



Consultation Document

Gatwick Airport Second Runway

Heathrow Airport Extended Northern Runway

Heathrow Airport North West Runway

November 2014

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Chair's Foreword



In our *Interim Report* published in December of last year we explained our view that we would need additional runway capacity in the South East of England by 2030.

Our argument is that one new runway, with the capacity to handle around 200,000 aircraft movements a year, will be needed to maintain the UK's connectivity and hub status, which is what our brief from the Government invites us to secure.

We identified three lead options for that additional runway, two of them at Heathrow and one at Gatwick. But we also decided to subject the proposals for a new airport in the inner Thames Estuary to further analysis. That analysis, which we published in the summer, convinced us that we should not take those ideas forward. Our reasons are set out in detail in a paper we published in early September.

The proposers of the three shortlisted options submitted well-developed and detailed schemes to us in May, and in the six months since then we have carried out detailed independent assessments of those proposals. The results of that work are published today.

The documentation is extensive. The assessments are summarised in the paper which follows, but we make no apology for the degree of detail published. It is particularly important for local residents and their representatives to understand more clearly what the proposals entail, and what their consequences might be for the local environment.

The consultation period on the material runs through to February of next year. Details on how to respond are included in the papers. Over the course of our work, my fellow Commissioners and I have visited both the Heathrow and Gatwick areas and met local residents, MPs and Councillors. During the consultation period, we will return to those locations to listen to views from the local area. We will then, as the Government has asked us to do, present a firm recommendation shortly after the general election.

A handwritten signature in black ink, reading "Howard D. Jarvis".

Introduction

1. In December 2013 the Commission published its *Interim Report*, which included a short-list of three options for increasing the UK's aviation capacity in the long-term. This consultation seeks views on the three options and the Commission's assessment of them.
2. The consultation will run for 12 weeks, ending on Tuesday 3 February 2015. Details on how to respond to the consultation are contained at the back of this document. The Commission welcomes responses from all organisations and individuals with an interest in its work.
3. The consultation questions are listed below. Throughout this document the Commission has identified which sections are relevant to specific questions, to help respondents make an informed response.

Questions inviting views and conclusions in respect of the three short-listed options	Q1: What conclusions, if any, do you draw in respect of the three short-listed options? In answering this question please take into account the Commission's consultation documents and any other information you consider relevant. The options are described in section three.
	Q2: Do you have any suggestions for how the short-listed options could be improved, i.e. their benefits enhanced or negative impacts mitigated? The options and their impacts are summarised in section three.
Questions on the Commission's appraisal and overall approach	Q3: Do you have any comments on how the Commission has carried out its appraisal? The appraisal process is summarised in section two.
	Q4: In your view, are there any relevant factors that have not been fully addressed by the Commission to date?

Questions inviting comments on specific areas of the Commission's appraisal	Q5: Do you have any comments on how the Commission has carried out its appraisal of specific topics (as defined by the Commission's 16 appraisal modules), including methodology and results?
	Q6: Do you have any comments on the Commission's sustainability assessments, including methodology and results?
	Q7: Do you have any comments on the Commission's business cases, including methodology and results?
Other comments	Q8: Do you have any other comments?

4. The Commission will take account of responses to this consultation in its final report, due in the summer of 2015.
5. The first section of this consultation document provides an outline of the Airports Commission's purpose and remit, and provides an overview of its work to date. The second section outlines the Commission's appraisal process, and explains how respondents can explore the reports which document this work in greater detail. The third section provides a summary of the three options and outlines how the scheme performs in the Commission's appraisal. The final section lists the consultation questions, and explains how to respond to the consultation.

1. Section 1 – The Airports Commission’s work so far

Remit and Purpose

- 1.1** The Airports Commission, chaired by Howard Davies, was set up in November 2012 to examine the scale and timing of any necessary steps to maintain the UK’s status as Europe’s most important aviation hub.
- 1.2** The Commission’s terms of reference task it to maintain a UK-wide perspective, taking appropriate account of the national, regional and local implications of any proposals, and to engage openly with interested parties and members of the public.

Conclusions from the first phase of the Commission’s work

- 1.3** The Commission’s work is divided into two phases. The first phase concluded, in December 2013, with the publication of an *Interim Report*. That document set out:
 - the Commission’s assessment of the evidence on the nature, scale and timing of the steps needed to maintain the UK’s global hub status;
 - its recommendations for immediate actions to improve the use of existing runway capacity in the next five years – consistent with credible long-term options; and
 - its recommendations as to the credible long-term capacity options which merited further detailed development in phase two of its work programme.
- 1.4** The Commission undertook a detailed review, informed by a series of discussion papers covering key thematic issues, of the UK’s aviation capacity and connectivity requirements. This included considering how demand for air travel in the UK was likely to develop across a range of future scenarios and both the economic and environmental effects of aviation.
- 1.5** It also included an examination of potential developments in airline and airport operating models, looking in particular at the roles of hub capacity and point-to-point capacity in the current and future aviation sector in the UK. The Commission considered the potential impacts of the growth in low-cost aviation, the rise of new Middle Eastern carriers and airports and the increasing scale of the three major airline alliances.

- 1.6** Each of the Commission's first five discussion papers was used as the basis for a short consultation process, with responses being received in each case from a range of stakeholder organisations and individuals. The discussion papers and any substantive responses received are available on the Commission's website.
- 1.7** The Commission concluded that the UK faces no immediate capacity crisis. The country is one of the best connected in the world, and London has the largest origin and destination market in the world. Problems are emerging, however, particularly at Heathrow, which is now operating at very close to full capacity. The current approach of forcing ever greater volumes of traffic through the UK's existing infrastructure, if continued, would have increasingly detrimental effects for air passengers, but also over the long-term for the national economy and wider society.
- 1.8** Future demand forecasts across a range of scenarios predict significant growth in demand for aviation to 2050, placing additional pressure on already stressed airport infrastructure in London and the South East. This includes forecasts in which carbon emissions from aviation in 2050 are constrained to the 2005 level, in line with the Climate Change Committee's planning assumption for achieving the UK's 2050 emissions target.
- 1.9** Without the provision of new infrastructure the London airport system is likely to be under very substantial pressure in 2030, and demand will significantly exceed total available capacity by 2050. The Commission looked at accommodating this future demand through a variety of means, including measures to redistribute traffic, or through using surface transport improvements to replace the need for air movements. None of these options was found to be effective in reducing the capacity shortfall, and some of the measures were found to reduce long-haul connectivity and be carbon inefficient. For these reasons, **the Commission concluded that there is a case for at least one net additional runway in London and the South East by 2030.**
- 1.10** The Commission also identified that there was likely to be a demand case for a second new runway in the south east by 2050, although it noted that it did not necessarily follow that there would be a strong economic or commercial case. The Commission intends to make recommendations to Government in its final report as to when, how and by whom the case for any second new runway should be considered.
- 1.11** In terms of the nature of the capacity that is needed, the Commission did not consider that there was a binary choice between providing additional hub capacity

or additional point-to-point capacity. Instead, future recommendations should aim to support the continuation of an airport system that caters for a range of airline business models. This would be particularly important in a competitive airport system, like London, where airlines can choose how to use the available capacity, and the market can be expected to respond dynamically to the provision of new infrastructure. The Commission committed to look further at this issue in the next stage of its work, and it has incorporated analysis of future scenarios for the development of the aviation sector and of competition effects within the sector into the evidence base for this consultation.

- 1.12** The *Interim Report* also set out the Commission's recommendations for immediate actions to improve the use of existing runway capacity in the next five years. The Commission reached its recommendations having reviewed the operational deliverability, as well as the economic, social and environmental costs and benefits, of a range of options submitted via a public call for evidence.

The shortlisting process

- 1.13** In parallel to forming these recommendations, the Commission identified and evaluated a wide range of options for the provision of additional long-term capacity to identify the shortlist of options that would be taken forward for further detailed development and consultation in the next phase of its process.
- 1.14** Early in 2013, the Commission invited interested parties to submit proposals for long-term capacity options. Some 52 proposals were received. These included options for building new airports, for expanding existing single runway airports into large multi-runway hubs, and for the incremental expansion of existing airports. It also included a number of proposals which suggested ways in which the UK's aviation capacity and connectivity needs might be met without the provision of new airport infrastructure, for example through significant investment in surface transport infrastructure as an alternative to new runways.
- 1.15** The Commission also sought views and representations on its proposed criteria for identifying a short-list of credible options. Following that consultation, the Commission finalised a set of sift criteria which related to the following categories: the strategic fit of the option, its economic impacts, surface access requirements and impacts, impacts of on the environment and people, cost, operational viability and deliverability.
- 1.16** To inform its evaluation of the options, the Commission published details of the proposals submitted and invited stakeholders to submit views and additional

evidence on them. The Commission considered these responses in reaching its decisions on shortlisting.

- 1.17** An initial sift based on short templates summarising performance against the sift criteria identified a number of options which were not taken forward for further consideration, on the basis that they either presented fundamental challenges that could not credibly be overcome, for example regarding safety, legality or deliverability; or were very similar in scope to more credible, well developed options; or were inconsistent with the Commission's remit.
- 1.18** As part of this initial sift, the Commission also reviewed the options to address the UK's aviation capacity and connectivity needs without the provision of new runway infrastructure. These were developed into two generic options to be considered as part of the second sift stage: one focused on measures to redistribute aviation demand to less congested airports; the other considered surface access investment as an alternative to new infrastructure.
- 1.19** For the second sift stage, more detailed templates were prepared covering the full range of criteria. These combined evidence submitted by promoters with independent analysis in a number of key areas carried out by the Commission's consultants.
- 1.20** On this basis, the Commission identified a range of proposals which it did not consider merited further consideration. They included options for expansion at airports in the South East of England (including some new runway proposals at Gatwick and Heathrow), as well as options for entirely new airports close to Oxford and in the outer Thames Estuary. The Commission also ruled out at this stage the option of expansion at Birmingham as an alternative to new capacity in the South East; the case for such expansion was predicated on the improvements in surface access to the airport that would be provided by HS2, but the Commission's analysis found that even with such improvements available capacity at the airport was not forecast to be filled until the mid-2040s.
- 1.21** In respect of the non-runway options, the Commission reached a view that these would not offer a viable solution to the UK's aviation capacity and connectivity needs. The Commission's analysis indicated there were no feasible or effective methods to redistribute traffic around the UK's existing infrastructure – for example via tax measures or legal powers – without potentially reducing the UK's overall levels of connectivity. And the surface access options that the Commission considered were ruled out on the grounds that they would not free up the number

of slots necessary to meet the Commission's *assessment of need*, were undesirable for passengers or were prohibitively expensive.

- 1.22** Eight options were considered in the third sift stage. At the end of this process, the Commission identified two existing airports as credible locations for an additional runway: Gatwick and Heathrow. **At Gatwick, the Commission committed to further consideration of a new runway to the south of the existing runway. At Heathrow, two alternative expansion proposals were carried forward: a new runway to the north west of the existing runways, and the extension of the current northern runway to create a runway of double length.** The Commission committed to undertake more detailed work on the design and appraisal of these schemes as part of the next phase of its work programme.
- 1.23** The sift process is described in detail in the *Interim Report* and associated technical documents. These are available on the Commission's website, together with the sift templates prepared on the options at each stage of the process.
- 1.24** In addition to short-listing these three schemes, the Commission committed to carrying out further research and analysis of the feasibility and impacts of a new airport in the inner Thames Estuary, with the intention of adding this option to its short-list if it was found to be a credible option for detailed development and appraisal.
- 1.25** The Commission opened a Call for Evidence and undertook four feasibility studies on a possible new inner Thames Estuary airport, considering its environmental impacts, socio-economic impacts, operational feasibility and surface access requirements. Further to consulting on this work, the Commission concluded that such an airport would have substantial disadvantages that collectively outweigh its potential benefits. Cumulative obstacles to delivery, high costs and uncertainties in relation to its economic benefits contributed to an assessment that it did not represent a credible option for shortlisting.
- 1.26** Full details of the Commission's phase one work, including the analysis underpinning its assessment of the need for additional capacity, its construction of recommendations for immediate actions to improve the use of existing runway capacity, and its process of evaluating and sifting proposals for long-term capacity, can be found in its *Interim Report* and supporting annexes, all of which are on the Commission's website.¹ The Commission's analysis of a potential ITE airport is also on its website.²

1 <https://www.gov.uk/government/publications/airports-commission-interim-report>

2 <https://www.gov.uk/government/news/airports-commission-announces-inner-thames-estuary-decision>

The second phase

1.27 The Commission began the second phase of its work on publication of its *Interim Report*. This phase of work is shaped by the Commission's terms of reference, which state that it should report no later than summer 2015 on:

- *its assessment of the options for meeting the UK's international connectivity needs, including their economic, social and environmental impacts;*
- *its recommendation(s) for the optimum approach to meeting these needs; and*
- *its recommendation(s) for ensuring that the assessment of need is met as expeditiously as practicable within the required timescale.*

The Commission should base the recommendations in its final report on a detailed consideration of the case for each of the credible options. This should include the development or examination of detailed business cases and environmental assessments for each option, as well as consideration of their operational, commercial and technical viability.

1.28 The Commission has therefore undertaken a detailed consideration of the three expansion schemes it short-listed in its *Interim Report*. This consultation presents for public scrutiny the Commission's initial assessments of these options. This includes analysis of the economic, social and environmental impacts of each scheme, as well as their operational viability, commercial viability and risks to delivery.

1.29 The information presented for consultation enables respondents to assess the comparative strengths and weaknesses of the three short-listed options on the basis of consistent assessments and the Commission's independent review of the evidence.

1.30 Responses to the consultation will be used to validate and challenge these initial assessments, and to inform both the Commission's consideration of what further analysis of the options is appropriate and its final recommendations to Government.

1.31 Alongside this consultation process, the Commission will review and update its analysis of the broader strategic issues relating to the UK's aviation capacity and connectivity requirements discussed in its interim report. As part of this, and in addition to the analysis that is the subject of this consultation, the Commission has also published two further discussion papers in 2014 on issues related to its terms of reference:

- The utilisation of the UK's existing airport capacity, including consideration of the connectivity provided by the UK's regional airports, and what measures could be taken to support them, and the role and development of airports in the wider south east.
- The delivery of new runway capacity, including consideration of legal and planning issues, of how impacts on local communities might be addressed, and of the role of the state, for example in respect of funding or regulation.

1.32 The above workstreams are not the subject of the present consultation. However, the Commission has received a large number of responses to its discussion papers, and will take these into account alongside responses to this consultation as it prepares its final report, due in the summer of 2015.

2. Section 2 – The Commission’s appraisal

This section will help respondents to answer consultation questions two and three:

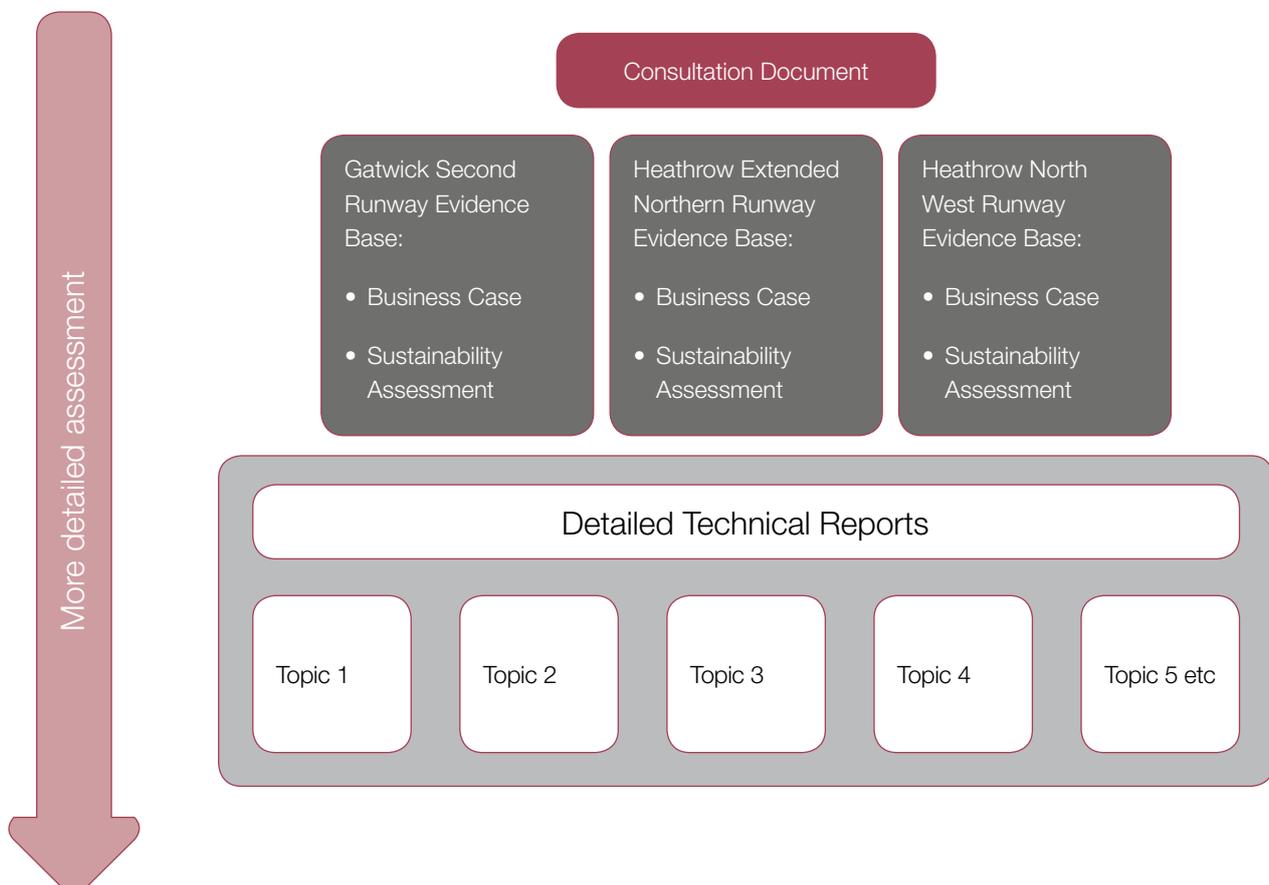
Q2: Do you have any comments on how the Commission has carried out its appraisal?

Q3: In your view, are there any relevant factors that have not been fully addressed by the Commission to date?

How to navigate the consultation documents

2.1 The Commission has undertaken a detailed, wide-ranging and comprehensive appraisal of the three schemes, which has generated a substantial body of documentation.

Figure 2.1: The Commission’s consultation documents. A series of detailed technical reports underpin each scheme’s business case and sustainability assessment. This Consultation Document summarises the key attributes of each scheme.



- 2.2** This section explains how this documentation relates to the Commission's process, and how it can be navigated to research particular topics or understand particular impacts.
- 2.3** The structure of the consultation documents is summarised in Figure 2.1. It may help respondents to consider the work as comprising three layers. At the bottom are the series of detailed, technical studies undertaken on specific aspects of each scheme (for example, a scheme's potential noise impacts, or an assessment of a scheme's local economic impacts). In the level above, these detailed assessments are summarised in a business case and a sustainability assessment, both of which have been produced for each scheme. At the top the Consultation Document (this document) provides a high-level overview of the three options and the Commission's appraisal outputs. This document also explains how to respond to the Commission's consultation.
- 2.4** Further information on how to navigate and engage with the Commission's consultation documents is provided below.
- 2.5** In addition, an index of the published consultation documents, showing where to locate particular analysis (be that in relation to appraisal topic or a particular scheme), is located in Annex A of this document. And a glossary of terms is also being published.
- 2.6** The Commission's intention is that, as well as informing its final report, its analysis can be used as an evidence base to support the delivery of any recommendation, should Government choose to take this forward, in particular as materials in the preparation of a National Policy Statement or Hybrid Bill.
- 2.7** Should the Government decide to implement the recommendations in the final report, further consultations would be likely as part of the preparation of any National Policy Statement or Hybrid Bill, as well as any consultations which may be required to support any planning applications. This process may therefore be seen as one stage in a longer-term process of consultation and engagement, which began with the calls for evidence, discussion papers and associated consultations which informed the Commission's *Interim Report*.

The Commission's *Appraisal Framework*

This section will help respondents to answer consultation questions six and seven:

Q6: Do you have any comments on the Commission's sustainability assessments, including methodology and results?

Q7: Do you have any comments on the Commission's business cases, including methodology and results?

2.8 The Commission’s appraisal of the three short-listed options is structured in line with its *Appraisal Framework*. That document was published in draft for consultation in January of this year, with a revised, final version published in April.³

2.9 The *Appraisal Framework* sets out in detail how the Commission expected the short-listed scheme designs to be developed, and how the schemes are to be appraised. The framework incorporates four inter-related elements:

- an **updated scheme design** for each short-listed option, to be used as the starting point for appraisal;
- the **Commission’s objectives**, against which options will be assessed and on which its final recommendations will be based;
- a set of **appraisal modules** explaining the methodologies that the Commission proposes to use in assessing options; and
- a **business case** and **sustainability assessment** for each option, incorporating the information needed to make informed assessments against the Commission’s objectives.

2.10 Each of these elements is represented in this consultation, as set out below.

2.11 Since the publication of the *Interim Report*, each scheme has been developed to a greater level of detail. These **updated scheme designs** are a development of the specific options short-listed by the Commission at the end of 2013.

2.12 The Commission’s view of each scheme has been extensively informed by the work of the organisation which originally proposed the option. These are Gatwick Airport Limited (Gatwick Second Runway), Heathrow Airport Limited (Heathrow North West Runway) and Heathrow Hub Limited, an organisation separate from Heathrow Airport itself (Heathrow Extended Northern Runway). Having short-listed each scheme, the Commission invited each scheme promoter to work up a more developed version of the scheme in line with the Commission’s published objectives. In particular, the Commission invited further detail on each scheme’s strategic overview, airport master plan, high-level engineering plans, strategies to mitigate detrimental impacts and development strategies. The surface access strategies that accompany each scheme have also been updated since the *Interim Report*. This work has been led by the Commission, drawing upon information submitted by scheme promoters.

³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/300223/airports-commission-appraisal-framework.pdf

2.13 Scheme promoters provided updated scheme designs to the Commission on 14 May. Since then, the Commission has worked iteratively with scheme promoters to further refine the proposals. The schemes as set out in this document, and as referred to in the underlying consultation documents, are the versions of the scheme as assessed by the Commission, and form the basis of all the analysis published in this consultation. Earlier iterations, including the version initially received by the Commission from scheme promoters, can be viewed on the Commission's website.

2.14 Each scheme has been appraised following the approach set out in the Commission's *Appraisal Framework*. This is based around 29 objectives, which are assessed through 16 appraisal modules. As set out in Table 2.1 below, this represents an evolution of the categories and approach used in the first phase of the Commission's work programme.

Table 2.1: The Commission's objectives for the short-listed schemes

Phase 1 sift criteria categories	Phase 2 objective	Phase 2 appraisal module
Strategic Fit	To provide additional capacity that facilitates connectivity in line with the <i>assessment of need</i> .	Strategic Fit
	To improve the experience of passengers and other users of aviation.	
	To maximise the benefits of competition to aviation users and the broader economy.	
	To maximise benefits in line with relevant long-term strategies for economic and spatial development.	
Economy	To maximise economic benefits and support the competitiveness of the UK economy.	Economy Impacts
	To promote employment and economic growth in the local area and surrounding region.	Local Economy Impacts
	To produce positive outcomes for local communities and the local economy from any surface access that may be required to support the proposal.	
Surface Access	To maximise the number of passengers and workforce accessing the airport via sustainable modes of transport.	Surface Access
	To accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight.	
	To enable access to the airport from a wide catchment area.	

Phase 1 sift criteria categories	Phase 2 objective	Phase 2 appraisal module
Environment	To minimise and where possible reduce noise impacts.	Noise
	To improve air quality consistent with EU standards and local planning policy requirements.	Air Quality
	To protect and maintain natural habitats and biodiversity.	Biodiversity
	To minimise carbon emissions in airport construction and operation.	Carbon
	To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.	Water and Flood Risk
	To minimise impacts on existing landscape character and heritage assets.	Place
	To identify and mitigate any other significant environmental impacts.	To be defined
People	To maintain and where possible improve the quality of life for local residents and the wider population.	Quality of Life
	To manage and reduce the effects of housing loss on local communities.	Community
	To reduce or avoid disproportionate impacts on any social group.	
Cost	To make efficient use of public funds, where they are required, and ensure that the benefits of schemes clearly outweigh the costs, taking account of social, environmental and economic costs and benefits.	To be assessed in the business case
Delivery	To be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users.	Cost and Commercial Viability
	To have the equivalent overall capacity of one new runway operational by 2030.	Delivery
	To actively engage local groups in scheme progression, design and management.	
Operational Viability	To enhance individual airport and airports system resilience.	Operational Risk
	To ensure individual airport and airports system efficiency.	Operational Efficiency
	To build flexibility into scheme designs.	
	To meet present industry safety and security standards.	
	To maintain and where possible enhance current safety performance with a view to future changes and potential improvements in standards.	

2.15 The Commission intends its recommendations to be based on an integrated approach to the shortlisted options, taking into account the full scope of their impacts, looking at their effects at local, regional and national level, and considering how the benefits and costs may best be balanced, any positive effects enhanced and negative impacts mitigated. The Commission will not look at airport expansion in isolation but will consider how it interacts with the wider transport network, with broader policies in respect of economic growth, environmental protection and quality of life, and will consider how it affects different communities, businesses and localities.

- 2.16** The analysis prepared by the Commission for this consultation is designed to support that approach. Focusing on the objectives identified will help to enhance the economic, environmental and social benefits of all schemes, whilst reducing their disbenefits. The objectives conform to the principles of mitigating and adapting to climate change and achieving good design, and should provide information which can help to ensure that schemes balance national, local and commercial interests. The Commission recognises, however, that there will need to be trade-offs between these objectives. No scheme should be expected to meet fully all the objectives set.
- 2.17** The performance of each scheme in relation to the objectives is considered in the consultation reports relating to each of the 16 appraisal modules, and summarised in each scheme's **business case** and **sustainability assessment**.
- 2.18** The business case provides an integrated assessment of the overall case for a proposal, taking into account strategic, economic, social, environmental and other factors. It comprises a strategic case, which looks at the alignment of the scheme with the Commission's *assessment of need*; an economic case, which sets out the overall costs and benefits of the scheme; a commercial and financial case, which assesses the costs associated with the scheme and considers how they can be financed; and a management case, which reviews the deliverability of the scheme.
- 2.19** The aim of a sustainability assessment is to ensure that the Commission has information available on how a scheme performs in relation to sustainability indicators and benchmarks. It sets out the impacts of the scheme – whether positive, neutral or adverse – in a range of areas, covering economic, environmental and social factors.
- 2.20** There is some degree of overlap between the content of business cases and sustainability assessments. However, not every scheme appraisal is relevant to the business case, and not every scheme appraisal forms part of the sustainability assessment. By undertaking both pieces of analysis, the Commission aims to produce a thorough and integrated appraisal, which measures the schemes' performance across a range of metrics.
- 2.21** The following sections provide an overview of the appraisals. A more detailed description of the Commission's overall approach is provided in its *Appraisal Framework* document, referred to above. In addition, the technical reports published as part of this consultation process provide information on the specific methodologies and approaches used in relation to each appraisal module.

Approach taken to the assessments

The following sections will help respondents to answer consultation question five:

Q5. Do you have any comments on how the Commission has carried out its appraisal of *specific topics* (as defined by the Commission’s 16 appraisal modules), including methodology and results?

Forecasting future demand for aviation

2.22 An important aspect of the appraisals is that they are not centred on one view of the future. This is because the future development of the aviation sector, and of the wider UK and global economy, is inherently difficult to predict.

2.23 The DfT aviation model has been used to produce demand forecasts, following a number of updates since the *Interim Report*. The Commission’s view is that the DfT model provides the most robust, peer-reviewed, tool available for assessing overall national demand for aviation, a view which was broadly supported by responses to its 2013 discussion paper on Demand Forecasting.⁴ The Commission has also constructed five future forecast scenarios, rather than basing its analysis on any single likely pattern of future demand. These scenarios are reflected in the Commission’s passenger demand forecasts, and are incorporated where appropriate into the assessments undertaken in this consultation. By considering each scheme in relation to several potential futures, the Commission aims to stress-test the robustness of its analysis, and ultimately its final recommendations to Government.

2.24 The Commission’s scenarios broadly follow the approach taken in the first phase of its work, in which a set of scenarios were developed to test the overall assessment of the need for new capacity set out in the *Interim Report*. They reflect different potential outcomes in respect of the development of the global economy and the international aviation sector, including consideration of:

- ongoing liberalisation or more protectionist policies;
- shifts in the balance between full-service and low-cost carriers;
- varying rates of long-term economic growth, including at the global level or in specific regions;
- how established and new entrant airlines might work together; and
- differing effects of global or domestic climate change measures.

⁴ <http://www.gov.uk/government/publications/discussion-paper-on-aviation-demand-forecasting>

- 2.25** These scenarios broadly follow the structure of those used in the preparation of the *Interim Report*, but they have been reviewed and updated as part of developing the Commission’s consultation materials. Details of the approach to modelling these scenarios is set out in the document, *Strategic Fit: Forecasts*.
- 2.26** The Commission recognises there are areas where the model has limitations and for this reason the forecasts form only one input into the strategic analysis. Although passenger choices are modelled in detail, airline and airport behaviour is only simplistically represented, meaning that the competitive impacts of any new capacity cannot be fully assessed using this model. The allocation model also does not include fare differentials in the range of factors governing passengers’ choice of airport. This approach reflects the available evidence and has been confirmed through peer review, although it is also unavoidable given the available data. As a result, potential changes in the cost of travel via specific airports, which will be influenced by a range of factors, are not taken into account in model outputs.
- 2.27** Airline behaviour and the potential implications of changes in fares are considered as part of the strategic fit element of the Commission’s overall analytical framework, in the report, *Strategic Fit: Expanding Airport Capacity – Competition and Connectivity*.
- 2.28** The Commission is keen to strengthen further its evidence base on the competition effects of expanding aviation capacity and will continue to develop this work.
- 2.29** Descriptions of the five scenarios used by the Commission in appraising the shortlisted options are provided below:

<i>Assessment of need</i>	This scenario is consistent with the forecasts underpinning the Commission’s assessment of need. Future demand is primarily determined by central data projections (for example GDP and global oil prices).
<i>Global growth</i>	This scenario sees higher global growth in demand for air travel in the future, coupled with lower operating costs.
<i>Relative decline of Europe</i>	There is higher relative growth of passenger demand in emerging economies in the future, compared to growth in the developed world.
<i>Low-cost is king</i>	High levels of global growth in demand see the low-cost carriers strengthening their position in the short-haul market and successfully capturing a substantial share of the long-haul market.

<i>Global fragmentation</i>	This scenario sees lower global growth and economies closing themselves off by adopting more interventionist national policies.
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2.30 It must be stressed that none of these should be considered a ‘central’ scenario. It would be as risky, for example, to assume that past trends will simply continue into the future as it would be to base a decision on any single view of how those trends might alter over time. The purpose of the scenarios is not to identify a single correct or most plausible future. It is to provide a range of potential demand forecasts, in order to understand better the ways in which the benefits, impacts and feasibility of each shortlisted option might be affected by long-term structural changes.

2.31 How these scenarios are reflected in the appraisal varies from module to module. In relation to the strategic and economic cases of each scheme, the Commission has undertaken analysis of the scheme’s performance in relation to all five scenarios. In other areas, such as noise and commercial viability, the forecast scenarios are used to identify plausible upper and lower end estimates for demand at each airport. Where the future aviation scenario would not affect the assessment as significantly, the Commission has restricted itself to qualitative analysis, or merely indicative judgements. And in a small number of cases, such as operational risk or air quality, scenario analysis was either considered unnecessary or will be considered in the light of further detailed analysis. The Commission has prioritised its scenario analysis on those instances where an alternative scenario is likely to produce a markedly different result, in order to offer a sense of the range of impacts that a scheme may generate.

2.32 In line with the approach taken in the *Interim Report*, the Commission has also prepared two sets of forecasts for each scenario based on different approaches to handling carbon emissions from aviation: ‘carbon-capped’ and ‘carbon-traded’. Both sets of forecasts assume that the total number of emissions are set with reference to stabilisation targets aiming for a global temperature increase of equal or close to two degrees Celsius, and aiming to ensure that a four degree Celsius global temperature increase is reached only with very low probability (less than 1%). The two forecasts are characterised by the following key differences:

- The Commission’s ‘carbon-capped’ forecasts model the levels of aviation demand expected in a world where carbon dioxide emissions from flights departing UK airports are limited to 37.5MtCO₂e – the level recommended by the Committee on Climate Change (CCC) as a planning assumption to achieve carbon reductions across the whole UK economy of 80% over 1990 levels by

2050.⁵ The ‘carbon-capped’ forecasts therefore increase the costs of carbon to ensure demand for aviation in the UK is reduced to stay within this planning assumption, and as such assume no trading of aviation emissions either within the UK economy or internationally (for example, under an EU Emissions Trading Scheme or any subsequent international global agreement).

- By contrast the Commission’s ‘carbon-traded’ forecasts model the levels of aviation demand in a future where carbon emissions from flights departing UK airports are traded at the European level until 2030 and thereafter traded as part of a liberal global carbon market. In contrast to the ‘carbon-capped’ forecasts these do not constrain emissions to a pre-determined level; rather, they reflect the demand response to DECC’s carbon values for appraisal.

2.33 As with the Commission’s scenarios, the objective is not to identify a single ‘correct’ forecast, but rather to understand the varying effects on aviation demand of constraining and pricing carbon emissions. In effect the two worlds set out above represent a range of possible ways in which aviation in the UK may contribute to achieving stabilisation of the global climate.

2.34 At one end of the range the capped approach sees that happen within the UK economy. This takes a static view of what the relative effort between sectors should be, assuming no flexibility to promote economic efficiency or reflect society’s changing views of the value of aviation relative to other sectors. It is set with reference to the 37.5MtCO₂e planning assumption the CCC recommends as a proxy until such time as a long-term global climate agreement is reached. This planning assumption has been developed with a view of what the relative effort of sectors should be based on what is known now – and thus reflects the CCC’s concern that should aviation emissions grow to 37.5MtCO₂e, the implied 85% reduction in the CO₂e emissions of other sectors may be at the limit of what is feasible. As the CCC notes it is a limit that should be kept under review, to allow for policy changes and new information about technology and abatement in different sectors.

2.35 The other end of the range assumes action to tackle emissions seeks the most globally economic efficient approach, without reference to national boundaries or other concerns that characterise current international negotiations.

2.36 The future reality is most likely to lie somewhere between these two worlds. For example, already today we can see a shift towards the international trading of

⁵ This assumes international aviation emissions are assigned to the UK economy on the basis of departing flights or bunker fuel sales in the UK, which is a relatively good proxy.

aviation emissions through their inclusion in the EU emissions trading system, but also the international reactions to that and delays to its full implementation.

Calculating economic benefits

- 2.37** The economic analysis undertaken for this consultation considers the benefits and dis-benefits associated with each scheme. The Commission has approached each scheme’s appraisal from both a microeconomic and macroeconomic perspective. This dual approach draws on some methods used by Government but also offers a wider perspective.
- 2.38** The microeconomic approach largely follows standard Government appraisal methodologies, with costs and benefits weighed against each other, although it should be noted that in contrast to most other large transport infrastructure schemes the costs of new airport infrastructure are likely to be borne entirely or predominantly by the private sector. The Commission’s analysis here is broadly consistent with guidance outlined in DfT’s WebTAG⁶ and the HM Treasury Green Book⁷ and incorporates a large number of inputs, drawn from across the *Appraisal Framework*, to build a picture of a scheme’s welfare impacts. These include wider welfare impacts associated with each scheme – such as impacts to the environment, the local economy and the quality of life of local populations and UK citizens – which are considered both quantitatively and qualitatively in the assessments.
- 2.39** The macroeconomic approach is more innovative and makes use of a Spatial Computable General Equilibrium (S-CGE) model, which enables the Commission to predict the Gross Domestic Product impacts of the schemes. The S-CGE model is based on analysis of the ways in which the impacts of airport expansion may transmit through the economy, such as through interactions between firms (domestic and international), households and Government, allowing a whole economy assessment.
- 2.40** These micro and macro approaches should not be considered as additional to each other; rather they should be viewed as providing different and complementary perspectives of the likely impacts of expansion.
- 2.41** It has not been possible to assess the transport economic efficiency, delays or wider economic impacts under a carbon-capped forecast. This is because carbon

6 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/275125/webtag-tag-unit-a1-1-cost-benefit-analysis.pdf

7 <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

prices are much higher in each scheme option than the 'do minimum' baseline⁸, meaning the carbon policy component of the appraisal dominates the capacity appraisal. This is particularly problematic as appropriate carbon policies have not been investigated in detail. For example, carbon emissions have been forecast assuming a rate of technological development and fleet turnover commensurate with past trends, whereas in reality it might be expected that the higher carbon prices associated with greater capacity could incentivise technological developments and uptake which enhance the carbon efficiency of aircraft. This risks implying greater dis-benefits attached to cutting carbon than may be realistic. The Commission intends to carry out further work to complete a fuller economic assessment of the case where UK aviation emissions are constrained to the CCC planning assumption of 37.5MtCO₂e for its final report in summer 2015.

Paying for new capacity, airport and surface access

2.42 The Commission has estimated the capital costs associated with each scheme by reviewing the infrastructure plans for the new runway to identify the necessary works and breaking these down, as far as possible, into individual items. For each item, a cost per unit rate was applied (e.g. cost per square metre of new terminal space). These were tested against appropriate market benchmarks and discussed with the relevant airport owners.

2.43 In addition, the Commission has included in its cost estimates appropriate allowances for risk and a range of values for optimism bias. The base cost estimates for the capital cost of each scheme have been increased by 20% to account for risk and by a further 20% to account for optimism bias, which has been mitigated from the full rate recommended in the HM Treasury Green Book to reflect the significant degree of detailed development work carried out to date. In order to understand the range of possible outcomes, the Commission has also made estimates of costs without optimism bias and with a higher, unmitigated, allowance for optimism bias.

2.44 All schemes have been developed based on the model of the existing airport operator delivering the additional capacity and then operating the airport as a single corporate entity. In order to assess the commercial viability of the shortlisted option, the Commission has also estimated, drawing on information submitted by

⁸ The Commission uses a 'do minimum' assessment to develop a baseline to compare the schemes against, which assumes no airport expansion at the three short-listed sites. In the case of both Heathrow schemes this do minimum case is based on Heathrow Airport Ltd's most up to date Masterplan, and for the Gatwick scheme the respective Gatwick Airport Ltd Masterplan. These cover both what the airports are like now and agreed plans for how to develop the airport with no new runway.

promoters and again including appropriate allowances for risk and optimism bias, the likely level of investment required in the existing airport infrastructure and the costs of asset maintenance over the assessment period. Combined with estimates of operating costs and non-aeronautical revenues for each airport, this has enabled the Commission to consider the overall financial impact on the airport of funding the new runway and associated infrastructure, and to make an estimate of the passenger charges which may be required as a result.

- 2.45** The Commission has made conservative assumptions in its commercial analysis regarding any increases in per passenger charges to ‘pre-fund’ new infrastructure which might be levied prior to the delivery of additional capacity. Other financing assumptions have been based on discussions with existing airport owners, augmented by the Commission’s financial advisors where appropriate. Flexing the assumptions made regarding the financing parameters would alter the timing and level of any increase in charges.
- 2.46** In respect of surface access, the Commission identified two baselines. The ‘core baseline’ contains surface transport schemes which are already committed and funded, while the ‘extended baseline’ contains those schemes which the Commission considered it was likely Government would need to fund before 2030 to meet background demand, regardless of decisions on airport expansion. Surface transport interventions contained within either baseline have not been included in the Commission’s cost estimates for airport schemes.
- 2.47** The infrastructure investments required specifically as a result of expansion have, however, been identified and the costs associated with the relevant scheme. These have been estimated by the Commission’s consultants on the basis of unit cost estimates and include allowances for optimism bias of 44% for road schemes and 66% for rail schemes.
- 2.48** The approach adopted by the Commission to the treatment of surface access costs should not be taken as a firm view as to the appropriate allocation of costs between the public sector and the private funding of the short-listed scheme. There may be a case, for example, for some costs directly associated with the scheme to be funded by the public sector. Equally, the benefits for an airport from wider investment on the core network, and potentially changes in prioritisation resulting from airport expansion, may mean that a contribution from the scheme promoter to these costs is justified. State aid rules may also in some circumstances require an appropriate contribution from the airport operator where the operator would derive a benefit from a surface access scheme. The Government would need to reach its own view on the level of public investment that can be justified.

2.49 In its commercial analysis, the Commission’s core assessments do not include surface access costs, but a sensitivity test has been carried out in which each scheme’s full surface access costs are borne by the promoter.

Assessing environmental impacts

2.50 The approach to assessing aviation noise impacts has been informed by responses to the Commission’s discussion paper on aviation noise, published in July 2013.⁹ These indicated that a noise assessment based on any single metric would be unlikely to provide a rounded view of the potential impacts of any proposal for expansion.

2.51 So the Commission has developed a ‘noise scorecard’ which includes a range of metrics, covering average daytime and night-time noise, the 55 L_{den} approach used at European level to measure noise levels over 24 hours, and daytime and night-time ‘number above’ metrics, which show the frequency of noise events, rather than an average noise level over a period of time. Full details are provided in the *Appraisal Framework* and the scorecard is reproduced below:

Table 2.2: Airports Commission noise scorecard

Period	Average measure		Frequency measure (based on number above contour)
	UK Measure	EU Measure	
Day	54-72 L_{Aeq16h} in 3dB increments		‘Number above’ N70 contour
Night	48-72 L_{Aeq8h} in 3dB increments		‘Number above’ N60 contour
24-hour		55 L_{den}	

2.52 The Commission’s demand forecasts have been used as the basis for measuring future noise impacts. For each scheme, the *assessment of need* carbon-capped forecast has been assessed as a rough ‘lower end’ case, and a ‘top end’ case has also been assessed to understand the implications of scenarios showing higher levels of demand. A number of additional sensitivities have been considered, particularly in relation to Heathrow, which affects many more people with noise pollution than Gatwick.

9 <https://www.gov.uk/government/publications/aviation-noise-discussion-paper>

- 2.53** The outputs of these scenarios in terms of numbers of air transport movements (ATMs) and fleet mix (i.e. the mix of larger and smaller aircraft, and newer and older technology) have been used by the CAA’s Environmental Research and Consultancy Department to develop noise contours for each metric. In order to achieve this, an indicative flight path design has been prepared for each scheme by the CAA, further to a workshop with the CAA, NATS, the Commission secretariat and scheme promoters, and a broad assessment of potential future noise impacts has been carried out on the basis of these designs. These flight paths can be seen in *Operational Efficiency: Airspace Efficiency Report*.
- 2.54** These indicative designs should not be taken as showing where future flight paths would in practice be located. Creating and agreeing airspace plans for any new runway would require a process of development and public consultation. Careful consideration of mitigation options, as well as the impacts of new technology, could lead to significant changes from the indicative designs. Such mitigation options could include changes to night flight regimes, although the current noise assessment assumes that existing night flight regulations remain in place.
- 2.55** The demand forecasts and surface access modelling have also been used as the basis for the analysis of air quality and carbon impacts. For carbon, the Commission has analysed the potential increases and reductions in emissions associated with increased air travel, reduction in delays, construction, ground operations and surface transport. For its air quality assessments the Commission has used the forecasts to predict the mass emissions of harmful compounds associated with airport expansion, and has then considered the impacts of these emissions at a national and local level. It has carried out a high-level assessment of local impacts and the risks of exceeding legislated air quality limits, as well as considering the scope for mitigation.
- 2.56** The high-level air quality modelling presented for consultation enables a comparison to be made of the scale of impacts and risks associated with each option. Prior to reaching any final recommendations, the Commission intends to supplement this with more detailed dispersion modelling, as set out in its Appraisal Framework, which will provide greater assurance in respect of the air quality implications of each proposal and the scope for mitigation. The range of inputs required and the complexity of this work mean that it has not been possible to carry it out in advance of consultation.
- 2.57** It is acknowledged it would have been preferable to have available the outcome of more detailed modelling exercises prior to consultation. On balance, however, the Commission considers that it is better to launch the consultation phase of its work at the present time (enabling sufficient time for participation in the process and for

consideration of the outcome of those responses), than to hold off the consultation process in an attempt to achieve a firmer foundation for its air quality assessments. Although a fuller picture may be provided by more detailed work, the high level modelling undertaken to date identifies the key challenges which shortlisted schemes face and provides a sufficient evidential basis for consultees to express their views on the questions asked in the consultation document. The Commission is continuing to work in this area and it is anticipated that fuller work will inform its final recommendations.

- 2.58** The impacts of the schemes on the other environmental modules – Biodiversity, Water & Flood Risk and Place – are in general a function of the scheme masterplan and any mitigations proposed by the promoters. The Commission has assessed the baseline status of the local landscape and waterscape around the current airports, and reviewed against this the mitigated and unmitigated impact of the scheme.

Measuring effects on quality of life and communities

- 2.59** In addition to their economic and environmental impacts, each of the shortlisted options will have a direct impact on the local community through the loss of housing and community facilities, as a result of the land-take required to construct new or extended runways and associated infrastructure. The Commission has assessed the scale of housing loss and the specific facilities put at risk for each option, as well as reviewing the potential to mitigate or compensate for these impacts, and the specific mitigation proposals put forward by scheme promoters.
- 2.60** The Commission has also carried out a high level equalities impact screening for each scheme, which seeks to understand whether it may have a disproportionate impact on specific social groups, including the elderly, disabled and ethnic minorities. This provides an initial indication of what effects of this kind may be felt, but further, more detailed, screening exercises would be required to obtain a fuller understanding as any scheme is progressed and to help identify appropriate mitigations to address any issues.
- 2.61** Alongside its analysis of community impacts, the Commission has also sought to understand how airport expansion may affect quality of life, both at the local and national level. It has commissioned a new study, which has reviewed the available evidence in relation to a range of measures of well-being and sought to understand whether and how these change in areas close to an airport, as well as considering potential effects on quality of life at national level. This study has been published as part of this consultation.

2.62 This is the first time quality of life impacts have been considered in relation to a major infrastructure project, and the Commission welcomes consultees’ views on this initial research.

Assessing airport and airspace operations

2.63 In its *Interim Report* the Commission provided an estimate of the level of additional capacity that each shortlisted proposal would provide. As the scheme designs have become more detailed, further work has been carried out to validate these capacity estimates, as well as to further understand the risks and issues associated with the delivery of each scheme.

2.64 The Commission’s consultants examined the airfield masterplans put forward by each scheme promoter and used established design criteria and professional judgement to establish the maximum capacity of the proposed runway and taxiway infrastructure in terms of annual ATMs, as well as any potential limiting factors and bottlenecks. Adjustments to masterplans were agreed with scheme promoters where particular capacity limitations were identified.

2.65 The consultants’ appraisal was conducted with reference to the Commission’s objective that there should be no worsening (and where possible, improvement) of present levels of resilience at any expanded airport. The consultants’ work was augmented by work from NATS (the UK’s air traffic services provider) on the feasibility of accommodating expansion within the UK’s air traffic control systems.

2.66 Wider resilience issues, such as the impacts that each proposal would have upon whole-system resilience and whether the proposed schemes have any particular vulnerabilities to major disruptive events (including flooding, utility outages, adverse weather and terrorism), were also assessed.

2.67 Passenger capacity (as distinct from ATM capacity) was assessed by examining the scale of the proposed terminal infrastructure and applying an internationally recognised standard of ‘square metres per design-hour passenger’. This allowed the Commission to understand both the overall passenger capacity of the proposed infrastructure and the likely levels of crowding that would ensue.

2.68 The Commission has worked with its consultants and NATS to develop indicative airspace designs for each of the proposals. These designs have allowed the Commission to reach a preliminary view on the ability of UK airspace systems to support each scheme. They are not intended to represent the final airspace designs that would be implemented upon scheme opening.

- 2.69** The Commission intends to supplement the analysis carried out for consultation with ‘Fast Time Simulations’ which will provide greater assurance in respect of the airspace implications of each proposal.

Delivery

- 2.70** Further to all its assessments, the Commission has considered the overall level of risk associated with each scheme’s ability to deliver one net additional runway’s worth of capacity by 2030. The Commission undertook a qualitative summary of the key issues arising from the Commission’s appraisal across each of the assessment areas.
- 2.71** The deliverability appraisal specifically considers key risks in terms of planning, financing, construction, public deliverability and resilience to legal challenge, and how these might be mitigated, as well as how the transitional steps towards the delivery of new infrastructure may be managed.
- 2.72** The Commission is interested to hear views on how the deliverability of the schemes can be improved, be that through improvements to the schemes – such as mitigating their negative impacts or enhancing their benefits – or through other recommendations related to the actions of Government or other parties.

Analysis and engagement

- 2.73** Throughout these consultation documents the Commission has set out data and analysis on topics that can have enormous impacts on people’s lives. In order to share this information clearly, and to facilitate comparisons between schemes, many of the effects of the schemes are set out quantitatively.
- 2.74** The Commission is acutely aware, however, that the numbers in this report are not an end in themselves, but a representation of how each scheme may affect people. Over the past two years the Commission’s discussions with those currently affected by airports, or most likely to be affected by a future expansion, have made clear the strength of feeling in this area.¹⁰
- 2.75** The topic that generates the most intense emotions is the noise generated by overflying aircraft. While there are measures that can reduce the amount of noise generated, and mitigation or compensation that can limit the impacts of noise, the noise generated by airports has the potential to have significant effects of peoples health and wellbeing. The Commission has heard first hand from councillors, MPs and local residents about the problems that can be generated by regular overflight, and from teachers in local schools highlighting the impacts of aircraft noise on

¹⁰ A list of the Commission’s engagements to date is published on its website.

their classes, from sleep disturbance to having to pause lessons while planes pass overhead.

- 2.76** Other local impacts can be sizeable. For example, the Commission has visited the Great Barn in Harmondsworth and a number of the listed properties that would be affected by Gatwick expansion, and understands how valuable heritage sites like these are, not just because of their historical importance but also for the way they shape and define the areas in which people live.
- 2.77** On the other hand, the Commission is petitioned by groups and individuals who press the case for the positive impacts on people that expansion could generate. Growing an airport could create many thousands of new jobs, both locally (in the communities that experience some of the most negative impacts of the airports) and across the country. The value of employment for individuals, their families and their communities can be transformative.
- 2.78** The Commission has also heard from regional airports and businesses around the country about the importance they place on regular air links into London, both to visit the capital and to make onward connections. These routes, which have been constrained in recent years due to lack of capacity, are vital for the businesses they serve, who wish to travel to existing and new potential markets around the world. There is no questioning the importance that Scotland, Northern Ireland and the UK’s more peripheral cities place on expanding aviation capacity in London and the South East.
- 2.79** And of course the value of connectivity is not only an economic value, as those who visit relatives and friends in other countries, or holiday overseas, can testify. They, too, would stand to benefit from an improvement to the UK’s global connectivity.
- 2.80** The Commission is not attempting to set out in these documents which of these impacts is the most important, or matters most to people’s lives. Its intention is to provide comparable data and analysis, so that the people reading these documents can make their own judgements. The Commission would like to thank those people in the local communities and across the country who have engaged with us so far to give us their points of view.

Consultation questions

- 2.81** The analysis presented for consultation comprises initial assessments across the full range of modules set out in the Commission’s Appraisal Framework, which have been used to develop draft business cases and sustainability assessments.

2.82 These assessments, which are set out in the technical documents published in relation to each appraisal module, will be of relevance in answering consultation questions five, six and seven, which ask for comments on the Commission's approach to appraising each of the sixteen appraisal topics (Q5), and on the sustainability assessments (Q6) and business cases (Q7).

2.83 In addition, the Commission is interested in identifying through consultation other areas where additional analysis may be of value in informing its final recommendations. This is the objective of consultation question three, which asks:

Q3: In your view, are there any relevant factors that have not been fully addressed by the Commission to date?

2.84 Responses to these questions will help the Commission to test and strengthen its analysis prior to reaching any final recommendations, and to ensure that the conclusions in its final report are based on as robust and comprehensive an evidence base as is practicable.

3. Section 3 – The short-listed options

The scheme descriptions in this section will help respondents to answer questions one and two:

Q1: What conclusions, if any, do you draw in respect of the three short-listed options?

Q2: Do you have any suggestions for how the short-listed options could be improved, i.e. their benefits enhanced or negative impacts mitigated?

The results of the Commission's assessments explained in this section may also help respondents to answer question five:

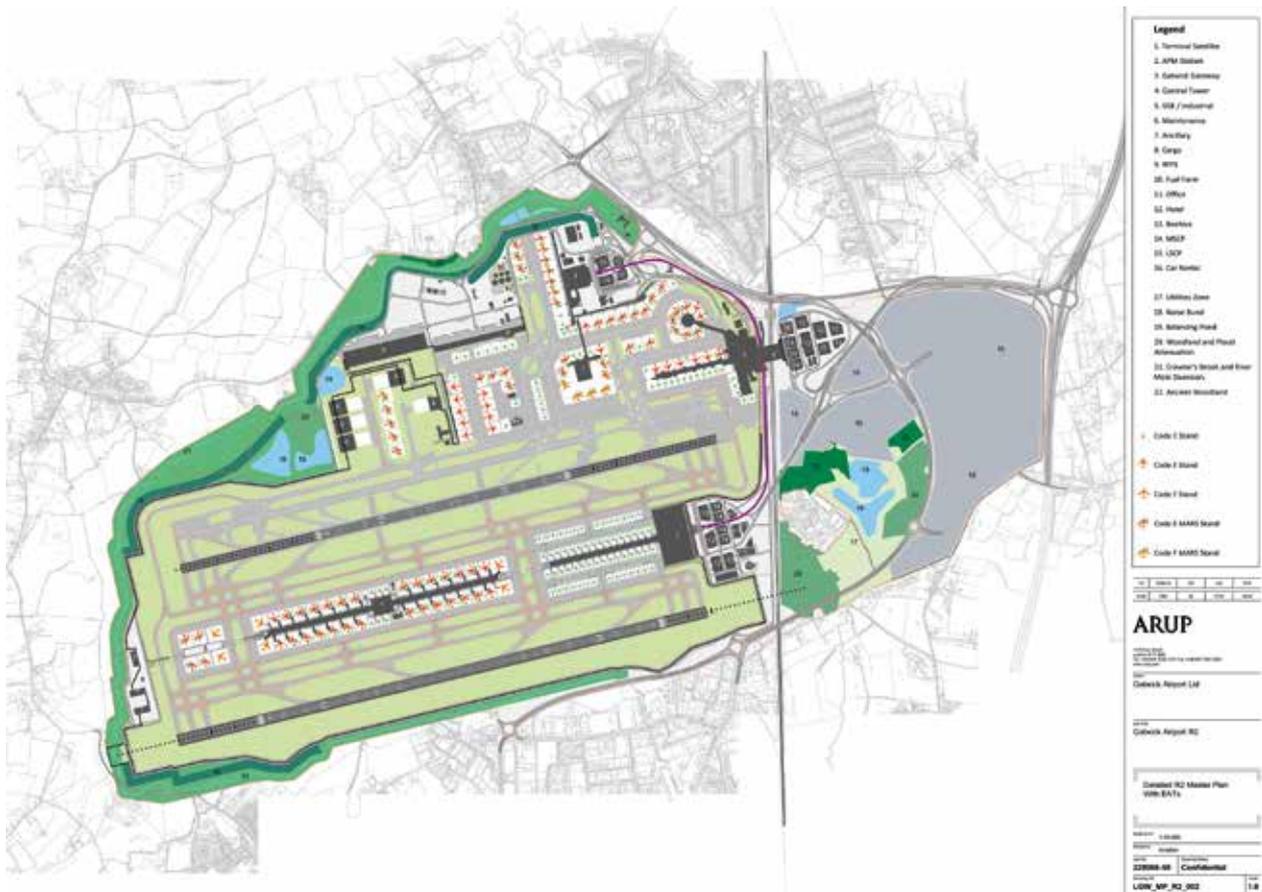
Q5: Do you have any comments on how the Commission has carried out its appraisal of specific topics (as defined by the Commission's 16 appraisal modules), including methodology and results?

Scheme Description – Gatwick Airport Second Runway

Description of Infrastructure

3.1 The Gatwick Airport Second Runway scheme proposes a new runway south of the current runway. This new runway runs parallel to the existing runway as shown in the airport’s masterplan:¹¹

Masterplan



Source: Gatwick Airport Ltd.

3.2 The space between the runways is set at 1,045 metres as this distance provides space for required airport infrastructure (see below) and is needed to permit simultaneous independent mixed mode operations on each runway.¹²

¹¹ Gatwick Airport Ltd made some minor modifications to the masterplan submitted to the Commission on 14 May 2014 as part of its updated scheme design, following feedback received during its April 2014 consultation on runway options. The modified masterplan was published in its July 2014 consultation report, which can be found at the following link: <http://www.gatwickairport.com/business-community/New-runway/Documents-library/>

¹² This means that each runway can operate without operational interactions or limitations with the other runway, subject to appropriate regulatory mitigations.

- 3.3** The space between the two runways will house a new terminal building, main pier and satellite. The capacity of the new terminal is approximately 50 million passengers per annum (mppa), which is slightly higher than the combined capacity of the current two north and south terminals (45mppa).
- 3.4** The airport footprint will extend southwards to encompass the space for the new runway, and also to the east, broadly to the M23, to provide space for expanded ancillary airport services and parking.
- 3.5** A total of 168 residential properties lie within the airport land take and are likely to need to be demolished. Further residential properties could also be lost as a result of surface access works, depending on detailed route and construction design and potential mitigation options. In total 624 hectares (ha) and up to 78ha will be required for airport and surface access development respectively, with approximately 9ha of this total lying within designated Green Belt.
- 3.6** Gatwick Airport Ltd suggests that the development will be built in phases, with development being undertaken as demand requires it. The runway would be constructed first, to ensure that the ATM (air transport movements) capacity is available as soon as possible. After this the terminal (and all associated infrastructure in the midfield site) would be built up in phases as passenger numbers increase to the point at which they are necessary. This phasing approach would require the use of a remote passenger facility during the period following the runway's construction and prior to the opening of the first phase of the new terminal capacity.

Description of surface access

- 3.7** The surface access design for Gatwick can be split into three sections: the core baseline, the extended baseline and the scheme specific developments.
- 3.8** The core baseline is made up of the surface transport schemes that are already agreed and funded. The extended baseline includes surface transport schemes that are not finally agreed and funded but provide an indication of the type of investment needed to accommodate background growth whether or not the airport is expanded. In terms of schemes with relevance for Gatwick this would include, for instance, proposed capacity enhancements to the Brighton Main Line and the M23 motorway improvements between junctions 8 and 10. These two baselines are common across the three shortlisted schemes, and are set out in detail in the appendices to *Surface Access: Process Overview*.

3.9 In addition to these baselines the Gatwick scheme will need additional surface transport investments. These are noted below, and focus on improving local and strategic roads which should improve journey times both for airport and local users.

Category	Location	Requirement
Local road enhancement	M23 J9	Slip road widening
		Grade-separated flyover for southbound slip
	M23 J9 to J9a road widening	Widening of existing sections to four and five lanes as appropriate
	Airport Way	Widening of existing section to four lanes in each direction
	A23 re-alignment	Provision of new section of A23
		Grade-separated section of A23 re-alignment
	Long-term parking	New high capacity roundabout and approaches
	Industrial zone	New roundabout and approaches
	North Terminal access	New high capacity roundabout and approaches
		A23 to Airport Way grade-separated flyover
	New Terminal access	Provision of new section connecting M23 to new terminal
		Grade-separated section of new access to new terminal
	South Terminal access	New high capacity roundabout and approaches
	Longbridge Roundabout	Capacity enhancements
Gatwick Road	New roundabout and approaches	
Balcombe Road	Re-provision of existing road (standard 7.5m width one lane in either direction)	

3.10 As well as the scheme specific road developments, the Gatwick surface access strategy draws heavily upon planned upgrades to the Brighton Main Line. Over the next few years, capacity enhancements will unlock new capacity on the line, service pattern changes will improve journey frequencies, particularly between Gatwick and London Bridge, and rolling stock changes will provide carriages better suited to the needs of airport users. The Gatwick Express service will continue to run from London Victoria, but the overall effect of the changes will be to shift the emphasis of

Gatwick's rail access from central London more towards London Bridge, Blackfriars and St. Pancras. A planned upgrade of the station will significantly enhance its capacity and improve the passenger experience. The new Thameslink Southern and Great Northern franchise also increases the number of locations to the north of London with direct access to Gatwick.

How the proposal has changed since initial May Submission

Key Change	Why the change has occurred
Phasing	<p>Gatwick Airport Ltd's submission included a proposal to build a new remote pier (to function as a departure lounge) in the midfield area alongside the opening of the new runway in 2025, which would increase airport capacity to 63mppa. The existing terminals would still be used for passenger processing.</p> <p>The Commission's analysis indicated a risk that current terminals may need to operate above capacity to accommodate the increase in footfall during this period. The scheme as assessed therefore takes a more conservative approach and brings forward the building of the first phase of the new midfield terminal once passenger numbers exceed 45mppa.</p>

Assessment against Airports Commission appraisal categories

Strategic Fit

Appraisal Modules: Strategic Fit

- 3.11** A second runway at Gatwick would provide sufficient capacity for the airport to accommodate up to 560,000 ATMs. This constitutes roughly a doubling of existing capacity at Gatwick and is sufficient to meet the Commission's *assessment of need* for new capacity by 2030.
- 3.12** The Commission's forecasts indicate that the proposed second runway at Gatwick would see 60-96mppa, across all five of the Commission's scenarios. These passenger numbers would make an expanded Gatwick in 2050 broadly equivalent in terms of passenger numbers to Frankfurt or Paris CDG airports for the lower-end forecasts and as large as any current airport for the upper-end forecasts.
- 3.13** Gatwick currently has a mainly point-to-point business model, including a significant low-cost presence, and these are the sectors in which the highest levels of growth have been seen over recent years. Expansion at Gatwick would support continuing

growth in these sectors at the airport. In the *low-cost is king* scenario, which sees a significant shift into the long-haul market from low-cost carriers, Gatwick becomes a predominantly long-haul airport by 2040 (or slightly later in the carbon-capped forecast), in terms of both passenger numbers and destinations. In other scenarios, Gatwick remains mainly focused on the short-haul market, although some growth in long-haul is generally seen.

- 3.14** The Commission's carbon-traded forecasts indicate that expansion at Gatwick would deliver significant increases at national level in 2050 in long-haul (3-16 million seats) and short-haul capacity (9-51 million seats) compared to a situation in which no new runways are built. In the *low-cost is king* scenario, and to a lesser extent *global growth*, this would include substantial growth in capacity to emerging markets, but this would be much lower in other scenarios. The picture is more nuanced in the carbon-capped scenarios, with growth focused in different sectors in each scenario – for example, the *low-cost is king* scenario sees higher growth in domestic and long-haul routes, but a reduction in European seat capacity compared to the baseline forecast, whereas *relative decline of Europe* sees significant growth in short-haul capacity but no real change in long-haul.
- 3.15** Expansion at Gatwick would create the opportunity for growth in domestic services. The Commission's forecasts indicate higher numbers of domestic passengers at the airport by 2050 across all scenarios, with particularly significant increases in both the carbon-capped and traded *low-cost is king* forecasts. The forecasts suggest this would be more likely to result in increased frequencies than significant numbers of new routes. Nonetheless, given Gatwick's strong domestic route network and the increased international connectivity enabled by expansion, this could provide valuable improvements in connectivity for travellers from outside London and the South East.
- 3.16** While all of the carbon-capped scenarios keep carbon emissions from aviation within the range 37.4-37.6 MtCO₂e in 2050, i.e. consistent with the Climate Change Committee's (CCC) advice, all the carbon-traded expansion scenarios entail increases in carbon emissions from aviation above 37.5 MtCO₂e. The highest levels of emissions are associated with the *low-cost is king* and *global growth* scenarios, which would see UK aviation emissions in 2050 of 49-51 MtCO₂e. If these emissions were not accounted for as part of a liberal global carbon market (as envisaged in this forecasting approach) and needed to be accommodated within any UK specific target this would see aviation emissions account for a larger share of the total and require commensurate reductions elsewhere in the economy, a situation in which the CCC advises it currently has 'limited confidence'.

- 3.17** The differences between forecasts indicate the potential implications of developments in the aviation sector for an expanded Gatwick. For example, significant long-haul growth at the airport may depend upon an expansion in low-cost long-haul services, new partnerships between low-cost and network carriers or – perhaps least likely – a relocation from Heathrow of a major airline alliance.
- 3.18** Expansion at Gatwick would enhance competition in the London airport system. Increased long-haul traffic at Gatwick could lead to a less dominant hub airport, and further growth in the low-cost sector could put downward pressure on fares and provide more choice for passengers, although higher per passenger airport charges may present risks to the achievement of these benefits.
- 3.19** In respect of passenger experience, an expanded Gatwick would benefit from effective surface access links, with a range of rail services catering to business and leisure travellers and enhanced connectivity via improvements to the Thameslink route. This would provide links to a number of key London termini, and to Crossrail at Farringdon, as well as direct to Bedford, Cambridge and Peterborough. Gatwick would be accessible by road from the M23 and M25, but its southerly location would see relatively long journey times by road access from areas north of London. The expanded airport would offer a reasonable level of terminal capacity for passengers, broadly in line with the existing facilities, and with some scope for improvement, but passengers may experience some reduction in the quality of their airport experience prior to new facilities being brought fully on-stream.
- 3.20** Gatwick currently hosts a moderately sized air freight operation, handling 98,000 metric tonnes of freight during 2013. Expansion at Gatwick may produce benefits for air freight, though this would be dependent to some extent on changes to established operations within that sector, particularly given the limited carriage of freight in the low-cost sector. Any significant growth in the cargo sector at Gatwick would require significant investment by third parties in the provision of freight handling and forwarding facilities.
- 3.21** Expansion at Gatwick has the potential to align well with local and regional development strategies, providing potential increased employment in the immediate vicinity and supporting economic development in the Wandle Valley corridor identified in the London Plan. By expanding Gatwick the London airports system would gain added resilience and would be well-placed to accommodate growth from expanding low-cost and point-to-point carriers. The catchment area for the thickest long-haul routes could expand as Gatwick develops its presence in these markets. Its growth could help foster development of the Gatwick Diamond, with greater international connectivity helping local businesses reach growth markets

more quickly and more affordably. The impacts on the surrounding area of expansion (noise, environmental and potential housing growth) would need to be considered carefully in line with local concerns.

Economy

Appraisal Modules: Economy, Local Economy

- 3.22** Differences in the scale and pattern of demand growth across the Commission's scenarios leads to a wide range in potential economic benefits. Under a carbon-traded scenario transport economic efficiency benefits would range from £44.1 billion under the *low-cost is king* scenario at the high end, to £3.7 billion under the *global fragmentation* scenario at the low end. In addition, passengers would benefit from reduced delays to the extent of £0.73 billion to £1.78 billion, depending on the demand scenario under consideration.
- 3.23** In addition, the Commission has made a macroeconomic assessment of the GDP benefits which might accrue from expanding Gatwick airport. This assessment, which is based on modelling the operation of the economy as a whole, has been specifically developed to support the Commission process and estimates that there could be wider benefits within the economy ranging from £42-127 billion depending on the scenario. These results should be interpreted with caution, given the innovative methodology used, but they provide an indication of the scope for wider benefits to be felt throughout the economy, for example from enhanced productivity, trade or consumer spending, as a result of expansion.
- 3.24** At local and regional level, growing passenger numbers at an expanded Gatwick airport would support employment growth in the local area and region. The number of jobs associated with the airport, including direct, indirect and induced employment, is forecast to be 500-23,600 higher in 2030 compared to the 'do minimum' rising to 7,900-32,600 higher in 2050. These projections assume Gatwick's business model remains focused on the low-cost market, prioritising high levels of efficiency and a comparatively low ratio of employees to passengers. An alternative approach to assessing the number of jobs created comes from the S-CGE model, with an estimated 49,000 jobs created under the *assessment of need* scenario by 2050, rising to 90,000 by 2060. This figure is larger than the Commission's estimates above as it also includes the catalytic impacts of the scheme.
- 3.25** The delivery of these employment benefits would require housing and associated services to be in place to accommodate higher numbers of workers and sufficient development land to support business growth. These factors, however, are not

considered to present insuperable challenges, although they would need to be carefully managed. At the lower end, the requirement for additional housing is estimated to be negligible, and even the upper end housing estimates (18,400 homes across 14 Local Authorities) are assessed to be deliverable over the period to 2030, with land availability unlikely to be affected by Green Belt issues.

Surface Access

Appraisal Modules: Surface Access

- 3.26** On the basis that both planned capacity increases and further (uncommitted) investment to accommodate background demand growth in the 2020s are delivered on the Brighton Main Line, sufficient rail capacity is expected to be available to accommodate passengers from an expanded Gatwick airport. High levels of crowding would be felt in peak hours on some services, particularly into and out of London Bridge, although this would largely be driven by background demand growth. By the 2040s, continuing growth in background demand would be likely to require further investment increasing capacity on the London to Brighton corridor.
- 3.27** Airport passengers would benefit from a range of rail options, including direct Gatwick Express services to London Victoria, southbound services to Brighton and other south coast destinations and through services via London Bridge, Farringdon (providing an interchange with Crossrail) and London St Pancras International to Bedford (via the Midland Main Line) and Cambridge (via the East Coast Main Line). This would contribute to an increase of roughly 15% in the size of population within three hours' public transport travel time of the airport, and a total of eight million people within one hour travel time on public transport.
- 3.28** Planned and anticipated (though uncommitted) investment on the M23 and M25 is also forecast to provide sufficient capacity to accommodate growth in road traffic from the expanded airport. A range of investments in the local road network would be needed to enable the delivery of the second runway and associated infrastructure.
- 3.29** Improvements in rail capacity and connectivity are predicted to support an increase in public transport usage by airport passengers from 44% in 2012 to 54% in 2030, with rail mode share rising from 36% to 43%. There would also be an increase in the proportion of employees travelling to the airport by public transport; this is forecast to rise from 25% in 2012 to 40% in 2030.
- 3.30** Resilience risks in respect of surface access to Gatwick Airport are mitigated by the four-track configuration of the Brighton Main Line and, north of East Croydon,

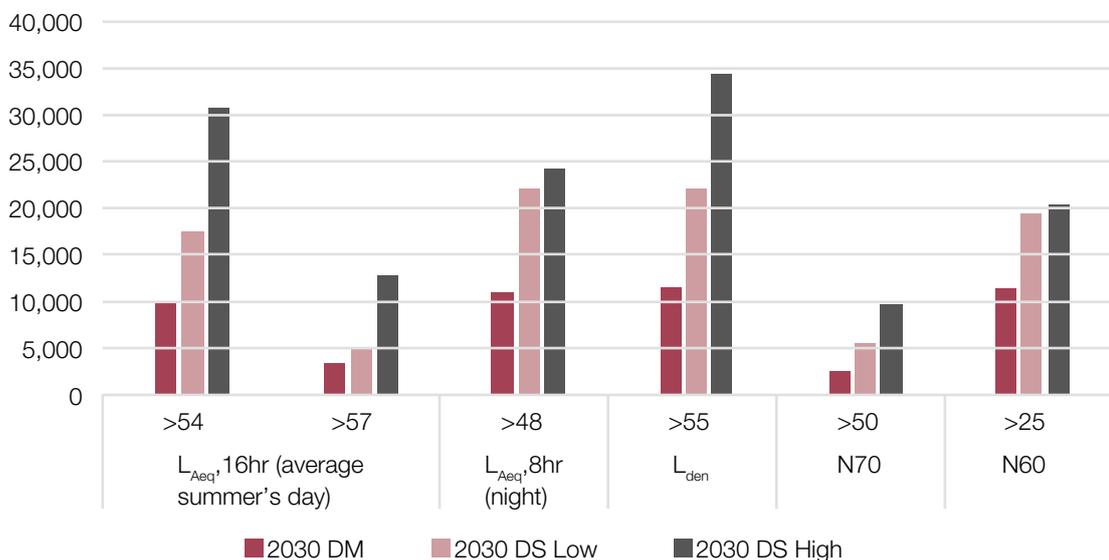
the existence of separate branches to two London terminals. This provides a good degree of resilience against service disruptions and station closures. However, south of East Croydon, disruptive incidents (for example power supply failures, signalling failures and suicides) can lead to a total suspension of services between London and the airport. In the last three years an all lines closure on the line occurred 22 times (an average of seven or eight times a year). Network Rail typically aims to alleviate such closures within 90 minutes.

Environment

Appraisal Modules: Noise, Air Quality, Biodiversity, Carbon, Water and Flood Risk, Place

3.31 In respect of noise, the Commission’s analysis indicates that the Gatwick Second Runway scheme would lead to a significant growth in the number of people affected by aviation noise, in comparison to the ‘do minimum’ baseline in future years. This is true of both high end and low end traffic forecasts, as shown in relation to 2030 in Figure 3.1.

Figure 3.1: Gatwick Second Runway, 2030 do minimum versus 2030 do something low end (assessment of need, carbon-capped) and high end (low-cost is king, carbon-traded) forecasts



3.32 The rise in numbers of people affected is apparent in relation to all metrics, including night noise and frequency metrics measuring incidences of noisy overflight.

3.33 When compared to current noise levels, the numbers of people affected by noise impacts around Gatwick is seen to grow across all metrics in the period to 2050, with some metrics indicating a doubling or trebling of affected populations. This is true of both high end and low end scenarios, as shown by figures 3.2 and 3.3.

Figure 3.2: Gatwick Second Runway, current day scenario versus do something in 2030, 2040 and 2050, low end forecasts (assessment of need, carbon-capped)

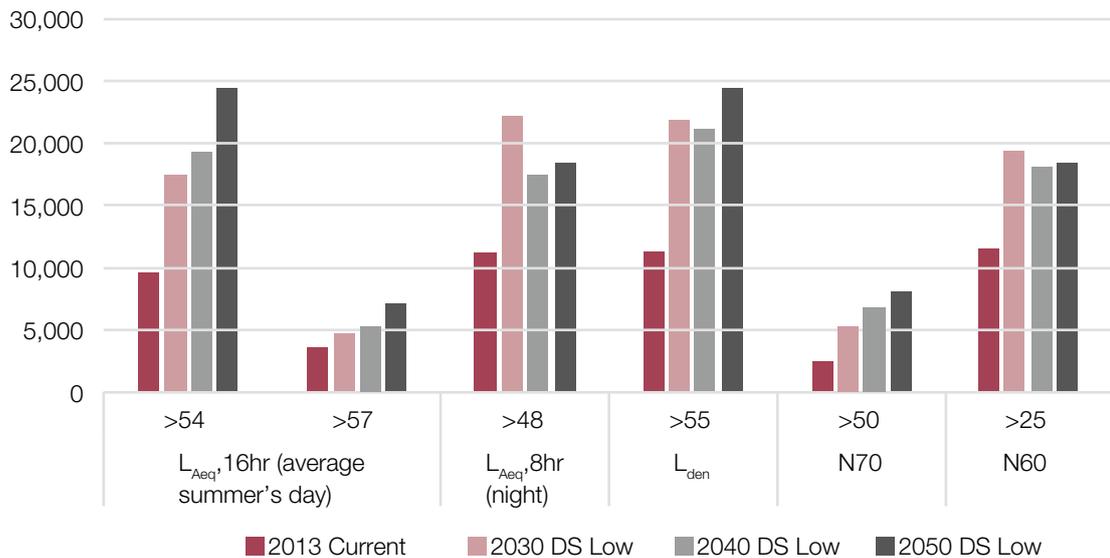
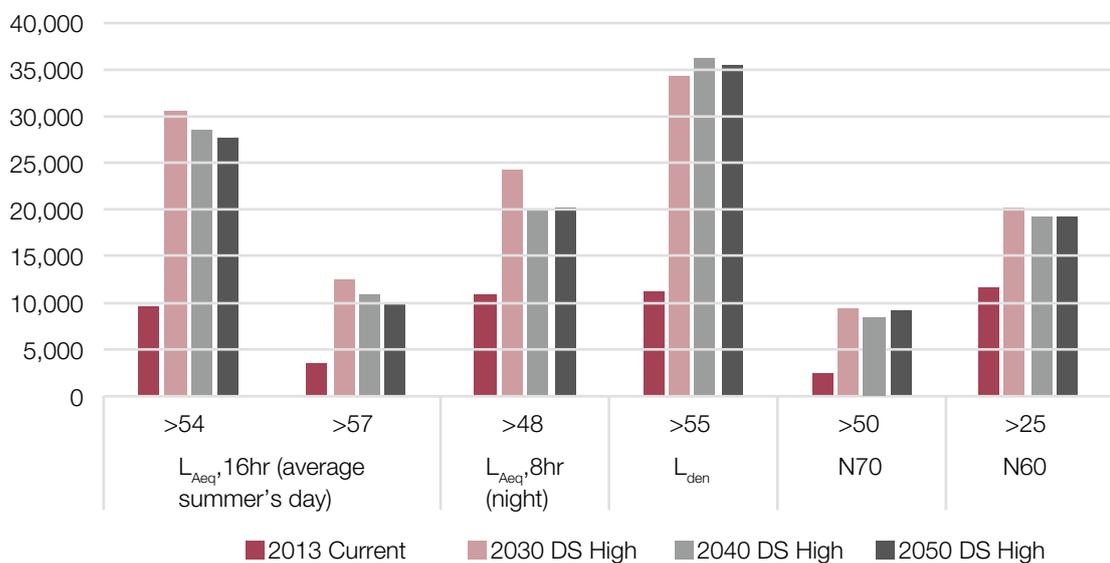


Figure 3.3: Gatwick Second Runway, current day scenario versus do something in 2030, 2040 and 2050, high end forecasts (low-cost is king, carbon-traded)



3.34 Nonetheless, the numbers of people affected in even the upper-end scenario are significantly below the total numbers at Heathrow, where currently some 760,000 people fall within the 55 do minimum L_{den} contour. Conversely, however, there are areas around Gatwick that are rural and have high levels of tranquillity that would be adversely impacted by new development at the airport.

3.35 Expansion would have a negative impact on a range of other local environmental factors, including air quality, landscape, heritage, biodiversity and water. In general while good detailed design and operational delivery by the airport operator could significantly reduce the impact of the scheme, the impacts in some cases will never be entirely mitigated. However, the mitigated impacts are not predicted to exceed domestic or international regulations, except in the case of air quality where further work is required to fully quantify the limited risks.

People

Appraisal Modules: Quality of Life, Community

3.36 The expanded airport would require land take in the Langley Green, Pound Hill North and Northgate wards of Crawley, plus the Rusper and Colgate ward within the district of Horsham. Although it does not intrude into the existing urban boundary of Crawley, a total of 168 residential properties lie within the airport land take and are likely to need to be demolished. Many of these are in the airport's safeguarded development zone. Additional properties could also be lost depending on the detailed route and construction design of surface access.

3.37 Gatwick Airport Ltd proposes financial compensation for housing loss, with house values in the safeguarded area protected by a 2005 agreement, though at the moment there is limited information available on the secondary impacts of development, for instance where displaced households will be relocated. Similarly Gatwick Airport Ltd proposes financial compensation for community facilities, such as places of worship and the Crawley Rugby club, as well as re-linking public rights of way and cycle paths.

3.38 For those within 5km of the airport the Commission's quality of life analysis so far suggests that the 'bundled' impact is likely to be broadly neutral, with the positive impacts of the airport (such as transport connections and jobs) and the negative impacts (such as noise and congestion) balancing each other out in quality of life surveys. However, it is important to note that within this bundled impact different communities and individuals would be affected in differing ways. Expansion at Gatwick is likely to result in improvements in quality of life at national level, due to the improved connectivity and its attendant economic and social benefits.

Cost and Delivery

Appraisal Module: Cost and Commercial Viability, Delivery

- 3.39** The construction of a second runway at Gatwick, together with a third terminal and all associated infrastructure, is estimated to cost up to £9.3 billion. This is higher than Gatwick Airport Ltd's estimate of £7.4 billion, reflecting in large part differing views of optimism bias and differing construction profiles. These costs are, however, significantly lower than those of either of the Heathrow expansion schemes, both in quantum and in terms of cost per additional ATM of capacity.
- 3.40** The Gatwick Airport Second Runway scheme has been designed in such a way that the supporting infrastructure can be constructed in phases in line with increases in passenger demand. This spreads the cost over a longer period and allows for flexibility to manage differing levels of demand. In the Commission's lower end scenarios, the final phase of construction may not be required to accommodate passenger demand before 2050. This would reduce the cost over this period by just under £2 billion.
- 3.41** Investment of this scale would entail increases in the airport's charges to airlines. Gatwick Airport Ltd has estimated, for example, that per passenger charges would rise from £9 currently to £12-15 as a result of expansion. This is lower than the charges predicted by the Commission's analysis, which indicate average charges rising to between £15 and £18, with peak charges of up to £23. As can be seen, the Commission's estimates show significant potential variation reflecting the variation in passenger demand across its scenarios. In the upper end demand scenarios, charges would be close to Gatwick Airport Ltd's own estimates, although still slightly higher, reflecting higher costs and a more conservative view of how the infrastructure delivery might be phased. Conversely, the higher end of the Commission's predicted range of charges reflects lower estimated levels of demand leading to peak charges above £20 (roughly the current level of charges at Heathrow).
- 3.42** The Commission's assessment of potential financing approaches across a range of scenarios and sensitivities suggests that Gatwick Airport Ltd may have to raise additional equity of up to c. £3.7 billion and additional debt of up to c. £14.3 billion. This level of finance is not unprecedented for infrastructure projects and airports. It is, however, significantly larger than the company's financing to date and may be challenging in a context where there is uncertainty around passenger demand forecasts and where the airport may need to raise its aero charges from £9 per passenger to up to c. £15-18 or more within a competitive environment.

- 3.43** There are a number of options that may mitigate this risk including: different approaches to phasing delivery (as in Gatwick Airport Ltd's proposal); smoothing the recovery of infrastructure costs over longer periods through a level of pre-funding; or even some level of public sector involvement, for example through commitments to deliver necessary surface access improvements or the provision of other Government measures to provide a degree of assurance to lenders and investors.
- 3.44** In addition to the costs described above, the surface access interventions required to support expansion at Gatwick Airport are estimated to cost £787 million.
- 3.45** The delivery risks associated with the Gatwick scheme are assessed as relatively low, and the Commission considers an opening date in 2025 achievable. There are some risks associated with this, for example around airspace redesign, as there would be with any infrastructure scheme of this scale, and the effectiveness of mitigation and compensation schemes will be important, but there remains a very high probability of meeting the Commission's assessment that new capacity is needed by 2030. The potential phasing of expansion at Gatwick reduces further the risk, as the full scheme would not need to be in place for initial capacity benefits to be delivered. Effective mitigation and compensation mechanisms would be required to manage environmental and community impacts. Local opinion appears to be mixed with opposition from local community organisations and some local authorities, but support from others, subject to the provision of adequate environmental mitigation, and from regional business organisations.

Operational Viability

Appraisal Modules: Operational Viability, Operational Risk

- 3.46** The proposals for expansion at Gatwick are not considered to present any significant safety or security risks and are considered adequate to deliver an increase in ATM capacity from 280,000 currently to 560,000. The design of the expanded airport provides flexibility to accommodate a range of different industry operating models and sizes of aircraft, although its ability to accommodate significantly high numbers of the largest, 'Code F', aircraft (e.g. the A380) would be more limited.
- 3.47** The airport masterplan includes a third, midfield terminal which would enable the airport to handle around 95mppa, with a broadly comparable standard of passenger experience to the airport in the present day. The minimum connection time between terminals is estimated at around 60 minutes.

- 3.48** The airport has designed its expansion plans to be delivered in phases, with the initial phase including only the new runway, together with additional pier capacity linked to the existing terminals by bus, and the construction of the new terminal beginning at a later point. The Commission's analysis suggests that, during the initial phase, this may lead to higher levels of crowding. To mitigate this risk, the construction of the first phase of the new terminal could be brought forward to take place alongside or shortly after construction of the new runway. Conversely, the airport's plans assume that it could be managed through more efficient security and immigration procedures and broader changes in passenger handling.
- 3.49** On the basis of the available evidence, the Commission does not believe that expansion at Gatwick would lead to any reduction in capacity at commercial airports in London and the South East, or any worsening of current levels of whole-system resilience, provided the ongoing Future Airspace Strategy and London Airspace Management Programme are delivered successfully.
- 3.50** The proposed expansion appears, on balance, unlikely to worsen the airport's resilience to disruptive events. The addition of a second runway grants Gatwick a degree of additional resilience to some events which might require the closure of a single runway (such as fire), assuming adequate operational procedures are in place. A significant growth in traffic at the airport, however, would mean that major disruptive events requiring the suspension of operations at the entire airport would result in higher levels of increased pressure on the London Terminal Management Area. On the basis of the available evidence, the Commission believes that such pressures would be manageable, and an additional runway at Gatwick would increase resilience to disruptive events requiring the temporary closure of other airports.

Appraisal results compared to scheme promoter's analysis

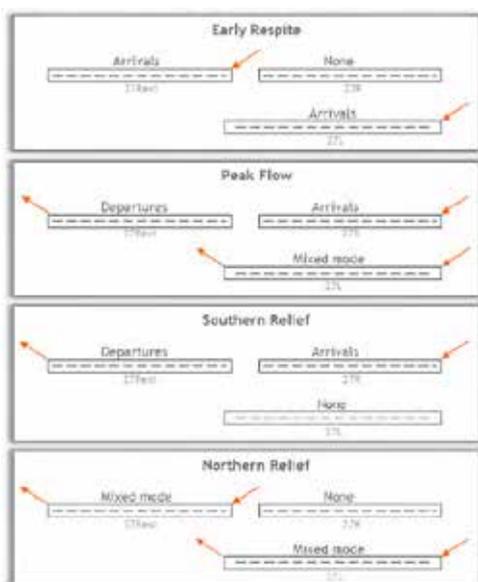
- 3.51** Throughout the appraisal documents the Commission highlights areas where its analysis differs from the scheme promoter's analysis. In some cases Gatwick Airport Ltd has proposed potential mitigation that at a high level appear well judged and reasonable but have not been (and at this stage would be very hard to be) quantified. Gatwick Airport Ltd has been optimistic that these mitigations would completely, or very fully, mitigate a number of risks or negative impacts, whereas the Commission has currently taken a more conservative approach.

3.52 Several key areas of difference are:

- **Forecasts:** Gatwick has developed its forecasts using a different model from the Airports Commission. Gatwick's forecasts show higher passenger numbers at Gatwick than in the Commission's models in most scenarios, and this number of passengers has an impact across many of the appraisal modules.
- **Costs:** Gatwick Airport Ltd's analysis estimates that the full airport masterplan is deliverable for less money than is set out in the Commission's analysis. This is discussed in the Commission's Commercial and Financial Case but is in large part a result of differing opinions on the application of risk and optimism bias.
- **Aero charges:** Gatwick Airport Ltd has suggested a lower aero charge is achievable than the Commission's assessment indicates. There are many reasons for this difference, which are summarised in *Cost and Commercial Viability: Funding and Financing*.
- **Phasing:** Gatwick Airport Ltd's approach involves phasing the delivery of the scheme, with the runway being delivered first and the terminal and associated infrastructure being delivered as demand requires. The Commission considers the remote pier facility built as part of the intermediate phase of this plan may produce a worse passenger experience than is currently the norm at Gatwick. Gatwick believe that passenger experience can be maintained in the remote facility.

3.54 The extended length runway allows it to be used for departures and arrivals at the same time to increase capacity, or at less busy times of the day to facilitate alternate ‘deep’ or ‘shallow’ landing on the westerly or easterly section of the runway to provide a degree of noise respite for communities.

Figure 3.4: Different operating models of the Heathrow Extended Northern Runway scheme



3.55 The runway extension is supported by a new terminal building to the west of the existing central terminal area (terminals 1-3). There will also be space for hotels and car parking, as well as some development for ancillary services to the south of the airport, all on the north side of the perimeter road.

3.56 The airport site will grow to accommodate the new runway and ancillary services, with a total land take of 724ha. Some housing and commercial properties will need to be demolished, the majority being to the west of the current northern runway and centred on the Poyle industrial estate. However, there will be some other housing and commercial development lost to the north and south, partly to facilitate the required changes to road junctions. A total of 242 residential properties lie within the airport land take and are likely to need to be demolished. Further housing loss could be required as a result of surface access works, depending on detailed route construction design and potential mitigation options. Additional land take for surface access improvements (approximately 330ha) and flood storage area (approximately 60ha) is likely to be required. Approximately 238ha of proposed land take would lie within designated Green Belt.

Description of surface access

- 3.57** Alongside the airfield proposition described above, Heathrow Hub Ltd put forward proposals for a surface transport strategy centred on a new hub station on the Great Western Main Line, connected to the airfield site via an automated people mover.
- 3.58** The Commission recognises this proposal as deserving further exploration. However, to enable a consistent comparison of the Heathrow Airport Extended Northern Runway airfield option with the Heathrow Airport North West Runway airfield option proposed by Heathrow Airport Limited, the Commission has taken the decision to treat the core assessment case for the Extended Northern Runway as containing an ‘on site’ surface access strategy, while treating the hub station as a separate concept which could be applied to either Heathrow runway option. As such the assessments throughout these consultation documents are based on the use of an on-site surface access solution for both Heathrow options. The analysis of the hub station proposal is set out in *Surface Access: Heathrow Airport Hub Station Option*.
- 3.59** The surface access scheme for Heathrow Extended Northern Runway can be split into three sections: the core baseline, the extended baseline and the scheme specific developments. The core baseline is made up of the surface transport schemes that are already agreed and funded. The extended baseline includes surface transport schemes that are not finally agreed and funded but provide an indication of the type of investment needed to accommodate background growth whether or not the airport is expanded. For this scheme this would include, for instance, the Crossrail and the Thameslink Programme. These two baselines are common across the three shortlisted schemes, and are set out in detail in the appendices to *Surface Access: Process Overview*.
- 3.60** In addition to these baselines the scheme will need additional surface transport investments. These are noted below and focus on improving local and strategic roads which should improve journey times both for airport and local users.

Unit Type	Section	Requirement
Strategic Road	M4 J3 to J4	Road Widening
	M4 Airport Spur	Road Widening
	M4 J2 to J3	Road Widening
	M4 J4 and J4B	Road Widening
	M4	Large M4 J4b replacement
	M4	Higher Capacity @ M4 J4a
	M4	Capacity improvements to existing main airport tunnel
	M25	M25 tunnelling costs (south of junction 15)
Local Road Network	M25 J13 (A13) D2	Grade separated junction and flyover/bridge structures
	Tunnel From A4 to T5	
	A4 Access	Tunnel running parallel to M25 – expected to have light traffic
	New roundabouts on access roads	Southern Road Tunnel/Southern Perimeter Road Interchange
	Airport Roads	New link from junction 13
	Heathrow Road Tunnel	Providing new spur access
	Airport One Way	Single lane widening
Rail	Southern Rail Access to Staines	

How the proposal has changed since initial May submission

Key Change	Why the change has occurred
Taxiways and runway links	Extra taxiways have been added to the scheme to the north and south of the new terminal area, supported by some other small amendments to runway links and apron layout. This was done to allow planes to exit runways faster (which improves the capacity of the airport), allow planes to move about the airport more freely (making the airport simpler to operate) and to provide resilience to deal with any unforeseen circumstances. ¹²
Parking	Because the Heathrow Hub proposal originally had car parking at the hub station (which is now being considered separately) car parking has had to be added to the airport site.
Operational Space	Originally the scheme had a slightly smaller land take. Small parcels of additional land were added to the south of the airport (to the north of the current perimeter road) to make space for ancillary services. Predominantly, this reflects the area of land required for aircraft maintenance, cargo handling and fuel storage.

Assessment against Airports Commission appraisal categories

Strategic Fit

Appraisal Modules: Strategic Fit

- 3.61** The Heathrow Airport Extended Northern Runway proposal would expand the airport's maximum air traffic movement capacity to 700,000, an increase of 220,000 on its present level, which is sufficient to meet the Commission's *assessment of need* for new capacity by 2030.
- 3.62** The Commission's forecasts indicate that the proposed extended northern runway would enable passenger numbers at the airport to reach 126-142 million by 2050, across all five of the Commission's scenarios. This is larger than any current airport and compares to plans for Istanbul's new airport, which is being designed to accommodate up to 150 million passengers.
- 3.63** Heathrow is by far the largest of the London airports in terms of passenger movements, serving the UK as its primary long-haul gateway – 84% of London's long-haul market is at Heathrow. The airport currently caters almost exclusively

¹³ The detail of these are set out in *Operational Efficiency: Ground-Infrastructure Heathrow Airport Extended Northern Runway*.

for legacy carriers, both network and point-to-point, with over 50% of flights at Heathrow being operated by IAG and its alliance partners. The Commission's forecasts suggest that this would be likely to continue, with long-haul passengers remaining the majority at the airport, although with some rebalancing towards short-haul as expansion provides capacity for more of these routes to be established. Expansion would also enable the airport to maintain relatively high numbers of international transfer passengers, supporting the airport's hub operation, compared to the reductions seen in the baseline as capacity constraints bite. The key exception to these patterns is the *relative decline of Europe* scenario, in which by 2050 the number of transfer passengers is smaller, though still higher than the baseline. As its role as a hub shrinks, more capacity is made available for short-haul growth, such that short-haul passenger numbers are much closer to long-haul by this point.

3.64 At national level, the extension of the northern runway at Heathrow, under the Commission's carbon-traded forecasts, would facilitate growth in the capacity of the overall UK route network, with 5-17 million more long-haul and 12-26 million more short-haul seats across scenarios in 2050 compared to a situation in which no expansion takes place. This would include noticeable increases in capacity to emerging markets in 2050¹⁴ (4-8 million seats) in all scenarios except *global fragmentation* where London's declining role as a hub would see noticeably smaller growth in capacity (2 million seats) on these routes. The picture is more nuanced in the carbon-capped forecasts as lower demand growth overall due to the cap on emissions is seen across all scenarios. This leads to strong growth across all scenarios in capacity to established long-haul destinations in the developed world, offset by significant reductions in short-haul, and more limited change in capacity to emerging markets.

3.65 The differences between forecasts indicate different potential implications of developments in the aviation sector for an expanded Heathrow. For example, depending on how the aviation sector develops, growth at Heathrow may potentially be achieved through the expansion of the current hub carrier at Heathrow, by another alliance establishing a competing hub at Heathrow or by a low-cost carrier entering the airport to compete for point-to-point traffic and possibly to provide additional transfer opportunities for the passengers of some legacy airlines.

14 Destinations defined as 'newly industrialised countries' or 'less developed countries' in the DfT forecasting model.

- 3.66** Continuing pressure on capacity means that across the majority of scenarios, the number of domestic travellers at Heathrow stays broadly static or declines in the baseline. Expansion would create the opportunity to address this, with the Commission's forecasts indicating higher numbers of domestic passengers at the airport by 2050 across all scenarios with an extended northern runway in place, and more than double in some cases. Without any specific measures to incentivise new services, however, the forecasts suggest that only very limited changes in the number of domestic routes may be seen. Instead, increased frequencies would provide improved access for passengers from outside London and the South East to the airport's international route network and to the capital.
- 3.67** While all of the carbon-capped scenarios keep carbon emissions from aviation at 37.5 MtCO₂e in 2050, i.e. consistent with the Climate Change Committee's advice, all the carbon-traded expansion scenarios entail increases in carbon emissions from aviation above that level. The highest levels of emissions are associated with the *global growth* and *low-cost is king* scenarios, which would see UK aviation emissions in 2050 of 50-51 MtCO₂e. If these emissions were not accounted for as part of a liberal global carbon market (as envisaged in this forecasting approach) and needed to be accommodated within any UK specific target this would see aviation emissions account for a larger share of the total and require commensurate reductions elsewhere in the economy, a situation in which the CCC advises it currently has 'limited confidence'.
- 3.68** An expanded Heathrow's key strength is likely to be in its ability to provide a wide network of connections, both long-haul and short-haul. The scheme's connectivity benefits are likely to be largest if Heathrow's capacity is taken up by the hub carrier and its partners as that would allow for the most significant expansion of the airport's route network. This airline response is most likely in the *global growth* and *assessment of need* scenarios. On the other hand, the benefits of competition in the case of the dominant hub carrier expanding are likely to be limited. The benefits of competition would be larger if the hub carrier and its partners are exposed to competition, either from another hub carrier establishing a second hub at Heathrow or from a new, low-cost entrant. There would most likely be a trade-off between these larger benefits of competition and potential connectivity impacts, particularly in the long-haul market. Reduction in scarcity rents at Heathrow could potentially contribute to lower fares at the airport.
- 3.69** In respect of passenger experience, an expanded Heathrow would benefit from improved surface access links, with a range of new and improved rail services catering to business and leisure passengers with increased direct connections

via Western Rail Access to Heathrow, Crossrail, and Southern Rail Access and improved national connectivity from HS2. The expanded airport would continue to offer a high level of terminal capacity for passengers, broadly in line with the recently opened Terminals 5 and 2. Improvements to the rail network should reduce travel times from many locations, however the Piccadilly line is likely to be capacity constrained during peak hours.

3.70 Heathrow currently plays a vital role in the UK's air freight market, handling 1.42 million metric tonnes of freight during 2013. Expansion at Heathrow is likely to be highly beneficial to the air freight sector. With many freight handling and forwarding companies already having a presence on or near the Heathrow site, the industry would be well placed to respond quickly to a growth in capacity. The availability of more slot capacity provides both the potential for enhanced freight capacity on existing routes, as well as the creation of new routes, which would open opportunities for the cargo sector as well as passengers.

3.71 Expansion at Heathrow has the potential to align well with local and regional development strategies, providing significantly increased employment and housing in the surrounding boroughs and supporting economic development in the Heathrow Opportunity Area and Western Wedge and along an east-west axis in the Capital, identified in the London Plan as an 'engine for growth'. By expanding Heathrow, and in particular its hub capacity, the UK could gain improved connectivity to growth markets, which would be particularly important for maintaining London's status as a global city. Expansion would further benefit the business clusters along the M4 corridor and beyond through the improved connectivity it would provide. The impacts on the surrounding area of expansion (including noise, environmental and housing growth) would need to be considered carefully in line with local concerns. The airport's negative environmental impacts have been cited as a reason to oppose expansion by a number of nearby local authorities and in the London Plan.

Economy

Appraisal Modules: Economy, Local Economy

3.72 Difference in the scale and pattern of demand growth across the Commission's scenarios leads to a wide range in potential economic benefits. Under a carbon-traded scenario, transport economic efficiency benefits would range from £36.7 billion under the *low-cost is king* scenario at the high end of the range to £9.4 billion under the *global fragmentation* scenario at the low end of the range.

In addition, passengers would benefit from reduced delays to the extent of £0.64 billion to £2.18 billion, depending on the demand scenario under consideration.

- 3.73** In addition, the Commission has made a macroeconomic assessment of the GDP benefits which might accrue from expanding Heathrow airport. This assessment, which is based on modelling the operation of the economy as a whole, has been specifically developed to support the Commission process and estimates that there could be wider benefits within the economy ranging from £101-214 billion depending on the scenario. These results should be interpreted with caution, given the innovative methodology used, but they provide an indication of the scope for wider benefits to be felt throughout the economy, for example from enhanced productivity, trade or consumer spending, as a result of expansion.
- 3.74** Growing passenger numbers via a Heathrow Extended Northern Runway scheme would support employment growth in the local area and region. The number of jobs associated with the airport, including direct, indirect and induced employment, is forecast to be 47,400-96,200 higher in 2030 compared to the ‘do minimum’ rising to 54,800-92,900 higher in 2050. These projections assume Heathrow’s business model continues to require relatively high numbers of staff per passenger to enable a complex hub transfer operation. An alternative approach to assessing the number of jobs created comes from the S-GCE model, with an estimated 164,200 jobs created under the *assessment of need* scenario by 2050. This figure is larger than the Commission’s estimates above, as it includes the catalytic impacts of the scheme.
- 3.75** The delivery of these employment benefits would require housing to be in place to accommodate higher numbers of workers and sufficient development land to support business growth. The upper end housing estimate (60,600 homes) may present challenges for local authorities, many of whom already struggle to meet housing targets, but this is mitigated by the timescales for delivery and the broad area (some 14 authorities) over which the requirement is spread. Overall, the Commission’s analysis is that the delivery of the necessary housing and associated infrastructure (which may have wider benefits to local communities) is likely to be achievable, but there are risks of localised constraints at the upper end, which may affect the overall benefits of expansion.

Surface Access

Appraisal Modules: Surface Access

- 3.76** The Heathrow Airport Extended Northern Runway ‘on-site’ surface access strategy would see a number of significant shifts to access to the airport, compared to how it operates today. Two major changes are due to occur regardless of any

decision on expansion: Crossrail and the HS2 connection from Old Oak Common. Crossrail will expand direct rail access to Heathrow to a range of destinations both within and outside London. The link from Old Oak Common will improve rail access to Heathrow from a significant area of the Midlands and North. A third major change, Western Rail Access, is also likely to happen regardless of any expansion decision. This will provide enhanced rail connections to the airport from a number of destinations from the West, such as Reading, and eliminate the need for many of these rail passengers to travel past the airport to make a connection at Paddington.

3.77 In addition to this, the surface access strategy includes a Southern Rail Access link, which opens up direct rail access to further destinations, including Waterloo. The overall impact of Heathrow's rail strategy is to render the airport accessible via direct connections to a significantly enlarged section of the population, while relieving a wider group of the need to change at a central London rail terminal. This should make using rail to access the airport a more attractive proposition for many people and promote significant modal shift towards rail.

3.78 In terms of rail passenger experience, the surface access strategy would enhance one of the airport's most noticeable benefits at present: the ability of passengers to make their own trade-off decisions between price and quality. Assuming that premium pricing is maintained on the Heathrow Express, the service will continue to offer the near guarantee of a seat, in addition to ample luggage space. The Piccadilly Line will continue to provide a slower and more crowded experience (particularly in the peaks) at a much lower cost. While Crossrail pricing for journeys to the airport is not yet known, it is likely to present a mid-point in terms of both price and quality. The proposed station under Terminals 5 and 6 will provide an effective interchange for passengers across the South of England, while passengers to the West Midlands and North will have the option of an interchange with HS2 at Old Oak Common.

3.79 In terms of road access, significant works are needed on the roads around the airport site to accommodate its expanded footprint, including putting the M25 into a tunnel. The management of congestion on the M25 and M4 will be a significant issue and infrastructure interventions (including widening), demand management or a combination of both may be required. The majority of these strategic road works would be needed even without any expansion, given baseline expectations about increases in demand, and the impact of airport development would generally be to bring forward marginally schemes which would be needed in any case. Some additional widening on the M4 may, however, be needed as a result of the airport's expansion, although it may be possible to avoid or reduce this through mitigation measures.

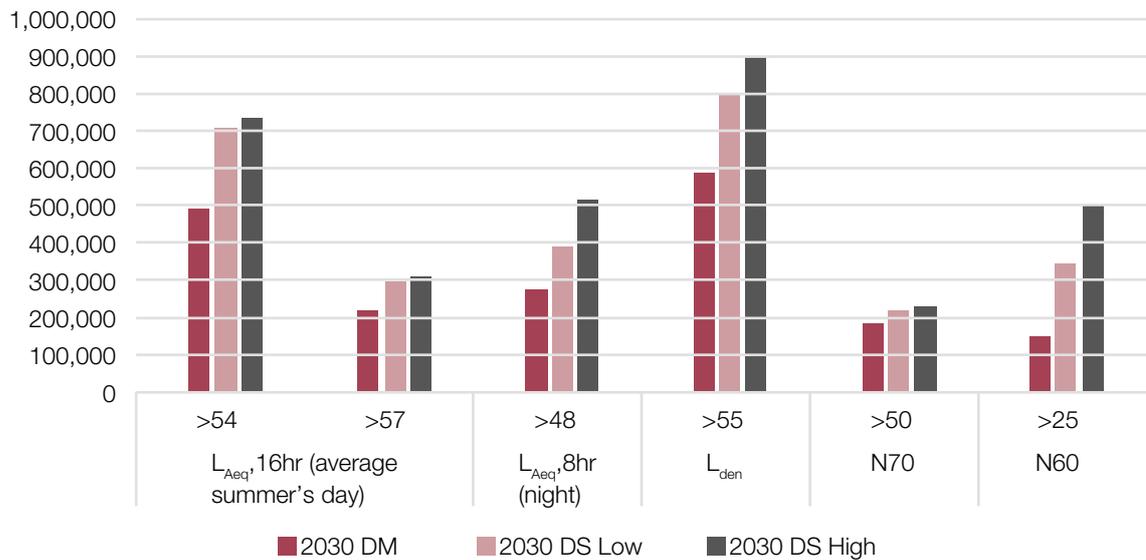
- 3.80** The alternative hub station surface access strategy proposed by Heathrow Hub Ltd is designed to meet a number of objectives, such as improved access times for passengers from the West and South West of England and Wales, the dispersion of traffic on the M25 and the potential to open up a wider number of direct destinations from Heathrow. Offset against this would be the costs of the station and an increase in journey times for non-airport passengers on the Great Western Mainline.
- 3.81** The proposition for passengers underlying the hub station is that of an integrated interchange allowing for connections to a large part of the country from what is, in essence, an extension of the airport site. The scheme's success would be dependent upon passengers being willing to accept the hub station as a part of the airport itself, particularly passengers from the North who would have already been required to make a connection at Old Oak Common or another London interchange. These issues are discussed in detail in the consultancy report on the hub scheme.

Environment

Appraisal Modules: Noise, Air Quality, Biodiversity, Carbon, Water and Flood Risk, Place

- 3.82** Heathrow is sited in an area of London that even without the impacts of the airport is congested and busy. Any development at Heathrow will be adding development to an area that is already under environmental stress.
- 3.83** In respect of noise, the Commission's analysis indicates that operating an extended northern runway at Heathrow would lead to a significant growth in the number of people affected by aviation noise, in comparison to the 'do minimum' baseline in future years. This is true of both high end and low end forecasts, as shown in relation to 2030 in Figure 3.4.

Figure 3.5: Heathrow Extended Northern Runway, 2030 do minimum versus 2030 do something low end (assessment of need, carbon-capped) and high end (global growth, carbon-traded) forecasts



3.84 The rise in numbers of people affected is apparent in relation to all metrics, including night noise and frequency metrics measuring incidences of noisy overflight, although this is less pronounced during day time operations (0700-2300 hours).

3.85 When compared to current noise levels, the numbers of people affected by noise impacts is seen to grow across all metrics in the period to 2050. This is true of both high end and low end scenarios, although in the high end forecasts the growth is more uniform, as shown in figures 3.6 and 3.7.

Figure 3.6: Heathrow Extended Northern Runway, current day scenario versus do something in 2030, 2040 and 2050, low end forecasts (assessment of need, carbon-capped)

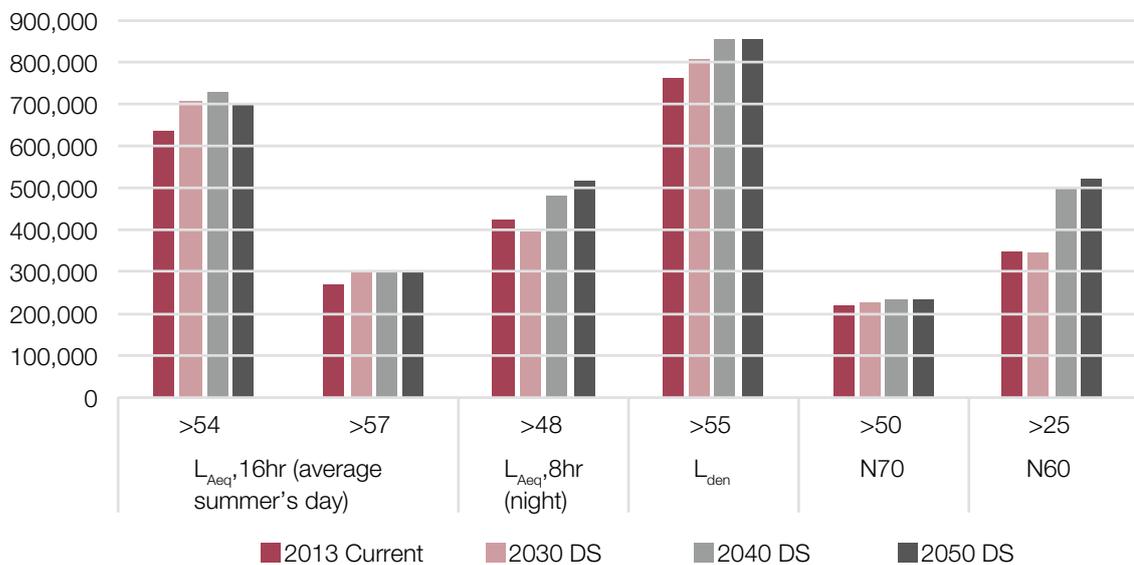
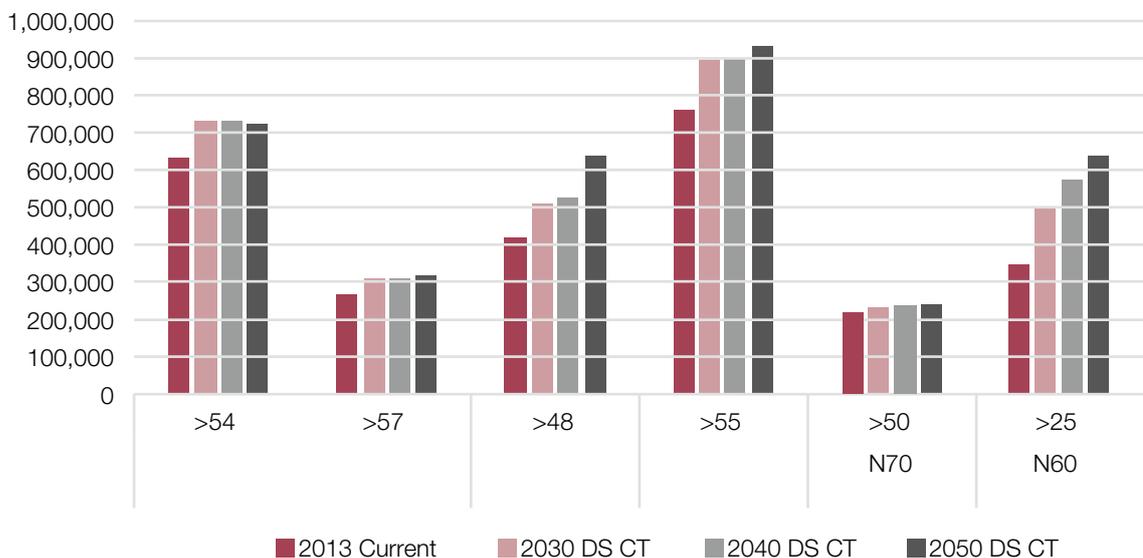


Figure 3.7: Heathrow Extended Northern Runway, current day scenario versus do something in 2030, 2040 and 2050, high end forecasts (global growth, carbon-traded)



3.86 The number of noise-affected people increases because of an increase in traffic into the extended northern runway, over highly populated areas of west London (and areas where population figures are due to increase). The indicative flight paths created for the Extended Northern Runway scheme are designed to limit the numbers of new residents affected by overflight in the event of expansion: for instance, people living to the north of the current flightpaths would continue to experience no (or very limited) overflight. It may be possible to apply different flight

paths to the Extended Northern Runway scheme which could achieve different noise impacts including, perhaps, a reduction in the total number of affected people.

- 3.87** Both local Air Quality Objectives and EU limit thresholds are at risk of exceedance at a small number of monitoring sites in the local area under this scheme. While in some cases these exceedances are also forecast to occur in the do minimum scenario, there is clearly a substantial negative impact of the scheme on air quality, unless forceful mitigation measures are implemented. As explained at paragraph 2.56-7 above, further work on this issue is ongoing.
- 3.88** Expansion would have a negative impact on a range of other local environmental factors, including landscape, heritage, biodiversity and water. In general while good detailed design and operational delivery by the airport operator could significantly reduce the impact of the scheme, the impacts in some cases will never be entirely mitigated. One area where these residual impacts could be problematic is flooding – even with excellent channel design and ongoing mitigation the Commission’s assessments predict that there could be residual risks of flooding downstream from the airport.

People

Appraisal Modules: Quality of Life, Community

- 3.89** The proposed scheme would largely impact the Colnbrook with Poyle ward situated to the west within the borough of Slough. Areas within the boroughs of Spelthorne and Windsor and Maidenhead would also be directly affected. A total of 242 residential properties, mostly in Poyle, lie within the airport land take and are likely to need to be demolished. Additional residential properties could also be lost depending on detailed route and construction design of surface areas. 74ha of industrial and business land would be lost.
- 3.90** Heathrow Hub Ltd has suggested several mitigations to the impact on the community, for instance possible relocation for Poyle residents and financial compensation for businesses. However, even with mitigations proposed there remains significant uncertainty for the residents of Poyle, and relocating a significant number of households will present challenges.
- 3.91** For those within 5km of the airport, the Commission’s quality of life analysis suggests that the ‘bundled impact’ is likely to be broadly neutral, with the positive impacts of the airport (such as transport connections and jobs) and the negative impacts (such as noise and congestion) balancing each other out in quality of life

surveys. However, it is important to note that within this bundled impact different communities and individuals would be affected in differing ways. Expansion at Heathrow is likely to result in improvements in quality of life at national level, due to the improved connectivity and its attendant economic and social benefits.

Cost and Delivery

Appraisal Module: Cost and Commercial Viability, Delivery

- 3.92** The scheme is estimated to cost c. £13.5 billion, including the runway extension, a new terminal and all other required airport facilities. This is higher than Heathrow Hub Ltd's estimate of c. £10.1 billion, reflecting in large part differing views of optimism bias and differing construction profiles. These costs are lower than for the Heathrow North West Runway scheme but still substantially higher than those of the Gatwick Second Runway scheme.
- 3.93** Investment on this scale would entail increases in the airport's charges to airlines. Current airport charges at Heathrow are already comparatively high (£20 per passenger), reflecting both the demand for slots and the high operating and ongoing development costs for the airport of delivering a high quality and complex hubbing product for their airline customers, in a relatively constrained site. These charges would increase if the airport were to be developed, the extent of which would be dependant in part on the demand scenario. Heathrow Hub Ltd estimate an increase in charges per passenger to £22. This is noticeably lower than the Commission's estimates which indicate charges could rise to between £27-28, an increase of around 40%, with peak charges of up to £30.
- 3.94** The Commission's assessment of potential financing approaches, consistent with Heathrow Hub Ltd's proposals, assumes that the scheme will be purchased, delivered and financed by Heathrow Airport Ltd. The Commission's analysis suggests that Heathrow Airport Ltd may have to raise additional equity of up to c. £5.1 billion and additional debt of up to c. £24.9 billion. This will put the airport at the highest end of the range of financing for infrastructure projects in the UK and could make Heathrow Airport Ltd of comparable scale to Network Rail (with a long-term debt of c. £35 billion) and larger than National Grid (c. £25 billion). Raising this level of financing would be challenging; and there are risks associated with an increase of passenger aero charges to £27-28, significantly higher than current charges across the UK and globally, in a context where Heathrow must compete with other airport operators.
- 3.95** There are a number of options that may mitigate this risk including: different approaches to phasing delivery (as in Heathrow Hub Ltd's proposal); smoothing the

recovery of infrastructure costs over longer periods through a level of pre-funding; or even some level of public sector involvement, for example through commitments to deliver necessary surface access improvements or the provision of other Government measures that provide a degree of assurance to lenders and investors.

3.96 In addition to the above costs, the surface access capital expenditure interventions required to support expansion at Heathrow Airport are estimated to cost £6.3 billion for the 'onsite' surface transport option, which excludes construction of a hub station. If the 'offsite' hub station were included in this assessment, and Western Rail Access therefore not taken forward, the net additional estimated cost would be between £2.1 billion and £4.1 billion. This is discussed in further detail in the hub station surface access report referenced above.

3.97 The delivery risks associated with an extended runway at Heathrow Airport are substantial, but could be managed. The airport operator would need to work closely with local communities for any expansion at the site to be achievable and the development of effective mechanisms to mitigate or compensate for environmental and community impacts would be crucial. This would be particularly important in respect of noise impacts of this scheme as these would be significant if left unmitigated.

3.98 Design, planning and construction risks associated with delivery include risks related to airspace redesign and the management of M25 works. These are not unusual for an infrastructure scheme of this scale and are considered manageable. The end-to-end runway configuration may require further exploration and testing to satisfy the requirements of UK and international safety regulators, but the Commission's view at this time is that this should be possible within the timescales required for planning and construction. Therefore, the Commission views 2026 as a realistic runway opening date, and the risks to achievement of the Commission's assessment that new capacity is needed by 2030 appear low. Many nearby local authorities strongly oppose expansion, as do a number of community organisations, although regional business groups are supportive.

Operational Viability

Appraisal Modules: Operational Viability, Operational Risk

3.99 The Heathrow Extended Northern Runway proposal is not considered to present any significant safety or security risks and is considered adequate to deliver an increase in ATM capacity to 700,000 per annum (from 480,000). The design of the expanded airport provides flexibility to accommodate a range of different industry operating models and sizes of aircraft.

- 3.100** The proposed T6, expanded T2 and their satellites would appear able to deliver a passenger experience (based on floor space per passenger) similar to that experienced at the airport today when at full capacity. The minimum connection time between terminals is estimated between 64 to 73 minutes.
- 3.101** An issue the Commission has considered carefully given the novelty of the proposed runway design relates to any concerns that may arise in relation to the safety of the scheme. On the basis of the available evidence, the Commission believes that the proposed runway option can be operated, and proven to be operable, in a safe manner. The Commission recognises that further work with the CAA and appropriate international bodies would be required to validate fully this finding. In the event that full safety assurance cannot be provided, it is likely that the two runways would not be capable of operating independently, resulting in a lower runway capacity. However, all expansion options under consideration will require some further work to fully assess their safety implications at the appropriate juncture in the detailed design process.
- 3.102** The operational risks associated with the scheme are limited given the scale of the development, and effective mitigation by the operator can limit them further. One key area where detailed planning would be needed is birdstrike, where the extension of the runway towards the Queen Mother reservoir in particular could bring aircraft into proximity with geese and gulls. The options for mitigation here could also negatively impact on biodiversity.
- 3.103** On the basis of the available evidence, the Commission does not believe that the operation of an extended northern runway at Heathrow would lead to any reduction in capacity at commercial airports in London and the South East, or any worsening of current levels of whole-system resilience, provided the ongoing Future Airspace Strategy and London Airspace Management Programme are delivered successfully.
- 3.104** The proposed expansion would, on balance, not worsen the airport's resilience to disruptive events. The addition of an extended northern runway grants Heathrow a degree of additional resilience to some events which might require the closure of a single runway (such as fire), assuming adequate operational procedures are in place. A significant growth in traffic at the airport, however, would mean that major disruptive events requiring the suspension of operations at the entire airport would result in higher levels of increased pressure on the London Terminal Management Area. On the basis of the available evidence, the Commission believes that such pressures would be manageable, and an additional runway at Heathrow would increase resilience to disruptive events requiring the temporary closure of other airports.

Appraisal results compared to scheme promoter's analysis

3.105 Throughout the appraisal documents the Commission highlights areas where its analysis differs from scheme promoter's analysis. In some cases Heathrow Hub Ltd has proposed potential mitigations that at a high level appear well judged and reasonable but have not been (and at this stage would be very hard to be) quantified. Heathrow Hub Ltd is optimistic that these mitigations would substantially mitigate a number of risks or negative impacts, whereas the Commission has currently taken a more conservative approach.

3.106 Several key areas of difference are:

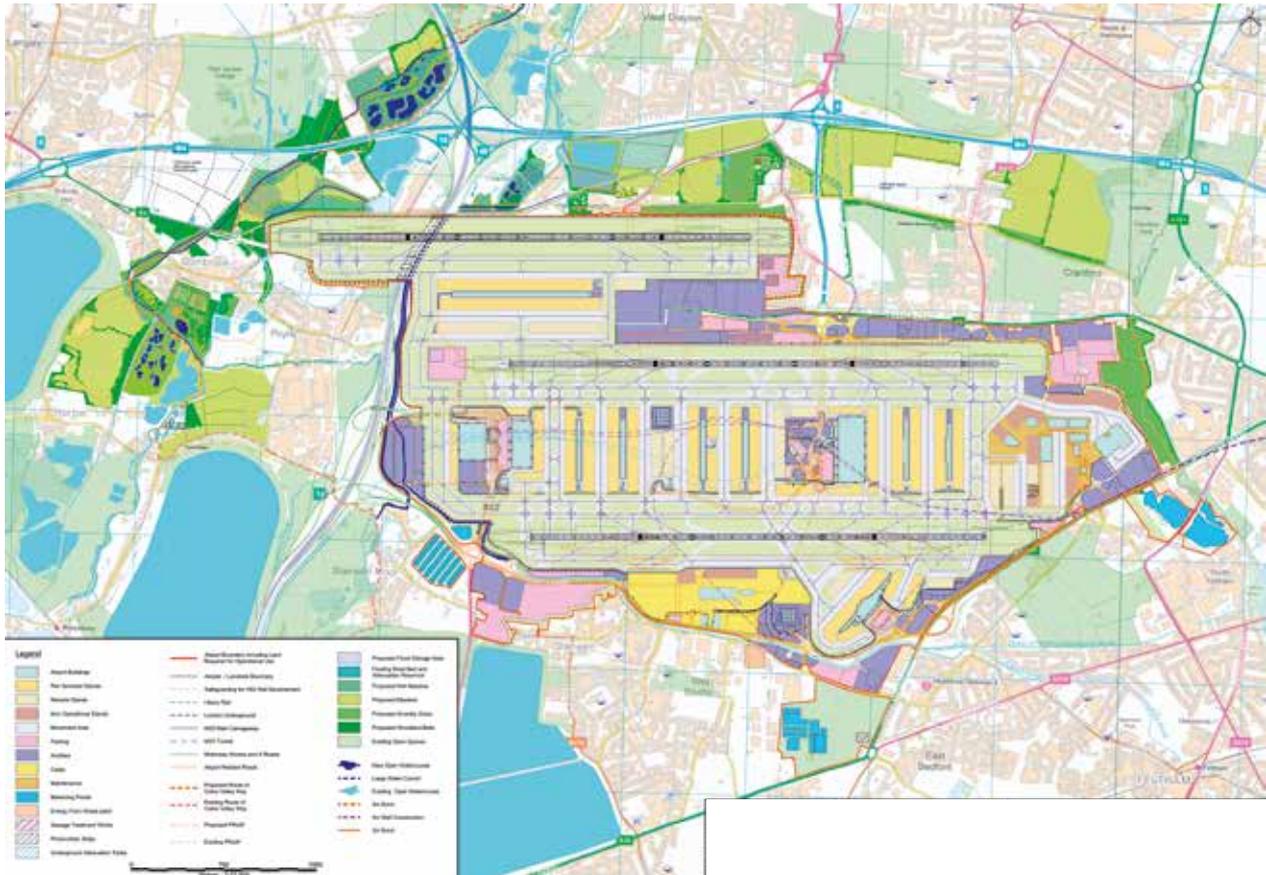
- **The hub station site:** Heathrow Hub Ltd included a hub station to the north of the airport as part of their scheme. Their analysis suggested that this offered a better surface transport solution than the 'on-site' surface transport scheme. This proposal has been assessed by the Commission in a separate report, with its main analysis being based on an 'onsite' surface access strategy to ensure comparability of the assessments of the two runway options at the airport. Heathrow Hub Ltd also considers that the hub station would drive transformative catalytic benefits for locations on the Great Western Main Line. While the Commission in principle does not disagree that such impacts are possible, it would be very difficult at this point to quantify these with any level of certainty.
- **Local commercial development:** Heathrow Hub Ltd has not included areas of land within the airport boundary for commercial development. The Commission considers that the expansion of the airport is likely to drive the need for more commercial development locally for those business that most value ease of access to the airport. If this space is not within the airport boundary it could either limit the opportunities for these businesses to develop, or this development will occur elsewhere in the local vicinity, with possible negative environmental and community impacts. Heathrow Hub Ltd believes that any such constraint is positive, encouraging the area to move up the value chain by incentivising lower GVA businesses to locate away from the airport.
- **Costs:** Heathrow Hub Ltd's analysis estimates that the full airport masterplan is deliverable for less money than is set out in the Commission's analysis. This is discussed in the Commission's Commercial and Financial Case but is in large part a result of differing opinions on the application of risk and optimism bias, along with some smaller differences of opinion on taxiway, land and carparking costs.
- **Aero charges:** Heathrow Hub Ltd has suggested that a lower aero charge is achievable than the Commission's estimate. There are many reasons for this difference, which are summarised in *Cost and Commercial Viability: Funding and Financing*.

Scheme Description – Heathrow Airport North West Runway

Description of airport infrastructure

3.107 The Heathrow Airport North West Runway scheme proposes the building of a new full length (3,500m) runway to the north west of the current northern runway at Heathrow.¹⁵

Masterplan



Source: Heathrow Airport Ltd.

3.108 The space between the runways is 1,045m. This distance provides space for the required airport infrastructure (a new satellite and stands). Although the configuration could allow fully independent mixed mode operations¹⁶ on all runways, it is not proposed that the airport would operate in this way. Instead, a system of alternating runway usage would be maintained, with one runway used only for departures, one

¹⁵ Heathrow Airport Ltd made some minor modifications to the masterplan submitted to the Commission on 14 May 2014 as part of its updated scheme design, following consultation with local groups about mitigation actions. The modified masterplan was published in October, and can be found at the following link: <http://your.heathrow.com/heathrow-uses-local-community-news-revise-expansion-plan/>

¹⁶ This means that each runway can operate without operational interactions or limitations with the other runways, subject to appropriate regulatory mitigations.

only for arrivals and one operating in mixed mode at any one time, to offer a level of continuing respite for local communities and reflect prevailing winds.

Table 3.1: Rotating runway use to produce alternative operating modes

Operating mode	Mode 1	Mode 2	Mode 3	Mode 4
Northern runway	DL	DL	L	D
Centre runway	L	D	D	L
Southern runway	D	L	DL	DL
D – Departures, L – Landing, DL –Departures and Landing				

Source: Heathrow Airport Ltd

- 3.109** A new terminal would be built to the west of the current central terminal area. This means the majority of terminal space and satellites (apart from terminal 4 and a new satellite serving the new runway) and the surface transport spine of the airport would continue to run between the two current runways (this is sometimes referred to as a ‘toast rack’ configuration).
- 3.110** The new terminal would be built in stages but when complete will have a capacity of 35mppa, a similar capacity to T5 (currently 30mppa). The terminal would be built in the same style as Terminals 5 and 2.
- 3.111** The airport site would expand north-westwards to make space for the new runway but also south, west and east to make space for ancillary services and commercial development. In particular new commercial space is suggested to the west of the current central terminal area and between the new runway and the current northern runway. A total of 569ha for the airport development and up to an additional 294ha for related surface access improvements and 43ha for flood storage is likely to be required, with approximately 431ha of this within designated Green Belt. A total of 783 residential properties lie within the airport land take and are likely to need to be demolished. Further housing loss could be required as a result of surface access works, depending on detailed route and construction design and potential mitigation options.

Description of surface access

- 3.112** The surface access scheme for the North West Runway scheme can be split into three sections: the core baseline, the extended baseline and the scheme specific developments.

3.113 The core baseline is made up of the surface transport schemes that are already agreed and funded. The extended baseline includes surface transport schemes that are not finally agreed and funded but provide an indication of the type of investment needed to accommodate background growth whether or not the airport is expanded. In terms of schemes relevant for Heathrow this would include, for instance, Western Rail Access from Reading to Heathrow. These two baselines are common across the three shortlisted schemes, and are set out in detail in *Surface Access: Process Overview*.

3.114 In addition to these baselines the scheme will need additional surface transport investments. These are noted below, and focus on improving local and strategic roads which should improve journey times both for airport and local users. For the North West Runway scheme in particular it is important to note that we do not assume a direct connection to HS2 as part of either baseline.

Unit Type	Road Section	Requirement
Strategic Road	M4 J3 to J4	Road Widening
	M4 Airport Spur	Road Widening
	M4 J2 to J3	Road Widening
	M4 J4 and J4B	Road Widening
	M4	Large M4 J4b replacement
	M4	Higher Capacity @ M4 J4a
	M4	Capacity improvements to existing main airport tunnel
	M25	M25 tunnelling costs (south of junction 15)
Local Road Network	A4	Diversion of A4 Road alignment, dual carriageway
	A3044	Diversion of A3044 Road alignment, dual carriageway
	Airport Roads	Airport Way/Southern Perimeter Road Interchange, grade separated junction and flyover/bridge structures
	Heathrow Road Tunnel	Southern Road Tunnel/Southern Perimeter Road Interchange
	Airport One Way	One way system for western campus
Rail	Southern Rail Access to Staines	

3.115 In the *Interim Report*, the Commission said it would consider the proposal put forward by Heathrow Hub Ltd for a surface access strategy centred on a new hub station on the Great Western Main Line as a detachable concept that could be put alongside either of the Heathrow runway options. This proposal is summarised in the scheme description for the Heathrow Hub scheme and is assessed in detail in the relevant consultancy paper, referenced above.

Assessment against Airports Commission appraisal categories

Strategic Fit

Appraisal Modules: Strategic Fit

3.116 The Heathrow Airport North West Runway proposal would expand the airport's maximum air traffic movement capacity to 740,000, an increase of 260,000 on its present level, which is sufficient to meet the Commission's *assessment of need* for new capacity by 2030.

3.117 The Commission's forecasts indicate that the proposed third runway would enable passenger numbers at the airport to reach 132-149 million by 2050, across all five of the Commission's scenarios. This is larger than any current airport and compares to plans for Istanbul's new airport, which is being designed to accommodate up to 150 million passengers.

3.118 Heathrow is by far the largest of the London airports in terms of passenger movements, serving the UK as its primary long-haul gateway; 84% of London's long-haul market is at Heathrow. The airport currently caters almost exclusively for legacy carriers, both network and point-to-point, with over 50% of flights at Heathrow being operated by IAG and its alliance partners. The Commission's forecasts suggest that this would be likely to continue, with long-haul passengers remaining the majority at the airport, although with some rebalancing towards short-haul as expansion provides capacity for more of these routes to be established. Expansion would also enable the airport to maintain relatively high numbers of international transfer passengers, supporting the airport's hub operation, compared to the reductions seen in the baseline as capacity constraints bite. The key exception to these patterns is the *relative decline of Europe* scenario, in which the number of transfer passengers is smaller (though still higher than the baseline). As its role as a hub shrinks, more capacity is made available for short-haul growth, such that short-haul passenger numbers broadly match long-haul over time.

3.119 At national level, the North West Runway at Heathrow, under the Commission's carbon-traded forecasts, would facilitate growth in the overall capacity and scale

of the overall UK route network, with 7-21 million more long-haul seats and 15-30 million more short-haul across scenarios in 2050 compared to a situation in which no expansion takes place. This would include noticeable increases in capacity to emerging markets¹⁷ (6-9 million seats) in all scenarios except *global fragmentation* where London's declining role as a hub would see noticeably smaller growth in capacity (2 million seats) on these routes. The picture is more nuanced in the carbon-capped forecasts as lower demand growth overall due to the cap on emissions is seen across all scenarios. This leads strong growth across all scenarios in capacity to established long-haul destinations in the developed world, offset by significant reductions in short-haul, and more limited change in capacity to emerging markets.

- 3.120** The differences between forecasts indicate different potential implications of developments in the aviation sector for an expanded Heathrow. For example, depending on how the aviation sector develops, growth at Heathrow may potentially be achieved through the expansion of the current hub carrier at Heathrow, by another alliance establishing a competing hub at Heathrow or by a low-cost carrier entering the airport to compete for point-to-point traffic and possibly to provide additional transfer opportunities for the passengers of some legacy airlines.
- 3.121** Continuing pressure on capacity means that across the majority of scenarios, the number of domestic travellers at Heathrow stays broadly static or declines in the baseline. Expansion would create the opportunity to address this, with the Commission's forecasts indicating higher numbers of domestic passengers at the airport by 2050 across all scenarios with a new north west runway in place, and more than double in some cases. Without any specific measures to incentivise new services, however, the forecasts suggest that only limited growth in the number of domestic routes may be seen. Instead, increased frequencies would provide improved access for passengers from outside London and the South East to the airport's international route network and to the capital.
- 3.122** While all of the carbon-capped scenarios keep carbon emissions from aviation within the range 37.4-37.5 MtCO₂e in 2050, i.e. consistent with the Climate Change Committee's advice, all the carbon-traded expansion scenarios entail increases in carbon emissions from aviation above that level. The highest levels of emissions are seen in the *global growth* and *low-cost is king* scenarios, which would see UK aviation emissions in 2050 of 51-52 MtCO₂e. If these emissions were not accounted

17 Destinations defined as 'Newly Industrialised Countries' or 'Less Developed Countries' in the DfT forecasting model.

for as part of a liberal global carbon market (as envisaged in this forecasting approach) and needed to be accommodated within any UK specific target this would see aviation emissions account for a larger share of the total and require commensurate reductions elsewhere in the economy, a situation in which the CCC advises it currently has 'limited confidence'.

- 3.123** An expanded Heathrow's key strength is likely to be in its ability to provide a wide network of connections, both long-haul and short-haul. The scheme's connectivity benefits are likely to be largest if Heathrow's capacity is taken up by the hub carrier and its partners as that would allow for the most significant expansion of the airport's route network. This airline response is most likely in the *global growth* and *assessment of need* scenarios. On the other hand, the benefits of competition in case of the dominant hub carrier expanding are likely to be limited. The benefits of competition would be larger if the hub carrier and its partners are exposed to competition, either from another hub carrier establishing a second hub at Heathrow or from a new, low-cost entrant. There would most likely be a trade-off between these larger benefits of competition and potential connectivity impacts, particularly in the long-haul market. Reduction in scarcity rents at Heathrow could potentially contribute to lower fares at the airport.
- 3.124** In respect of passenger experience, an expanded Heathrow would benefit from improved surface access links, with a range of new and improved rail services catering to business and leisure passengers with increased direct connections via Western Rail Access to Heathrow, Crossrail, and Southern Rail Access and improved national connectivity from HS2. The expanded airport would continue to offer a high level of terminal capacity for passengers, broadly in line with the recently opened Terminals 5 and 2, an improvement for the airport overall. Improvements to the rail network should reduce travel times from many locations, however the Piccadilly line is likely to be capacity constrained during peak hours.
- 3.125** Heathrow currently plays a vital role in the UK's air freight market, handling 1.42 million metric tonnes of freight during 2013. Expansion at Heathrow is likely to be highly beneficial to the air freight sector. With many freight handling and forwarding companies already having a presence on or near the Heathrow site, the industry would be well placed to respond quickly to a growth in capacity there. The availability of more slot capacity provides both the potential for enhanced freight capacity on existing routes, as well as the creation of new routes, which would open opportunities for the cargo sector as well as passengers.
- 3.126** Expansion at Heathrow has the potential to align well with local and regional development strategies, providing significantly increased employment and

housing in the surrounding boroughs and supporting economic development in the Heathrow Opportunity Area and Western Wedge and along an east-west axis in the Capital, identified in the London Plan as an ‘engine for growth’. By expanding Heathrow, and in particular its hub capacity, the UK could gain improved connectivity to growth markets, which would be particularly important for maintaining London’s status as a global city. Expansion would further benefit the business clusters along the M4 corridor and beyond through the improved connectivity it would provide. The impacts on the surrounding area of expansion (including noise, environmental and housing growth) would need to be considered carefully in line with local concerns. The airport’s negative environmental impacts have been cited as a reason to oppose expansion by a number of nearby local authorities and in the London Plan.

Economy

Appraisal Modules: Economy, Local Economy

- 3.127** Differences in the scale and pattern of passenger demand across the Commission’s scenarios leads to a wide range in potential economic benefits. Using a carbon-traded scenario transport economic efficiency benefits would range from £42 billion under the *global growth* scenario at the high end of the range, to £10.3 billion under the *global fragmentation* scenario at the low end of the range. In addition, passengers would benefit from reduced delays to the extent of £0.84 billion to £2.36 billion, depending on the demand scenario under consideration.
- 3.128** In addition, the Commission has made a macroeconomic assessment of the GDP benefits which might accrue from expanding Heathrow airport. This assessment, which is based on modelling the operation of the economy as a whole, has been specifically developed to support the Commission process and estimates that there could be wider benefits within the economy ranging from £112-211 billion depending on the scenario. These results should be interpreted with caution, given the innovative methodology used, but they provide an indication of the scope for wider benefits to be felt throughout the economy, for example from enhanced productivity, trade or consumer spending, as a result of expansion.
- 3.129** At local and regional level, growing passenger numbers via a Heathrow North West Runway scheme support employment growth in the local area and region. The number of jobs associated with the airport, including direct, indirect and induced employment, is forecast to be 47,400-112,400 higher in 2030 compared to the ‘do minimum’ rising to 64,100-108,300 higher in 2050. These projections assume Heathrow’s business model remains focused on a legacy and hubbing focussed

business, with relatively high numbers of staff per passenger required. An alternative approach to assessing the number of jobs created comes from the S-GCE model, with an estimated 179,600 jobs created under the *assessment of need* scenario by 2050. This figure is larger than the Commission's estimates above as it includes catalytic impacts of the scheme.

- 3.130** The delivery of these employment benefits would require housing to be in place to accommodate higher numbers of workers and sufficient development land to support business growth. The upper end housing estimate (70,800 homes) may present challenges for local authorities, many of whom already struggle to meet housing targets, but this is mitigated by the timescales for delivery and the broad area (some 14 authorities) over which the requirement is spread. Overall, the Commission's analysis is that the delivery of the necessary housing and associated infrastructure (which may have wider benefits to local communities) is likely to be achievable, but there are risks of localised constraints at the upper end of the scale, which may affect the overall benefits of expansion.

Surface Access

Appraisal Modules: Surface Access

- 3.131** The surface access strategy would see a number of significant shifts to access to the airport, compared to how it operates today. Two major changes are due to occur regardless of any decision on expansion; Crossrail and the HS2 connection from Old Oak Common. Crossrail will expand direct rail access to Heathrow to a range of destinations both within and outside of London. The link from Old Oak Common will open up rail access to Heathrow to a significant area of the Midlands and North. A third major change, Western Rail Access, is also likely to happen regardless of any expansion decision. This will provide direct rail connections to the airport from a number of destinations from the West, such as Reading, and eliminate the need for rail passengers from the west to travel past the airport in order to make a connection at Paddington.
- 3.132** In addition to this, the surface access strategy includes a Southern Rail Access link, which opens up direct rail access to further destinations, including, crucially, Waterloo. The overall impact of Heathrow's rail strategy is to render the airport accessible via a direct connection to a significantly enlarged section of the population, while relieving a wider group of the need to change at a central London rail terminal. This should make using rail to access the airport a more attractive proposition for many people and promote significant modal shift towards rail. An

increasing variety of links will improve the resilience of rail access to the airport although it will remain heavily reliant on the great Western main Line.

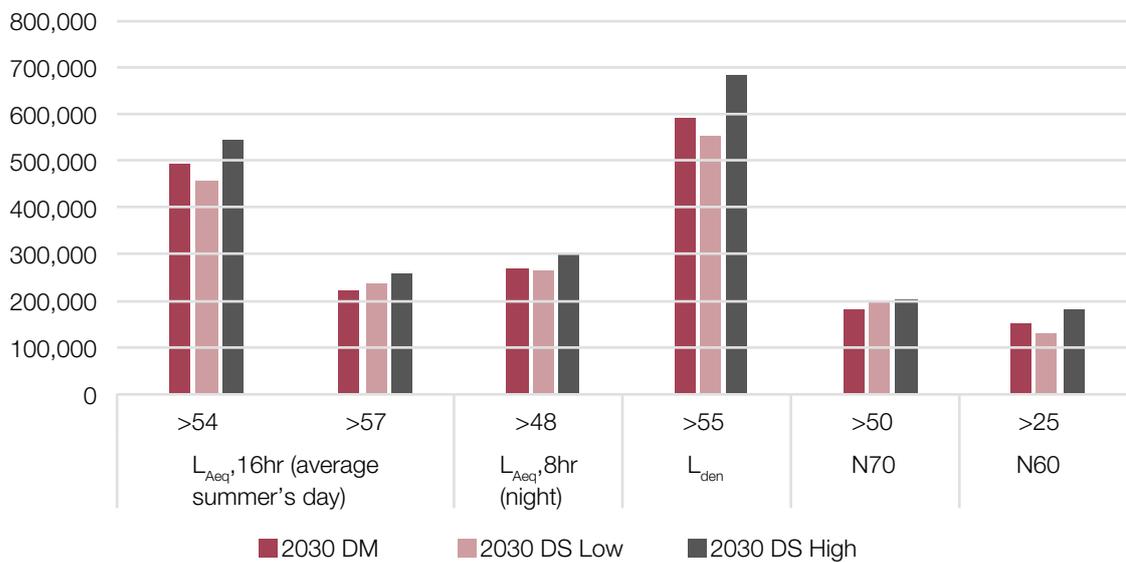
- 3.133** In terms of rail passenger experience, the surface access strategy would enhance one of the airport's most noticeable benefits at present: the ability of passengers to make their own trade-off decisions between price and quality. Assuming that premium pricing is maintained on the Heathrow Express, the service will continue to offer the near guarantee of a seat, in addition to ample luggage space. The Piccadilly Line will continue to provide a slower and more crowded experience (particularly in the peaks) at a much lower cost. While Crossrail pricing for journeys to the airport is not yet known, it is likely to present a mid-point in terms of both price and quality. The proposed station under Terminals 5 and 6 will provide an effective interchange for passengers across the South of England, while passengers to the West Midlands and North will have the option of an interchange with HS2 at Old Oak Common.
- 3.134** In terms of road access, significant works are needed on the roads around the airport site to accommodate its expanded footprint, including putting the M25 into tunnel. The management of congestion on the M25 and M4 will be a significant issue and infrastructure interventions (including widening), demand management or a combination of both may be required. The majority of these strategic road works would be needed even without any expansion, given baseline expectations about increase in demand, and the impact of airport development would generally be to bring forward marginally schemes which would be needed in any case. Some additional widening of the M4 may, however, be needed as a result of the airport's expansion, although it may be possible to avoid or reduce this through mitigation measures.

Environment

Appraisal Modules: Noise, Air Quality, Biodiversity, Carbon, Water and Flood Risk, Place

- 3.135** Heathrow is sited in an area of London that even without the impacts of the airport is congested and busy. Any development at Heathrow will be adding development to an area that is already under environmental stress.
- 3.136** In respect of noise, the Commission's analysis indicates that operating a new north west runway at Heathrow would lead to a growth in the number of people affected by aviation noise in most metrics in relation to the do minimum baseline in future years. But this is not true across all metrics and depends on whether high or low end forecasts are being considered. Figure 3.7 explores the do something outcomes in relation to the do minimum in 2030 across high and low end forecasts.

Figure 3.8: Heathrow North West Runway, 2030 do minimum versus 2030 do something low end (assessment of need, carbon-capped) and high end (low-cost is king, carbon-traded) forecasts



3.137 Day time metrics, including frequency metrics measuring incidences of noisy overflight, show an increase against future do minimums, and this becomes more pronounced in the period from 2030 to 2050 as the airport fills with traffic. However, almost all night noise (defined as between 2300 and 0700) metrics are seen to reduce in both high and low end forecasts, as improvements to aircraft technology and the capability of late evening and early morning arrivals to land further to the west see a positive impact against the ‘do minimum’.

3.138 When compared to current noise levels, fewer people are predicted to be affected across all metrics. This is true of both high end and low end scenarios, as Figures 3.9 and 3.10 show.

Figure 3.9: Heathrow North West, current day scenario versus do something in 2030, 2040 and 2050, low end forecasts (assessment of need, carbon-capped)

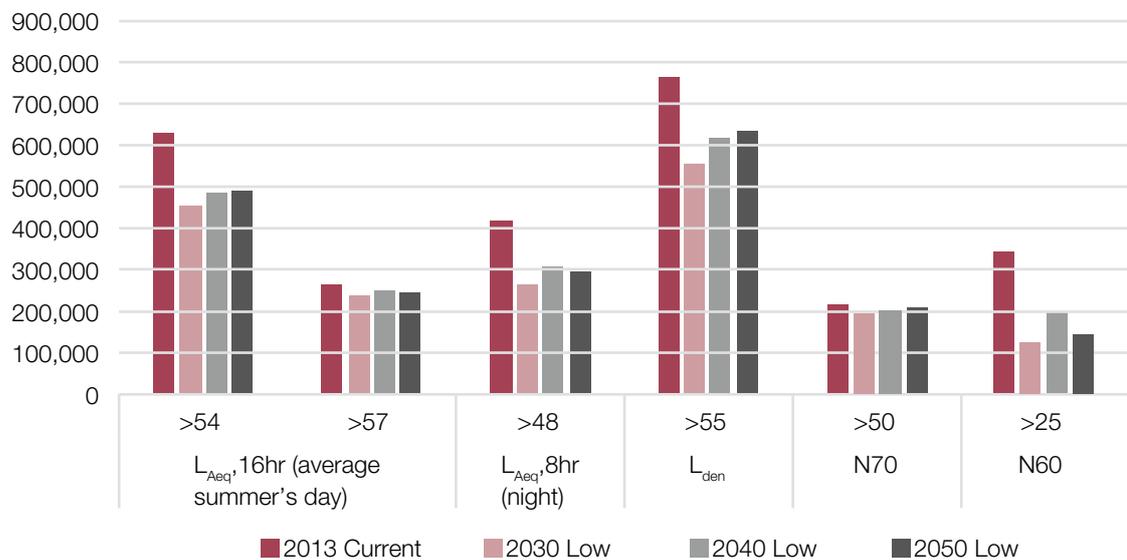
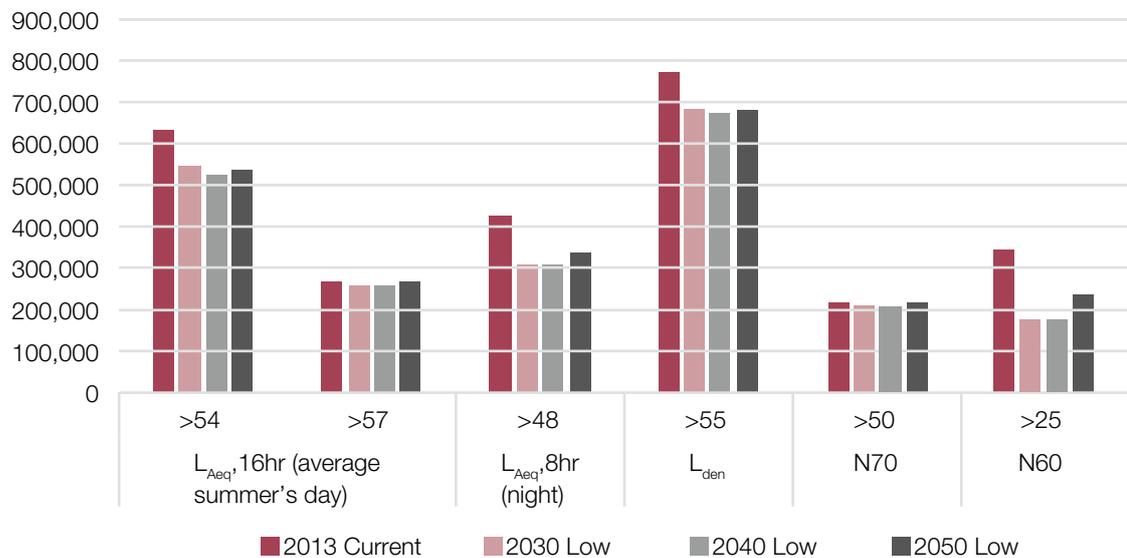


Figure 3.10: Heathrow North West, current day scenario versus do something in 2030, 2040 and 2050, high end forecasts (low-cost is king, carbon-traded)



3.139 Both local Air Quality Objectives and EU limit thresholds are at risk of exceedance at a small number of monitoring sites in the local area under this scheme. While in some cases these exceedances are also forecast to occur in the do minimum scenario, there is clearly a substantial negative impact of the scheme on air quality, unless forceful mitigation measures are implemented. As explained at paragraph 2.56-7 above, further work on this issue is ongoing.

3.140 Expansion would have a negative impact on a range of other local environmental factors, including landscape, heritage, biodiversity and water. In general while good detailed design and operational delivery by the airport operator could significantly reduce the impact of the scheme, the impacts in some cases will never be entirely mitigated. One area where these residual impacts could be problematic is flood – even with excellent channel design and ongoing mitigation the Commission’s assessments predict that there could be residual risks of flooding downstream from the airport, although appropriate mitigation actions are possible.

People

Appraisal Modules: Quality of Life, Community

3.141 The proposed extension would largely impact four villages in the Heathrow Villages ward of Hillingdon, to the north and west of the current airport. The Colnbrook with Poyle ward of Slough, situated to the west, would also be affected. A total of 783 residential properties in Harmondsworth, Longford and Sipson and are likely to need to be demolished. Additional residential properties could also be lost depending on detailed route and construction design of surface areas. Other properties will become much closer to the revised airport boundary. The main ingredient of Heathrow Airport Ltd’s proposed mitigation is compensation, with compensation for homes lost at 25% above un-blighted market value, as well as an extension of the current community investment programme and re-provision of community services. Despite these mitigations, at the very local level it is difficult to see any existing community cohesion being maintained, unless entire communities and their facilities could be moved *en masse* at the same time.

3.142 For those within 5km of the airport, the Commission’s quality of life analysis suggests that the ‘bundled impact’ is likely to be broadly neutral, with the positive impacts of the airport (such as transport connections and jobs) and the negative impacts (such as noise and congestion) balancing each other out in quality of life surveys. However, it is important to note that within this bundled impact different communities and individuals would be affected in differing ways. Expansion at Heathrow is likely to result in improvements in quality of life at national level, due to the improved connectivity and its attendant economic and social benefits.

Cost and Delivery

Appraisal Module: Cost and Commercial Viability, Delivery

- 3.143** The scheme is estimated to cost c. £18.6 billion including construction of the new runway, a new terminal and all other required airport facilities. This is higher than Heathrow Airport Ltd's estimate of £14.8 billion (excluding £800m of surface access costs), reflecting in large part differing views of optimism bias and differing construction profiles. These costs are higher than for either of the other schemes, mainly because of higher land acquisition and transit system costs.
- 3.144** Investment on this scale would entail increases in the airport's charges to airlines. Currently airport charges at Heathrow are already comparatively high (£20), reflecting both the demand for slots and the high operating and ongoing development costs for the airport of delivering a high quality and complex hubbing product for their airline customers, in a relatively constrained site. These charges would increase if the airport were to be developed, the extent of which would be dependent in part on the demand scenario. Heathrow Airport Ltd estimate that charges would peak at roughly £27 before returning to approximately current levels by 2050. This is lower than the increases indicated by the Commission's analysis, which indicates charges rising to between £28 and £29, an increase of around 40%, with peak charges of up to £32.
- 3.145** The Commission's assessment of potential financing approaches suggests that Heathrow Airport Ltd may have to raise additional equity of up to c. £8.4 billion and debt of up to c. £29.9 billion. This will put the airport at the highest end of the range of financing for infrastructure projects in the UK and could make Heathrow Airport Ltd of comparable scale to Network Rail (with a long-term debt of c. £35 billion) and larger than National Grid (c. £25 billion). Raising this level of financing would be challenging; and there are risks associated with any increase of per passenger aeronautical charges to c. £30, significantly higher than current charges across the UK and globally, in a context where Heathrow must compete with other airport operators.
- 3.146** There are a number of options that may mitigate this risk including: different approaches to phasing delivery (as in Heathrow Airport Ltd's proposal); smoothing the recovery of infrastructure costs over longer periods through a level of pre-funding; or even some level of public sector involvement, for example through commitments to deliver necessary surface access improvements or the provision of other Government measures that provide a degree of assurance to lenders and investors.

- 3.147** The surface access interventions required to support expansion at Heathrow are estimated to cost £5.7 billion.
- 3.148** The delivery risks associated with a new north west runway at Heathrow Airport are substantial, but could be managed. The airport operator would need to work closely with local communities for any expansion at the site to be achievable and the development of effective mechanisms to mitigate or compensate for environmental and community impacts would be crucial. Design, planning and construction risks associated with delivery include airspace redesign, handling the M25 works and relocation of the nearby waste energy plant (see below). These are significant, but are not unusual for an infrastructure scheme of this scale. Therefore, the Commission views 2026 as a realistic runway opening date, and the risks to achievement of the Commission's assessment that new capacity is needed by 2030 appear low. Many nearby local authorities strongly oppose expansion, as do a number of community organisations, although regional business groups are supportive.

Operational Viability

Appraisal Modules: Operational Viability, Operational Risk

- 3.149** The Heathrow North West Runway proposal is not considered to present any significant safety or security risks and is considered adequate to deliver an increase in ATM capacity to 740,000 per annum (from 480,000). The design of the expanded airport provides flexibility to accommodate a range of different industry operating models and sizes of aircraft.
- 3.150** The proposed T6, expanded T2 and their satellites would appear able to deliver a passenger experience (based on floor space per passenger) similar to that experienced at the airport today when at full capacity. Passengers would benefit from the construction of the new modern terminal to the west and the replacement of the older terminals. The minimum connection time between terminals is estimated to fall to between 64 and 73 minutes.
- 3.151** One key area where detailed planning would be needed is the proposed removal and replacement of the waste energy plant. The planning and construction of a waste energy plant is a substantial exercise in its own right, whose timescales are not substantially shorter than the delivery of new runway airport infrastructure. The tunnelling of the M25 will also provide a substantial engineering challenge, although the Commission's current analysis suggests that it is deliverable in the timescales available.

- 3.152** On the basis of the available evidence, the Commission does not, on balance, believe that expansion at Heathrow would lead to any reduction in capacity at commercial airports in London and the South East, or any worsening of current levels of whole-system resilience, provided the ongoing Future Airspace Strategy and London Airspace Management Programme are delivered successfully.
- 3.153** The proposed expansion would not worsen the airport’s resilience to disruptive events. The addition of a third runway grants Heathrow a degree of additional resilience to some events which might require the closure of a single runway (such as fire), assuming adequate operational procedures are in place. A significant growth in traffic at the airport, however, would mean that major disruptive events requiring the suspension of operations at the entire airport would result in higher levels of increased pressure on the London Terminal Management Area. On the basis of the available evidence, the Commission believes that such pressures would be manageable, and an additional runway at Heathrow would increase resilience to disruptive events requiring the temporary closure of other airports.

Appraisal results compared to scheme promoter’s analysis

- 3.154** Throughout the appraisal documents the Commission highlights areas where its analysis differs from the scheme promoter’s. In some cases Heathrow Airport Ltd has proposed potential mitigations that at a high level appear well judged and reasonable but have not been (and at this stage would be very hard to be) quantified. Heathrow Airport Ltd is optimistic that these mitigations would substantially mitigate a number of risks or negative impacts, whereas the Commission has currently taken a more conservative approach.
- 3.155** Several key areas of difference are:
- **Impact of mitigations on noise and air quality impacts:** Heathrow Airport Ltd has proposed a range of measures, such as operational mitigations or financial incentives, to mitigate adverse noise and air quality impacts. Not all of these mitigations have informed the Commission’s quantitative assessments, but the Commission has considered these potential mitigations when evaluating the scheme.
 - **Costs:** Heathrow Airport Ltd’s analysis shows that the full airport masterplan is deliverable for less money than is set out in the Commission’s analysis. This is discussed in *Cost and Commercial Viability: Cost and Revenue Identification Heathrow Airport North West Runway*, but is in large part a result of differing opinions on the application of risk and optimism bias.

- **Aero charges:** Heathrow Airport Ltd has suggested a lower aero charge is achievable than the Commission's assessment suggests. There are multiple reasons for this difference, which are summarised in *Cost and Commercial Viability: Funding and Financing*.
- **Passenger numbers:** Heathrow Airport Ltd's updated scheme design modelled a phased release of the new capacity provided by its scheme. This phased release has the effect of tempering the environmental (particularly air quality and noise) impacts of expansion, which may be necessary if the airport and environs have to adhere to environmental impact limits. A phased release may also tally with the future strategies and aircraft numbers of airlines currently operating at the airport, and could also have commercial benefits. The Commission's modelling has not incorporated a phased release of slot capacity of this kind, but has assumed that any new capacity will fill in line with demand forecasts. This difference between the Commission's and Heathrow Airport Ltd's assessments has led to different results for environmental and economic appraisals in particular.
- **Energy from Waste Plant:** Heathrow Airport Ltd and the Commission agree that the scheme requires the demolition and re-provision of an energy from waste plant, and that this process would require appropriate planning permissions. The Commission is less confident than the scheme promoter on the timelines for achieving these, and this is discussed in the Delivery module.

4. Section 4 – Consultation questions and how to respond

Introduction

- 4.1** The Airports Commission has assessed three options for a new runway in the South East of England: Gatwick Second Runway, Heathrow North West Runway and Heathrow Extended Northern Runway.
- 4.2** The Commission's analysis is captured in:
- the Commission's Consultation Document (this document);
 - a business case and sustainability assessment for each scheme;
 - a series of detailed technical reports.
- 4.3** An explanation of how to navigate the Commission's analysis is provided at the start of Section 2 of this document, and a topic-specific index to help navigate the analysis (be that in relation to appraisal topic or a particular scheme) is provided at Annex A.

Consultation Questions

- 4.4** The Commission wishes to seek views on the three short-listed options, and on its assessments and assessment results. In particular, the Commission wishes to test the evidence base it has assembled, to understand stakeholders' views as to the accuracy, relevance and breadth of the assessments it has undertaken and the potential conclusions that might be drawn from them. It is also interested in receiving evidence and ideas about how any or all of the short-listed options might be enhanced or improved, for instance through mitigation measures to address specific impacts.
- 4.5** The consultation will run for 12 weeks, ending at midnight on Tuesday 3 February 2015.
- 4.6** The consultation questions are set out below.

4.7 Questions 1 and 2 invite views and conclusions on the three short-listed options. Questions 3 and 4 are on the Commission’s appraisal and overall approach. Questions 5-7 are on specific areas of the Commission’s appraisal. Question 8 asks for any further comments on any aspect of the Commission’s work.

Questions inviting views and conclusions in respect of the three short-listed options	Q1: What conclusions, if any, do you draw in respect of the three short-listed options? In answering this question please take into account the Commission’s consultation documents and any other information you consider relevant. The options are described in section three.
	Q2: Do you have any suggestions for how the short-listed options could be improved, i.e. their benefits enhanced or negative impacts mitigated? The options and their impacts are summarised in section three.
Questions on the Commission’s appraisal and overall approach	Q3: Do you have any comments on how the Commission has carried out its appraisal? The appraisal process is summarised in section two.
	Q4: In your view, are there any relevant factors that have not been fully addressed by the Commission to date?
Questions inviting comments on specific areas of the Commission’s appraisal	Q5: Do you have any comments on how the Commission has carried out its appraisal of specific topics (as defined by the Commission’s 16 appraisal modules), including methodology and results?
	Q6: Do you have any comments on the Commission’s sustainability assessments, including methodology and results?
	Q7: Do you have any comments on the Commission’s business cases, including methodology and results?
Other comments	Q8: Do you have any other comments?

4.8 Respondents do not have to answer every question, and can answer selectively if they wish.

Stakeholder Engagement

- 4.9** Throughout its work the Commission is committed to running an open, fair and transparent process that provides an opportunity for interested parties to present their views and evidence to the Commission.
- 4.10** As a part of this consultation exercise the Commission is holding two public discussion sessions where invited witnesses and people from local communities around Heathrow and Gatwick airports will have the opportunity to set out their views on the three proposals.
- 4.11** The Heathrow discussion session will take place on 3 December 2014 and the Gatwick discussion session on 16 December 2014. Entry to these events will be by ticket only. The Commission will launch the registration process shortly after the publication of this consultation.
- 4.12** In addition the Secretariat supporting the Commission will hold drop in sessions, where members of local communities impacted by these proposals will have the opportunity to seek information regarding the Commission's consultation process and how to respond. These sessions will also take place on 3 December 2014 in the Heathrow area and on 16 December 2014 in the Gatwick area. Further details of these events will be publicised in due course.
- 4.13** Throughout this consultation the Airports Commission will keep under review requests for meetings from stakeholders.

How to respond

- 4.14** There are several ways to respond to the Commission's consultation. You can:
- answer the Commission's questions via an online form;
 - download the question and response form from the website and e-mail in your responses;
 - print off the question and response form from the website and post in your responses to a freepost address;
 - e-mail in standalone responses;
 - mail standalone responses to a freepost address.
- 4.15** The online form can be accessed at this link: www.gov.uk/airports-commission. Half-completed forms can be saved and returned to at any point. You may wish to compose answers offline, and then copy and paste them into the form.

- 4.16** The question and response form can be downloaded and printed from the same link. This form can be completed on a computer or printed out and completed by hand.
- 4.17** Responses should be e-mailed to: airports.consultation@systra.com. If you wish you may submit image, audio or other multimedia files. In order to submit a file larger than 10MB (for instance, files containing lots of images or maps), please write to the e-mail address above and you will be contacted with details of how to upload the file to a data-sharing site.
- 4.18** Responses should be posted to
Airports Commission Consultation
Freepost RTKX-USUC-CXAS
PO Box 1492
Woking
GU22 2QR
- 4.19** Respondents who submit their response via the online form or via e-mail will receive a confirmation message indicating that their response has been received. Respondents who submit their response via post will not receive confirmation that their response has been received.
- 4.20** The Commission cannot guarantee that consultation responses which are not submitted via the above methods will be considered as part of its consultation. Nor can the Commission accept responsibility for any consultation responses which are not submitted via the above routes. This includes responses that are submitted directly to the Airports Commission or the Airports Commission Secretariat.
- 4.21** If you are unsure **how** to respond, you may leave a message at 0800 023 8128. This is an unmanned telephone line. Only technical queries relating to how to respond to the consultation will be returned.

How your response will be treated

- 4.22** The Commission is committed to ensuring that its process is fair and transparent, and has a presumption to publish all information relevant to its decision making.
- 4.23** The findings of the Commission's consultation will be published in a consultation report. This report will include details of the number of responses received and the key topics, points and themes that the consultation generated. The report will also contain details of the framework used to analyse the responses.

- 4.24** In addition, as with all its previous calls for evidence, the Commission will publish all substantive, technical responses it has received.
- 4.25** Both of these publications will occur alongside the publication of the Commission's final report, due in the summer of 2015. Publication of the Commission's final report will be announced via conventional and social media (the Commission's official twitter profile is [@ukairportscomm](#)).
- 4.26** The Commission does not intend to make public any names or other details of individual respondents. Where a respondent is an organisation, this data is likely to be made public as part of the Commission's response.
- 4.27** Respondents wishing information that they provide to be treated as confidential should be aware that, while the Commission is not a body designated under the Freedom of Information Act 2000 ('the Act') as subject to the terms of the Act, it seeks to broadly follow the terms of the Act. Information provided may therefore be made public where the Commission considers that no exemption from disclosure applies.
- 4.28** In view of this it would be helpful if respondents could explain to the Commission why the information provided should remain confidential. If the Commission receives a request for disclosure of the information, it will take full account of your explanation, but it cannot give an assurance that confidentiality can be maintained in all circumstances. A confidentiality disclaimer generated by an IT system will not, of itself, be regarded as binding on the Commission.
- 4.29** The Commission will process personal data in accordance with the Data Protection Act 1998 and in the majority of circumstances this will mean that personal data will not be disclosed to third parties.

Consultation Principles

- 4.30** Although the Airports Commission is independent of Government, this consultation is being conducted broadly in line with the Government's guidance on consultation. This can be found at: <https://www.gov.uk/government/publications/consultation-principles-guidance>. This was issued in July 2012 and last updated in November 2013 and replaces the Code of Practice for Consultation issued in July 2008.

Annex A: Index of Airports Commission's Detailed Analysis Reports

Report Title	Author	Description of contents
1. Strategic Fit		
1. Strategic Fit: Forecasts	Airports Commission	Report setting out the methodology, assumptions and results of the Commission's forecasting of aviation demand. It includes a description of the various scenarios modelled and the differences between them.
1. Strategic Fit: Expanding Airport Capacity – Competition and Connectivity	International Transport Forum (ITF) and SEO Economic Research	Report assessing how airlines could potentially respond across a range of different global scenarios to expanding runway capacity at either Gatwick or Heathrow, and what potential connectivity and competition impacts would be generated by such responses.
1. Strategic Fit: Fit with Wider Spatial and Socio-Economic Development Strategies	Airports Commission	Report looking at the context of each expansion option across a number of plans, including Local Authority and Local Enterprise Partnership strategies, national frameworks and the London Plan.
2. Economy Impacts		
2. Economy: Transport Economic Efficiency Impacts Assessment	Airports Commission	Assessment of the costs and benefits attached to airport capacity options which fall directly on airports, airlines, passengers and the public finances. Produced using the Commission's aviation forecasting model under the five demand scenarios: <i>assessment of need, global growth, relative decline of Europe, low-cost is king and global fragmentation</i> .
2. Economy: Delay Impacts Assessment	Airports Commission	Report setting out the background to and explanation of the analysis to estimate the carbon reductions and benefits for airlines and passengers due to reduction in delays in the UK airport system under the different options for expanding capacity.
2. Economy: Wider Impacts Assessment	PwC	Report assessing the wider economic impacts on the GDP/ GVA of each expansion option. The report sets out the methodologies, assumptions and results of the Computable General Equilibrium (CGE) modelling used to underpin its analysis.
3. Local Economy Impacts		
3. Local Economy: Literature Review	PwC	Literature review considering the local economic impacts of increases in airport capacity or increased airport use, focusing on the supply chain effects of airports and their role as catalysts of wider economic impacts. Case studies examine these issues at Heathrow, Gatwick, Manchester, Paris Charles de Gaulle and Frankfurt airports, as well as the New York airport system.
3. Local Economy: Impacts Assessment	Airports Commission	Report assessing the impact of expansion proposals across four areas: Employment & Business, Surface Access, Housing & Social Infrastructure, and Land. It considers the impact during construction, in 2030 and in 2050. The report uses historic and forecast data on a variety of indicators, plans from local authorities, LEPs and the London Plan along with outputs from other modules to inform the assessment.
4. Surface Access		
4. Surface Access: Process Overview	Airports Commission	Report setting out the reasoning behind the approach the Commission took to analysing surface transport, and why it set Jacobs the parameters within which their appraisal was carried out

Report Title	Author	Description of contents
4. Surface Access: Gatwick Airport Second Runway	Jacobs	Appraisal of the performance of the Gatwick Airport Second Runway scheme's surface access elements against the objectives set out in Module 4 of the Commission's <i>Appraisal Framework</i> .
4. Surface Access: Heathrow Airport North West Runway	Jacobs	Appraisal of the performance of the Heathrow Airport North West Runway scheme's surface access elements against the objectives set out in Module 4 of the Commission's <i>Appraisal Framework</i> .
4. Surface Access: Heathrow Airport Extended Northern Runway	Jacobs	Appraisal of the performance of the Heathrow Airport Extended Northern Runway scheme's surface access elements against the objectives set out in Module 4 of the Commission's <i>Appraisal Framework</i> .
4. Surface Access: Gatwick Airport Second Runway Appendices	Jacobs	Technical appendices, supporting the main surface access appraisal document for the Gatwick Airport Second Runway scheme and describing methodology and assumptions.
4. Surface Access: Heathrow Airport North West Runway Appendices	Jacobs	Technical appendices, supporting the main surface access appraisal document for the Heathrow Airport North West Runway scheme and describing methodology and assumptions.
4. Surface Access: Heathrow Airport Extended Northern Runway Appendices	Jacobs	Technical appendices, supporting the main surface access appraisal document for the Heathrow Airport Extended Northern Runway scheme and describing methodology and assumptions.
4. Surface Access: HS2 Spur to Heathrow Airport	Jacobs	Literature review assessing the case for a spur from HS2 to the Heathrow Airport site.
4. Surface Access: Heathrow Airport Hub Station Option	Jacobs	Assessment of the impacts of the hub station proposed by Heathrow Hub Ltd, which could be considered alongside either of the Heathrow airfield proposals, on the Great Western Main Line.
5. Noise		
5. Noise: Baseline	Jacobs	Report on the expected noise environment over a 60 year period on both a local and national level, reflecting expected developments in traffic growth and technological development against a "do minimum" scenario with no airport expansion.
5. Noise: Local Assessment	Jacobs	Assessment of the local noise impacts of schemes on the areas surrounding the expanded airport.
5. Noise: National Assessment	Jacobs	Assessment of the national level noise impacts of schemes, considering both their impacts on traffic at the expanded airport and the expected consequences for traffic at other major UK airports.
6. Air Quality		
6. Air Quality: Baseline	Jacobs	Report on the expected developments in air quality over a 60 year period in the vicinity of Heathrow and Gatwick, considering airport operations, airport surface access and background users of surface access networks, on the basis of a "do minimum" scenario with no airport expansion.
6. Air Quality: National and Local Assessment	Jacobs	Report on the implications of schemes for both air quality in the vicinity of Heathrow and Gatwick airports and for national air quality levels, appraised across a 60 year period.
7. Biodiversity		
7. Biodiversity: Baseline	Jacobs	Report identifying designated sites in region of the scheme proposals as well as non-designated sites and trends at those sites, as well as setting out baseline values based on a do minimum case for issues such as bird-strike.
7. Biodiversity: Assessment	Jacobs	Report setting out the assessment of biodiversity impacts, mitigation and cost estimates for the areas affected by expansion proposals.

Report Title	Author	Description of contents
7. Biodiversity: Ecosystem Services	Jacobs	Report on the impacts of schemes on the life sustaining processes which provide the environmental goods and services on which human life is dependent and which also enhance the quality of life.
8. Carbon		
8. Carbon: Baseline	Jacobs	Report on the forecast baseline carbon emissions for Heathrow and Gatwick airports on a “do minimum” no expansion basis, covering a 60 year period.
8. Carbon: Assessment	Jacobs	Report on the carbon emissions associated with schemes, assessed across a 60 year period, in terms of aircraft, passenger surface access, airport operations (energy and fuel use) and construction activity
9. Water and Flood Risk		
9. Water and Flood Risk: Baseline	Jacobs	Report on how water quality, quantity and flood risk will develop in the areas surrounding Heathrow and Gatwick in the absence of an airport scheme, over a 60 year operational period.
9. Water and Flood Risk: Water Quantity and Water Quality Assessment	Jacobs	Report on the impacts of schemes on levels of water quantity and water quality at the affected airport site and its environs.
9. Water and Flood Risk: Flood Risk Assessment	Jacobs	Report on how the creation and operation of each scheme will affect flood risks for the airport and adjacent areas of their respective flood plains.
10. Place		
10. Place: Baseline	Jacobs	Report asesseing how the Landtake, Landscape & Townscape, Heritage and Waste impacts in the areas surrounding Heathrow and Gatwick will develop in the absence of an airport scheme, over a 60 year operational period.
10. Place: Assessment	Jacobs	Report assessing the Landtake, Landscape & Townscape, Heritage and Waste impacts of each capacity expansion option over a 60 year operational period.
11. Quality of Life		
11. Quality of Life: Assessment	PwC	Research report examining the relationship between aviation & Quality of Life (QoL). The report seeks to determine which QoL indicators are impacted by aviation, analyse available UK datasets to assess evidence on the impact of aviation on QoL and draw conclusions in relation to possible scheme impacts and mitigation.
12. Community		
12. Community: Assessment	Airports Commission	Assessment of the impacts of each expansion option on community cohesion in terms of loss of housing, and in terms of access to community facilities and resources. Consideration is given to the extent that these impacts can be mitigated.
13. Cost and Commercial Viability		
13. Cost and Commercial Viability: Literature Review	PwC	Literature review of the funding and financing arrangements for airports in the UK and other international comparators, considering the key risk factors relevant to airport development as well as looking at procurement models in use in the UK beyond the airports sector.
13. Cost and Commercial Viability: Cost and Revenue Identification Gatwick Airport Second Runway	Leigh Fisher/Jacobs	Report identifying costs and revenues associated with the construction and operation of the Gatwick Airport Second Runway expansion option.
13. Cost and Commercial Viability: Cost and Revenue Identification Heathrow Airport Extended Northern Runway	Leigh Fisher/Jacobs	Report identifying costs and revenues associated with the construction and operation of the Heathrow Airport Extended Northern Runway expansion option.
13. Cost and Commercial Viability: Cost and Revenue Identification Heathrow Airport North West Runway	Leigh Fisher/Jacobs	Report identifying costs and revenues associated with the construction and operation of the Heathrow Airport North West Runway expansion option.

Report Title	Author	Description of contents
13. Cost and Commercial Viability: Financial Modelling Input Costs	PwC	Report setting out a summary of the costs and assumptions used as inputs to the financial modelling.
13. Cost and Commercial Viability: Funding and Financing	PwC	Report analysing the financing and funding of each expansion option and an analysis of the potential spread of aeronautical charges required to finance each.
14. Operational Efficiency		
14. Operational Efficiency: Airspace Efficiency Report	NATS	NATS report assessing the ability of the UK's airspace systems to accommodate the forecast traffic growth associated with each scheme.
14. Operational Efficiency: Ground-Infrastructure Gatwick Airport Second Runway	Leigh Fisher/Jacobs	Report on the levels of additional capacity provided by the Gatwick Airport Second Runway proposal, taking into account its runway, taxiway, stand and terminal infrastructure. The report also assesses the relationship between terminal space and forecast passengers to produce a metric of passenger experience.
14. Operational Efficiency: Ground-Infrastructure Heathrow Airport North West Runway	Leigh Fisher/Jacobs	Report on the levels of additional capacity provided by the Heathrow Airport North West Runway proposal, taking into account its runway, taxiway, stand and terminal infrastructure. The report also assesses the relationship between terminal space and forecast passengers to produce a metric of passenger experience.
14. Operational Efficiency: Ground-Infrastructure Heathrow Airport Extended Northern Runway	Leigh Fisher/Jacobs	Report on the levels of additional capacity provided by the Heathrow Airport Extended Northern Runway proposal, taking into account its runway, taxiway, stand and terminal infrastructure. The report also assesses the relationship between terminal space and forecast passengers to produce a metric of passenger experience.
14. Operational Efficiency: Preliminary Safety Review	CAA	CAA report on the likely safety issues associated with each scheme which would need to be addressed through detailed design work, and their level of severity.
15. Operational Risk		
15. Operational Risk: Ground Infrastructure Gatwick Second Runway	Leigh Fisher/Jacobs	Report on the ability of the Gatwick Airport Second Runway scheme to adapt to adverse events, such as severe weather, utility outages and terrorism.
15. Operational Risk: Ground Infrastructure Heathrow Airport North West Runway	Leigh Fisher/Jacobs	Report on the ability of the Heathrow Airport North West Runway scheme to adapt to adverse events, such as severe weather, utility outages and terrorism.
15. Operational Risk: Ground Infrastructure Heathrow Extended Northern Runway	Leigh Fisher/Jacobs	Report on the ability of the Heathrow Airport Extended Northern Runway scheme to adapt to adverse events, such as severe weather, utility outages and terrorism.
15. Operational Risk: Airspace Resilience	NATS	NATS report addressing the impacts of each scheme upon the UK airspace system's ability to react to major disruptive events.
16. Delivery		
16. Delivery: Risk Assessment and Mitigation	Airports Commission	Report on the major risks associated with each scheme, categorised as Strategic, Implementation, Legal and Planning, Commercial and Public Engagement, along with potential mitigations for those risks where identified.
17. Glossary	Airports Commission	Glossary of terms used throughout the Commission's consultation documents
17. PwC Compendium of Assumptions	PwC	Paper compiling a list of the assumptions used across the Commission's reports.

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