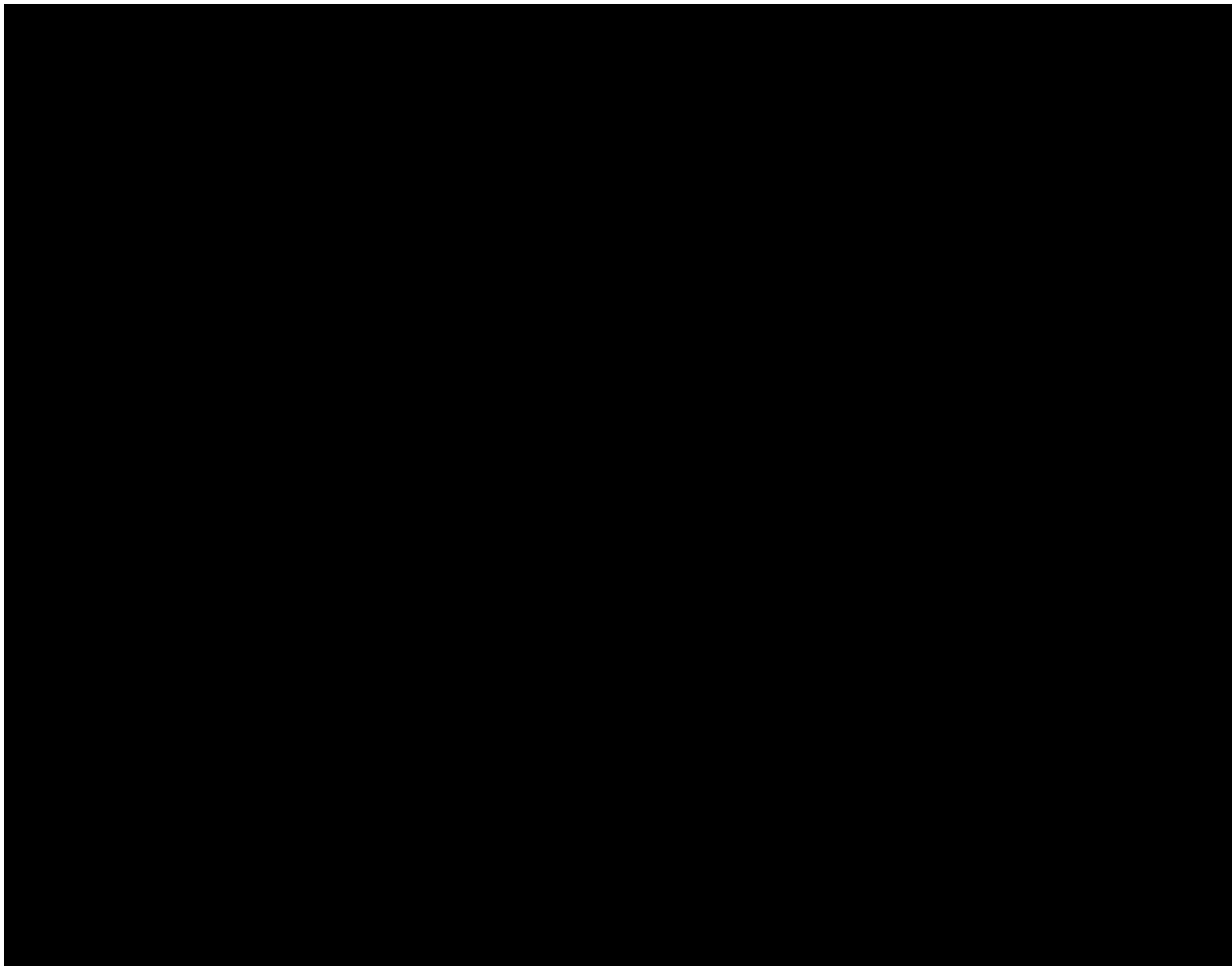


As set out in Figure 3 below, we are currently one of the largest issuers of investment grade Sterling denominated debt. In contrast we have relatively little issuance in the largest global markets compared to the largest issues in these markets (Euro and US dollar in particular). We intend to make significantly greater use of foreign currency debt markets than we have in the past to fund expansion. Our expected issuance until 2036 in each global market that we are currently active in will be significantly lower than the current largest issuer in each market. We therefore consider that global debt markets have sufficient capacity to enable us to successfully finance expansion. This will ensure that we are able to efficiently price new debt by managing issuance volumes to meet investor appetite in each market. As a result, once the third runway is completed, we currently expect U.S dollar denominated debt to be around one third of our total debt portfolio, a much higher proportion than currently. Exact proportions of debt raised will ultimately depend on the relative value each market offers at the point of debt issuance.



- [Redacted]
- [Redacted]

As set out in Figure 4, our annual issuances are expected to be around one third to half the historic global A- issuance levels. Our A- rating is essential both in terms of market capacity but also pricing and volatility. As set out in Figure 5, on average BBB bond spreads are around [REDACTED] wider than A rated bonds and are also substantially more volatile. On average, reducing our rating to BBB would add around [REDACTED] to the airport charge as a result of the incremental increase in financing costs. In addition to price, BBB markets are significantly more volatile in terms of annual issuance levels. Feedback from debt investors and our advisors is that we must maintain an A- credit rating to be able to access sufficient debt and bank facilities. Moreover, in addition to debt, a lower rating would make it more difficult and more expensive for banks to provide the swaps we need to access foreign currency debt markets and to manage financial risks relating to interest rate and inflation exposure. This is because capital adequacy rules require banks to hold more capital against lower rated borrowers. This will further increase our overall costs and constrain the size of the facilities we could obtain. For example, U.S capital charges more than triple post tax for a BBB rated bond compared to an A rated bond.



An additional factor supporting the need to maintain an A- rating is that this underpins the returns of our existing debt providers. Around 60% of our existing debt matures after completion of the third runway. Since these debt investors in turn are likely to form a substantial portion of the investor base for new debt raisings, maintaining their confidence in Heathrow is vital. A reduction in Heathrow's credit rating during this period would reduce the

320 [REDACTED]

321 [REDACTED]

[REDACTED]

value of existing debt providers holdings, undermining their confidence in us and potentially forcing some investors to divest their holdings in Heathrow and preventing them from investing at all in future. This would substantially increase the difficulty of raising new debt.

We cannot raise the significant amount of debt we require cost effectively without access to global debt markets, the confidence of existing debt holders and strong bank support. Therefore, the foundation of our funding plan is maintenance of our existing investment grade credit ratings.

3. Financeability

To be financeable, expansion requires an A- credit rating. Given the substantial period of negative free cashflows that are inherent in large capital projects, maintenance of our A- rating will require substantial additional equity investment by our shareholders. Without sufficient equity support, our credit metrics will fall below credit rating agencies tolerances or debt investors may have reduced confidence in our ability to raise finance in future. That will lead to higher costs and reduced access to funding.

As a result, the foundation of financeability is equity investability.

3.1 Equity Investability

Expansion needs significant support from equity as well as debt to be financeable. The key concerns of our shareholders are:

- The expected returns from the investment are commensurate with the associated risks and in line with global benchmarks;
- The requirements for new equity are appropriate and manageable;
- Equity risk is clear, predictable and mitigated; and
- Regulatory risk is mitigated through use of a sufficiently lengthy (15-year) regulatory framework and cost of equity.

Our shareholders invest on a global basis. In order to attract sufficient equity financing, our plan therefore needs to deliver appropriate returns that are commensurate with the risks that shareholders are exposed to benchmarked against other investment opportunities world-wide. Chapter 12 - WACC sets out our views on the appropriate return required for investors for expansion. Equity investability is highly sensitive to both the level of WACC and the future certainty of the cost of equity in particular. For example, every 0.5% reduction in WACC increases the net equity required to support an A- rating by approximately £2.2 billion driven primarily by the need to reduce leverage to maintain the same credit metrics. This impact is less pronounced in the notional structure as gearing is fixed at 60%. This means that lower WACC scenarios in the notional structure lead to materially lower credit metrics unless a lower notional level of leverage is applied.

We have assessed the equity requirements for financing expansion based on a notional balance sheet with a gearing of 60% as set out in Table 71. The table also shows the implied net equity required taking into account forecast dividends.

Table 71: Equity requirements for notional balance sheet

Prioritising Savings (£' Billions)	2022	2023	2024	2025	2026	H7
Gross equity	0.6	1.0	1.1	0.7	0.4	3.8
Net equity	0.3	0.6	0.5	0.1	(0.3)	1.1
Prioritising Service (£' Billions)	2022	2023	2024	2025	2026	H7
Gross equity	0.6	0.8	1.0	1.1	0.2	3.8
Net equity	0.3	0.4	0.5	0.4	(0.5)	1.1

Source: Heathrow

Table 1 sets out the equity requirements based on maintaining the notional gearing level of 60%. The opening gearing of Heathrow is higher than the notional assumption. This means that the actual equity requirement of expansion will be higher than those set out in the table. Our shareholders consider that the amount of equity required is manageable and appropriate given the WACC included in this plan, other regulatory and operating assumptions and current market conditions.

The key remaining concern is return on investment. The nature of expansion means that free-cashflow is negative for a long period so recovery for equity investors is delayed. Figure 6 shows the anticipated free cash flow being negative between 2021 and 2028, and cashflow after taxes and interest is negative until 2030 in the Prioritising Service case.

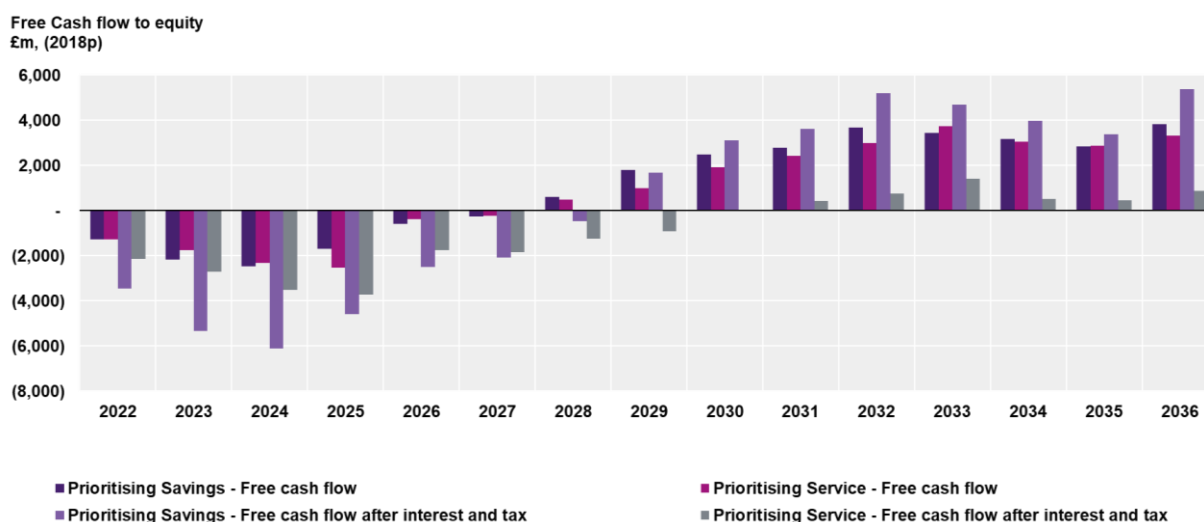


Figure 6: Free cashflow generation

The long period until free cashflows turn positive increases equity risk. The scale and duration of the investment mean that regulatory risk remains a key concern. To help reduce regulatory risk we are proposing to fix certain elements of the regulatory settlement over a longer period (see Chapter 14 - Regulatory Framework) to ensure that there is clarity and high visibility, particularly on the cost of equity and key elements of the framework over a longer period.

Fundamental existing current protections, including resets for operational assumptions such as passenger volumes and operating costs are also important to maintain.

3.2 Debt Financeability

Debt financeability is driven primarily by debt investors' confidence in the ability and willingness of our Shareholders to invest over the long term which in turn enables us to maintain debt credit metrics at the levels required for our current ratings. As set out above, debt investors also take substantial comfort from the strength and consistency of the regulatory framework to mitigate certain operating risks.

Credit ratings are an opinion from each credit rating agency on the relative creditworthiness of a company and the debt that it issues. Credit ratings reflect a combination of the strength of the business, the stability of its cashflows and the level of leverage used to fund the business. For a regulated company such as Heathrow, the key driver of our business strength is the stability and robustness of the regulatory framework. Our existing regulatory framework provides a high degree of comfort to long term investors for cashflow predictability, cost recovery and being able to fund ourselves over the longer term.

Given the historically low interest rate environment at present, a key risk to our credit metrics is the evolution of interest rates particularly given the volume of new debt that expansion will require. We welcome indexation for changes in cost of new debt over the regulatory period as a more effective and affordable mechanism to manage growing refinancing risk.

The previous sections set out why we consider that the key to ensuring expansion is financeable is maintaining our A- credit rating. This section sets out the key credit metrics we will need to achieve in order to be able to retain an A- rating.

We are working with all of our current credit rating agencies to understand a preliminary view of their opinion of the credit metrics that Heathrow will have to achieve to retain an A- rating throughout expansion. The process is ongoing. For this IBP, credit rating ratio guidance is based on historic thresholds as summarised in Table 72 below.³²² It is possible that the outcome of the review by credit rating agencies could lead to material changes in the target thresholds Heathrow needs to achieve an A- rating. Any such change could have a material impact on financing expansion. The FBP will reflect the final guidance we receive from Rating Agencies.

Table 72: Summary of required credit metrics

Credit Metric	A- Threshold
Senior debt to RAB (S&P)	<70%
PMICR (Fitch)	>1.6x
Net Debt to EBITDA (Fitch)	<8x
FFO to Net Debt (S&P)	>8%

Source: S&P Global Ratings /Fitch Ratings /Heathrow

4. Financing Strategy

³²² Current rating agency guidance from S&P and Fitch available at <https://www.heathrow.com/content/dam/heathrow/web/common/documents/company/investor/credit-ratings/sp/2019-Heathrow-Funding-Ltd.pdf>; and <https://www.heathrow.com/content/dam/heathrow/web/common/documents/company/investor/credit-ratings/fitch/2019-Fitch-Affirms-Heathrow-Funding%27s-Class-A-Notes.pdf>

Our financing strategy is designed to support our commitment to our existing investment credit ratings and build liquidity to ensure that we can meet the financing needs as efficiently as possible and ultimately reduce financing costs in order to maximise benefits for consumers. We have a very strong track record of delivering cost efficient financing for big capital projects over the last ten years. Our financing strategy is to mitigate foreseeable financial risks associated with completing such a large capital project.

Our financing strategy is based on three key strands. These are:

- **Liquidity:** Maintaining sufficient liquidity is a key requirement during a large capital project to absorb the variations in expenditure and volatile access to debt capital markets. During construction, we will be heavily cashflow negative for a number of years. Maintaining strong liquidity is therefore critical to remaining a going concern particularly in the event of underperformance, market access volatility and the increased refinancing risk that we will face. Liquidity will be further supported by the very substantial revolving credit facility which we expect to implement in 2020. Heathrow has a very strong track record in being able to access the debt market during all economic cycles. Maintaining strong liquidity also enables us to access debt markets strategically which in turn allows us to achieve the most efficient pricing possible. This, combined with access to a diverse range of debt markets ultimately leads to benefits to consumers by reducing our overall cost of finance.
- **Diversification:** As set out above, expansion will require a significant increase in debt funding levels. To maintain efficient pricing and reduce costs for consumers, we have been diversifying the debt markets that we participate in to prepare for Expansion. We have signaled that we will be a repeat issuer in each active market to ensure that investors benefit from liquid markets for Heathrow debt. This has also enabled us to identify and capture relative value between markets. Diversification has primarily been focused on Class A debt which has in turn freed up Sterling debt market capacity for our lower rated Class B and Heathrow Finance debt.
- **Duration:** more than 60% of existing debt matures after the new runway is completed. We focus on maximising the available duration in each market to match the long-term nature of Heathrow's assets. This in turn minimises refinancing activity during the construction period.

5. Assessment of Financeability of the Plan

This section sets out an assessment of the financeability of the plan based on a notional balance sheet consistent with regulatory precedent. It sets out the amount of equity required and compares key credit metrics against the targets set out in Table 2 to retain our A- credit rating. The assessment has been undertaken using the PCM.

In the first subsection we set out an analysis of the Prioritising Savings and Prioritising Service options.

In the subsequent section we set out a number of additional scenarios to test the robustness of our plans for each option to possible stress scenarios.

- Using a lower WACC consistent with some recent regulatory decisions;
- The cost of new debt increasing to 5% in 2022 and remaining at that level thereafter;
- Increasing expansion related capital costs by 28%;
- Increasing expansion related capital costs by 48%
- Reducing passenger numbers to the P10 forecast; and
- Reducing inflation to 2% over the period 2022 to 2026.

5.1 Assessment of financeability of our plan and the choices

For each of the option cases, this section sets out an assessment of:

- Cashflow and equity requirements for the plan;
- An assessment of the four key credit metrics compared to targets; and
- An overall conclusion on financeability.

5.1.1 Cashflow Requirement

Table 3 – H7 gross and net equity requirements

H7 Equity cashflows (£ Billions)	Gross Equity	Net Equity
Prioritising Savings	3.8	1.1
Prioritising Service	3.8	1.1

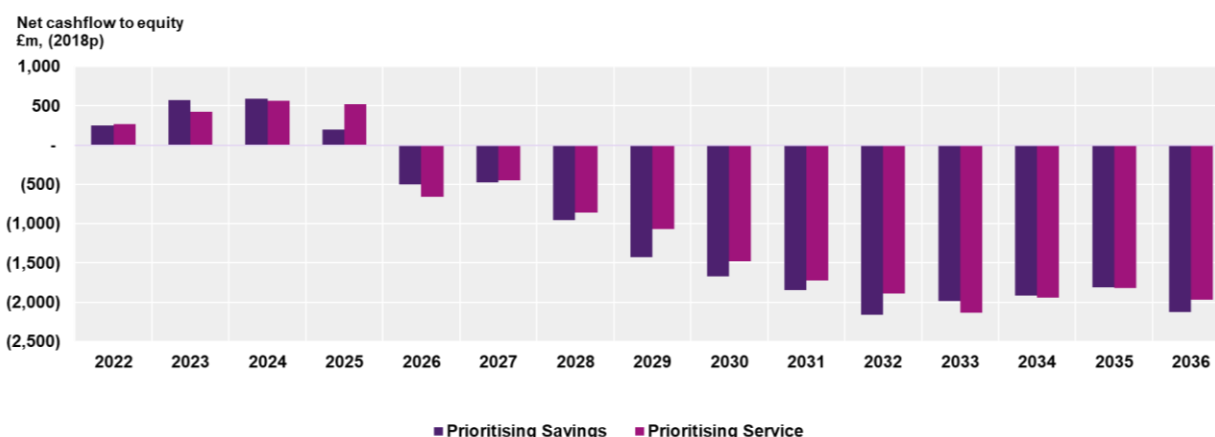


Figure 7: Net cash flow to equity

On the notional balance sheet, as set out in Table 3 above, both the Prioritising Savings and Prioritising Service case require a net equity injection of £1.1 billion in H7. Taking into account assumed dividends, around £3.8 billion of new equity would be required on a gross basis. In each case, net cash flow to equity is negative for each year before turning positive on completion of the new third runway. As set out above, we consider that these equity requirements are investable for our shareholders at the WACC included in the IBP.

5.1.2 Assessment of key credit metrics

At present, our senior debt is rated A- by both Fitch Ratings and S&P Global Ratings. On the notional balance sheet, a fixed gearing level of 60% Net Debt to Regulatory Asset Base (RAB) is assumed. As a result, the 70% Net debt to RAB rating threshold is not a material consideration in assessing debt financeability in the notional structure.

The first key credit metric is to maintain our Post Maintenance Interest Cover Ratio (PMICR) above 1.6x. As set out in Figure 7 below, both options maintain adequate headroom on this metric which supports our current A- ratings.

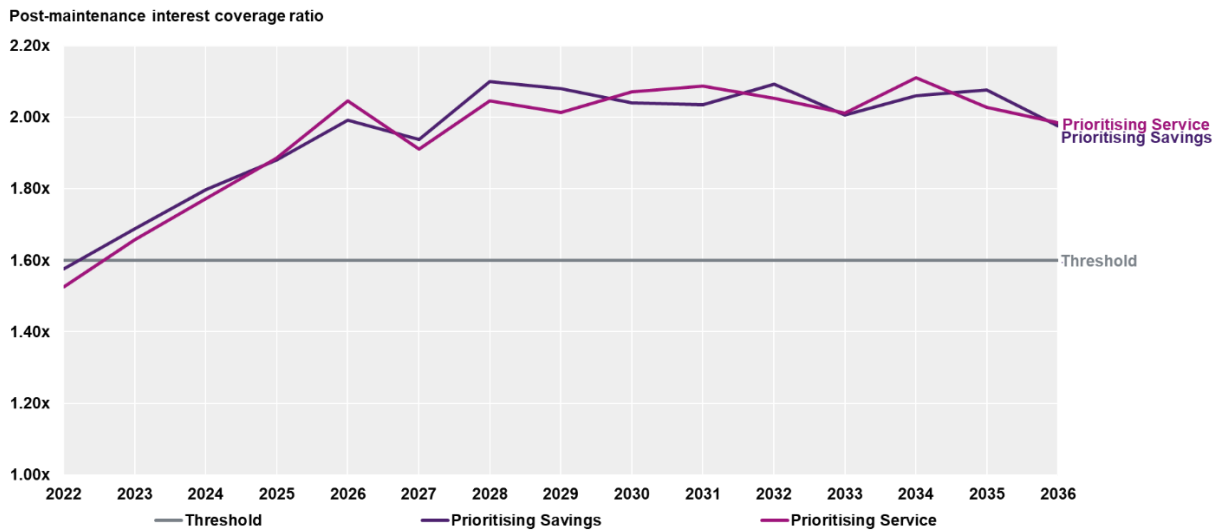


Figure 8: Post maintenance interest cover ratio

As set out in Figure 8 below, the second key credit metric is to maintain net debt to EBITDA below 8x. The Prioritising Savings case has little headroom around 2027 as credit metrics approach 8 times. This metric declines to towards 6x over the early 2030s. We believe both cases demonstrate financeability at A- as the 8x threshold is never breached and the metric is trending down over a number of years once the new third runway opens and traffic increases.

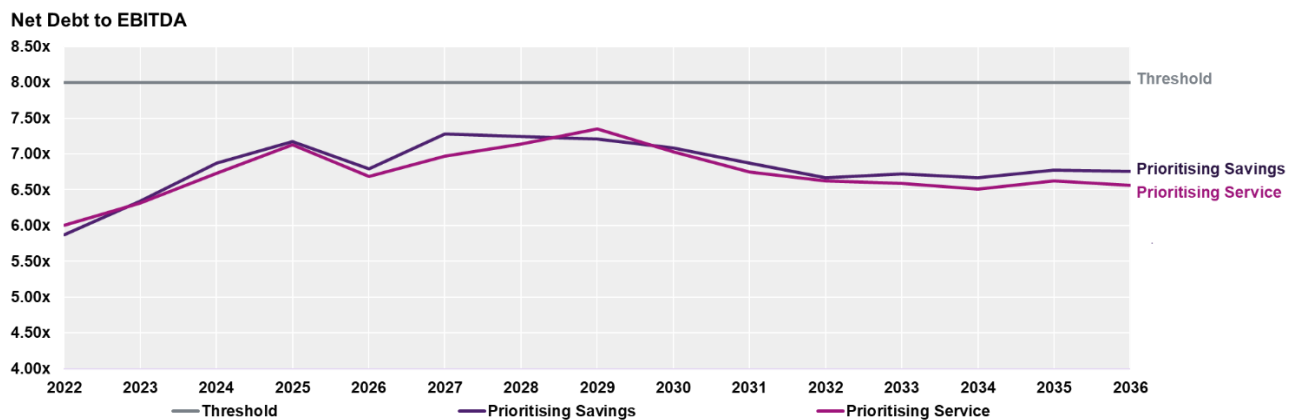


Figure 9: Net debt to EBITDA

The final key credit metric for our existing A- ratings is Funds from Operations to Net Debt (FFO to Net Debt) which must be maintained above 8%. As demonstrated in Figure 9 below, FFO to net debt will breach the 8% threshold from 2027 for 3 years in both options. We understand that rating agencies take a long-term view to assessing credit metrics and are likely to average the results over a number of years. Three years close to the threshold level with long term recovery trends is likely to be considered marginal to sustain our A- rating on the notional balance sheet. Rating agencies would be likely to require a very strong commitment from management and shareholders that metrics would return above the 8% threshold as planned. In addition, there is very little room for under performance on this metric if we are to sustain the important A- rating level.

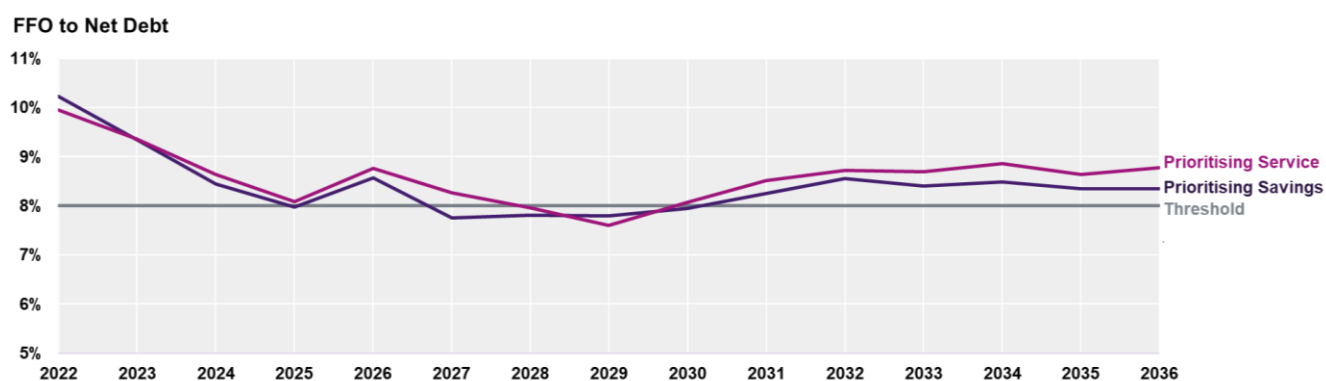


Figure 10: Funds from operation to net debt

5.1.3 Overall conclusion

The analysis above demonstrates that, under the notional structure and based on historic rating agency guidance, expansion can be successfully financed from the perspective of both debt and equity. However, given the very limited credit metric headroom, any deterioration or underperformance would likely result in a downgrade below A- which would significantly constrain our ability to finance expansion without additional support from our shareholders. In addition, regulatory certainty plays a significant role in cases where credit metrics have limited headroom as debt investors may place greater weight on future cashflow generation in these cases. This demonstrates the importance of equity investability and ongoing equity support to the overall success of the project. With limited headroom available to key credit metrics, debt investor confidence in our shareholders ability and willingness to support the business in times of stress is key to successful delivery of an expanded Heathrow.

It is also clear from this analysis that any reduction in the cost of equity compared to that included in the IBP would result in greater and potentially more prolonged breaches of the FFO to Net Debt threshold of 8% significantly increasing the likelihood of a credit rating downgrade. This means that the plan is unlikely to be financeable at WACC levels below those set out in Chapter 12.

5.2 Sensitivity assessment

Given the scale of the capital works that we will need to undertake in H7, an important facet of our financeability assessment is for our company to have sufficient resilience to deal with unexpected events. Rating agencies typically prefer this resilience to be provided by demonstrating that rating thresholds can be maintained under likely levels of stress. While our Shareholders have demonstrated their willingness to inject additional equity during periods of stress to support our current ratings, we have not explicitly modelled this additional possible support. However, we have taken it into account in our analysis below. We outline below the key sensitivities that we believe are relevant to assessing the debt and equity financeability of our plans. These are scenarios with:

- 1) lower WACC;
- 2) higher capital expenditure;
- 3) higher cost of new debt compared to the rates assumed in our regulatory settlement;
- 4) lower passenger numbers than assumed in the regulatory settlement; and
- 5) lower inflation

Scenario Description

Lower WACC scenario

In this scenario we assess financeability of a case with a lower cost of equity and an expansion risk premium of 1.0%. The cost of debt is the same as that set out in Chapter 12. This sensitivity is designed to meet the CAA requirement to examine financeability using a WACC consistent with recent regulatory precedent.

The lower WACC is based on the assessment of 5.4% for TMR from the CAA NERL decision, and an asset beta of 0.5 (based on Q6). This results in a post-tax cost of equity of 6.1%, and a pre-tax cost of equity of 7.4%. An expansion risk premium of 1.0% is assumed based on the regulatory precedent of Phoenix Natural Gas. The resulting WACC is set out in Table 4.

Table 4: WACC sensitivity case

	2022-2026	2026-2031	2032-2036
Cost of debt	1.77%	1.06%	0.79%
Vanilla WACC	3.50%	3.08%	2.92%
Pre-tax WACC	4.00%	3.58%	3.42%
WACC including expansion risk	5.00%	4.58%	4.42%

Source: Heathrow

5.2.1 Higher Capital cost scenarios

Section 4.2 in Chapter 12 sets out an analysis of the potential construction risk arising from expansion. In this case we increase expansion related capital costs by 28%, but reflect the additional expenditure in the RAB growth and revenue requirement to represent the mitigation of the core and development process. We have also run a scenario where expansion related capital costs increase by 48% (the P90 level) while assuming that 6.4% of total expenditure is inefficiently incurred and therefore excluded from the RAB at the end of H7 to assess the impact of inefficiently incurred costs. This 6.4% disallowance is based on the highest observed disallowance by the CAA at previous reviews.

Higher cost of new debt scenario

This scenario reflects a risk of debt costs increasing and having to be absorbed by Heathrow before being corrected through the debt indexation mechanism. In this case we assume the following:

- The cost of new debt increases to 5% nominal from the start of 2022;
- Cost of debt indexation results in the additional costs being recovered through revenue in 2027-2032;
- The WACC for 2027-2036 and associated aero-revenue reflects the higher cost of debt.

Lower Passenger Numbers Scenario

In this scenario we assume:

- For 2022 to 2026 passenger numbers at P50;
- Between 2027 and 2031 passenger numbers are at P50 for the revenue requirement, but outturn passenger numbers are P10;
- For 2032 to 2036 passenger numbers are P10 for revenue requirement and outturn.

Lower inflation scenario

In this scenario we assume inflation is 2.0% over the period 2022 to 2026.

Cashflow Requirement

Table 5 – Sensitivity case H7 gross and net equity requirements

Equity Cashflows £ Billions	Prioritising Savings		Prioritising Service	
	Gross	Net	Gross	Net
Base case	3.8	1.1	3.8	1.1
Lower WACC	5.2	2.5	5.2	2.5
Efficient 28% higher capital cost	5.7	2.8	5.6	2.7
48% higher capital cost 6.4% disallowed	7.1	4.0	6.9	3.9
Higher cost of debt	4.4	1.8	4.4	1.8
Lower Passenger Numbers	3.8	1.1	3.8	1.1
Lower inflation	4.1	1.5	4.1	1.5

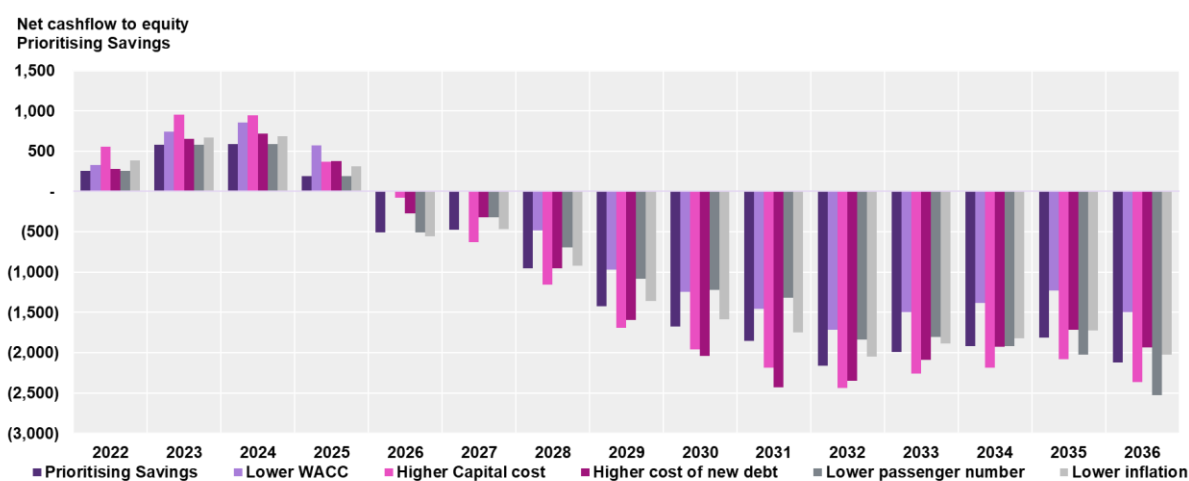


Figure 11: Prioritising Savings sensitivity case net cash flow to equity

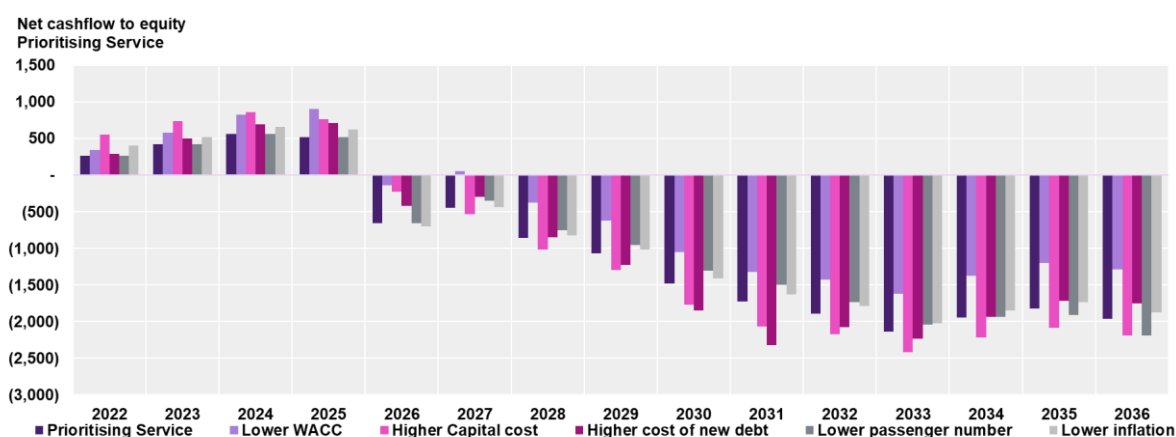


Figure 12: Prioritising Service sensitivity case net cash flow to equity

The lower WACC scenario has the largest impact on both gross and net equity compared the base case with both gross and net equity requirements increasing by around £1.5 billion on both the Prioritising Savings and Prioritising Service cases. These additional equity

requirements are not investable for shareholders given the significantly reduced returns that they would be receiving. The efficient higher capital cost scenario also requires significant levels of both gross and net equity albeit with higher long term returns via the increased RAB. A significantly higher cost overrun of 48% requires significantly more gross equity. The lower passenger number scenario does not impact 2022-2026 equity requirements as the passenger stress is only applied from 2027. Finally, the lower inflation scenario in 2022-2026 results in both higher gross and net equity requirements as a result of the lower cashflows generated in a lower inflationary environment.

Assessment of key credit metrics

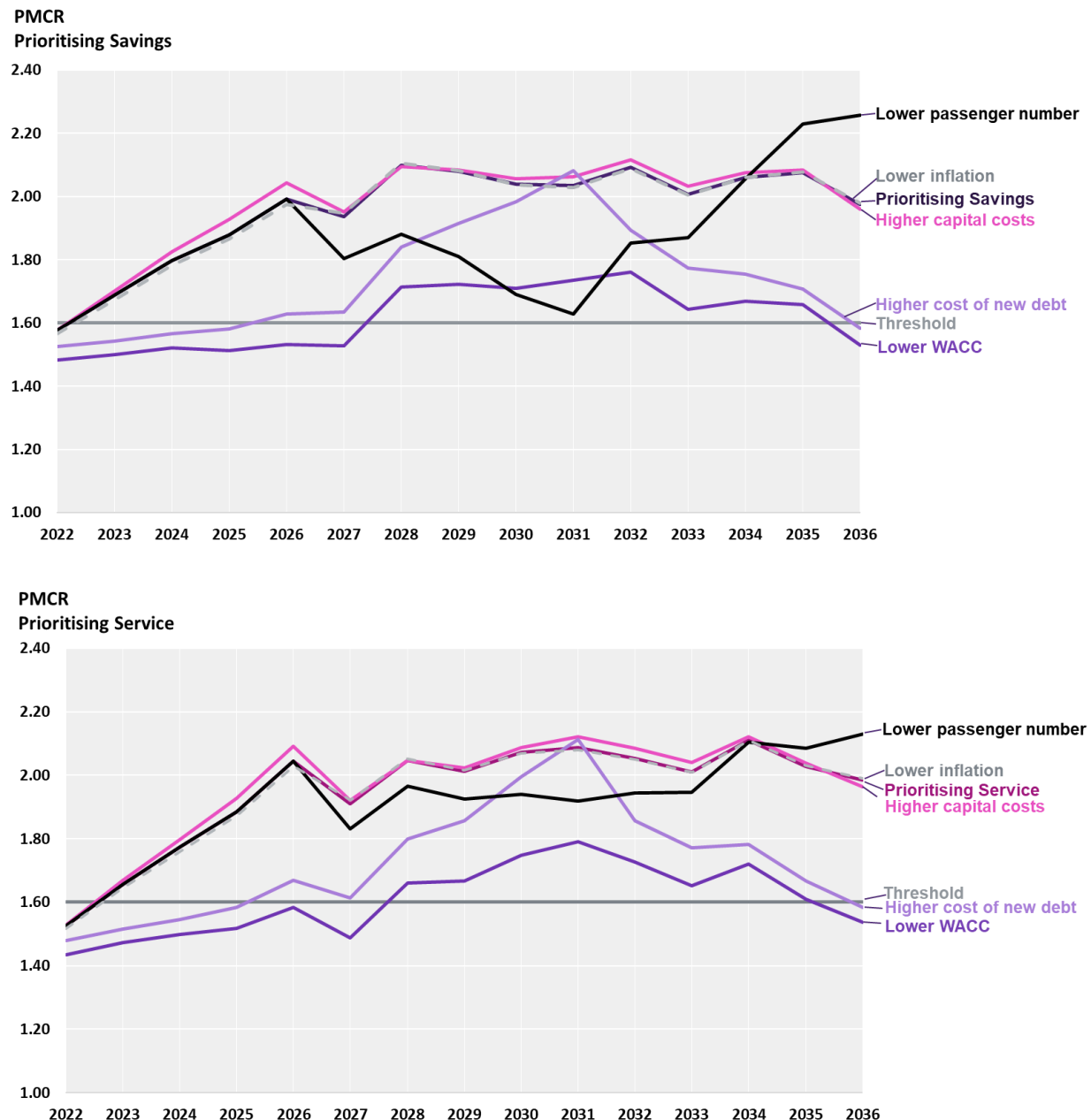


Figure 13: Sensitivity case PMICR

As set out in Figure 12 above, in both the Prioritising Savings and Prioritising Service, adequate headroom is retained in all scenarios aside from the lower WACC and cost of new debt scenarios. Under the cost of new debt scenarios, PMICR falls marginally below the 1.6x

threshold before recovering strongly. In the lower WACC scenario, PMICR is materially below the 1.6x threshold until the late 2020s. This would clearly result in a downgrade on this metric under a lower WACC scenario without additional support from our Shareholders which is not investable given the lower cost of equity available to shareholders in this case.

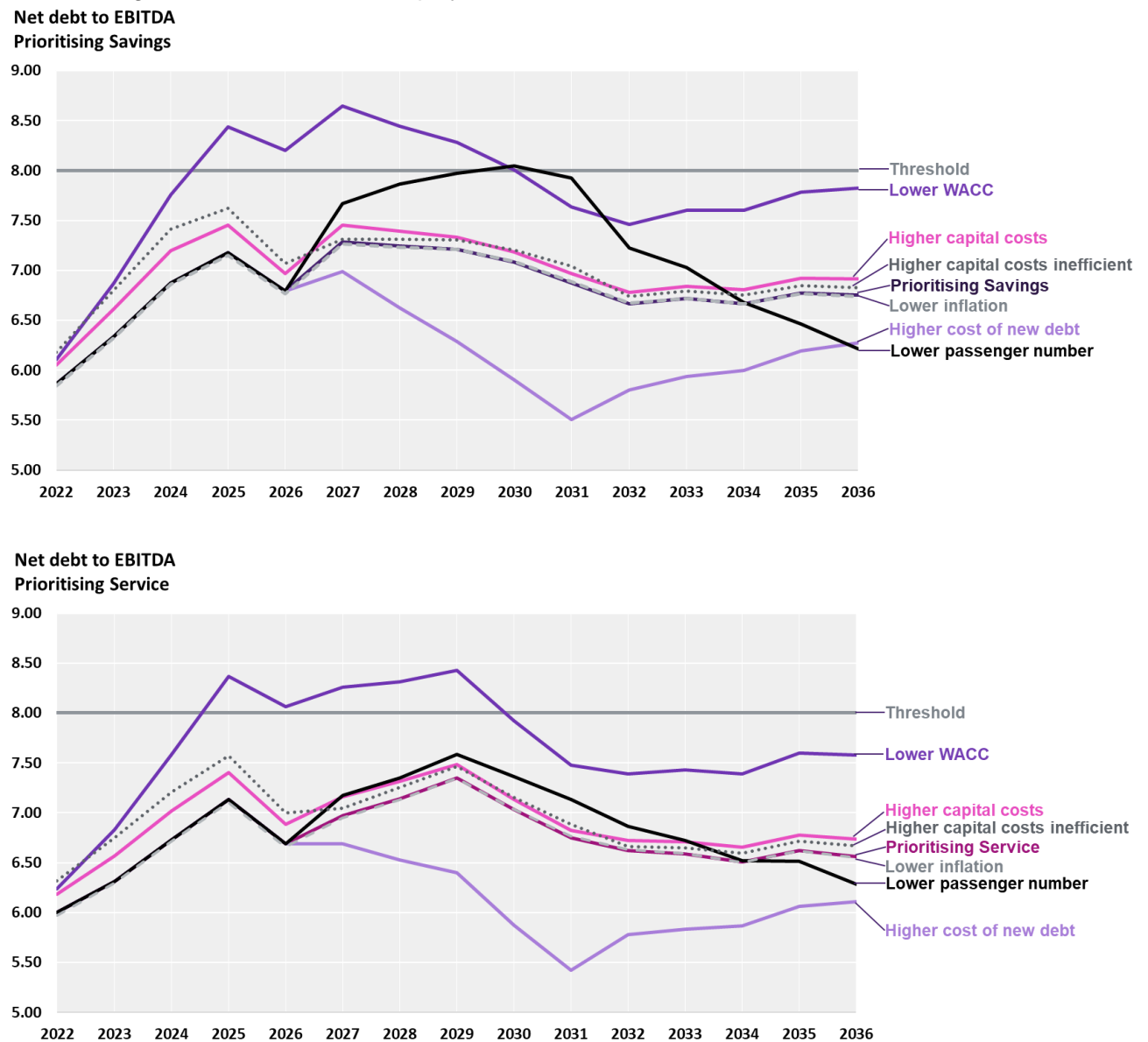


Figure 14: Sensitivity case net debt to EBITDA

As set out in Figure 13 above, most sensitivities aside from WACC and the passenger volumes lead to similar results to the base case and therefore support our existing A- ratings. However, the lower WACC sensitivity leads to a material breach of this credit metric over a sustained period with net debt to EBITDA peaking at around 9x in the Prioritising Savings case. This would clearly result in a downgrade on this metric under the lower WACC scenario without additional support from shareholders which is not investable. The lower passenger volumes, particularly in the Prioritising Savings Case result in almost immediate pressure on this metric when the stress is assumed to commence in 2027. While the 8x threshold is not breached, any further under performance or deviation would be likely to require additional support from shareholders to sustain our existing A- credit rating.

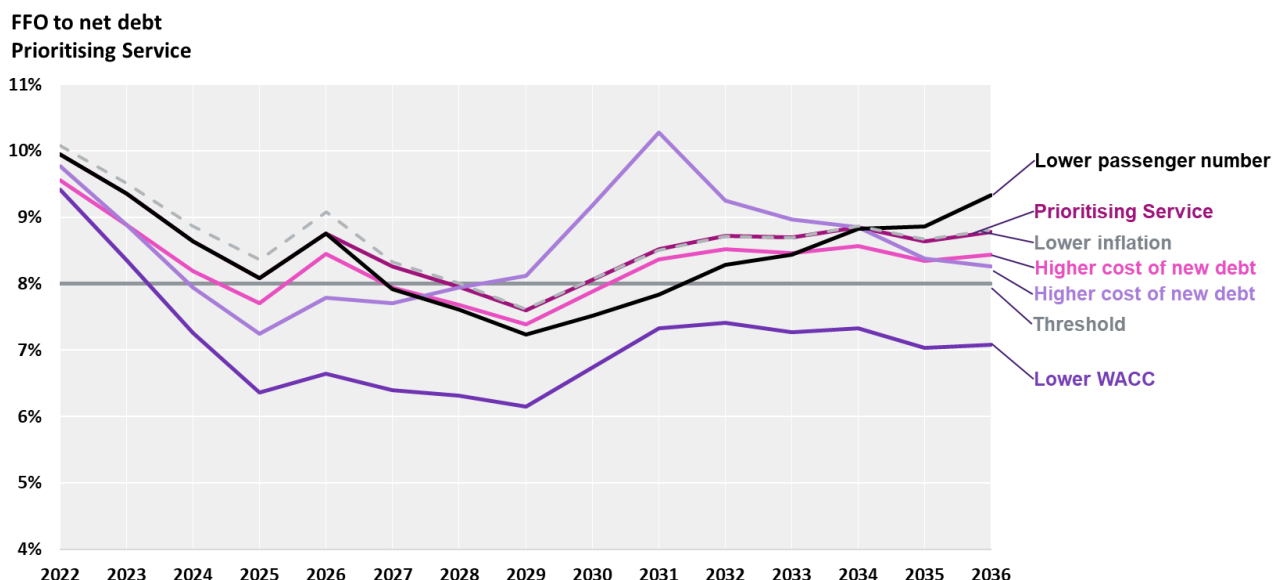
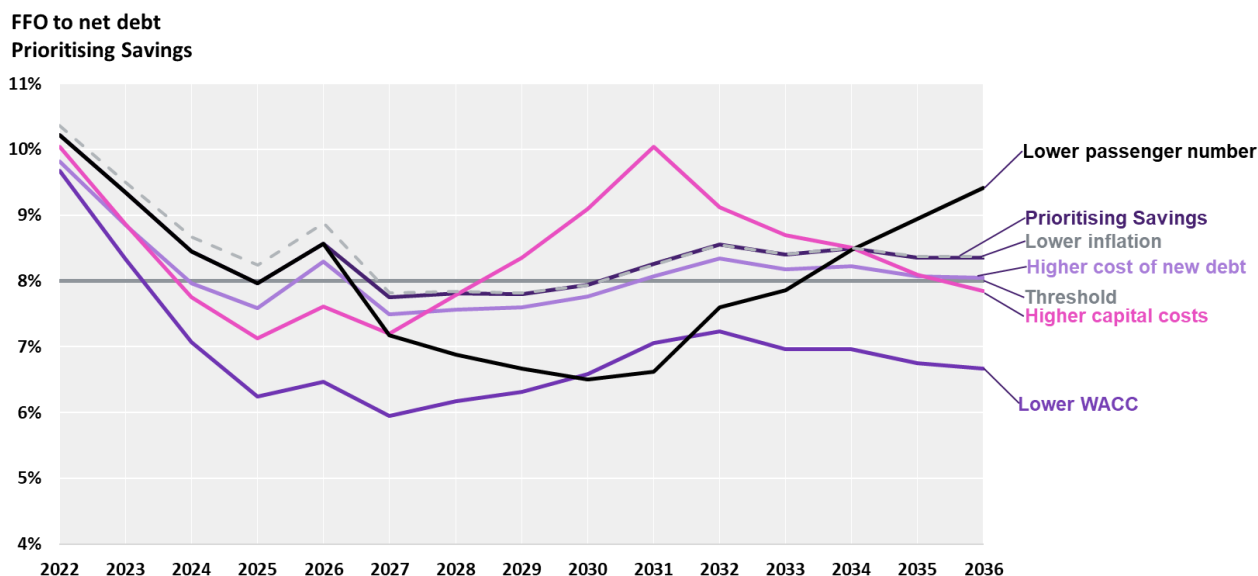


Figure 15: Sensitivity case FFO to debt

As set out in Figure 14 above, all sensitivities aside from WACC and the passenger volumes lead to similar results to the base case and show that the ability to maintain an A- rating will be borderline and may require additional equity support. The lower WACC sensitivity leads to a material breach of this credit metric over a sustained period with FFO to net debt reducing to below 5.5% in both the Prioritising Savings and Prioritising Service case. This would clearly result in a downgrade on this metric under the lower WACC scenario without additional support from shareholders which is not investable given the lower equity returns available in this scenario. Similarly, particularly in the Prioritising Savings case, the underperformance in passenger volumes causes a material weakening in this credit metric. Given there is no headroom in the base case, this underperformance would likely require additional equity support to retain an A- rating. There is a more modest impact in the Prioritising Service case as lower passenger forecasts are used in this case.

Overall conclusion

The analysis shows that the headroom to target ratios in the base case is balanced with the FFO to debt ratio showing breaches of the target in some years. The sensitivity analysis (excluding WACC) shows that the margin is further eroded in some cases. Weaker performance would therefore increase the likelihood of a downgrade under these circumstances without additional timely support from our shareholders. This demonstrates the importance of equity investability and ongoing equity support to the overall success of the project given the its associated risk.

In contrast, the WACC sensitivity analysis clearly demonstrates that the lower WACC is not financeable for debt investors nor investable for equity investors. This is because it results in all key credit metrics falling below the relevant historic thresholds on a sustained basis. This reinforces the need for an appropriate cost of equity to ensure expansion is financeable.

14 - REGULATORY FRAMEWORK

Overview

- We propose evolution of the current regulatory framework. A stable, predictable regulatory settlement that maintains simple, clear incentives to do better for consumers and can attract patient investment is needed for new capacity to happen
- A 15-year price control is required to ensure that Heathrow expansion is affordable and financeable. To avoid excessive deviations in performance over the settlement we propose reset mechanisms over the 15 years
- An expansion premium needs to be recognised once Heathrow notifies its final commercial decision to deliver expansion
- Other uncertainties in the plan should be dealt with by clear objective triggers so consumers only see investment when there is benefit
- Regulation should build on existing ex-ante mechanisms. It must avoid the high costs of fixing capital too early. There may be opportunities for different traffic incentives though we have not incorporated these in the plan
- We have considered various alternative mechanisms. There is real value in Innovation partnerships for delivery and we will explore commercial deals with airlines
- Splitting terminals is not in the interests of consumers at an integrated hub airport

1. Introduction

The purpose of this chapter is to set out the integrated regulatory framework proposed by Heathrow underpinning our Initial Business Plan (IBP).

2. Evolving the regulatory framework

The outcomes we define in this plan are based on consumer feedback. In H7, new capacity is a big portion of delivering those outcomes. Heathrow expansion is in consumers' interest. It will generate huge benefits of up to £68bn by Department for Transport (DfT) estimates, for passengers, generate capacity to allow effective airline competition to take place and more generally benefit the UK economy. Heathrow is committed to expansion provided the regulatory determination is reflective of the risks that expansion creates.

Expansion also means that over the next fifteen years Heathrow will be facing challenges never before encountered. Not all risks are strictly new to H7. But the magnitude of the practical and financial challenges and difficulty of forecasting is of an unprecedented scale. That means it is particularly important that we get the regulatory framework right for H7. We need to protect consumers against excessive variations in outcomes. We need to mitigate against windfall gains or losses that weaken the commercial incentives for all, especially for Heathrow. Simplicity, predictability and continuity are also fundamental for regulatory decisions that aim to foster investment. These characteristics become even more important with enhanced scale and inherent risk ahead. As discussed in this plan, 2022-2036 encompasses much more than building an additional runway. It is an incredibly complex undertaking - involving the expansion of terminal capacity, major investment in the surrounding road and rail infrastructure, extensive environmental mitigation and balancing service, resilience and growth.

Heathrow during this growth period is thus one of the largest and most complex infrastructure developments ever undertaken in Europe. Over the next fifteen years Heathrow will invest at a scale of 3 to 4 times the whole Terminal 5 development. At the peak of the construction phase, annual capex will be 8 to 10 times as high as the typical annual investment during Q6. Heathrow's capacity will increase by 50%. The value of our regulatory asset base will more than double. It is envisaged that Heathrow will issue c£3bn of debt every year. The programme is at least 15 years long to develop and then deliver the benefits for consumers – and indeed other stakeholders. That is the frame within which Heathrow must plan to be affordable and financeable.

The regulatory framework for H7 needs to be **flexible** enough to deal with the ever-changing reality of an operational airport in the process of expanding. This includes adapting to unforeseen ANPS conditions, or changes to the mix of airlines operating from Heathrow, or uncontrollable shifts in costs from which consumers should benefit directly. The regulatory framework cannot be a constraint to Heathrow to react in a consumer focused way to these changes.

The regulatory framework needs to strike the right balance between **affordability and financeability**. It needs to enable Heathrow to commit to expanding the airport while ensuring that passengers and airlines receive value for money. It needs to ensure that this can all be entirely privately financed. Strong but fair incentives thus should be defined to ensure that Heathrow delivers efficiently but is rewarded commercially for doing so.

The regulatory framework needs to provide **certainty** over the duration of the enhanced risk period, maintaining consistency throughout. There is no value in change for change's sake in regulation. That only causes complexity and risk. That in turn means costs and delays for consumers, or at worst prevents new capacities and facilities entirely. Likewise, investors, airlines and ultimately consumers need as much stability over the full 15-year period as is possible to allow them to plan and manage risks.

The current regulatory framework has been highly successful at a high level, whatever the debates about specific details. It has fostered Heathrow developing as one of the world's leading hub airports. It has improved the consumer experience. It has allowed billions in investment. At the same time, it has driven long term efficiency and cut the costs of airport charges – which are now less than 5% of the average airfare. It has fostered competition for consumers and innovation in services both between airports and across aviation and transport.

We therefore think it is key to build on that strength. We characterise the regulatory framework needed for H7 as evolution rather than revolution. The framework needs to evolve to handle the risk, challenges and opportunities of delivering and operating an expanded Heathrow. We outline specific requirements for this evolution in this chapter.

We have however thought hard about how more radical change to the economic regulatory framework could support expansion. We have considered a wide range of options including dual-till models, a new ring-fenced and separately licenced undertaking (inspired by the approach taken for Thames Tideway Tunnel (TTT)) and Hinkley Point, splitting terminals, different delivery models, deregulation and commercial deals with airlines. From these investigations we are clear that, in most cases, a radical departure from the existing framework is not justified in terms of consumer results.

- Dual-till regulation has a number of potential consumer benefits such as reducing direct landing charges, and incentivising ancillary development. It is widely adopted in

European airports – indeed Heathrow is now an outlier in having a single till. In principle these models deserve further consideration. In practice we consider the disruption in terms of regulatory process to establish a fair framework, disruption to financing and unpredictable impacts on service incentives in a period of great change make them likely less optimal for Heathrow in the 2020s. We have not assumed such changes in this plan.

- A separate stand-alone licence-based model such as TTT would require primary legislation change introducing years of further delays and uncertainty for new capacity. Additionally, even a Hinkley or TTT like framework requires a Government Guarantee. This is not on the table. It would take years to create during which consumers would lose out, even if was an option. Nor is it needed for Heathrow given our existing funding and regulatory model. Moreover, expanding the airport is too integral to the operation of Heathrow to be practically treated as a ring-fenced project with a different regulatory structure and subject to a different set of incentives. Market funding for such a scheme appears problematic. The Hinkley Point C regime has received important criticism. Specifically, the National Audit Office (NAO) report³²³ draws attention to the risks placed on the private contractor by requiring it to enter into a fixed price contract for construction and subsequent price agreement between the operator and the authority. The NAO identifies that a more flexible approach to procurement, more akin to traditional public procurement could have been financed at a far lower cost, exposing consumers to lower overall costs.
- Likewise, the superficial appeal of on-airport ‘competition’ though splitting terminals or other assets wanes when confronted with the enormous regulatory and operational complexity, perverse incentives and uncertain benefits it brings. From an operational perspective it would duplicate costs, introduce coordination problems and harm resilience - exposing consumers to a suboptimal level of service. From a design and delivery perspective it would remove the ability for Heathrow to design and deliver an integrated hub and cause inefficiencies in capacity. The evidence from other hubs across the world such as JFK is unequivocal – experiments in split operations have led to poorer service, connectivity and higher costs. It would also be far more costly to finance based on market feedback – or potentially impossible. It would require a radically reshaped regulatory framework. That will delay new capacity for years. [REDACTED]
- We see real opportunities for innovation and partnership in delivery within an integrated and expanding hub. In 2018 we launched our Innovation Partners programme which had 160 proposals from over 140 firms come forward to propose new ways to build or operate elements of Heathrow. Following the rounds of evaluation, including two different phases, we have selected nine Innovation Partners and are pursuing ten of these projects in areas as diverse as surface access, baggage and cargo handling, fuel and more. Likewise, we see real opportunities to expand and accelerate how Heathrow develops related property and facilities around the perimeter, and we propose some ways to facilitate this in the regulatory framework in this chapter.
- We also see opportunities in a commercial deal with airlines. We have agreed such an arrangement for iH7 with the majority of Heathrow airlines. While we expect such a deal to exist within a regulatory framework, and indeed this stability also supports investment, service and financing, we see ways it can potentially improve incentives and risk allocation to benefit consumers. We have written to all current airlines and approached potential new entrants to explore such a commercial framework from 2022. We think properly structured airline deals can create significant value for consumers, airlines and other stakeholders.

³²³ <https://www.nao.org.uk/report/hinkley-point-c/>

By evolving the Q6 framework we believe that it is possible to address the challenges expansion presents in H7, apportioning the risks to create a beneficial result for passenger and airlines. These include lower prices, greater choice, a more resilient airport and improved passenger experience. Fundamentally, an evolved regulatory framework will help us to deliver our H7 outcomes and deliver consumers better value for money.

The expansion plan, we have put forward is intrinsically linked to the regulatory framework that we outline. If that framework changes in material ways, Heathrow cannot commit to delivering the plan as set out in this document or the charges, investments, service and growth described.

The CAA published its guidance on pre-DCO Category C expenditure in December 2019. Our plan is broadly consistent with the expenditure assumptions in the CAA consultation. However, at first reading we are concerned over whether the CAA is setting the right incentives to allow investment. Inability to make these early investments will impact, or could prevent, the delivery of our plans. We are reviewing the detail and will respond in due course to the CAA consultation.

3. Changes to the economic regulatory framework

In this section we outline the key new issues created by Heathrow expansion that could trigger changes to the regulatory framework. Each of the changes outlined below have been designed to optimise the allocation of risk, both over time and between stakeholders. The objective is to offer opportunities for consumers, balance affordability and financeability, all the while providing the flexibility required to protect our ability to deliver the outcomes for consumers.

3.1. Expansion duration and the need for regulatory stability

The issue

Heathrow's H7 programme and expansion as a whole is on a different scale and timeline to anything previously undertaken. In 2019 we are preparing the Development Consent Order (DCO) planning application. Assuming permission is granted, construction is expected to commence in 2022, with the runway opening in 2027-2029. Opening the runway is not the end for consumers or others – rather it is the beginning of the greatest benefits. Only then will ever larger numbers of passengers benefit from capacity and greater competition. Development of airfield infrastructure will also continue well into the 2030s, including new terminal capacity, plus enhancements to surface access. This programme will last at least 15 years and needs to be conceived of as such.

Heathrow's H7 plan and expansion programme thus does not fit into the scope of a single five-year review. Taking only a five-year review would force all of the fifteen-year investment risk to be compensated in those 5 years. All of those 5 years will be years of intensive investment that can only be repaid many years later. This approach would significantly increase investor risk exposure in 2022 to 2026 and therefore compensation required to make the project financeable. This will result in higher costs for consumers and greater uncertainty for all stakeholders.

Five years is an arbitrary period that should be changed if it helps consumers. Under this pattern the regulator is free to make a completely new and independent determination of the risk and reward allocation at each determination. Reopening the regulatory framework in the middle of the expansion process with the possibility of moving goal posts on key regulatory parameters and expectations, such as risk and returns determination is a recipe for uncertainty. Uncertainty that will ultimately cost consumers. The duration and nature of the

project – at least as related to the investment profile - requires a rethink about the regular five-yearly pattern of regulatory reviews.

Discussion and proposed solutions

We believe that the regulatory period should align with the investment programme. As that is anticipated to be around 15 years, our proposed solution is to extend the period beyond the conventional five-year horizon to 15 years, 2022 to 2036.

There is regulatory precedent. Most notably Ofgem have experimented with adjusting the standard five-year regulatory cycle to achieve a balance of risk and incentive better suited to the nature of the investments that are being undertaken. In fact, at Heathrow, we have rarely had a precise 5 year period - including Q6, which has been extended from five to eight years to better align H7 with the timing of Heathrow expansion.

A longer period does have issues – as indeed Ofgem acknowledge. The biggest issue is being able to accurately and fairly forecast settlement variables so far ahead. Big errors can lead to big variances in outcomes, often for reasons hard to manage or predict. Passenger demand and external cost drivers change in ways that cannot always be predicted, which may call for necessary adjustment. Moreover, over the duration of the expansion programme it is reasonable to believe that consumer preferences and airline business models will evolve. New capacity particularly opens the possibility of new airlines operating different business models, for example more low-cost carriers at Heathrow. That could lead to new requirements of Heathrow which cannot be fully anticipated today.

There are good reasons to protect consumers – as well as airlines and investors from these variances. Failure to do so could for example lead to consumers paying more than they need to for the airport or detrimental pressures on the financing and viability of the business.

Therefore, establishing a 15-year period is not to say that all regulatory parameters should be set in stone through to 2036. There is benefit in reassessment over the duration for those parts of the settlement which are performance driven. This contrasts to those related to the framework’s definition, specifically the one-off decisions made on investing in expansion. We see two alternative models for managing this uncertainty – either (i) performance-based tramlines or reopeners or (ii) periodic reopeners.

We propose a period for H7 of 15 years, covering the duration of expansion. This would fix in the licence some investment related elements of the framework over the whole 2022-2036 H7 period. We also propose pre-defined reopeners for other elements to ensure fairness. We have a preference for performance-based tramlines or reopeners. Although this requires further discussion.

The elements reopened and fixed are summarised below in Table 1.

Table 73: Re-opened and fixed elements over H7

Elements subject to re-opener over H7	Fixed elements over H7
<ul style="list-style-type: none"> • Passenger numbers • Operational expenditure • Commercial revenue • Other Regulated Charges • Capital investment • Revenue from the HULEZ and HVAC • Corporation tax 	<ul style="list-style-type: none"> • Expansion premium calculated based on additional risks • Post-tax Cost of Equity • Defined allowance for embedded debt • Debt indexation for new debt • Pre-tax approach • Financial structure (60/40% D/E) • RPI indexation of RAB and charges

Performance-based tramlines or reopeners allow the sharing of certain pre-defined out/underperformance. If breached, the tramlines would trigger a re-assessment of some or all of the elements subject to reopening. The appeal of this approach is that it allows a more flexible and tailored way of testing for variance and out/underperformance. The tramlines would have to be designed to avoid complexity and unintended consequences for incentives across stakeholders and the business. We can see a number of potential performance metrics for tramlines: 1. Passenger volumes 2. A combined metric of commercial and operating expenditure 3. An EBITDA like metric 4. A RAB like metric.

All these options would appear to protect both consumers and investors from significant underperformance / outperformance. All appear to be viable mechanisms to allow reassessment. Some are more simple and transparent and some more holistic in nature. All might present a timing issue. Once a performance tramline was triggered, a review would be triggered to reassess the building blocks and therefore aeronautical charge. We know, based on experience, that a price control determination takes time to be performed. Therefore, it would be important to define as part of these mechanisms the process a duration to recalibrate aeronautical charges.

With **periodic reopeners**, there could be a number of interim reviews to allow the recalibration of the elements subject to reopening. If this approach was adopted, we propose that the reopeners take place every 5 years from the start of the H7 period. This should mitigate against excessive variance. It might be possible to have even more frequent reopeners (e.g. 3 years). However, such a short period both increases the regulatory burden for all and starts to limit the efficiency incentives for the airport. A five-year period ensures that efficiency incentives are preserved – which are shown to work as in Q6 – and is a better understood process for all stakeholders.

We would like to engage with the CAA and airlines on the detail of these options over Constructive Engagement with a view to establishing an approach in the Final Business Plan (FBP).

Benefits

The key benefit of a 15-year period is that it allows Heathrow to finance expansion while at the same time maximising affordability. It provides certainty in the regulatory framework to enable investors to commit to delivering expansion and facilitates efficient financing. Such an approach is widely supported by our debt community. In addition, it provides the opportunity to smooth out prices over a longer period of time, opening options for a wider set of alternative price profiles that could support financeability and affordability. Heathrow would like to engage with stakeholders on the potential pricing profile options that a longer price control provides.

Passengers will benefit from this approach. Risk associated with expanding Heathrow will be recognised and rewarded over the full period. Rather than focusing these risks within a standard five-year price control, over a longer period it will be possible to achieve lower airport charges and so improve affordability for passengers from the start of H7.

The re-openers provide protection for consumers and investors against the possibility that key parameters do not perform as anticipated at the original regulatory review. It allows for the benefit of outperformance/underperformance to be shared with airport users, as is the case under the Q6 framework. Albeit harder to quantify in monetary terms, our proposal leaves a large part of the familiar and successful Q6 framework in place, with similar exposure to forecast and performance risk.

3.2 Expansion premium

The issue

Given the scale, complexity and duration of investment, the financial and operational risks stemming from expanding Heathrow should have a substantial impact on the regulatory framework for the next 15 years. Construction risk, primarily around the difficulties in estimating total costs and the timeliness of delivery are not unique to expansion. But given the scale and nature of the build in 2022-2036, relative to Heathrow's existing asset base, construction risk takes on a disproportionate importance for H7. Clearly the risk premium relating to construction is substantial in this case. This situation is made more severe if that premium is concentrated into a conventional five-year price review. Both because a large part of the risk associated with construction impacts on the initial period and because the possibility of a resetting of the allowed WACC in the middle of the construction period adds significantly to the regulatory uncertainty faced by investors.

Likewise, there are additional risks linked to traffic volatility and forecasting, financing risks, legal and regulatory policy and other factors that increase the risk borne by investors and the business through the next 15 years. These are analysed and quantified in the Chapter 12 on WACC and the related review by KPMG of the potential risks.

If these risks are not compensated for in the settlement, investment will not be financeable. If they are baked into the regulatory framework as a whole, then investors are likely to be overcompensated. It therefore is both logical and in line with regulatory precedent to set an expansion risk premium for the H7 period.

This issue creates a challenge for affordability, impacting on passengers and airlines, as well as financeability. It is in nobody's interest for Heathrow to attract too high a risk premium on its WACC at the same time as the RAB expands significantly. This would place unwanted upward pressure on charges.

Discussion and proposed solutions

We consider it is appropriate to explore options relating to the debt and equity finance of expansion that seek to smooth the relevant risk premia over the whole of the construction and ramp-up growth phase. This should permit lower charges than could be achieved with a traditional five-year control.

The Expansion premium should be isolated and robustly quantified using sound financial principles. We believe that the Expansion premium is best dealt by defining an additional parameter in the cost of equity determination, it will be fixed over the 15 years of the H7 period.

Benefits

Fixing an appropriate expansion premium for the period enables expansion to be delivered, since it enables the programme to be financeable by fairly rewarding Heathrow (and its investors) for the enhanced risks that it will face.

It enables the programme to be affordable, these proposals will directly benefit airport users by permitting airport charges from the start of H7 to be lower than would be possible if the expansion premium is defined for a period of five years.

An expansion premium that is identifiable and quantified by way of a robust financial assessment enables the CAA to explain and defend its estimation, aiding transparency and

clarity on the CAA's part. Additionally, it avoids the risks of setting the premium too high or too low across the framework.

3.3 Event trigger based regulation

The issue

A number of factors for Heathrow from 2022-2036 are as yet unknown and potentially binary in their implications for our plan and consumers. Chief among them are whether planning consent is granted at all for expansion, whether airspace change aligns with new capacity, whether Heathrow is permitted to increase the ATM cap before the new runway to allow Early Growth and whether private financing is available. These decisions may also come with conditions that materially alter the future plan, in part determined by the statutory process following Planning Inspectorate (PINS) advice to the DfT. An example would be any environmental related restrictions that may have an impact on the airport capacity Heathrow can offer. Similar conditions, delays or changes because of airspace modernisation could have similar effects.

Consumers should not have to be locked-in now ahead of these decisions or make probabilistic bets on a binary outcome. That could for example leave them paying for an expansion premium despite expansion being stopped. Likewise, investors need certainty that if key permissions or thresholds are not passed that will be reflected in the settlement. Consistent with the statement of Principles signed between DfT and Heathrow investors, Heathrow also requires a formal point in the expansion process in which we will commit to delivering expansion based on a commercial decision. Absent a mechanism to allow for these discussion points financing Heathrow for expansion beyond 2022 would be questionable.

At the same time, it is important that H7 starts in January 2022. Certainty and stability require that the regulatory arrangements for developing expansion are fully known as soon as possible. In January 2022, the statutory planning process may not be finished, and each of the decisions noted above may not yet be known. Therefore, in addition to developing a regulatory framework that copes with uncertainty, we need to develop a process that allows stakeholders to progress expansion knowing what happens once uncertainty is resolved.

Discussion and solutions

Given the discussion above, we propose the following set of two to four key trigger events that are defined in the settlement. Each of these would have defined consequences for relevant settlement mechanics such as risk premia, passenger forecast etc.

The most critical of these would be the expansion go/no go commercial decision. We would propose that this work as follows:

- H7 would start as planned in January 2022. Therefore, the CAA would follow the process described in its consultations, where Heathrow would submit the FBP in 2020 and the CAA would issue Initial and Final Proposals in 2021.
- The H7 regulatory conditions would describe all the regulatory variables (including the risk and return determination) Heathrow would be subject to. This would enable Heathrow to recover an expansion premium over 15 years (see WACC discussion) At the point when Heathrow considered all the necessary conditions in terms of planning, airspace, regulatory, financing and other factors were in place, it would notify the CAA that it was either deciding to expand or deciding to halt expansion. The mechanism whereby Heathrow triggered this decision would be clearly defined by the CAA in the regulatory determination.

- Should Heathrow confirm that it will not deliver expansion, the expansion risk premium would automatically be removed. From this point, Heathrow would be compensated based on a WACC that does not include an expansion premium.

We would propose similar triggers linked to Early growth and potentially any other binary decision points identified that fall after 2021.

Benefits

The proposed approach benefits all stakeholders. It protects consumers and airlines as it ensures that Heathrow is incentivised to deliver expansion and is rewarded for the risks associated with expansion unless a decision is made not to proceed. It protects investors by providing regulatory certainty as soon as practicably possible, giving clear and enduring incentives in an H7 settlement in 2021. Equally, providing a clear milestone in the process where investors express their commercial views, eases financeability and affordability concerns, since it provides clarity regarding when the decision to proceed with expansion is taking place. It also provides clarity and transparency to the CAA's decision-making process. It provides clear and objective regulatory incentives to delivering expansion, and it uses commercial incentives rather than punitive and coercive measures to achieve an outcome that the CAA recognises to be in the interest of consumers.

3.4 Early growth / additional 25,000 ATMs

The issue

As part of the Development Consent Order (DCO) application we are requesting the current 480,000 ATM cap to be lifted by up to an additional 25,000 ATMs. This would enable us to capture current unserved demand from Heathrow, generating passenger growth ahead of runway and terminal capacity being delivered. These additional movements and the resulting passenger numbers, would enable Heathrow to maximise utilisation of current capacity and contribute to achieving an affordable outcome. They are also of direct benefit to consumers, particularly for the "choice of flights and destinations" outcome.

Heathrow is thus keen to ensure that we have the ability to enhance capacity ahead of the third runway being delivered. We have shown the impact in the IBP and financials. We are planning to invest in additional terminal capacity to ensure that we can cater for this demand.

Nevertheless, the decision to remove the cap is dependent upon third party decisions by PINS, DfT, CAA and others. Additional capacity may be only partially granted or not granted at all. We are assuming that an additional 4 million passengers per annum would fly to and from Heathrow from 2022 onwards, equating to c£100m per annum or c.£500m in contribution to the single till by 2026. We are also potentially exposing consumers to investment we might not require if the capacity is not permitted.

Discussion and proposed solutions

We propose to introduce a mechanistic adjustment to airport charges that reduces the yield per passenger if we are allowed to uplift the cap. This would be another of the event triggers we describe above.

To avoid any perverse incentives, we consider that it would work best for Heathrow, at the point planning and airspace change is complete, to notify the CAA of the additional ATM capacity created, if any. Heathrow would also notify the CAA of the timing of ATM release. Once done this actual figure, flowed through the pre-existing forecast model, would be

reflected in building block calculations. Until such notification Heathrow would operate at a capped 480k ATM forecast.

Benefits

The triggered approach should avoid the issues of too wide a divergence in the settlement and actual ATM and passenger volumes early in H7. This allows more accurate planning of capacity over the 2020s and reduces unnecessary financing risk as well. It provides clarity and certainty for all around the ATM cap and impacts on the settlement. It ensures Heathrow and others are incentivised to use all available capacity as soon as it comes available but also not to push resilience or other constraints too far in the absence of the full new capacity allowance and related changes.

3.5 Early Ex-ante capital incentives and development and core framework

The issue

We have operated under a regime in Q6 that has been effective at incentivising efficient capital investment delivery. The 'development and core' framework introduced for the first time in Q6 was designed to address issues of inflexibility in the previous regime. It was also explicitly to encourage more joint decision making that based investment on present needs rather than a settlement at a point in time. Under this development and core regime, Heathrow is already subject to ex-ante and ex-post incentives, in addition to on-going review of delivery. Heathrow is currently exposed to ex-ante incentives following each project's Gateway 3 (G3) determination. Heathrow does not earn a return on costs above G3 value within a 5-year settlement period. Furthermore, projects above £20m are subject to predefined trigger payments due to any delay against milestones. Heathrow is also subject to constant scrutiny of the IFS and the airline community throughout the different project delivery phases, with the airlines having an important role in agreeing to project delivery at G3. Ex-post, Heathrow also is exposed to review by the CAA, with the possibility – and actual reality of tens of millions of pounds in Q6 - of disallowing inefficient investment from recovery in subsequent price controls.

The CAA has discussed an increase in ex-ante incentives in H7. It has proposed quite broad brush and large-scale incentives so far in its consultations on the matter. We have been asked to consider the CAA's proposals for different ex-ante incentives in our plans.

Discussion and proposed solutions

The current approach has successfully achieved what it sought to do. Heathrow has delivered over Q6 record level of passenger satisfaction for record levels of passengers while managing to invest below the Q6 regulatory allowance. It provides assurance to airlines that investment is only undertaken efficiently and in alignment with the needs of airport users. The portfolio of investment projects has been substantially adjusted since 2014. These arrangements provide both flexibility and effective cost, quality and timely delivery control.

We thus believe the basic development and core framework is best suited to handling the intrinsically uncertain details of service and expansion investment that will have to be developed over the next 15 years. We note also that Heathrow and the airline community have continued to jointly evolve the framework to incorporate CEPA's recommendations³²⁴, enhancing IFS and airline engagement at earlier stages of business case development with a particular focus on finding more certainty regarding cost and benefit of business cases at early

³²⁴ CEPA, Review of Heathrow Airport's Q6 Capex Governance Framework, April 2017

stages of development. The airline community and Heathrow agree that the framework represents a major step forward to delivering capital efficiency compared to Q5's approach and have demonstrated a preference to maintain it³²⁵. A new approach would be untried and could struggle to obtain similar levels of user support and bed in. It may also have unforeseen impacts on airport incentives precisely at the time stability in the capex investment process is most needed.

In contrast, having studied best practice across the construction and infrastructure industry, Heathrow considers that the imposition of a greater fixed price element is the wrong solution to the problem of controlling capex costs for expansion. There is mounting evidence that such an approach leads to higher not lower costs in the end, by imposing levels of risk on private investors that they are not well placed to accommodate.

Indeed, there is increasing evidence from the world of concessions and public private partnerships that fixed price construction contracts, even when competitively tendered, tend to result in higher cost of construction overall than traditional public procurement methods³²⁶. We also note the recent criticism of the UK government by the NAO over their method of procuring Hinkley Point C from EDF. Specifically, the NAO report³²⁷ draws attention to the risks placed on the private contractor by requiring it to enter into a fixed price contract for construction. The NAO identifies that a more flexible approach to procurement, more akin to traditional public procurement could have been financed at a far lower cost.

For these reasons, combined with importance of maintaining flexibility and responding to airlines and passengers' needs, Heathrow believes that continuation of the existing development and core framework is the best approach for all stakeholders involved. We have therefore developed the IBP with this fundamental assumption underpinning it. However, we do accept that the much increased scale of investment will require revamped and more effective and efficient scrutiny within the current governance arrangements to ensure all decisions are well taken in the interests of all airport users, both current and future. We also note that as elements of the programme from 2022 reach G3 maturity, milestone triggers will need to be set in collaboration with the airlines.

Benefits

We estimate that introducing ex-ante incentives could add at least £6 per passenger to our airport charges as an average across 2022 to 2026 just through the expansion risk premium, construction cost increases could be additional to this consumer impact. This cost can be largely avoided by continuing to use the current framework. In addition, defining a framework that enables Heathrow and the airlines to react to unforeseen situations enhanced Heathrow's ability deliver the projects that stakeholders require on a timely, cost effective and quality manner³²⁸.

3.6 Risk sharing arrangements to passenger volumes

³²⁵ Virgin, Response to CAP1782, May 2019.

AOC, Response to CAP1782, May 2019

³²⁶ CAA-H7-135 Frontier Report - Ex Ante Incentives, page 21

³²⁷ <https://www.nao.org.uk/report/hinkley-point-c/>

³²⁸ Steer Review, LHR Capital allowances, December 2019

The Issue

We see two broad options to consider in respect of passenger volume risk: (i) continuing with the current Q6 approach under which Heathrow bears 100% of volume risk; or (ii) moving to an alternative arrangement with some risk shared by airlines to incentivise growth.

Under the Q6 framework, Heathrow is fully exposed to passenger demand risk. No adjustment is made to the price control if traffic volumes vary from those anticipated at the regulatory review. This also means that airlines, and potentially consumers, do not gain from higher volumes in the regulatory period. This might limit airline incentives to grow volumes.

Demand has outstripped capacity at Heathrow in recent years. This situation will change in H7. With the opening of the new runway there is inevitably much increased scope for uncertainty over outturn passenger volumes at an expanded Heathrow, as capacity will no longer constrain traffic to the same extent. From an investor point of view, at other major investment programmes which may act as comparators, such as TTT and Hinkley Point C, while investors have been exposed to construction risk, they have not typically been exposed to revenue risk as well. It is likely to be in consumer interests for Heathrow to have incentives to build traffic at the expanded airport, and therefore it may not be optimal to insulate Heathrow completely from this risk. However, it is also true that limiting that risk improves financeability, even as it provides airlines with incentives to grow and consumers with the economic benefits of growth sooner.

Which of these is the optimal approach depends in part on the passenger forecast used to set charges. If a forecast different from a P50 forecast is used, then an alternative approach to risk sharing is likely to be required. The issue is particularly acute in the 'Prioritising Savings' strategic option. This option requires Heathrow and airlines to commit to faster growth to achieve a lower airport charge and greater airfares savings. Retaining full volume risk in this scenario would not be appropriate.

This is an issue we would like to explore with airlines and the CAA during Constructive Engagement.

Discussion and proposed solutions

If the business plan were to be based on an aggressive passenger forecast, such as in the prioritising savings option, then we see a need for an alternative risk sharing approach that introduces a mechanism that shares and balances the risk of more material traffic under (or out)-performance.

As outlined above, revenue risk to Heathrow will increase significantly after the opening of the third runway. While it is extremely unusual for major infrastructure contracts of this type to carry significant revenue risk (see TTT and Hinkley Point C as examples), in Heathrow's case it remains appropriate for the airport to be exposed to some level of risk to ensure we have a strong incentive to grow passenger volumes and make effective use of current and new infrastructure.

This mechanism could be introduced from the point where the runway becomes operational or from the start of H7. Given the mechanism we are proposing we would expect the start date to have no material difference in practice, because the extent of risk sharing proposed is such that there is less chance of it being triggered before the runway opens. We therefore think that the mechanism, if used, might commence from the beginning of H7.

We consider that in the 'Prioritising Savings' option a mechanism like the above could be useful for both Heathrow and airlines. We cannot be fully confident that we will be able to pursue this option absent some form of traffic risk sharing.

Benefits

A passenger volume risk sharing approach as set out above would maintain a large part of the existing protections for both airport users and investors by incentivising the airport to drive passenger growth and maximise commercial revenues while preventing excessive discrepancies between forecast and outturn passenger numbers through resetting of passenger forecasts at interim reviews. It could also help provide strong incentives to airlines to grow passenger volumes as they benefit directly from the spreading of fixed costs across a larger passenger base.

3.7 Debt Indexation

The Issue

Historically UK economic regulators have provided a fixed allowance to regulated companies for the cost of debt element of the WACC determination. This determination provided an allowance for both historical/embedded cost of debt and forthcoming cost of debt (i.e. for new debt) for the regulated companies within the price control that they were entering into.

In following this approach regulators in recent periods have tended to overestimate the actual cost of debt incurred by companies, leaving consumers potentially exposed to higher charges. Conversely should regulators have underestimated cost of debt determinations, regulated companies would have encountered difficulties in raising required debt to finance their activities. This leads to an argument that consumers have been exposed to a risk that regulated companies would have been best placed to manage and therefore face.

Actual costs of raising debt are strongly driven by market conditions. Given the challenging enterprise that financing expansion represents, a one-off determination of the allowed costs of debt would no doubt be contentious, it risks exposing consumers and Heathrow to significant market risks. This in turn would have unfavourable consequences for financing expansion, since it would enhance the perceived risk of financing the programme, a sub-optimal outcome for consumers.

Discussion and proposed solutions

UK regulators, including the CAA, have proposed a different approach to determining cost of debt allowances by indexing the costs of debt. Heathrow is supportive of this approach for estimating the cost of new debt and has therefore included it in principle in this plan. The mechanics and implementation of this approach are discussed within the WACC and financing chapters of this plan.

Benefits

This benefit of this approach is to reduce Heathrow's and consumers exposure to deviations between allowed cost of debt and actual cost of debt, which as discussed above are in the main driven by market conditions differing from the one assumed at the price control determination. In addition, since allowed cost of debt would be determined by a defined index, Heathrow would still maintain strong incentives to outperform the index therefore retaining incentive-based regulation principles.

3.8 Flexibility to meet Airport National Policy Statement (ANPS) requirements

The Issue

There are uncertainties and unknowns around the Secretary of State's approval of planning consent for Heathrow expansion. Where ANPS requirements such as property or noise compensation are well defined we have included the costs in our plan as part of the single till. It is possible that approval will result in additional obligations being placed on Heathrow, including additional environmental targets around the development of surface access to the expanded airport and potentially further requirements to fund compensation to local residents and communities. The fact that these conditions are uncertain and are likely to remain so at the time the regulatory framework is to be finalised, means it is necessary for the framework to be sufficiently flexible to be adjusted for new commitments imposed at this late stage.

We accept reasonable conditions on us as we seek to expand Heathrow. We recognise the importance of attaining positive outcomes from expansion for our local communities and the wider economy, in addition to the positive outcomes for consumers. In its response to our summer 2019 Airport Expansion Consultation (AEC), the CAA recognises that Heathrow, as scheme promoter, will have to incur costs in relation to mitigating environmental impacts and compensating the local community to meet requirements set out by the ANPS.³²⁹

Some conditions could also create new stream of income. We consider it important that this income be used for the ANPS purpose intended, although where appropriate it might also contribute to other consumer outcomes and affordability. Consumer insight on access charges and other mitigations tells us they will support such costs but not if they are seen as primarily commercial. Two conditions are already apparent with impacts for our consumers, outcomes and plans - the Vehicle Access Charge and the Community Compensation Fund.

Discussion and proposed solutions

Heathrow will introduce Heathrow Ultra Low Emission Zone (HULEZ) charge and Heathrow Vehicle Access Charge (HVAC) following DCO approval. They are intended in a planning context to incentivise sustainable travel. The proposed charges constitute new and hard to forecast income streams in H7 and beyond. The HULEZ will in fact be the world's first airport Ultra Low Emission Zone. The level of charges is not yet set, although we illustrated options in the AEC. An assumption has been made for the IBP in line with the AEC proposals (see Chapter 10 Commercial Revenues.) It is therefore, important that the regulatory framework is able to deal with these novel income streams. It needs to provide the flexibility and correct incentives to ensure that they can be implemented to best effect throughout the coming years in order to truly influence consumer behaviour, rather than just maximise revenues. At the same time there is an opportunity to reduce airport charges for all consumers.

There are a number of options for how the revenue can be treated, including passing through the revenue or creating a more complete ring fence of the revenues to fund surface access. In line with recent conversations with CAA and airlines, we have assumed, for the purpose of the IBP, that the revenues form part of the single till and are subject to a pass through against forecast through the airport charges formula.

Another ANPS requirement which requires consideration of a Community Fund. The ANPS states this fund is expected to be proportionate to the environmental impact of expansion and it is expected that we will consult on the size and duration of the fund, the eligibility criteria surrounding the fund's administration and the source of revenue for the fund. Following

³²⁹ CAA, *CAA response to HAL AEC*, September 2019, pages 16-17, paragraph 2.20

consultation on the fund in the summer 2019 AEC, we have reviewed the scope, eligibility criteria and governance surrounding the fund to ensure that it meets the requirements of the ANPS and the outcomes we need to achieve in the local community. Through this review, we have decided that the correct approach for the administration of the fund is to ensure it sits outside of our regulatory framework and, be collected via a passenger levy. This would be levied directly on passengers at the time of ticket purchase, a process similar to that used for the collection of APD. It would thus have no commercial impact on Heathrow. Revenues from the levy would be held outside of Heathrow's regulated revenues and the administration of the fund would be overseen by an independent body likely to be comprised of representatives from local authorities and the local community.

Benefits

The pass through option for vehicle charging revenues was considered the most appropriate for the IBP as it:

- Allows for revenues from the charge to subsidise our investment in surface access initiatives through the single till, as set out in the CAA's surface access policy.
- Means that any revenue from the charge, over and above that used to fund surface access initiatives will be used to reduce the airport charge for the benefit of all passengers.
- Ensures that Heathrow has the flexibility to vary the charge to influence consumer behaviours and prevents Heathrow from being incentivised to hold the charge at a level that is unnecessary to influence behaviours
- Does not expose Heathrow to risk that is not recognised in the proposed cost of capital

It should be noted that, should revenues from the vehicle access charge not be included within the single till, this will have a material impact on the level of the overall airport charge, raising the level of the charge

The levy option for the consumer fund was considered the most appropriate as it ensures that the charge is transparent and can be governed outside of Heathrow's existing structures.

3.9 Other Regulated Charges

The Issue

The Other Regulated Charges (ORC) structure is a mechanism for Heathrow to recover the costs of services provided by Heathrow that are not included in the airport charge through a robust and transparent process. Through the ORC mechanism, the airport and its users can work together to drive efficiencies and improve service for key elements of the passenger journey and ensure that our scarce capacity is being used efficiently.

The mechanism implements a clear and transparent governance structure around the costs of providing these services. The current ORC mechanism is built on the principle of strict cost recovery, meaning that Heathrow can only recover the costs incurred in providing these services through the charges it implements.

For H7 and beyond, Heathrow and the wider airport community will be facing new challenges, such as increased scrutiny on actions to promote sustainability. It is therefore necessary to review the scope and mechanism of ORCs to ensure that they incentivise the correct behaviours to meet both our consumer and other stakeholder outcomes.

Discussion and proposed solutions

To ensure that the ORC structure remains fit for purpose, we are proposing changes to the scope and pricing principles for ORCs to ensure that the correct services are covered and that these are priced in a way to incentivise the correct behaviours.

We are proposing to remove the strict cost recovery principle from ORCs in some cases and instead focus on a pricing approach which incentivises sustainable behaviours and efficient use of Heathrow's scarce capacity. This includes, for example, incentivising the use of sustainable transport modes by colleagues by creating a colleague transport fund, funded through increasing the price of colleague car parking passes in line with market costs.

This change will also allow us to establish new pricing models with the airline community to better incentivise service improvements for passengers or provide alternative levels of service better aligned to airline business models. Baggage is an example of where changes to pricing structure could improve efficiency and employing increasingly commercial pricing models would improve passenger service. This could mean for example, implementing SLAs and a performance incentive on Heathrow to deliver certain baggage performance levels or allowing for the alternative pricing of different baggage products to incentivise more efficient usage, that better aligns to different airline business models.

We are also proposing to make some changes to the services and activities included in the ORC mechanism to better align to the principles agreed with the airline community in the Q6 settlement or changes to our operation. These proposed changes include moving costs for the delivery of our passengers with reduced mobility (PRM) contract and the costs of providing check-in and automation infrastructure in the airport charge along with moving annuities for baggage from the airport charge into ORCs to ensure the price per bag is fully reflective of cost. The specifics of these changes are discussed in Chapter 11 Other Charges.

Benefits

Revisions to the ORC mechanism will allow us to better incentivise efficient use of Heathrow's infrastructure, leading to further cost savings for airport users and, ultimately, consumers. Our proposed changes also ensure that services, such as the delivery of assistance to passengers requiring support and the provision of automation infrastructure, which are both driven significantly by passenger numbers, can be managed through the airport charge to ensure they meet consumer requirements. The proposed refocus on sustainability will also help to ensure that we can deliver the ultimate benefit for consumers, which is expansion and growth in capacity at Heathrow by helping us meet air quality and surface access targets.

3.10 Outcome Based Regulation

The Issue

The Service Quality Rebates and Bonuses (SQRB) scheme was first introduced in 2003 and provides a formal mechanism for incentivising Heathrow to deliver service quality standards to airlines. However, the SQRB has not materially changed since its conception and is narrow in scope as it does not fully capture what our insights tells us is most important to consumers across the end-to-end journey. Furthermore, the SQRB covers only those elements of the passenger journey that Heathrow controls. We know from our insights that consumers do not differentiate between the responsibilities of airports and their partners and their high-level needs go far and beyond what Heathrow has sole responsibility for.

Discussion and proposed solutions

The CAA, from the very outset of the H7 price control review has strongly advocated for a move towards an outcome based regulatory framework. This included the introduction of the Consumer Challenge Board (CCB) to ensure that the interests of consumers are reflected in this process. We have supported the introduction of the CCB and a move towards an outcome-based framework.

We have developed a robust service quality performance scheme that builds on the Q6 SQRB scheme and can be used alongside our other incentives to track and incentivise outcomes for consumers. The evolution of the performance framework has been informed by a wide range of consumer evidence. Our increased understanding of the views and opinions of consumers has influenced our outcomes, measures, targets and incentives to ensure that these reflect our consumers' expectations. We discuss the proposed scheme in more depth in Chapter 6 Measures, Targets and Incentives.

Benefits

Performance measurement and target-setting are important factors to the success of every growing business. Knowing how the different areas of our business are performing is valuable information in its own right, but a good measurement system allows us to examine the triggers for any changes in performance. Regulatory rebates and bonuses are not the only or even primary incentives we face but they are an important part of the wider package. We believe the more comprehensive, balanced and sophisticated measures proposed will support Heathrow's focus on our outcomes after 2022.

3.11 Approach to Taxation

The Issue

In previous reviews, the CAA has used a pre-tax approach to the cost of capital based on the standard corporation tax rate. This ensures that Heathrow receives enough revenue to cover the amounts it has to pay for tax. For H7 the CAA has set out that it is considering a post-tax approach with a specific allowance for tax.

Discussion and proposed solutions

In the UK regulators have adopted two different approaches towards tax allowances for regulatory settlements. Some such as Ofwat and Ofgem have used a post-tax approach. In this approach, the cost of capital is set on a post-tax basis and a specific amount is allowed for tax based on forecast tax payments. Others, such as the CAA and Ofcom have adopted a pre-tax approach where a pre-tax cost of capital is used that implicitly includes an allowance for the tax that will have to be paid by the company.

A key difficulty with a post-tax approach is that it requires an accurate forecast of the likely level of tax to be made. Where there are significant uncertainties in tax allowances and other elements of the tax calculation for companies this can be difficult to do without making a number of assumptions that might not be correct. In contrast, an advantage of maintaining a pre-tax approach consistently over a long period is that uncertainty in capital allowances etc will even out over time, ensuring that over the long run consumers pay the right level of tax.

An additional difficulty with a post-tax approach is that it requires a forecast of the companies gearing to be implemented properly. In a stable situation where gearing is unlikely to change this is straightforward. However, for Heathrow during expansion there is considerable

uncertainty over the precise path that gearing will take. This is because considerable amounts of equity are required to finance expansion and the precise amount will depend upon the outcome of macro parameters such as inflation and interest rates as well as the capital expenditure profile.

Finally, an issue with a post-tax approach is that it is difficult to validate as historic actual tax payments may not be settled until many years after the specific tax year. The calculations are not submitted to HMRC until 12 months after the year, HMRC then have 12 months to make enquiries, and then further time may be needed to reach agreement. This means that accurate details for historic task may only be available several years in arrears.

In contrast there are a number of important advantages to a pre-tax approach. Amongst the most important is that it is a continuation of the long-established approach of the CAA and that retaining this will deliver regulatory stability, which is welcomed by investors and helps reduce growing concerns of regulatory risk.

In addition, the approach is conceptually much more straight forward because calculating Heathrow's regulatory tax position is technically difficult. The main variation between the statutory rate and the cash tax rate is due to capital allowances. The uncertainty in these for H7 is high at this stage however, as the detailed tax treatment of the assets to be constructed in expansion is not yet known. The impact of the introduction of detailed rules for Structures and Buildings Allowances in 2018 is not yet fully clear. In addition, changes to accounting rules such as IFRS 16 can have different effects in different parts of the Group.

This issue on the right approach to taxation for Heathrow was considered carefully by the Competition Commission in its 2007 reference. It recommended that the CAA continue to use a pre-tax approach on the grounds that there is no good reason to change the approach adopted by the CC in previous quinquennia³³⁰. In addition, given the complexity of forecasting tax accurately, they recommended continuing with use of the standard corporation tax rate rather than an effective rate³³¹.

Therefore, for the IBP we have continued to use a pre-tax approach to tax based on the current view of the standard corporation tax rate.

Benefits

Continuing with the existing CAA approach to taxation has a number of benefits:

- It maintains regulatory stability which gives investors long-term confidence in the regulatory regime;
- It is simple to implement and does not require a wide range of potentially incorrect assumptions to be made;
- It is well understood and easy to model for Heathrow's stakeholders; and
- It is a more transparent approach as actual tax payable may not be settled until many years after the actual tax year has passed.

³³⁰ Competition Commission, Heathrow/Gatwick Quinquennial Review: Report, 2007, Appendix F, p4

³³¹ Competition Commission, Heathrow/Gatwick Quinquennial Review: Report, 2007, Appendix F, p33

3.12 Commercial property development

The Issue

Our plans for expansion include ambitious changes to the use of land in our central terminal area, as well as at different sites on the airport. This opens consumer focused opportunities to develop new facilities such as hotels and commercial spaces for passengers and local businesses. Currently, the development of commercial property at Heathrow is carried out by way of a ground lease model. In this model a long-term ground lease is granted to a developer to develop the site and a ground lease paid into the single till equivalent to a proportion of revenue.

It is notable that Heathrow lags behind other airports, which use alternative property development frameworks, in the development of commercial property. Airports such as Schiphol and Zurich are carrying out large scale 'airport city' developments to increase value generation from airport property. This gap was identified in [REDACTED] independent commercial benchmarking exercise³³².

Discussion and proposed solutions

Our 'Prioritising Service' option includes investment in five potential sites which have been identified as prime locations for commercial development as part of our capex plans for the H7 period. While development of these sites through the normal capex process is possible, Heathrow considers that an alternative model for delivery of this commercial property might allow for the generation of increased commercial revenues and subsequently reduced airport charges for consumers. We see this as a key area where changes to our delivery model could help to more efficiently drive commercial revenues, while increasing passenger satisfaction.

We have begun to review the potential delivery models available to improve our ability to develop commercial property. It appears possible that an alternative process that allowed a longer-term time horizon might facilitate development. This could be structured within a long-term RAB based single till.

Benefits

We expect this approach to provide increased benefits for consumers and airport users. A qualitative assessment of the model indicates that this proposed approach would be beneficial for consumers through the H7 period and beyond. The approach would:

- Allow for the delivery of commercial facilities quickly, in order to re-provide for commercial property removed during the construction of the expansion project and to remain consistent with expansion project delivery;
- Allow for the development of commercial facilities in line with consumer and stakeholder requirements understood through Heathrow's consumer engagement; and

Our preliminary modelling shows that this could allow the new commercial facilities to have a positive impact on the single till throughout 2022 to 2036, bringing down airport charges. Further detail on the developments under consideration is set out in the commercial revenues and choices chapters.

332 [REDACTED]

3.13 Alternative Delivery Mechanisms – Innovation Partners

The Issue

Heathrow Expansion provides significant opportunities to benefit consumers, airlines and the airport with innovation, new technology, services, operational improvements and investments from wider world across the entire airport to deliver on the H7 outcomes. The CAA has challenged us to consider alternative models and engage in good faith.

Discussion and proposed solutions

In 2018 Heathrow launched its Innovation Partners process. In the initial round, over 140 partners made initial contact. They covered the full range of airport activities and a mix of larger and smaller businesses across the UK and worldwide. Innovation Partners has been a success. It was designed to bring in widest possible range of participants and build collaboratively with an open mind on Heathrow's part. We had 160 proposals from over 140 firms come forward to propose new ways to build or operate elements of Heathrow. The airline community has had visibility, and expressed their support for those concepts that successfully pass all phases of assessment. We are now providing seed funding to implement a series of trials and feasibility studies with the nine Innovation Partners. The outcomes of this will determine the business cases to implement the innovations fully in H7. This is all within the single till. We are considering when and if a further round of Innovation partners should be best launched. It is anticipated that the trials will take place across 2020, however each workstream will now work separately at its own pace, so that it can be incorporated into our expansion plans at the appropriate time if the trial or feasibility study is successful.

Benefits

The Innovation Partners process should improve our delivery against most outcomes in terms of effectiveness, cost or speed and allows us to use newly developed technology that we might not have been aware of otherwise. For example, Ocado are developing new logistic and storage solutions underpinned by British technology that are highly relevant to baggage handling and car park efficiency. We are currently pursuing ten projects from nine partners. At the same time, we have ensured we maintain an integrated hub operation that delivers for consumers in a coherent way.

3.14 Alternative Delivery Mechanisms – Terminal Competition

The Issue

Heathrow has carefully considered the potential benefits and costs of introducing competition in the provision of new terminals.

This analysis shows:

- The customer and efficiency benefits of terminal competition is unproven;
- Integrated strategic management of Heathrow as a national hub provides significant consumer benefits;
- A third party entrant would make expansion more difficult to deliver.

The customer and efficiency benefits from terminal competition are unproven

Improvements in efficiency and customer satisfaction are often raised as rationales for separate terminal ownership. However, introducing terminal competition is unlikely to deliver any such benefits since:

- Heathrow has continuously improved passenger satisfaction over the past decade
- Heathrow's passenger satisfaction levels are at the top end of its European peer group. Passenger experience at Heathrow's terminals is reflected in industry awards, year-on-year

Third party terminal models are not notable for generating higher customer satisfaction levels, with airports such as JFK performing poorly across a number of measures

- Heathrow operates efficiently compared to its peers and delivers capex more efficiently
- There is limited scope for terminal competition to further improve efficiency and customer satisfaction

In addition, evidence from around the world shows that airports are moving away from separate terminal operator models. In the last two decades, five third party terminal models have been terminated, with a return to integrated operations, demonstrating that these models do not deliver better performance for consumers.

Integrated management of Heathrow provides significant consumer benefits

Integrated operation at Heathrow provides benefits for international connectivity through the hub, operational resilience and security, and making the best use of the capacity of the airport.

- Heathrow's hub provides world-leading connectivity generating significant economic benefits for the UK and growth of the hub was critical to the Airports Commission's choice. A hub model requires an integrated connectivity strategy, which would be jeopardised by third party terminal operation and thus reduces the benefits expansion delivers to the UK
Heathrow has significantly integrated operational activities leading to cost savings and large improvements in resilience. Introducing a third party with competing commercial interests would undermine this pan-Heathrow approach to operational resilience and make it hard to define accountability for airport operations, resilience and security. This would be likely to result in less resilience, greater cost and a worse service to consumers.
- Heathrow is one of the most highly utilised airports in the world, operating at 99% of capacity on a constrained site. Delivering expansion at lowest cost requires making the best use of existing terminal facilities and being able to optimise airline occupancy across the airport. For example, Heathrow optimised capacity after the opening of T2 through a complex reallocation of airlines across the airport. Introducing an effective terminal competition model would reduce the ability of the airport to make the best use of available capacity. We estimate that such a model would require additional capacity to be effective at significant cost of £2-4bn for consumers.

A third party entrant would make expansion more difficult to deliver

We have considered the likely impact of a third-party entrant on the delivery of Heathrow expansion:

- A competing terminal proposition could delay the opening of the third runway by two to four years (beyond the 2030 NPS date), increasing costs and costing consumers material lost benefit
- A third party will have higher financing costs unless a Government guarantee and risk protections are also put in place. Heathrow’s financing costs may also increase due to a loss of control around expansion.
- Regulation will become more complex, with any new framework costly to develop and administrate
- Evaluation by regulators in other sectors indicate that splitting terminal delivery would not add significant value to customers
- Heathrow is subject to a demanding set of ANPS requirements. A third- party operator introduces risk into the delivery of ANPS targets.
- In addition, we consider it very unlikely that a new entrant would be able to finance a terminal on a standalone basis without recourse to a subsidy/guarantee from Heathrow or the Government. Such guarantees are highly unlikely to be available in practice.

Benefits

Overall, this analysis shows that terminal competition could severely compromise the delivery of airport expansion, lead to significant delay and cost increases, undermine the resilience of the airport, increase the difficulty of financing expansion, and make it harder to meet the ANPS targets. In summary, we consider therefore that the introduction of competition in the provision of a new terminal would be severely detrimental to consumers.

The IBP assumes no competition from third parties. Any such third party would increase project delivery risk, modify the economics and financeability of expansion and ultimately significantly impair our ability to deliver the proposal described in the IBP.

4. Summary of the required regulatory framework

The table below summarises the regulatory framework that underpins our IBP.

Table 2: The regulatory framework

Building Block	Component	H7 Framework
Price control structure	Price control duration	15 years subject to defined re-openers for defined building blocks either (i) every 5 years for tramlines or (ii) operational building blocks
	Trigger based regulation	Expansion premium recognised and allowed through an increase in airport charges
Passenger forecasts	Overall forecasts	Subject to periodic or performance-based reset through 15 years; potential for some sharing growth in faster growth scenarios
	25k Early ATMs	Mechanistic adjustment to airport charges when cap is lifted

Building Block	Component	H7 Framework
Capex	Incentives and framework	Development and Core ex-ante milestone triggers and G3 incentives
	RAB Indexation	RPI for duration of the settlement
	Depreciation of existing RAB and future investment	<p>Maintain the current approach to regulatory depreciation where the RAB and projected investment is depreciated following statutory principles.</p> <p>Depreciation based on projected investment ensures that the value of the RAB is reduced by the same amount as the depreciation recovered through airport charges.</p> <p>Maintaining a link between operational life of the assets and associated depreciation.</p>
Opex	General Opex	Subject to periodic or performance-based reset through 15 years
	Security	Pass-through for new requirements as current arrangements but level to be reassessed as for opex for only
Commercial	General commercial	Subject to periodic or performance-based reset through 15 years
	Access charge	Income in till with options to mitigate risk
ORC		As in Q6 with some adjustments for some activities as described in Chapter 11
Service Quality	Incentives	Outcomes based targets building on SQRB with potential for on-going evolution over 15 years
WACC	Cost of debt	Debt indexation for new debt and defined allowance for embedded debt
	Cost of equity	<p>Fixed for duration of H7, including Beta and TMR</p> <p>Explicit Expansion Risk Premium calculated based on additional risks</p>

Building Block	Component	H7 Framework
	Financial structure	60/40% Debt to Equity notional fixed to 2036
	Tax	Based on notional structure, updated for corporation tax
Regulatory depreciation	Depreciation of existing RAB and future investment	<p>Maintain the current approach to regulatory depreciation where the RAB and projected investment is depreciated following statutory principles.</p> <p>Depreciation based on projected investment ensures that the value of the RAB is reduced by the same amount as the depreciation recovered through airport charges.</p> <p>Maintaining a link between operational life of the assets and associated depreciation.</p>
Commercial Property		RAB development for commercial property sites
Community Fund	Levy	ANPS requirement for community compensation fund collected through direct per passenger levy, outside of the airport charge
Alternative mechanisms	Commercial deal	Supported to supplement regulatory framework and promote growth
	Innovation Partnerships	Included to drive efficiency and service innovation for an integrated hub airport
	Commercial property	Options to develop ancillary facilities over longer term period

5. Analysis of risk arising from proposed framework.

We plan an analysis of the range of outcomes for return on regulatory equity (RoRE) that might result from the risks faced by Heathrow given the regulatory framework and incentives set out above. We will share this analysis with the CAA once it is complete early in 2020.

The RoRE range would capture the possible range of upside and downside returns arising from the regulatory methodology. The starting point is the traditional approach of allowed profit based on the RAB and the cost of capital. RORE is calculated as regulatory profit less tax and interest divided by the notional equity in the RAB.

This RoRE analysis will reflect our best estimate of the upside and downside scenario for the IBP. We will update it for the FBP to reflect developments in the regulatory framework and our understanding of the risks we face.

Analyses of risk are set out in the IBP in Chapter 12 WACC and Chapter 13 Financing. The analysis set out in Chapter 12 by KPMG is a monte-carlo analysis of the risks facing Heathrow and was used to estimate the required WACC premium to remunerate the risk of expansion for investors. The analysis set out in Chapter 13 considers some specific downside scenarios to understand their impact on the financeability of the IBP.

15 - GOVERNANCE & ASSURANCE

Overview

- Heathrow is governed by the Board and has an embedded governance framework in line with best practice corporate governance principles
- The Board and management have engaged extensively in preparing the Initial Business Plan to understand and test consumer views, and ensure affordability and financeability
- The Initial Business Plan has been assured by both Heathrow's existing planning and assurance processes and a set of external reviews of each element of the overall plan
- We have tested how the Initial Business Plan addresses the CAA's business plan guidance, meeting most IBP and FBP requirements as far as possible at this stage of development

1. Introduction

The following section sets out the governance framework at Heathrow, and the assurance activity undertaken, that enables the Board of Heathrow Airport Holdings Limited (the "Heathrow Board") to have confidence in the affordability, financeability and deliverability of our business plan. This assurance will be extended and reinforced for the Final Business Plan in response to CAA requirements.

Our governance and assurance strategy reflects the CAA's primary duty when assessing our business plan: that is, to ensure the plan furthers the interests of passengers and cargo owners (collectively, 'consumers'). We have taken into account the interests of other stakeholders, including in many cases through extensive engagement, but we have been clear in preparing this Initial Business Plan that the interests of our passengers and cargo owners is paramount. We have therefore developed our plan primarily by listening to consumers directly, rather than assuming that other stakeholders such as airlines are good proxies for consumers interests. This approach is consistent with the Civil Aviation Act 2012 and we explain the rationale for this approach further in Chapter 2 (Consumer Engagement).

2. Board and Governance

The Heathrow Board determines the long-term strategy, direction, and monitors the performance of the Heathrow Group, including approval of the Budget and Management Business Plan. It provides oversight to ensure that the Group acts ethically, has the resources to meet its objectives and meet its responsibilities as a leading airport company.

The Board consists of mainly Non-Executive Directors of which over half are shareholder representatives and a minority (including the Chairman), are independent Non-Executive Directors. The Chief Executive and Chief Financial Officer sit as Executive Directors on the Board.

Our Board is led by our independent Non-Executive Chairman, Lord Deighton, who was appointed on 22nd June 2016. Our Chief Executive Officer, John Holland-Kaye, has overall responsibility for

the management of Heathrow and delegated authority from the Board to implement the Board’s decisions.

Non-Executive Chairman – Lord Deighton			
Independent Non-Execs	Non-Executive Directors [Shareholder Representatives]		Executive Directors
Professor David Begg	Akbar Al-Baker Qatar Holdings	Ahmed Ali Al-Hammadi Qatar Holdings	John Holland-Kaye Chief Executive Officer
Rachel Lomax	David Xie CIC	Chris Beale Alinda	Javier Echave Chief Financial Officer
Rt Hon Ruth Kelly	Stuart Baldwin GIC	Olivier Fortin CDPQ	
	Jorge Gil Ferrovial	Maria Casero Ferrovial	
	Ernesto Lopez-Mozo Ferrovial	Mike Powell USS	

Figure 91: The Heathrow Board

Further details of Board members can be found at <https://www.heathrow.com/company/about-heathrow>.

Our Board meets every month and there is also well-established governance framework of Board Committees that support the Board in discharging its governance responsibilities. This framework consists of an Audit, Risk, Sustainability and Operational Risk, Remuneration, Nominations and Finance Committee. All Committees are chaired by Non-Executive Directors.

HEATHROW GOVERNANCE STRUCTURE



Figure 92: Heathrow's Governance Structure

Although Heathrow is not subject to the same requirements as publicly listed companies, the Heathrow Board always seeks to adopt high standards in corporate governance and ethical behaviour. We are currently carrying out a review of our corporate governance arrangements and comply with the additional reporting requirements under the Companies (Miscellaneous Reporting) Regulations 2018, effective from 2019. Our Annual Report and Accounts for the year ended 31 December 2019 will include a Section 172 Statement as well as a Corporate Governance Statement, and our intention going forward is that Heathrow will adopt the Wates Corporate Governance Principles for Large Private Companies, published by the Financial Reporting Council in December 2018. We will also enhance reporting by the voluntary adoption of the Task Force for Climate-Related Financial Disclosures.

2.1 Risk Management

Risk management is a key element of Heathrow's corporate operations. As explained in Heathrow's Annual Report and Financial Statements, Heathrow's corporate risk management

function sets the risk management strategy to provide the necessary framework to manage key risks and embed a risk management culture. The principal risks identified are set out in Heathrow's Annual Report and Financial Statements, along with the mitigation strategies in place.

Updates on the risk outlook are presented to the Board on a quarterly basis. Matters of risk management, alongside safety, corporate, assurance and compliance matters, are considered at monthly meetings of the Executive Committee, which is chaired by the Chief Executive Officer.

In addition, to support the discharging of the Executive Committee's risk management accountabilities, there is an Executive Risk and Assurance Committee established as a sub-committee of the Executive Committee, chaired by the Chief of Staff and General Counsel, and attended by the Chief Financial Officer and Chief Strategy Officer. The Executive Risk and Assurance Committee meets on a quarterly basis and reports to the Executive Committee and Heathrow Board. It is responsible for reviewing the effectiveness of the risk management strategy and framework and for reviewing the principal risks and risk outlook.

As referred to earlier in this section, there is also a committee called the Sustainability and Operational Risk Committee (SORC) which is part of Heathrow's Board governance. The focus of this Board committee is on operational and environmental risks and it meets to review policies, risk management strategies and performance in relation to sustainability objectives and operational risks and incidents. The SORC is chaired by David Begg, an Independent Non-Executive Director. Its members include the CEO and three shareholder Non-Executive Directors who also attend the Board. Financial risks are reviewed by the Audit Committee and joint sessions of the Audit Committee and SORC are held to review the risk outlook.

2.2 Plan governance and scrutiny

Given the scale of the investment required in expansion, and the government and airline challenge on affordability, our Board has subjected this plan to an extensive level of scrutiny and challenge commensurate with the additional risks of an investment of this magnitude. The level of scrutiny also reflects the commitment of the Board to ensuring the continued long-term success of the airport.

In developing this Initial Business Plan, and to ensure alignment across our short, medium and long-term ambitions of the airport, we have followed our business as usual governance processes. The co-ordination of the plan has been managed by the Planning Steering Group – a sub-committee of the Executive Committee, chaired by the Chief Financial Officer. The plan has also been subject to specific reviews by Executive Committee and Board members as the different elements of the plan have been progressed, with multiple reviews of the totality of the plan as it matured and as part of the sign-off process.

In addition to overseeing the development and progress of the plan against key milestones and overarching assurance, the Heathrow Board had oversight of consumer engagement and the integration of research and insight into the plan, and the processes that ensure the affordability and financeability of the plan.

Consumer Engagement

Members of the Heathrow Board have worked closely with Heathrow's Executive Committee, and management to ensure that our plan is based on what matters most to consumers. Consumer

research findings and the research synthesis have been shared with and reviewed by the Executive Committee and Board, including during in-depth review sessions. Board members have also observed consumer workshops hosted by our Horizon on-line platform, and members of our Executive Committee have participated personally with Horizon consumers at consumer workshops, observed passenger feedback surveys and engaged in multiple structured passenger engagement and service sessions in the last two years. This direct involvement in our consumer engagement initiatives has enhanced both our Board and Executive Committee's understanding of our current, and future, passengers' needs, priorities and concerns.

The Chairman of Heathrow's CCB also meets with the Heathrow Board three times a year, and separately with the Executive Committee, to discuss challenges and observations noted over the period. The CCB Chair also meets regularly with the Chief Executive Officer and the Chief Strategy Officer monthly to provide direct feedback on Heathrow's progress in developing a consumer-led business plan.

Affordability and Financeability

The Heathrow Board and Executive Committee have overseen extensive work to ensure that the charges proposed in our business plan are affordable and financeable. This same work also supports the masterplan and planning application DCO, so the plans we propose are integrated and cover expansion and business as usual operations.

The Board has sought preliminary advice [REDACTED] and key ratings agencies to begin to understand the financing aspects of our plan. The Board has had legal advice on the planning and other aspects of the DCO, and has commissioned extensive cost benchmarking from Turner & Townsend and the IFS, and consumer benefit and willingness to pay analysis.

3. Approach to Assurance

Heathrow has a well-established assurance framework in place to provide confidence to the Board, Executive Committee, and internal and external stakeholders that information provided on the company's future plans and current performance can be trusted. The Board has been fully engaged in the planning and preparation of our Initial Business Plan and this plan and assurance statement has been approved by the Board.

This assurance framework consists of five key elements –

1. **Board Oversight** – Board of Directors, Audit Committee, Remuneration Committee, Nomination Committee, Sustainability and Operational Risk Committee, Finance Committee
2. **Risk Management** – Heathrow Risk and Assurance Committee, Corporate Risk Management Team, Risk Champions
3. **Management Assurance** – Executive Committee Leadership Teams and sub-groups, Internal controls (including delegated financial authorities and approvals)
4. **Internal Business Assurance** – Internal Audit, Health & Safety and Environmental compliance audits and Legal Assurance.
5. **Independent Assurance** – provided by external assurance providers as required

Our business plans are developed in a framework that includes robust internal controls and assurance, in line with our business as usual arrangements.

Independent IBP Assurance

In addition to our business as usual assurance arrangements, additional independent assurance has been completed for the H7 process, recognising the scale and level of risk associated with our plans.

This plan has undergone independent external assurance to ensure that our forecasts for key building blocks are robust, efficient and evidence-based. A summary is provided below as well as being referenced in the relevant sections of the plan. In addition, the Board and Executive Committee have commissioned external assurance from leading independent consultants specialising in regulation and economics to obtain an independent review of the plan.

Specific detail on the building block assurance completed is set out below –

Passenger Forecast

At the early stages of developing the passenger forecast model Steer were engaged to support the methodology definition phase, and to carry out validation of the model structure and outputs.

Capital Investment

Turner and Townsend provide ongoing cost assurance across all elements of the capital programme. The IFS also provide ongoing assurance on the capital efficiency of the expansion programme as well as on the 2R and Maintain and Improve capital portfolios. Further assurance on capital cost efficiency has been sought through Heathrow's involvement in Project 13 and other external cost benchmarks.

Operating Costs

In developing our H7 forecast, KPMG have provided benchmarking analysis of Heathrow's relative cost efficiency against comparator airports. Frontier Economics were also engaged to develop operating cost elasticity assumptions for H7 and as part of this work provided triangulation of the results with other sources of evidence – regulatory precedent and an academic literature review. Steer also completed a third-party review of the model used to support our operating cost forecast for the 2022-2036 period.

Commercial Revenues

Our H7 commercial revenues forecast is supported by detailed benchmarking analysis carried out by [REDACTED]. The Frontier Economics work on developing elasticity assumptions for operating costs outlined above also included commercial revenues and is included in the same annex to the plan. KPMG were also engaged to complete econometric analysis to support the development of our forecast.

4. Meeting the CAA's Business Plan Criteria

We are confident that our business plan meets the criteria set out by the CAA in its updated Business Planning Guidance (July 2019)³³³. We are also confident that it meets our regulatory obligations and is designed to further the interests of consumers (passengers and cargo-owners). We have undertaken an extensive programme of assurance to enable our Board to have confidence that we have met the CAA's requirements in the preparation of our initial business plan or, where appropriate, we are on track to meet them in our final business plan.

An overview of our assessment against the CAA's criteria is set out in in Table 1 below, including references to the relevant sections of the plan and annexes.

5. Board Statement

As the Board of Heathrow Airport Holdings Limited it is our duty to set the long-term strategic direction for Heathrow Airport Limited, to promote good corporate governance and to ensure a robust system of risk management and internal controls is in place.

We recognise that a successful and growing Heathrow will deliver value for current and future passengers, and cargo owners, as well as being in the interests of our airline customers, colleagues, local communities, and our investors. In our Strategic Brief we recognise the needs of all our stakeholders and the role we play in balancing their needs as we develop our future plans for the airport.

Heathrow is now considered by passengers to be one of the best airports in the world and delivers service levels that are considerably higher than they were 10 years ago. We have fully supported this service transformation through investment in new infrastructure and through investment in our people. Keeping the passenger at the heart of our plans, means continuing to deliver the service levels they expect, in a sustainable way, and at a price they are willing to pay.

We have also worked hard to win back the trust of our local communities. We take seriously the role of being a responsible neighbour and have done this by investments to reduce our impact on local communities and providing jobs and opportunities for local people. Our comprehensive sustainability plan, 'Heathrow 2.0', is testament to our approach to managing growth in a responsible and sustainable way.

Our transformation has led the UK government to back Heathrow to provide the airport capacity in the South East of England, and in this context, we present our business plan for 2022-2036.

We welcome the CAA's vision to strengthen the link between consumer priorities and the regulation of Heathrow. It is important in doing so that the focus is on long term consumer value not simply the airport charge. In this plan we describe how we have put a process in place to ensure our plan is evidence-based and is directly linked to what our passengers, cargo owners, and other stakeholders are telling us is important to them, and will take into account the needs of all our stakeholders. This is reflected in the strategic options we have presented in our initial business plan and will guide our approach to our final business plan.

Building on our existing mechanisms, and as required by the CAA and consistent with the overarching objectives of the 2012 Civil Aviation Act, our initial business plan has been developed

³³³ CAP1819 Economic regulation of capacity expansion at Heathrow airport: consultation on early costs and regulatory timetable

through significant engagement with consumers and other stakeholders. This engagement has started with consumers, both current passengers and those who do not use Heathrow today.

The CCB is providing valuable input and challenge as we have developed our plans. The CCB has challenged us to ensure we have a robust consumer research and engagement evidence base in place and that we have effectively embedded this engagement in our decision making. The CCB's recommendations have tested us in making sure we translate what our passengers are telling us is important to them into our service targets and incentives framework. The CCB has provided six challenge logs to the Board and we have had regular in person updates from the CCB chair. We will continue to engage with the CCB closely on the options set out in this initial business plan as we work towards a final business plan.

Heathrow has always drawn on passenger and airline insights to build its business plan. However, in the context of expansion it is more important than ever to ensure our business plan is built on a foundation of extensive consumer research and engagement showing a clear 'golden thread' of how the needs of current and future passengers have informed our long-term planning.

There has also been extensive engagement over many years with existing and future airlines, cargo operators and our local communities and interested groups, including, but not limited to, the CBI, TUC and local business groups. To ensure our plan represents the needs of all Heathrow's current and potential users we have discussed our developing plans with, and sought feedback from, our stakeholders in different forums. Through the independent CCB and with airlines through our extensive airline governance and engagement forums as set out in the Enhanced Engagement Protocol³³⁴, and with our local community through our expansion consultation events, community engagement forums and the Community Engagement Board.

We have met the affordability challenge by developing a plan that will deliver affordable long overdue airport capacity in the South East of England, supporting airline growth and meeting the increasing demand for air travel. We have achieved this without compromising our environmental responsibilities and commitments to our local communities.

This initial business plan sets out challenging options, but options which will deliver a resilient, affordable and sustainable airport for current and future passengers and airlines.

6. Next Steps

Following submission of our initial business plan Heathrow will engage on our proposals with the airline community and the CCB through a period of constructive engagement. This supplements, and will be integrated into, the existing extensive engagement with airlines on operational and strategic issues, as well as on our current and future plans.

Constructive engagement will begin in early January and we expect around at least 120 hours of detailed engagement sessions.

The M5 masterplan gateway is also planned from February to April 2020. This will refine our preferred masterplan and DCO submission based on AEC feedback and airline views.

³³⁴ Enhanced Engagement Protocol (September 2018)

In the second half of 2020 we will develop both our final DCO submission and a Final Business Plan for H7. Both will be developed with further consumer insight and further internal and external engagement, assurance and review.

Table 74: Signposting to where Heathrow has met CAA's criteria for a high-quality business plan (CAP1819)

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
Outcomes and consumer engagement	For the successful implementation of outcome-based regulation (OBR) it is necessary for HAL to build on the success of the existing Service Quality Rebate and Bonus (SQRB) scheme, including by retaining many of the current metrics, where appropriate. This means that the scope of OBR should capture elements where HAL provides service directly to passengers (e.g. security), as well as elements of airport operation services focused on enabling airlines to provide service to passengers (e.g. stands and jetties).	Criteria met for the IBP. Proposed incentive scheme underpinned by the success of the existing SQRB scheme.	Chapter 6: Measures, Targets & Incentives Annex 46: Measures, Targets & Incentives Annex
Outcomes and consumer engagement	HAL's plans should take account of and demonstrate a deep understanding of consumer preferences based on a wide range of engagement and research. Its approach should be reviewed and tested by the CCB. We expect HAL will have taken careful account of the challenge and other feedback it receives from the CCB. Where its approach does not fully align with the views of the CCB, HAL should explain and justify its reasoning for doing so.	Criteria met for the IBP. Extensive and ongoing consumer research evidenced. An annex is provided on the Consumer Challenge Board, which includes a link to the full Challenge Logs.	Chapter 2: Consumer Engagement. In particular: <ul style="list-style-type: none"> ○ Section 2: Focus on consumers ○ Section 3: Headline Engagement Projects ○ Section 4: Stakeholder outcomes Annex 34: Consumer Engagement Strategy Annex 36: Consumer Challenge Board Annex Annex 40: Consumer Engagement Annex
Outcomes and consumer engagement	HAL should propose outcomes which reflect the most important aspects of airport services to consumers. Each outcome should have one or more performance measures associated with it, and the overall package of measures should cover all aspects of airport operations that are either directly or indirectly important to consumers. All the outcome performance measures should include reasonably challenging target levels of service performance, which reflect consumer views. The majority of targets should have	Criteria met for the IBP. Measures are outcome-based, with an alternative package of measures also considered. We have set targets at a challenging level, often at 99%, while considering factors such as the cost of delivery, passenger growth, asset availability during expansion and	Chapter 2: Consumer Engagement. In particular: <ul style="list-style-type: none"> ○ Section 5: Our outcomes Chapter 6: Measures, Targets & Incentives. In particular: <ul style="list-style-type: none"> ○ Section 2: Measures ○ Section 3: Targets ○ Section 4: Incentives ○ Section 5: Further Development beyond 2026

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	associated financial incentives on HAL, though reputational incentives may also be appropriate.	increasing consumer expectations.	Annex 40: Consumer Engagement Annex Annex 46: Measures, Targets & Incentives Annex
Outcomes and consumer engagement	There should be strong evidence that (i) consumers have been fully engaged in developing the outcomes that HAL proposes to deliver and (ii) the overall outcome-based regulation framework has been tested with consumers. HAL should be clear about how engagement has shaped and influenced the proposed outcomes, measures, targets and incentives. We expect HAL to have followed a clear and transparent process to be used to convert consumer research into business plan outcomes.	Criteria met for the IBP. Outcomes have been generated by consumer insight and tested with the Horizon passenger insight community. For the FBP we will be undertaking further consumer research - acceptability testing, incentive testing and affordability.	Chapter 2: Consumer Engagement Chapter 6: Measures, Targets & Incentives <ul style="list-style-type: none"> ○ Section 2: Measures ○ Section 3: Targets ○ Section 4: Incentives ○ Section 5: Further Development beyond 2026 Annex 34: Consumer Engagement Strategy Annex 40: Consumer Engagement Annex
Outcomes and consumer engagement	Throughout its plans, we expect HAL to demonstrate that it has made robust assumptions, that possible options have been carefully considered (including the trade-off between affordability and service), and how in the FBP strategic choices have been made. We expect HAL to be explicit that the options proposed are best placed to achieve maximum value for consumers.	Criteria met for the IBP. Key choices between the speed of delivering new capacity, investment in service and mitigating risk for consumers and investors are examined and combined to form two potential strategic options. Further development is planned for the FBP.	Chapter 3: H7 Plans & Choices
Outcomes and consumer engagement	In addition to robust engagement with consumers, HAL should engage extensively with airlines throughout the process, including in the development of the IBP. Airlines have a vital role to play in helping to deliver service quality and, thus, HAL should: (i) develop a coordinated approach to service provision with airlines; and (ii) collaborate closely with them in finalising the outcome-based framework.	Criteria met for the IBP. We have an established engagement and governance framework with airlines and engagement will be ongoing ahead of the FBP.	Chapter 2: Consumer Engagement. In particular: <ul style="list-style-type: none"> ○ Section 3: Headline Engagement Projects ○ Sub-section 4.3: Airlines Chapter 6: Measures, Targets & Incentives. In particular: <ul style="list-style-type: none"> ○ Section 2: Measures ○ Section 3: Targets ○ Section 4: Incentives Annex 39: Airline Engagement Annex
Resilience	The CAA has been consistent in its views that capacity expansion will improve the range of options for resilience at Heathrow airport for the benefit of consumers. HAL's business	Criteria met for the IBP. Resilience planning runs through all our other plans. Work is ongoing and further	Chapter 3: H7 Plans & Choices. In particular:

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	<p>plans should include a clear focus on the resilience of the airport. Its plans need to provide evidence on the following topics:</p> <ul style="list-style-type: none"> • how it will ensure a sufficient level of resilience is maintained throughout the transition to an expanded Heathrow airport so that consumers are not impacted by disruption that might arise from construction and/or from any early increase in capacity. • that sufficient resilience is being built into the design of new infrastructure so that it is fit for purpose and operable for airlines and other stakeholders. We expect HAL to provide evidence on how it has considered and evaluated linkages and trade-offs between resilience, operability, affordability and deliverability, and to justify how the end result reflects consumer interests. • how resilience will be built into its asset management and maintenance plans. • how the airport will remain operationally resilient over the H7 period and how any additional capacity will be appropriately released and used to maintain sufficient resilience in the longer term. 	<p>detail will be provided in our FBP.</p>	<ul style="list-style-type: none"> ○ Section 7: Summarising our Strategic Options <p>Chapter 5: Resilience</p>
Resilience	<p>HAL must also ensure its approach to resilience is joined up across the business (expansion and business as usual) and thus reflected not only in the business plan, but also in its operational resilience plan (consistent with its licence obligations). In particular:</p> <ul style="list-style-type: none"> • we expect HAL to ensure its operational resilience plan is appropriately focused and includes clear contingency measures to enable a joined up, airport-wide response to disruption that might arise during the transition period. • HAL must also provide evidence that it has developed and tested robust resilience contingency arrangements in 	<p>Criteria met for the IBP. Heathrow's Operational Resilience Plan details the systems, procedures and roles and responsibilities for preventing, mitigating, preparing, responding and recovering from disruption. Collaboration with stakeholders is an intrinsic component of Heathrow's resilience strategy. Work is ongoing and further detail will be provided in our FBP.</p>	<p>Chapter 5: Resilience</p>

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	collaboration with other stakeholders, to mitigate the operational impacts and disruption resulting from any additional capacity or early growth that is introduced before the third runway is built.		
Resilience	HAL must consider any updated resilience guidance we issue under the licence and ensure it is taken into account when updating its operational resilience plan.	Not applicable – CAA has not issued any updated resilience guidance.	Not applicable for the IBP
Costs and other revenue building blocks	HAL should provide a wide range of approaches and scenarios in respect of those operating costs, non-airport charges revenue, capital costs (asset renewal, replacement and enhancement) and passenger traffic forecasts consistent with its business as usual (BAU) activities.	<p>The IBP is an integrated plan in line with the CAA's criteria on Scope.</p> <p>A driver-based approach to forecasting operating costs and non-airport charges revenue has been taken in line with our proposal for a 15-year duration. The impact of expansion on costs and revenues is applied through elasticities.</p> <p>Expansion capital expenditure forecasts have been provided consistent with M4 Exit Masterplan. Maintain and Improve and Create Capacity expenditure reflects the latest engagement with the airline community.</p>	<p>Chapter 7: Passenger Forecasts</p> <p>Chapter 8: Capital Investment</p> <p>Chapter 9: Operating Costs</p> <p>Chapter 10: Commercial Revenues</p>
Costs and other revenue building blocks	Where appropriate these forecasts should separately identify the incremental impact of capacity expansion (e.g. the impact of more flights if HAL is successful in using the planning process to lift the cap of the number of air traffic movements) and should include challenging efficiency assumptions.	<p>The IBP is an integrated plan in line with the CAA's criteria on Scope.</p> <p>A driver-based approach to forecasting operating costs and non-airport charges revenue has been taken in line with our proposal for a 15-year duration. The impact of expansion on costs and revenues is applied through elasticities.</p>	<p>Chapter 7: Passenger Forecasts</p> <p>Chapter 8: Capital Investment</p> <p>Chapter 9: Operating Costs</p> <p>Chapter 10: Commercial Revenues</p>
Costs and other revenue	HAL should also provide detailed capital cost forecasts for capacity expansion, which are consistent with the masterplan (or reconciled to it) and demonstrate risk and challenges which	<p>Criteria met for the IBP.</p> <p>Since the M4 masterplan we have updated the capital cost</p>	<p>Chapter 8: Capital Investment</p> <p>Chapter 12: WACC. In particular:</p>

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
building blocks	might impact the delivery of the capacity expansion on time and budget, and how the plans have appropriate levels of contingency within them; these should also include scenarios that illuminate the level of costs if HAL delivers efficiently and/or with lower spending on contingency. The phasing of expansion capex should be consistent with its approach to passenger traffic forecasts, affordability and financeability.	forecasts with the most immediate investments. The forecast can be traced back to the M4 masterplan figures, which includes risk allowances consistent with [REDACTED] review.	<ul style="list-style-type: none"> Section 4: Impact of expansion on Heathrow WACC Annex 10: KPMG Influence of the number of airport terminals on airport operating costs [REDACTED] [REDACTED]
Costs and other revenue building blocks	HAL should provide all costs and revenue in both nominal terms and in 2018 prices making clear the assumptions it is making on inflation.	Criteria met for the IBP. The plan is presented in 2018 prices with nominal presented in the PCM model outputs.	Chapter 8: Capital Investment Chapter 9: Operating Costs Chapter 10: Commercial Revenues
Costs and other revenue building blocks	HAL should expressly set out how it has sought to ensure there is no double counting of costs between BAU and expansion costs, particularly in respect of areas where costs which were previously included within BAU have been reallocated to runway expansion costs – including both capital and operating costs (in respect of operating costs, for example, but not limited to, colleague costs and some accommodation costs).	Criteria met for the IBP. The three distinct portfolios of H7 – Expansion, Generate Capacity, Maintain and Improve – ensures no double counting.	Chapter 8: Capital Investment. In particular: <ul style="list-style-type: none"> Section 3: Investment driving change Chapter 9: Operating Costs
Costs and other revenue building blocks	With respect to BAU: <ul style="list-style-type: none"> evidence should be provided showing a wide range of possible cost options, including both operating and capital solutions and the links with outcomes. The IBP should clearly illustrate how the best options have been selected and how maximum value for money will be achieved; a description should be included of how costs have been allocated between BAU and expansion costs and where costs have been moved from BAU to expansion and vice versa; the granularity of cost data provided should be consistent with that provided to CAA as part of the regulatory accounts; forecast of costs should be fully explained, which should include an 	Criteria met for the IBP. The IBP is an integrated plan in line with the CAA's criteria on Scope. A driver-based approach to forecasting operating costs and non-airport charges revenue has been taken in line with our proposal for a 15-year duration. The impact of expansion on costs and revenues is applied through elasticities. Cost and revenue categories align to the Regulatory Accounts and to the CAA's Price Control Model (PCM). Benchmarking of costs and revenues provided as annexes to the plan.	Chapter 3: H7 Plans & Choices Chapter 8: Capital investment Chapter 9: Operating Costs Annex 6: KPMG Airport Operating Cost Efficiency Benchmarking Report

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	<p>evaluation of past performance together with challenging assumptions about the scope for increased efficiency in the future. This should include identifying those costs which HAL does not consider to be within its control (for instance because they are determined by a wider market). Where practicable costs should be market-tested or benchmarked, and baseline assumptions clearly explained.</p>		
<p>Costs and other revenue building blocks</p>	<p>With respect to capacity expansion costs:</p> <ul style="list-style-type: none"> • forecast costs should reflect (and be reconciled to) the latest masterplan costs; • there should be a clear line of sight between cost forecasts provided over time and the most recent cost forecasts and all costs should be presented in a format consistent with that provided in respect of the regulatory accounts to aid comparability; • forecast costs should also reflect the latest CAA costs policy and should be broken down by cost type, i.e. Category B, early Category C and Category C; • each cost type should be further broken down to reflect the level of detail provided in the relevant cost type dashboard, as presented to the Cost and Benefit Working Group (CBWG) on a quarterly basis; • where Category B planning costs and early Category C costs are concerned HAL should show the expected timing and level of additions to the RAB (using the current CAA policy, including the appropriate rate of return to be applied from the cost being incurred); <p>Scenario analysis should be provided to demonstrate the impact on each cost type of both delays to the runway expansion timetable (including, but not</p>	<p>Criteria met for the IBP.</p> <p>Since the M4 masterplan we have updated the capital cost forecasts with the most immediate investments. The forecast can be traced back to the M4 masterplan figures.</p> <p>A driver-based approach to forecasting operating costs and non-airport charges revenue has been taken in line with our proposal for a 15-year duration. The impact of expansion on costs and revenues is applied through elasticities.</p> <p>Costs and revenues provided in line with the detail of the regulatory accounts. Base data provided in detailed categories as an annex.</p> <p>Capital costs are broken down into Category B, early Category C & Category C, consistent with information reported to the airline community and CAA.</p>	<p>Chapter 8: Capital investment Chapter 9: Operating Costs Chapter 10: Commercial Revenues Annex 11: 2019/2020 Base data in detailed categories</p>

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	limited to, a delay to the DCO decision and construction delays) and events which could lead to overrunning costs (including, but not limited to, construction price inflation being higher than expected).		
Incentives and risks	HAL should identify key risks associated with delivering its plans. We expect HAL to identify the risks that it is able to control. For risks within HAL's control, HAL should be incentivised to manage these to the best of its ability, without unduly impacting the business. Risk management and mitigation strategies should be clear and proportionate.	Criteria met for the IBP. Note risk is also managed as part of BAU operations. The approach to risk management is set out in the Governance & Assurance chapter with risks specific to the regulatory framework set out in Regulatory Framework chapter.	Chapter 8: Capital Investment Chapter 12: WACC. In particular: <ul style="list-style-type: none"> Section 4: Impact of expansion on Heathrow WACC Chapter 14: Regulatory Framework Chapter 15: Governance & Assurance
Incentives and risks	At a minimum, we expect this list of incentives to include the proposed regulatory treatment of: <ul style="list-style-type: none"> outcomes; operational expenditure; capital expenditure; commercial revenues; and traffic volumes. 	Criteria met for the IBP.	Chapter 14: Regulatory Framework
Incentives and risks	With the exception of outcomes and capital expenditure (which have special arrangements, as described below), we expect the same arrangements as in Q6 to apply. If HAL wishes to depart from these, it should set out the case for and evidence supporting.	Criteria met for the IBP. Rationale for 15-year price control clearly presented.	Chapter 8: Capital Investment delivery model section Chapter 14: Regulatory Framework Annex 24: Steer Review LHR Capital allowances
Incentives and risks	HAL should be clear on the allocation of residual risks and on how the proposed allocation is consistent with protecting the interests of consumers.	Criteria met for the IBP. The allocation of risks and rationale is clearly presented in Chapter 14: Regulatory Framework.	Chapter 14: Regulatory Framework
Incentives and risks	For outcome incentives, HAL should prepare an outcome-based approach to service quality regulation as described above (higher in table).	Criteria met for the IBP. Proposed incentive scheme is outcome-based and underpinned by the current SQRB scheme.	Chapter 2: Consumer Engagement Chapter 6: Measures, Targets & Incentives. In particular: <ul style="list-style-type: none"> Section 4: Incentives Annex 46: Measures, Targets & Incentives Annex
Incentives and risks	For capex efficiency incentives, HAL should put forward its proposals for meaningful financial incentives for capital efficiency, clearly explaining any	Criteria met for the IBP.	Chapter 8: Capital Investment

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	differences with the CAA's latest views. We regard incentives for capital efficiency as an essential part of a credible business plan.		Chapter 14: Regulatory Framework. In particular: <ul style="list-style-type: none"> Sub-section 3.5: Early Ex-ante capital incentives and development and core framework Annex 24: Steer Review LHR Capital allowances Annex 49: KPMG - Inter-terminal competition
Incentives and risks	The IBP and FBP should include a quantitative assessment of the potential individual and collective impact of the proposed incentive mechanisms. This assessment should identify the impact in terms of both charge per passenger and return on regulatory equity. The assessment should, where possible, be linked to the downside scenarios examined for financeability analysis.	RoRE analysis to be shared separately with the CAA once finalised.	RoRE analysis to be shared separately with the CAA once finalised.
Incentives and risks	HAL should make clear in its business plan: <ul style="list-style-type: none"> how it has consulted with stakeholders on these issues; what comments stakeholders have made in relation to incentives and risk allocation; and how those comments have been taken into consideration in developing the incentives and risk allocations set out in the business plan. 	For the Final Business Plan.	Not applicable.
Financeability and affordability	HAL should provide robust evidence that its FBP is financeable and affordable.	Criteria met for the IBP.	Chapter 3: H7 Plans & Choices. In particular: <ul style="list-style-type: none"> Section 7: Summarising our Strategic Options Chapter 13: Financing. In particular: <ul style="list-style-type: none"> Section 5: Assessment of Financeability of the Plan
Financeability and affordability	The CAA recognises the importance of HAL maintaining an ability to raise debt with a reasonable investment grade rating to support financeability. Recognising the need to ensure that the business plan remains affordable, HAL should outline what structural and	Criteria met for the IBP.	Chapter 13: Financing Chapter 14: Regulatory Framework

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	regulatory options/changes would best maintain the rating while being consistent with the interests of stakeholders.		
Financeability and affordability	The analysis of affordability and financeability should include a baseline assessment using the CAA's price control model ("PCM") and should be accompanied by a data book detailing the rationale for all assumptions.	Criteria met for the IBP.	Excel file with PCM will be submitted to CAA.
Financeability and affordability	The analysis of affordability and financeability should test a range of downside scenarios examining separately the impact of controllable and non-controllable factors on the key affordability and financeability measures.	Criteria met for the IBP.	Excel file with PCM will be submitted to CAA.
Financeability and affordability	To the extent that HAL wishes to use other models (besides the PCM) to assess affordability and financeability, these models (and their results) should be provided as part of the business plan submission along with commentary and analysis reconciling the results to those of the PCM.	Not applicable – we are not using other models.	Not applicable.
Financeability and affordability	HAL's baseline affordability and financeability assessment should be undertaken with regard to the CAA's statements on financeability policy and we would expect HAL to examine the same key metrics and use the same broad approach to determine the downside scenarios that it tests. In addition, HAL is free to provide further assessment of affordability and financeability using a different approach though any departures from the CAA's policy statements on financeability should be identified and justified.	Criteria met for the IBP. A financeability assessment relating to key metrics has been performed.	Chapter 13: Financing
Financeability and affordability	In the event that HAL considers that adjustments of any sort are needed to support the affordability or financeability of its business plan, these adjustments should be clearly identified and justified with analysis of their impact in terms of financeability and affordability.	Criteria met for the IBP. Heathrow explains the adjustments required to support affordability and financeability, including the 15-year price control, the need for an expansion risk premium and the need to maintain an A- credit rating.	Chapter 13: Financing Chapter 14: Regulatory Framework
Financeability and affordability	Where practical, HAL should seek third party assurance of its assessment of affordability and financeability	Criteria met for the IBP. We have engaged with ratings agencies in the	Chapter 13: Financing

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
		financeability assessment of our plan.	
Cost of capital	HAL's proposal on the WACC should be consistent with efficient financing and its assumptions on risks and incentives	Criteria met for the IBP. We set out an overall efficient WACC required to deliver the plan.	Chapter 12: WACC
Cost of capital	HAL should assume a cost of capital for H7 no more than the efficient level necessary to compensate HAL for the business and regulatory risks it faces.	Criteria met for the IBP. We set out an overall minimum efficient WACC required for H7.	Chapter 12: WACC
Cost of capital	In estimating the efficient cost of capital for its business plan, HAL should align this with: <ul style="list-style-type: none"> recent UK regulatory precedent published since the Q6 decision; market evidence on cost of capital parameters; and the business and capacity expansion risks it faces. 	Criteria met for the IBP. Regulatory precedent, market evidence and risks included in the chapter.	Chapter 12: WACC
Cost of capital	In relation to recent UK regulatory precedent, we would expect HAL to provide a cost of capital that is estimated using market wide components (such as total market return and risk-free rate) that are consistent with recent publications from the CAA, including for RP3 and report by PwC on H7. HAL should also refer to recent papers from other UK regulators. In particular, changes in these market-wide parameters since Q6 have materially reduced the required cost of capital, all other things being equal.	Criteria met for the IBP. Reference to recent papers from UK regulators included. Our position relating to consistency with CAA and PwC publications is clearly presented.	Chapter 12: WACC
Cost of capital	In any cases where HAL proposes market wide components that depart from recent UK regulatory precedent, we would expect high quality evidence to support HAL's assumptions and we would expect it to undertake additional financeability testing under alternative assumptions that are consistent with recent regulatory precedent.	Criteria met for the IBP. Where we deviate from UK regulatory precedent we provide the rationale in the context of UK-wide market data.	Chapter 12: WACC. In particular: <ul style="list-style-type: none"> Section 2: Cost of Equity for Heathrow
Cost of capital	HAL should also reflect recent regulatory precedent and market evidence in its estimates for the cost of debt and other components of the cost of equity.	Criteria met for the IBP. We have reflected recent regulatory precedent in these areas.	Chapter 12: WACC. In particular: <ul style="list-style-type: none"> Section 3: Cost of Debt for Heathrow
Cost of capital	We would expect HAL to propose a tax allowance within or outside the WACC that provides a fair remuneration for the tax it expects to incur during the H7 price control period. The CAA will	Criteria met for the IBP.	Chapter 12: WACC. In particular:

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
	provide further details on its tax policy during 2019.		<ul style="list-style-type: none"> ○ Sub-section 2.5: Approach to Tax for the IBP Chapter 14: Regulatory Framework. In particular: <ul style="list-style-type: none"> ○ Sub-section 3.11: Approach to Taxation
Cost of capital	HAL should assume indexation for the cost of new debt and clearly identify its assumption for the opening cost of new debt, a forecast cost of debt and explain the impact of its assumptions and approach to debt indexation.	Criteria met for the IBP.	Chapter 12: WACC. In particular: <ul style="list-style-type: none"> ○ Sub-section 3.3: Cost of new debt
Cost of capital	HAL should set out its assumptions used to estimate the cost of capital, including the rate of RPI inflation to set the cost of capital in RPI-deflated terms, consistent with proposed indexation of the regulatory asset base.	Criteria met for the IBP.	Chapter 12: WACC. In particular: <ul style="list-style-type: none"> ○ Sub-section 3.2: Inflation
Scope	HAL's business plans must be integrated and fully encompass proposals for both existing operations and the new runway capacity expansion.	Criteria met for the IBP. Heathrow's IBP is an integrated plan.	Summary IBP. Detailed IBP.
Scope	The focus should be on the period from the end of the existing price control arrangements (December 2021) to the expected opening of the new runway with higher level projections to demonstrate longer-term financeability and affordability beyond that point.	Criteria met for the IBP. Projections have been made up to 2036 in line with the proposed 15-year control period.	Chapter 13: Financing
Scope	HAL should provide a level of detail on projects which reflects the time periods for delivery: projects that are further in the future will typically have less detail.	Criteria met for the IBP.	Annex 27: Underpinning detail for the Investment Plan
Scope	HAL's final business plan must be certified by HAL's Board that it reflects consumer views and preferences to the fullest extent practicable, is based on efficient costs and financing, and is affordable, deliverable and financeable. This certification should include a statement from the Board explaining its views on the plan, and how it has assured itself of the plan's quality and that it furthers the interests of users.	For the Final Business Plan.	Not applicable.
Alternative delivery models	In its business plans, HAL should account for how it has engaged in a proactive, timely and constructive way with interested and credible parties on alternative delivery and commercial arrangements.	Criteria met for the IBP. The IBP reflects the Innovation Partners process, launched by Heathrow in 2018.	Chapter 8 Capital Investment. In particular: <ul style="list-style-type: none"> ○ Section 1.5: Innovation Partners

Theme	Criterion	Our assessment	Key sections of Heathrow's IBP
			Chapter 14: Regulatory framework. In particular: <ul style="list-style-type: none"> ○ Section 2: Evolving the regulatory framework
Alternative delivery models	Where HAL has not taken forward genuine alternative proposals, we will expect that it is able to demonstrate that its preferred approach better serves the interests of consumers and provides better value for money than the alternative.	Criteria met for the IBP. Heathrow provides the rationale for its preferred delivery model.	Chapter 14: Regulatory framework. In particular: <ul style="list-style-type: none"> ○ Section 2: Evolving the regulatory framework
Transparency	HAL's should be as transparent as possible in the information it provides in its business plans. We consider that for a plan to be considered high quality, all stakeholders must have been able to meaningfull assess and comment on the plans.	The IBP and supporting annexes will be made available to all stakeholders subject to commercial confidentiality considerations.	Summary IBP. Detailed IBP. List of annexes.
Transparency	In assessing HAL's business plans, we will tend to give greater weight to the information evidence that HAL provides as part of a published business plan, rather than information that is provided on a confidential basis.	IBP and supporting annexes will be made available to all stakeholders subject to commercial confidentiality considerations.	Summary IBP. Detailed IBP. List of annexes.

LIST OF ANNEXES & APPENDICES

No	Annex/Appendix Title	Chapter
1	SDG Model Methodology Definition	Passenger Forecast
2	SDG Market Analysis	Passenger Forecast
3	SDG Heathrow Expansion Validation Report	Passenger Forecast
4	3R Traffic Forecasting Finance Note	Passenger Forecast
5	Shock Factor Estimate	Passenger Forecast
6	KPMG Airport Operating Cost Efficiency Benchmarking Report	Operating Costs
7	First Economics - Frontier Shift, input price inflation and Productivity Growth	Operating Costs Capex
8	Frontier Economics - Developing opex and commercial revenue elasticities for H7	Operating Costs Commercial Revenues
9	Steer Operating Cost Benchmarking Study	Operating Costs
10	KPMG Influence of the number of airport terminals on airport operating costs	Operating Costs
11	2019/2020 Base data in detailed categories	Operating Costs
12	Mercer - Scheme funding report of the actuarial valuation BAA pension scheme as at 30 September 2018	Operating Costs
13	████████████████████ ██████████	████████████████████
14	KPMG Airport Commercial Revenue Efficiency Benchmarking	Commercial Revenues
15	████████████████████	████████████████████
16	Surface Access Annex	Commercial Revenues
17	Surface Access proposals from AEC	Commercial Revenues
18	Surface Access PTIR reports (for LASAM etc.)	Commercial Revenues
19	ORCs in Q6	ORC
20	ORCs consultation protocol	ORC
21	████████████████████	████████████████████
22	████████████████████ ████████████████████	████████████████████
23	Scheme Development Manual	Capital Investment
24	Steer Review LHR Capital allowances	Capital Investment
25	████████████████████	████████████████████
26	████████████████████	████████████████████
27	Underpinning detail for the Investment Plan	Capital Investment
28	CAA-H7-135 Frontier Report - Ex Ante Incentives	Capital Investment
29	Blue Marble, Synthesis of consumer research	Consumer Engagement
30	Blue Marble, Synthesis of consumer insight register	Consumer Engagement
31	Caroline Thompson Associates HAL Qualitative findings	Consumer Engagement
32	WTP customer valuations research	Consumer Engagement
33	WTP Aggregate Benefit study	Consumer Engagement
34	Consumer Engagement Strategy	Consumer Engagement
35	NOT IN USE	
36	Consumer Challenge Board Annex	Consumer Engagement
37	Consumer Vulnerability and Engagement Strategy framework	Consumer Engagement
38	ASQ Trends 2006 - 2019	Consumer Engagement
39	Airline Engagement Annex	Consumer Engagement
40	Consumer Engagement Annex	Consumer Engagement



No	Annex/Appendix Title	Chapter
41	Heathrow's Expansion Consumer Benefit Report'	Consumer Engagement
42	Accent H7 Service Package Choices Research	Measures, Targets &Incentives
43	Developing the Cost Benefit Analysis Framework - Part 1: Development of Measures	Measures, Targets &Incentives
44	Developing the Cost Benefit Analysis Framework - Part 2: Consolidation of the Investment Options	Measures, Targets &Incentives
45	Developing the Cost Benefit Analysis Framework - Part 3: Valuation & CBA Results	Measures, Targets &Incentives
46	Measures, Targets and Incentives Annex	Measures, Targets &Incentives
47	NOT IN USE	
48	Frontier Economics - Economic report on inter terminal competition	Regulation Framework
49	NOT IN USE	
50	NOT IN USE	
51	NERA response to Pwc lower for longer	WACC
52	NERA Cost of equity for Heathrow in H7	WACC
53	NERA International precedent on cost of equity	WACC
54	NERA Review of UKRN recommendations on the real TMR	WACC
55	NERA Response to updated PwC paper on WACC and NERL draft determination	WACC
56	NERA the cost of debt for HAL in H7	WACC
57	Ernst & Young International View of Market Returns	WACC
58	KPMG Risks and returns for R3	WACC
59	KPMG Economic regulation of capacity expansion at Heathrow: Response to CAA consultation: estimation of required return premium	WACC
60	Frontier Economics - Competition & Choice, A Report prepared for Heathrow	WACC
61	Oxera Estimating RPI adjusted equity market returns	WACC
62	Oxera The cost of equity for RIIO-2	WACC
63	Economics Insight Local Large Cap vs Euro Indices for Beta Estimation	WACC
64	Oxera Assessment of future returns (TMR)	WACC
65	KPMG Analysis of risk and required returns for R3	

GLOSSARY

Acronym	Expansion of acronym
AACE	Association for the Advancement of Cost Engineering
A-CDM	Airport Collaborative Decision Making
ACI	Airports Council International
ACT	Aerodrome Congestion Term
AdP	Aeroports de Paris
ADR	Aeroporti di Roma
AEC	Airport Expansion Consultation
AICR	Adjusted Interest Cover Ratio
AISC	Average Incremental Social Cost
AMS	Amsterdam Schiphol
ANPS	Airports National Policy Statement
AOC	Airline Operators Committee
AOP	Airport Operating Plan
APD	Air Passenger Duty
APOC	Airport Operations Centre
APU	Auxiliary Power Unit
ASQ	Airport Service Quality
ATAG	Air Transport Action Group
ATC	Air Traffic Control
ATM	Air Traffic Movements
ATRS	Air Transport Research Society
BA	British Airways
BAA	Former name of Heathrow Airport Holdings Limited
CAA	Civil Aviation Authority
CAGR	Compound Annual Growth Rate
CAPEX	Capital expenditure
CAPM	Capital Asset Pricing Model
CBA	Cost-Benefit Analysis

Acronym	Expansion of acronym
CBI	Confederation of British Industry
CBWG	Cost and Benefit Working Group
CCB	Consumer Challenge Board
CDG	Charles de Gaulle Airport
CE	Constructive Engagement
CIP	Commercially Important Passenger
CMA	Competition and Markets Authority
CPB	Capital Portfolio Board
CPH	Copenhagen Airport
CPI	Consumer Price Index
CPNI	Centre for the Protection of National Infrastructure
CPZ	Controlled Parking Zone
CRS	Customer Relations and Service
CSP	Continuity of Service Plan
CT scan	Computerized Tomography scan
CTA	Central Terminal Area
CUSS	Common-Use Self-Service
DB scheme	Defined Benefit pension scheme
DC scheme	Defined Contribution pension scheme
DCB	Demand and Capacity Balancing
DCO	Development Consent Order
DDM	Dividend Discount Model
DfT	Department for Transport
DUB	Dublin Airport
DvC	Demand vs Capacity
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EDF	Expected Default Frequency
EE	Europe Economics
EEA	European Economic Area
EOI	Expression of Interest
ERP	Enterprise Resource Planning
ERP	Equity Risk Premium

Acronym	Expansion of acronym
eTBS	Enhanced Time-Based Separation
EU KLEMS	EU Capital Labour Energy Material Services data repository
FBC	Final Business Case
FBP	Final Business Plan
FEGP	Fixed Electrical Ground Power
FFO	Funds From Operations
FIDS	Flight Information Display Screens
FOD	Foreign Object Debris
FRA	Frankfurt Airport
FTE	Full-time Equivalent
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GWBS	Group Work Breakdown Structure
H7	Heathrow's next regulatory control period, following iH7
HAC	Heathrow Additional Capacity
HADACAB	Heathrow ATM Demand and Capacity Balancing group
HAL	Heathrow Airport Limited
HBS	Hold Baggage Screening
HEX	Heathrow Express
HKG	Hong Kong Airport
HPC	Hinkley Point C
HSPG	Heathrow Strategic Planning Group
HULEZ	Heathrow Ultra Low Emissions Zone
HVAC	Heathrow Vehicle Access Charge
IAG	International Airlines Group
IATA	The International Air Transport Association
IBP	Initial Business Plan
ICAO	The International Civil Aviation Organization
ICE	Institute of Civil Engineers
IDL	[International] Departure Lounge
IFS	Independent Fund Surveyor
IGOM	IATA Ground Operations Manual

Acronym	Expansion of acronym
iH7	Heathrow's interim regulatory control period between Q6 and H7, due to expire on 31 December 2021
ILS	Intelligent Lighting System
ILS	Instrument Landing Systems
IPA	Independent Parallel Approaches
IPCR	Independent Planning Cost Reviewer
IRR	Internal Rate of Return
JEB	Joint Expansion Board
JFK	John F. Kennedy Airport
KDA	Key Driver Analysis
LASAM	London Airports Surface Access Model
LED	Light-Emitting Diode
LGW	London Gatwick Airport
LHR	London Heathrow Airport
LTZ	Landside Terminal Zone
MPPA	Million Passengers Per Annum
MRT	Mass Rapid Transit
MS	Market Share
NAO	National Audit Office
NATS	National Air Traffic System
NBER	National Bureau of Economic Research
NGO	Non-Governmental Organisation
NIE	Northern Ireland Electricity
NIP	New Issue Premium
NIS	Network and Information Systems
NPV	Net Present Value
NRM	New Rules of Measurement
O/D	Origin & Destination
OBC	Outline Business Case
OBR	Office for Budget Responsibility
OFWAT	The Water Services Regulation Authority
OHP	Overhead and Profit

Acronym	Expansion of acronym
ONS	Office for National Statistics
OPEX	Operating expenditure
ORC	Other Regulated Charges
ORCG	Other Regulated Charges Group
ORD	Chicago O'Hare Airport
ORR	Office of Rail and Road
PBN	Performance Based Navigation
PCA	Pre-Conditioned Air
PCM	Price Control Model
PEK	Beijing Airport
PFI	Private Finance Initiative
PINS	Planning Inspectorate
PMICR	Post Maintenance Interest Cover Ratio
PPP	Public Private Partnerships
PR14	2014 water and sewerage companies price review
PR19	2019 water and sewerage companies price review
PRM	Passengers requiring support
PSE	Passenger Sensitive Equipment
PTI	Passenger Transport Interchange
Q6	The sixth quinquennium regulatory control period, 1 April 2014 until 31 December 2019 (extended by one year in 2016)
RAB	Regulated Asset Base
RCV	Regulatory Capital Value
RECAT EU	Recategorisation of the ICAO Wake Turbulence Separation Minima
RFR	Risk-Free Rate
RGG	Resilience Governance Group
RIIO-GD1	The first gas distribution price control review to use the RIIO model (Revenue = Incentives+Innovation+Outputs) of network regulation
RoRE	Return on Regulatory Equity
RPI	Retail Price Index
SAF	Sustainable Aviation Fuels
SARS	Severe Acute Respiratory Syndrome
SAS	Surface Access Strategy

Acronym	Expansion of acronym
SDP	Scheme Development Process
SEG	Stand Entry Guidance
SIN	Singapore Airport
SLA	Service Level Agreement
SORC	Sustainability and Operational Risk Committee
SPP	Spend Per Passenger
SQRB	Service Quality Rebates and Bonus scheme
SYD	Sydney Airport
TBS	Time-Based Separation
TCFD	Task Force for Climate Related Financial Disclosures
TMR	Total Market Return
TSA	Transportation Security Administration
TSC	Transport Strategy Centre
TTS	Track Transit System
TTT	Thames Tideway Tunnel
TUC	Trade Union Congress
UKPNS	UK Power Networks Services
UKRN	UK Regulators Network
UN	United Nations
VAC	Vehicle Access Charge
WACC	Weighted Average Cost of Capital
WEF	World Economic Forum
WODC	Westerly Option Dashboard Case