Airports Commission

# Airports Commission:

## Gatwick Airport Second Runway: Business Case and Sustainability Assessment

November 2014

An independent commission appointed by Government

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# Introduction

## Business Case and Sustainability Assessment – Gatwick Airport Second Runway

In its Appraisal Framework, the Commission set out its intention to construct a Business Case and Sustainability Assessment for each of the shortlisted schemes.

## Business Case

The Business Case provides an integrated assessment of the overall case for the Gatwick Airport Second Runway scheme.

The Components of the Business Case are as follows:

- **Strategic Case –** assessing the proposal's alignment with the *assessment of need* set out in the Commission's Interim Report, and providing an overview of its wider impacts, both positive and negative.
- **Economic Case –** assessing the value for money of the proposal, taking into account the full range of potential costs and benefits (including non-monetised as well as monetised impacts).
- **Financial and Commercial Case –** assessing the overall cost and sources of funding for the scheme and the risks around commercial deliverability, including discussion of the options for public sector contribution.
- **Management Case –** assessing the potential benefits realisation, risk management, contingency plans and structures that would enable robust management of delivery following the Commission's Final Report.

The results presented within the various cases represent the Commission's present judgement on the basis of the available evidence. This consultation seeks comment on these judgements, and the Commission will review them in light of responses received. As such these results may change between this consultation document and the Commission's Final Report.

## Sustainability Assessment

The Sustainability Assessment *provide information about the performance of the Gatwick Airport Second Runway scheme against a range of relevant indicators. In line with the principles of sustainable development, this includes examining the likely social, environmental and economic effects of the scheme.*

The Commission's intention is that should Government decide to use the recommendations in its Final Report as the basis for a future National Policy Statement, the information and analysis in the Sustainability Assessment would provide a useful foundation for the production of the associated Appraisal of Sustainability.

Judgements of performance within the Sustainability Assessment presented here reflect the Commission's present judgement on the information currently available. This consultation seeks comment on these judgements, and the Commission will review them in light of responses received. As such these impact level judgements may change between this consultation document and the Commission's Final Report.

The Sustainability Assessment is not intended to be a means of defining a total scheme impact (for example, through the process of summing predicted impacts). Neither does poor performance in one area or a number of areas imply that a scheme is not suitable for progression.

### Commission's approach to forecasting: passengers demand and carbon

The future development of the airline industry is inherently difficult to predict, particularly over a 60 year period. Therefore five possible scenarios of future demand have been constructed, building on the analysis presented in the Interim Report:

| | |
|---|---|
| **Assessment of need** | Future demand is primarily determined by central projections published by sources such as the Office for Budget Responsibility, OECD and IMF. |
| **Global growth** | Higher *global growth* in demand for air travel in the future, coupled with lower airline operating costs. |
| **Relative decline of Europe** | Higher relative growth of passenger demand in emerging economies in future and a strengthened position of Far and Middle Eastern aviation hubs and airlines. |

| | |
|---|---|
| **Low-cost is king** | Low-cost carriers strengthening their position in the short-haul market and capturing a substantial share of the long-haul market. It also sees higher passenger demand from all world regions and lower operating costs. |
| **Global fragmentation** | Economies adopting protectionist policies, with a decline in passenger demand from all world regions, coupled with higher operating costs. |

These scenarios are reflected in the Commission's passenger demand forecasts, and are used to inform the assessments undertaken in this consultation. None of these scenarios should be considered a 'central case'. Rather, by considering each scheme in relation to a range of potential futures, the Commission aims to test the robustness of its analysis, and ultimately its final recommendations to Government.

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 2 degrees Celcius and aims to ensure that a 4 degree Celcius global temperature increase is reached only with very low probability (less than 1%), but 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 37.5 $MtCO_2e$ – the level recommended by the Committee on Climate Change (CCC) as a planning assumption to achieve reductions across the whole UK economy of 80% over 1990 levels by 2050. These forecasts 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, such as under an EU Emissions Trading Scheme or any international global agreement to tackle these emissions).
- 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 then traded as part of a liberal global carbon market. In contrast to the carbon-capped forecast these do not constrain emissions to a pre-determined level, rather reflect the demand response to the Department of Energy and Climate Change's (DECC's) carbon values for appraisal.

The Commission has only considered aviation demand in a world without action to manage and reduce carbon dioxide emissions from aviation in one sensitivity test, explained in the report "Transport Economic Efficiency".

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.

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 or interactivity 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 37.5 $MtCO_2e$ 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 we know now – and thus reflects the CCC's concern that should aviation grow to 37.5 $MtCO_2e$, the implied near 85% reduction in the $CO_2e$ 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.

The other end of the range assumes action to tackle emissions from this international industry seeks the most globally economic efficient approach without reference to national boundaries or other concerns that characterise current international negotiations. The future will almost certainly lie between these two points, for example the agreement to inclusion of aviation emissions in the EU emissions trading system, but also the adverse international reactions to its full implementation illustrate this dynamic.

# Part 1: Business Case

# 1. Strategic Case

## Introduction

**1.1** The Airports Commission's Strategic Case comprises **(1)** a summary of how the scheme satisfies the Commission's *assessment of need* in terms of the (potential) capacity, connectivity and benefits of competition provided, and its impacts on passenger experience and the freight sector; and **(2)** a description of the wider economic, social and environmental impacts with reference to existing spatial and economic strategies.[1] This corresponds to the Strategic Case described by the Commission in the Appraisal Framework:

*Strategic Case – assessing the proposal's alignment with the assessment of need set out in the Commission's Interim Report, and providing an overview of its wider impacts, both positive and negative.*

**1.2** As such, the Strategic Case provides the Commission's overall **Strategic Fit** assessments, as outlined in the table below.

**Table 1.1: Airports Commission's Strategic Fit assessments**

| Objective | Questions to answer | Challenge to be addressed | How and where have we addressed it? |
|---|---|---|---|
| To provide additional capacity that facilitates connectivity in line with the *assessment of need* | **Q1:** Does the option provide additional capacity that facilitates connectivity in line with the *assessment of need*? What kind of connectivity may the option provide? | Demand for aviation is inherently uncertain so it is important to get the sense of the range of outcomes | **Part 1**: A set of global aviation scenarios testing a range of potential connectivity outcomes |

1 The details of the Commission's wider economic, social and environmental assessments are discussed in the Welfare Impacts section of the Economic Case.

| Objective | Questions to answer | Challenge to be addressed | How and where have we addressed it? |
|---|---|---|---|
| To improve the experience of passengers and other users of aviation | **Q2:** What kind of experience may the option offer to passengers and what kind of opportunities may it create for the freight sector? | Apart from number of destinations available to the passenger and the freight sector, frequencies of services and fare levels, other aspects of passenger experience and the needs of the freight sector are important considerations | **Part 1:** A review of how the infrastructure available and other characteristics of each of the options may impact passenger experience and the needs of the freight sector |
| To maximise the benefits of competition to aviation users and the broader economy | **Q3:** What kind of benefits of competition to aviation users and the broader economy may the option provide? | Providing extra capacity does not guarantee that it will be taken up by airlines and there are different potential scenarios of airline response | **Part 1**: A set of likely airline responses for each capacity expansion option and an assessment of impacts on connectivity and competition these responses could generate |
| To maximise benefits in line with relevant long-term strategies for economic and spatial development | **Q4:** How may the option fit with relevant long-term strategies for socio-economic and spatial development? | Providing extra capacity may interfere with previously established plans for affected constituencies or, conversely, it may also foster some goals set by these plans. In order to produce a recommendation, the Commission needs to have the full picture | **Part 2**: A qualitative assessments of the options against the relevant long-term strategies for economic and spatial development |

**1.3** The Commission's assessment of strategic fit draws particularly from the following documents:

- Strategic Fit: Forecasts
- Strategic Fit: Expanding Airport Capacity – Competition and Connectivity
- Strategic Fit: Fit with Wider Spatial and Socio-Economic Development Strategies

**1.4** The case also draws on a variety of other modules, including **Economy**, **Local Economy Impacts**, **Surface Access**, **Operational Efficiency** and a number of environmental modules. Findings arising from other modules regarding the financing and delivery of the scheme are also relevant to the case, but are chiefly captured through their impacts on **Delivery**.

**1.5** The Commission's **Strategic Case** does not precisely follow the Green Book format, but it at the same time replicates much of the function of the strategic case implied by the HM Treasury Green Book, in that it identifies how each of the short-listed proposals for airport expansion fit with the *assessment of need* set out

in the Commission's Interim Report and with national, regional and local policies, strategies and plans, thus providing a starting point for any Government-led strategic case assessments which might be prepared following the Commission's Final Report in the summer of 2015.[2]

## Part 1: Strategic fit with the Commission's *assessment of need*: strengths and weaknesses

### Q1: Does the option provide additional capacity that facilitates connectivity in line with the *assessment of need*? What kind of connectivity may the option provide?

**1.6** All three schemes fulfil the Commission's *assessment of need* set out in the Interim Report i.e. by 2030 they are capable of providing additional capacity equivalent to one net additional runway. This chapter sets out how the additional capacity provided by Gatwick Airport Second Runway would facilitate the potential future connectivity outcomes for UK aviation – at the expanded airport, in the London airport system and UK-wide airport network.

**1.7** Gatwick Airport's existing runway is currently operating at over 85% capacity, with limited room for further growth in ATMs. The airport has more scope to grow passenger numbers, through larger planes, higher load factors, and peak spreading from 35.4 million in 2013 to 45 million, which represents the limit of its runway capacity. The Airports Commission's forecasts indicate that across the full range of scenarios passenger numbers would approximately reach these capacity limits by the 2030s.

**1.8** Beyond that point, with no significant scope for further market growth, the Commission's forecasts suggest that Gatwick's passenger split would remain broadly one quarter long-haul, three quarters short-haul, although a marginal increase in the long-haul proportion would be seen over time as demand spills over from a constrained Heathrow. There would be a decline in short-haul routes served, particularly lower frequency routes, as airlines focus on the most profitable links and switch other services to alternative airports, and a small increase in frequency on long-haul routes, but not in the overall number. Domestic links would remain broadly static. This is similar to the pattern observed at Heathrow over recent years.

**1.9** The exception to this pattern, however, is the Commission's *relative decline of Europe* scenario in which the role of Europe's major hub airports is most effectively challenged by growing hubs and airlines from other world regions. In this scenario, with London increasingly providing a key spoke into major Middle and Far Eastern

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

hubs, Gatwick could provide an attractive alternative to a constrained Heathrow for long-haul carriers, although the airport would still remain predominantly a short-haul gateway.

**1.10** As the airport reaches its ATM and passenger capacity, other impacts would also be felt. The airport operator is at present working with NATS to increase the utilisation and resilience of its runway, but as high levels of utilisation are reached across the full day and year, it is still likely that increases in delays and unreliability will be felt, as scope for recovery is reduced. Passenger growth will see terminals and other facilities grow more crowded, and the Commission's analysis for its Interim Report suggested that fare increases would also be likely.

**1.11** The capacity and connectivity outcomes of expansion at Gatwick Airport (as for all the short-listed schemes) vary depending on the approach taken to managing carbon emissions. Therefore, this analysis treats the carbon-traded and carbon-capped scenarios separately.

### Carbon-traded

**1.12** Under any of the Commission's carbon-traded scenarios, an expanded Gatwick airport would grow into a major global airport carrying high numbers of passengers. At the upper end, under the *low-cost is king* and *global growth* scenarios, passenger numbers at the airport would exceed 90 million per annum by 2050. This is roughly equivalent to current passenger numbers at Atlanta, at present the world's largest airport. At the lower end, in the *global fragmentation* scenario, the airport would still see 68 million passengers per year by 2050.

**1.13** Passenger growth at the airport would drive significant increases in ATMs and destinations served at Gatwick. Under all but one scenario the airport would see at least 540,000 traffic movements per year – in excess of 95% capacity – by 2050, although the rate at which runway usage builds up varies across scenarios. The overall number of destinations served from the airport in 2050 would rise with expansion, reaching between 210 and 281 depending on the forecast scenario, of which approximately 55% would be higher frequency routes seeing at least a daily service. This compares to approximately 200 or fewer in 2050 without expansion.

**1.14** Passenger numbers and destinations at the airport across the Commission's five forecast scenarios together with Gatwick Airport Ltd's (GAL) forecasts are summarised in the table below.

**Table 1.2: Gatwick Airport Second Runway option, terminal passengers and destinations, Airports Commission's carbon-traded forecasts**

| Scenario | Passengers per annum (m) | | | | Destinations | | | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | 2030 | 2040 | 2050 | 2011 | 2030 | 2040 | 2050 |
| Assessment of need | 34 | 50 | 62 | 82 | 216 | 236 | 244 | 264 |
| Global growth | | 58 | 86 | 96 | | 253 | 276 | 281 |
| Relative decline of Europe | | 49 | 62 | 83 | | 202 | 208 | 224 |
| Low-cost is king | | 72 | 91 | 96 | | 269 | 260 | 254 |
| Global fragmentation | | 40 | 53 | 68 | | 187 | 197 | 210 |
| *Gatwick Airport Ltd forecasts* | | *65* | *83* | *95* | | | | |

Source: Airports Commission analysis.

**1.15** GAL's forecasts predict similar levels of passenger demand at the airport in 2050 as the Commission's *global growth* and *low-cost is king* scenarios, driven by significant growth in short-haul and low-cost traffic, including potential expansion by low-cost carriers into the long-haul market segment. GAL also assumes an increase in other long-haul carriers' presence at the expanded airport, which would offer an alternative option to a constrained Heathrow for accessing London's large origin-and-destination market. In contrast to the *global growth* scenario, however, it does not assume that an airline alliance would move from Heathrow to Gatwick.

**1.16** The largest increases in passenger numbers and destinations at Gatwick are seen in the Commission's *global growth* scenario, driven by high global economic growth rates and lower operating costs for airlines. A significant increase in destinations is also seen in the *assessment of need* scenario, in which aviation demand is forecast to grow broadly in line with central projections, whereas in the *relative decline of Europe* scenario a similar level of passenger demand is spread across fewer destinations (although with higher numbers of long-haul routes, driven by growth at Middle and Far Eastern hubs). The lower level of passenger growth in the *global fragmentation* scenario leads to a slower increase in the airport's route network.

**1.17** In each of these scenarios, although growth is seen in long-haul seat capacity, more significant changes are seen only in the *low-cost is king* scenario, driven in particular by the expansion of the low-cost sector into long-haul markets. Long-haul passenger numbers rise higher than short-haul by 2040 and interlining passengers increase significantly at the airport. This leads to the number of long-haul routes at Gatwick rising to more than 100, compared to a maximum of 68 in any other

scenario. In parallel, the number of short-haul routes declines at Gatwick, although the majority continue to be available elsewhere in the London system.

**1.18** The Airports Commission forecasts do not suggest that the number of domestic routes into London airports would change significantly compared to the baseline with Gatwick expansion, although it would clearly create opportunities for additional routes to be established if growth in the domestic market were to prove stronger than forecast or if specific measures were taken to incentivise improvements in domestic connectivity.

**1.19** Gatwick expansion is, however, forecast to support slightly higher numbers of domestic passengers to London and, as Gatwick would continue to serve a higher number of domestic routes than Heathrow, expansion at Gatwick would also provide benefits for regional connectivity. In particular, in those scenarios in which Gatwick's long-haul route network grows significantly, additional connecting opportunities for domestic passengers would be available, including for those making use of low-cost routes to the airport.

**1.20** At the national level, a second runway at Gatwick would facilitate growth in capacity and connectivity, with both seat capacity and the overall size of the UK route network (measured in seat-kms) growing compared to the baseline.

**1.21** The most significant increases are seen in the *low-cost is king* scenario, where strong long-haul growth at Gatwick is combined with high levels of growth in short-haul capacity and connectivity at other airports, delivering some 67 million more seats than the baseline in 2050 (including some 9 million more seats to emerging markets) and an increase in the overall route network of circa 175 billion seat-km.[3] Increases in other scenarios range from 13-39 million seats and 34-112 billion seat-km.

**1.22** All the carbon-traded expansion scenarios entail increases in carbon emissions from aviation above 37.5 $MtCO_2e$ (the Climate Change Committee's recommended planning assumption to ensure the UK can meet any future emissions reduction commitments). This is set out in the table below.

**Table 1.3: Gatwick Airport Second Runway option, Airports Commission's carbon-traded forecasts of UK aviation emissions in 2050 ($MtCO_2e$)**

| CCC Advice | Assessment of need | Global growth | Relative decline of Europe | Low-cost is king | Global fragmentation |
|---|---|---|---|---|---|
| 37.5 | 40.8 | 49.4 | 43.7 | 50.6 | 38.7 |

Source: Airports Commission analysis.

3 Destinations classed as 'newly industrialised countries' and 'less developed countries' in the DfT model.

**1.23** 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 49.4-50.6 $MtCO_2e$. 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.

## Carbon-capped

**1.24** In the Commission's carbon-capped forecasts, emissions from aviation are constrained to approximately 37.5 $MtCO_2e$ in 2050. This means that levels of growth in aviation are reduced compared to the carbon-traded scenarios in both the baseline and expansion forecasts. Nonetheless, even with carbon emissions constrained, an expanded Gatwick would still see significant growth in usage, reflecting its attractiveness to passengers.

**1.25** Growth in passenger numbers at the airport would also drive growth in its overall route network, with significant increases over both the current route network and the baseline across the majority of scenarios, as seen in the table below.

**Table 1.4: Gatwick Airport Second Runway option, terminal passengers and destinations, Airports Commission's carbon-capped forecasts**

| Scenario | Passengers per annum (m) | | | | Destinations | | | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | 2030 | 2040 | 2050 | 2011 | 2030 | 2040 | 2050 |
| Assessment of need | 34 | 46 | 56 | 69 | 216 | 225 | 240 | 258 |
| Global growth | | 44 | 49 | 60 | | 231 | 224 | 233 |
| Relative decline of Europe | | 42 | 49 | 61 | | 196 | 198 | 203 |
| Low-cost is king | | 53 | 78 | 86 | | 243 | 251 | 248 |
| Global fragmentation | | 39 | 50 | 63 | | 187 | 194 | 206 |

Source: Airports Commission analysis.

**1.26** The exceptions, in which the airport's overall number of routes reduces compared to the present day (although it is still higher than the 2050 baseline in both cases) are *global fragmentation* and *relative decline of Europe*. In both of these, higher passenger numbers tend to drive higher frequencies on existing routes, with stronger growth in routes with a daily service than in the overall network. The highest growth in the number of destinations, concentrated in Gatwick's core short-haul point-to-point market, is seen in the *assessment of need* scenario.

**1.27** In contrast to the carbon-traded equivalent, the carbon-capped *global growth* scenario sees one of the lower rates of growth at the airport. This reflects higher levels of long-haul demand, particularly at Heathrow, driven by strong global economic growth, entailing significant reductions in short-haul traffic to keep emissions to 37.5 $MtCO_2e$ in 2050. A similar split of demand between long-haul and short-haul services is seen in the *low-cost is king* scenario, but as low-cost carriers enter the long-haul market, Gatwick retains much a higher proportion of overall demand.

**1.28** As with the carbon-traded scenarios, the number of domestic routes into London airports would see limited change, but space could be created to establish new routes in the event of strong market growth and Gatwick's strong links to regional airports would ensure effective access to the airport's enhanced route network and new interlining opportunities for domestic passengers.

**1.29** At the national level, only very limited overall change in network size is seen, as carbon emissions are closely correlated with seat kilometres. Across all but one scenario, however, expansion at Gatwick supports some level of rebalancing towards long-haul connectivity compared to the baseline. This effect can be seen most strongly in the *low-cost is king* scenario, in which domestic and long-haul connectivity expand significantly, but are balanced by a noticeably lower level of growth in the short-haul market. The key exception is the *relative decline of Europe* scenario, in which the UK's attractiveness as a long-haul destination is reduced, enabling significantly higher growth in short-haul.

**1.30** All of the carbon-capped scenarios keep carbon emissions from aviation within the range 37.4-37.6 $MtCO_2e$ in 2050, consistent with the Climate Change Committee's advice.

### Q2: What kind of experience may the option offer to passengers and what kind of opportunities may it create for the freight sector?

### Passengers

**1.31** Since the current owners bought Gatwick in 2009, there have been a number of developments at the airport aimed at improving passenger experience. These include both terminal and runway optimisation programmes, such as speeding up passenger security procedures, a runway efficiency improvement programme to accelerate aircraft turnaround and enable a maximum of 55 aircraft movements per hour, and assistance for self-connecting passengers through the 'Gatwick Connect' scheme. Improvements to security have mainly been focused on the South Terminal, with the deployment of 'smart lanes'. Both Gatwick terminals will also be

redeveloped to "Generation 2" standard soon. Across the entire airport's terminal space, Gatwick currently holds a mid-range Space Planning Factor[4] of 30m$^2$/ Demand Hour Passengers (DHP), which is comparable to other European airports serving similar passenger segments.

**1.32** The airport has its own station close to the South Terminal on the Brighton Mainline, which is served from London by both Gatwick Express and Southern services from Victoria and Thameslink services from London Bridge and St Pancras. Passengers therefore have some ability to make trade-off decisions between fare, journey time and comfort. There are also some services connecting Guildford from the west and Brighton and other south coast destinations from the south. Given its location south of London, passengers from a number of regions must travel through or around London to reach the airport. A spur of the M23 provides road access from the M25, London and by extension destinations from the north and west. Coach services run to various national destinations with over 500 daily arrivals and departures.

**1.33** Recent CAA survey results estimated that 85% of passengers at Gatwick were positive about their airport experience[5]. As Gatwick underpins in its scheme design submitted to the Airports Commission, its passenger experience scores have improved and remained high since the transfer of ownership from BAA in 2009.

**1.34** Under the five Commission demand scenarios, without expansion, there is a forecast growth of passengers from 35.4m in 2013 to 41[6]-47m by 2030. The current terminals have capacity for 42 million passengers per annum (mppa), which could be optimised to give at least 45 mppa. However as passenger numbers increase it is likely that, in the absence of further improvements, queuing would exceed current levels at peak times, although it would the effect would be less noticeable off-peak.

**1.35** In respect of surface access, one of the most significant planned improvements will be to Thameslink services, beginning from 2018, which will eventually provide trains to London from the airport every 2½ minutes, with services divided between Victoria and London Bridge (and to further destinations north of London including Luton, Bedford, Cambridge and Peterborough). The interchange between these improved Thameslink services at Farringdon with the newly-opened Crossrail will benefit both City passengers and those travelling from Canary Wharf. It will also be of benefit to a wider collection of passengers travelling along the west-east axis

4 The gross terminal floor area per design hour passenger, i.e. a standardised measure of the typical space available to passengers in a given airport.

5 Civil Aviation Authority (2013) CAA Passenger Research: Satisfaction with the Airport Experience: Heathrow, Gatwick and Stansted.

6 These forecasts are under carbon-capped and carbon-traded respectively.

of Crossrail. All services will have a mix of standard and first class seating and a range of fast and stopping services, catering to different market segments. The Commission's Interim Report also recommended enhancements to Gatwick Airport station to be realised regardless of the expansion proposal.

**1.36** For other transport modes, 'smart motorway improvements' to the M25 and M23 will benefit passengers travelling by car and coach passengers; the removal of tolls on the Dartford crossing is also expected to reduce congestion and thus also journey times. These improvements would happen regardless of airport expansion but will still have a beneficial effect on passenger experience upon the construction of a second runway.

**1.37** Beyond the core transport improvements which are planned to be implemented without expansion, the promoter plans to convert the existing rail station into a multi-modal 'Gateway', serving as an improved interchange between coaches, trains and the terminals, supported by an extended landside rapid people mover to quickly transfer passengers to the appropriate terminal.

**1.38** Specific to the runway proposal are plans for upgrades to the South Terminal and construction of the new terminal. Both existing terminals would be upgraded to handle a greater influx of passengers, with improved security screening and automatic-boarding. A third midfield terminal would then be built in phases to accommodate further passenger growth. The new terminal and its satellite would be connected by an airside rapid people mover. For inter-terminal connections on traditional through-tickets, passengers would be required to travel on an airside bus. For self-connecting passengers, it is proposed that there will be improvements to Gatwick Connect to incorporate more carriers and enable luggage to be automatically transferred without the passengers' involvement. This would occur via manual transport as no automated transfer facility is planned between terminals.

**1.39** A potential risk of Gatwick's terminal infrastructure is the construction of relatively thin terminals and satellites, which will have a Space Planning Factor of 29$m^2$/DHP, a slight reduction from the present. During the phased construction there is likely to be some disruption as the temporary facility will not handle security and check-in, potentially leading to some delays at the existing terminals, unless these procedures could be significantly streamlined and accelerated. Whilst this would be improved come the completion of the new terminal, it could nonetheless present some intermediate problems following the construction of the southern runway.

**1.40** All terminals would continue to use 'closed' gates, whereby departing passengers wait in one area before boarding instead having access to the entire departure lounge. This can expedite aircraft boarding and help facilitate quick aircraft

turnarounds, but may create some inconvenience to passengers in terms of reduced seating space and access to other facilities.

### The freight sector

**1.41** Gatwick Airport currently hosts a moderately sized air freight operation, handling 98,000 metric tonnes of freight during 2013, significantly less than Heathrow, Stansted and East Midlands, but on a par with Manchester and substantially more than other UK airports. Air freight at Gatwick is carried entirely in the bellyhold of commercial passenger aircraft, with no dedicated cargo aircraft currently using the airport.

**1.42** Expansion at Gatwick may produce benefits for the air freight sector, though this would be dependent to some extent on changes to established operations within that sector. The availability of more slot capacity provides both the potential for more 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. Freight and logistics companies operating dedicated cargo aircraft may also choose to make use of spare capacity at the site to increase dedicated freighter operations, although commercial factors relating to slot prices and aero charges might potentially act as a constraint upon this. Should most growth emerge from the low cost sector, then any prospective cargo benefits may be reduced, because currently few low-cost airlines carry bellyhold freight. This is because doing so makes it more difficult to achieve a rapid turn-around time on stand. Changes in low-cost business models such as growth in low-cost long-haul may alter this to some degree.

**1.43** There is currently only a limited freight handling and forwarding presence on or around the Gatwick site. Any significant growth in the cargo sector at Gatwick would require significant investment by third parties in the provision of these facilities. Sufficient space exists around the proposed Gatwick Airport Second Runway masterplan for the provision of these facilities, but the commercial factors that would determine their success are difficult to appraise with any degree of certainty at present.

### Q3: What kind of benefits of competition to aviation users and the broader economy may the option provide?

**1.44** Expanding Gatwick would increase the airport's capacity to 560,000 ATMs per year and its peak-hour capacity from 55 to 98 ATMs per hour. Such an increase in capacity would enable Gatwick to facilitate a range of different airline operations. This could see Gatwick continuing to operate as a predominantly point-to-point airport, or to

combine point-to-point services with a hub operation, potentially of a size similar to the hubs in Rome or Copenhagen. The future airline response to the capacity increase and, in turn, connectivity offered by the airport depends on the development of global trends that are captured under the five Airports Commission scenarios that are set out in the introduction to this document.

**1.45** Based on the analysis of the London airport system and key drivers of airline behaviour, the Commission has identified three different feasible airline responses to expansion of Gatwick Airport.

- **Airline response 1: Hub operation at Heathrow and a competing hub operation at Gatwick**
  As the London market is one of the largest and strongest aviation markets in the world, the Gatwick capacity expansion option could trigger an incumbent UK or a foreign network carrier to use the new capacity to establish a hub operation at Gatwick, although this is considered the least likely of the three airline responses. Such a response is more likely in a future characterised by high-levels of growth of demand for aviation focused on network carriers (*global growth*). This response would also be more likely if the new hub carrier at Gatwick benefitted from lower charges in comparison to the hub carrier at Heathrow. The incumbent and its partners would then continue their hub operations from Heathrow. Due to persistent capacity constraints, the focus of Heathrow would become increasingly on long-haul, high-capacity flights with a growing share of local origin-and-destination traffic. The legacy point-to-point segment at Gatwick would be likely to grow modestly with more routes served. Low-cost and leisure carriers would continue to operate out of Gatwick and benefit from the increase in capacity.

- **Airline response 2: Partnerships – Gatwick becomes a low-cost 'gateway', Heathrow remains the network hub**
  The most likely airline response to Gatwick's expansion across all Airports Commission scenarios is that of Gatwick becoming a low-cost gateway, where point-to-point traffic is mixed with connecting traffic. This airline response assumes legacy network carriers and low-cost carriers (of which some start to operate in the long-haul market) building partnerships to facilitate connections between flights at the airport. This could take place either through a new alliance, codeshare formula or by an airport-led connection strategy ('Gatwick Connect'). While Heathrow would continue to operate as a hub for the incumbent hub carrier and its partners, some of the other long-haul carriers would increasingly focus network growth at Gatwick, benefiting from feeder traffic provided by low-cost carriers and availability of capacity.

- **Airline response 3: Gatwick point-to-point growth, Heathrow remains the network hub**

  This airline response is most likely under more pessimistic scenarios for European network carriers relative to other foreign network carriers and low-cost carriers i.e. *relative decline of Europe* and *global fragmentation*. It assumes that low-cost carriers take up most of the capacity at Gatwick but do not implement any specific measures to stimulate connecting traffic. The growth of low-cost carriers at Gatwick could partly comprise "autonomous growth" and partly migration of flights from Stansted and Luton to Gatwick, depending on the fare levels at the airport. A number of low-cost, long-haul destinations are assumed to be developed, supported by the growing inbound leisure market from Asia. Over time, an increasing share of the additional capacity at Gatwick will be used by carriers that currently operate at Heathrow but see Gatwick as more cost effective. This may free-up some capacity at Heathrow, which can be used by the hub carrier and other network carriers. As with airline response 1, as capacity shortages remain at Heathrow, its focus will increasingly be on high-capacity flights to thick long-haul destinations.

**1.46** The different airline responses will have varying impacts on connectivity, competition and reduction of airline rents to users of aviation. That applies particularly to the long-haul market where network carriers have a greater scope to deliver extensive route networks through hub connectivity. Long-haul routes are currently predominantly served from Heathrow and to a limited extent from Gatwick, as opposed to the short-haul routes, both domestic and within Europe, which can theoretically be served by different airline business models and which are already well served from all London airports and from regional airports throughout the UK.

**1.47** The Gatwick scheme's strengths lie predominantly in its potential impacts on competition through unlocking the potential of low-cost carriers to deliver competing short-haul and to some extent long-haul connections at a lower price to the consumer.[7] The extent to which these benefits of competition would be realised, particularly in the long-haul market, depends on how airline business models evolve in the future and the extent to which demand for aviation will shift towards inbound traffic. The costs of operation at an expanded Gatwick would also play a role. In a future world in which low-cost airlines capture a substantive market share of long-haul travel through utilisation of a new generation of aircraft and catering for rising numbers of inbound passengers coming to Europe from the emerging world, the need for hub capacity to sustain large long-haul route networks may diminish.

7 GAL commissioned Oxera to estimate the benefits of such competition. Oxera has estimated a direct competition benefit from expanding Gatwick of between £7.7 billion and £10.4 billion by 2050. Details of the study can be found in GAL's submission.

**1.48** If that future materialises, expanding Gatwick would potentially deliver substantial connectivity benefits, both in the short-haul and the long-haul market, most likely through a low-cost gateway in which low-cost and legacy carriers build a partnership to foster long-haul connectivity.[8] In a more pessimistic future for aviation (*relative decline of Europe*, *global fragmentation*) in which an expanded Gatwick would serve as an airport serving point-to-point connections, the benefits of competition in the long-haul market would not be realised to the same extent. The Commission's forecasts suggest that the number of business passengers using Gatwick is likely to be highest when significant growth in long-haul connectivity is seen at the airport, although it remains dominated by leisure travel under any scenario.

**1.49** The potential of Gatwick expansion to reduce fare levels due to constraints in the London airport system is expected to be lower than at Heathrow across all scenarios as excess demand (i.e. a situation in which the market demand for flights from a particular airport is greater than the market supply, this causing higher ticket prices) at Gatwick is currently relatively lower than that at Heathrow. Releasing constrained capacity at Gatwick would nevertheless have a beneficial impact on the level of fares, although this might be countered by any increase in costs of operation. Expanding Gatwick could also create choice for UK residents hubbing from the regions by providing them with a wider range of alternatives for accessing long-haul routes.

8 GAL's submission indicates that expanding Gatwick would result in substantial connectivity improvements, especially in those future scenarios that assume successful low-cost long-haul operations. GAL considers such scenarios to the most likely, see: CTAIRA (2014) supply side considerations: Perspective arising from the Airports Commission's Interim Report.

# Part 2: Wider economic, social and environmental impacts: Opportunities and threats

## Q4: How may the option fit with relevant long-term strategies for socio-economic and spatial development?

### Local assessments

*Growth of employment*

**1.50** A key positive impact at the local level from expansion at Gatwick would be job creation in the local economy. Commission forecasts suggest that across the full range of scenarios, between 200 and 23,600 jobs would be supported by 2030, rising to between 7,900 and 32,500 by 2050.

**1.51** At the higher end of the forecast, this presents a good opportunity for employment within the local area, defined as the 15 local authorities and the Gatwick Diamond. This is exemplified in the Crawley local plan's aim "to ensure economic growth is achieved through the consolidation and enhancement of the existing employment areas", where airport-related activity makes up 75% of all employment. The lower end demand scenarios for Gatwick, combined with strong productivity improvements at the airport, see limited job creation, with potentially 200 additional jobs created by 2030.

**1.52** The largest proportion of Gatwick employees, around a third, live in the Borough of Crawley, whose Local Plan acknowledges the positive impact on the town's economy. As well as employment directly at the airport, growth in indirect and induced jobs associated with expansion would be likely to align well with Crawley's existing strengths in the distribution, hospitality, transport, communications and finance sectors. The potential employment impacts of expansion at Gatwick are also supported by relevant Local Enterprise Partnerships and by the Gatwick Diamond group, as described below.

**1.53** There is significant flexibility in local labour markets, with a high level of commuting over distance, which suggests that there is little risk that the jobs created by Gatwick expansion could not be absorbed within the local area and wider region.

*Pressure on housing demand and infrastructure*

**1.54** Commission forecasts include demand for a range of housing developments in the event of expansion. These range from zero to 18,400 additional households that would be needed to accommodate the direct, indirect and induced employment created by 2030. Further social infrastructure such as schools and GP surgeries would also be required.

**1.55** A number of local councils, including both Crawley and Croydon, have identified challenges in meeting existing housing targets and any additional homes required to facilitate expansion at Gatwick would exacerbate this. However, the additional housing required is not of a scale which is likely to significantly increase these pressures, given the potential timescales for delivery and the number of local authorities affected.

**1.56** New housing would need to be sited responsibly, and with respect for present developments, especially should the upper-end demand scenarios be realised. This may require increasing housing density to reduce land requirements.

**1.57** Expansion at Gatwick would likely require the loss of a number of homes and community facilities. While the overall number is relatively small, this would need to be carefully managed and appropriate mitigations put in place.

*Environment and land*

**1.58** Expansion will necessitate a number of impacts on the local environment. For example, there will be impacts from the increased air traffic movements in terms of noise and local pollution, land take for the construction of the runway and expansion of the airport site, and impacts on local ecosystems. These will generally be in conflict with existing local plans which seek to minimise these impacts.

**1.59** It is forecast that a second runway will increase the numbers of those under flight paths affected by noise. Although aircraft noise is only specifically mentioned by Tandridge and Mole Valley District Councils in their local strategies as a problem for local residents, any increase in noise levels as a result of expansion is likely to be of wider concern. More construction and land take for the airport site may reduce the general ambience of areas north of Crawley, and there would be necessary changes to watercourses for the scheme. Local air quality would also be affected from the increase in aircraft movements. Conversely, expansion at Gatwick would have limited impacts on the Green Belt land and is not forecast to have any substantial impacts on flood risk.

**1.60** However, effective mitigation strategies could reduce the environmental impact of the proposals. Gatwick Airport Ltd have suggested an extended noise compensation scheme covering all households within the 57dB $L_{Aeq}$ contour. This would entitle them to annual compensation equivalent to Band A Council Tax (£1,000). Further optimisation of flight paths may also improve the overflight noise for residents, including the provision of respite periods for different areas; for example the promoter has also suggested that night operations could be grouped onto the airport's northern runway, further from the large population centre of Crawley.

**1.61** Some mitigations will help the local environment. In particular, the deculverting of 600m of the River Mole, returning it to a more 'natural' state, would have a positive environmental impact.

## Regional and wider impacts

*Regional*

**1.62** The need to grow the economy to support prosperity for a growing population is identified in national and regional development strategies. Investment in transport infrastructure where a need is identified is acknowledged as a key enabler of economic growth.

**1.63** Expansion of Gatwick airport could create further opportunities for growth within the 'Gatwick Diamond' which links Brighton, Tunbridge Wells and Croydon amongst others. Increased international connectivity in the local area could strengthen opportunity to diversify the local economy and strengthen knowledge-based industries. This is recognised in existing plans and strategies.

**1.64** Expansion at Gatwick is supported by both the South East and Coast to Capital Local Enterprise Partnerships' strategies, with the latter highlighting Gatwick's role in attracting businesses to East Sussex and noting that expansion would enhance this role. The Coast to Capital Local Enterprise Partnership has been active in its support for a second runway at Gatwick, but notes that this should be accompanied by appropriate investment in housing and other infrastructure.

**1.65** Gatwick's location to the South of London may limit its accessibility to northern and midlands regions, although improvements to surface access may mitigate this to some degree. These include the extension of direct rail services to Peterborough and Cambridge via the East Coast Main Line, and enhanced access to HS2 via the link to Crossrail at Farringdon. This would see the airport significantly widen its catchment area by public transport, although road access to the north would remain a weakness.

*London*

**1.66** London plays a particular role in contributing to the national economy. London's role as a global city, with strong international trade links, an international workforce, a strong record as an international exporter of services and a major tourism destination is identified as a strategic strength. Suitable international aviation links are vital to this role and increasingly constrained airport capacity in London and the South East could pose a threat.

**1.67** Expansion of Gatwick airport could provide an opportunity for London and its surrounding region to play to its strategic strength as a global city in the years ahead, supporting economic growth. Expansion at Gatwick could provide an opportunity for London to continue to benefit from a competitive network of international airports serving different markets and geographical catchment areas and may result in a greater dispersal of long-haul services, potentially increasing choice for passengers. In particular, Gatwick's strength in the low-cost market, which is increasingly used by business travellers, could bring significant benefits, particularly in those scenarios where growth in low-cost long-haul is seen. Conversely, the lower levels of growth in long-haul routes at Gatwick in other scenarios may limit these effects to some degree.

**1.68** By providing a second major gateway into the capital alongside Heathrow, expansion at Gatwick could provide improved access to aviation, including long-haul services to the extent that these are supported, from a wide range of areas of the city, particularly given the strong rail links to north east and north west London (areas not directly connected to Heathrow) via the enhanced Thameslink franchise.

**1.69** Gatwick airport is closely connected to the Croydon Opportunity Area identified in the London Plan. Expansion at Gatwick could also afford an opportunity to Croydon to achieve its strategic goal to act as an 'Airport City' – capitalising on its location close to Gatwick and other airports to act as a strategic interchange. The London Plan also includes a commitment to support key corridors, including the Wandle Valley corridor which runs through South London and Croydon towards Gatwick.

**1.70** A direct connection to Crossrail at Farringdon would provide enhanced access from the airport to other Opportunity Areas along London's east-west access, including the Lower Lea Valley (Stratford) and Old Oak Common, as well as to Canary Wharf.

# 2. Economic case

## Introduction

**2.1** The Airports Commission's appraisal framework sets out the purpose of the economic case as "assessing the value for money of the proposal, taking into account the full range of potential costs and benefits (including non-monetised as well as monetised impacts)."

**2.2** The document sets out a summary of the analysis, methods and initial views of the Airports Commission on the economic case for airport expansion in the form of a Gatwick Airport Second Runway. In constructing this case the Commission has been mindful of the need to ensure a fair and comparable assessment of all short-listed schemes. It has used methods for assessment from standard appraisal guidance such as HM Treasury Green Book and the Department for Transport's (DfT) WebTAG and supplemented these analyses with more novel approaches, both quantitative and qualitative, to better understand and account for the potential impacts of airport expansion.

**2.3** In its Interim Report the Commission concluded there was a need for one net additional runway in the South East by 2030. The analysis behind this assessment included studying connectivity, airline operating models, demand forecasting and estimating the economic impacts of having a capacity constraint in place. The economic analysis led the Commission to conclude that the cost to the economy of having a capacity constrained system compared to a completely capacity unconstrained system were as follows in Table 2.1.

**Table 2.1: Interim Report economic analysis findings**

| Impact | Cost of a capacity constraint (Present Values 2021-2080 in 2013 prices)[8] |
|---|---|
| Direct transport economic efficiency cost | £15-18bn |
| Delay costs | £5.1bn |
| Wider economic costs | £30-45bn |

Source: Airports Commission analysis.

9 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/266670/airports-commission-interim-report-appendix-3.pdf

**2.4** The analysis undertaken in phase two of the Commission's work is scheme specific and considers the benefits and dis-benefits associated with each scheme, as set out in the Airports Commission's Appraisal Framework.[10]

**2.5** There are many ways to weigh up the pros and cons of airport expansion ranging from the commercial assessment for an investor to the broader societal impact assessment that would normally be expected to accompany a government spending decision.

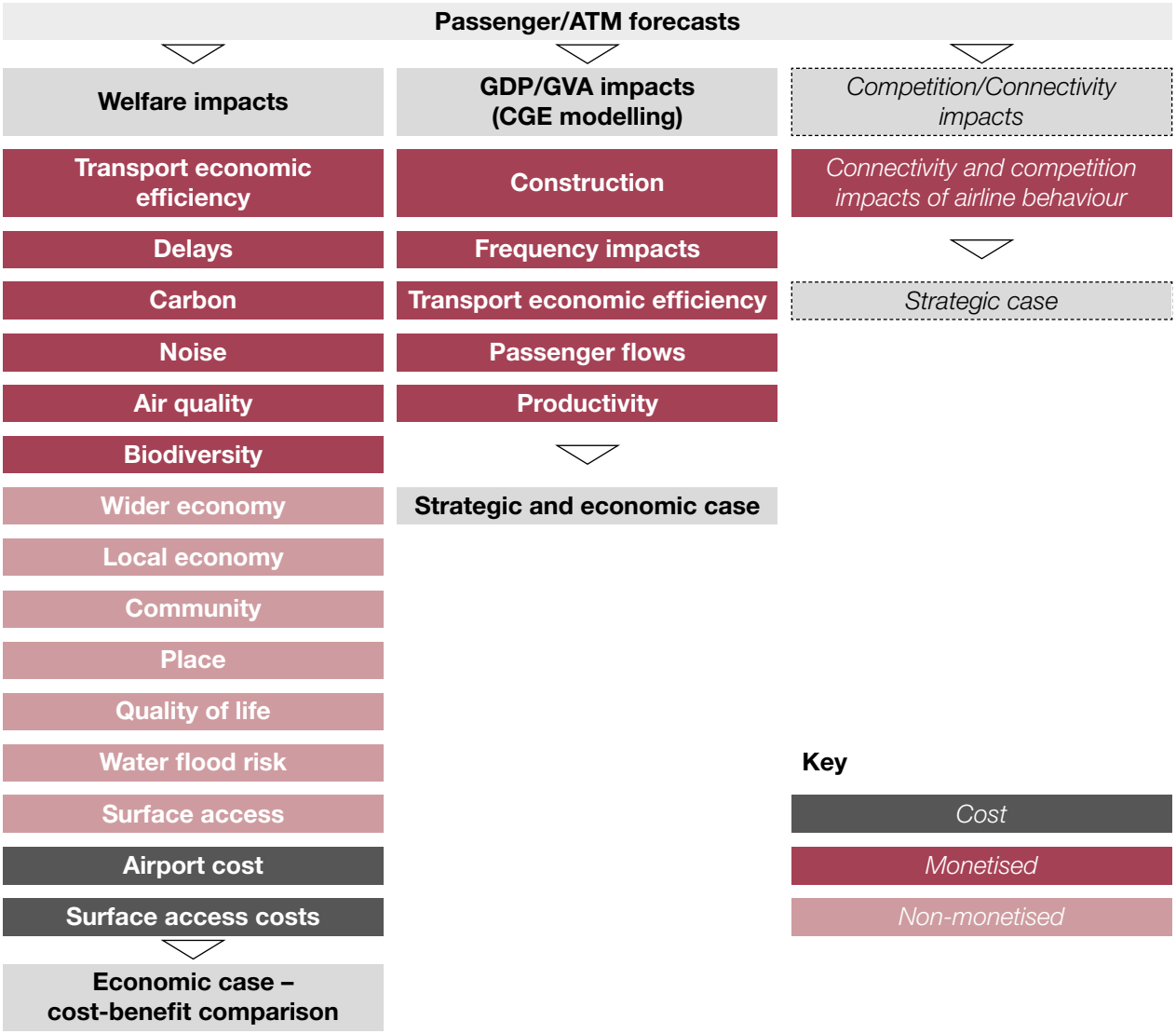
**2.6** Although the Commission is not defining relative contributions it is likely that a large proportion of the total scheme cost will be privately funded, though some elements of the proposal, notably the associated improvements to road and rail access to the airport, could require the investment of public funds. The commercial merits of the scheme are considered under the financial and commercial case. The varied nature of the sources of funding raise questions about the suitability of established government appraisal methods which normally deal with schemes where the majority of funding is public.

**2.7** In order to undertake an economic assessment, the Commission have approached the appraisal from both a microeconomic and macroeconomic perspective. This dual approach draws on some methods used by Government but also considers a wider perspective, giving the Commission a richer picture of the possible impacts. We have also noted in Figure 2.1 how airline responses to an increase in capacity may impact upon competition and connectivity which the Commission is considering under the strategic case,[11] alongside a range of wider impacts including on connectivity, passenger experience and spatial development. Figure 2.1 depicts the approaches and assessments underlying each.

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

11 SEO Economics are undertaking work in this area which will be released soon after the publication of the Commissions Consultation. The Commission remain interested in this subject and plan to undertake further work in the future.

## Figure 2.1: Economic appraisal framework




**2.8** The microeconomic approach on the left hand side includes many areas which would normally be included in a government appraisal of such a scheme, where the cost and benefits are weighed against each other. The Commission's analysis here is largely consistent with guidance broadly outlined in DfT's WebTAG[12] and the HM Treasury Green Book[13] and incorporates a large number of inputs, drawn from across the appraisal framework, to build a picture of the scheme's welfare impacts. Some of these impacts are also covered in the strategic case, such as surface access and local economy.

**2.9** The macroeconomic approach in the centre of this diagram is more innovative, using a Spatial Computable General Equilibrium (S-CGE) model, which allows a better understanding of the impact on the whole economy in terms of changes

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

13 https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

in Gross Domestic Product (GDP) or Gross Value Added (GVA) as a result of the scheme. This approach is novel and there are a number of uncertainties over the causation and scale of these impacts. Therefore, the results should not be treated as definitive, but rather as providing an indication of the ways in which investment in enhancing aviation capacity and connectivity can support economic growth. The GDP impact figures do not include any dis-benefits associated with impacts upon the environment and wider society.

**2.10** The welfare and GDP approaches provide different perspectives on the potential impacts of airport expansion, as does the competition and connectivity work outlined in the strategic case, and one should not be considered additional to the other, rather they should be viewed at this point as complementary methods for understanding the impacts.

**2.11** In respect of the economic case, each scheme has been assessed against the same 'do minimum' set of demand forecasts, which establishes what would happen if no new long-term capacity infrastructure is developed, under five demand scenarios. The 'do minimum' option was developed using the Commission's version of the DfT aviation forecasting model, which was extensively updated by the Commission in phase one in response to comments to its Demand Forecasting discussion paper.[14] The latest forecasts underpinning the appraisal can be found in the "Strategic Fit: Forecasts" report.

**2.12** A scenario based approach is taken to assess the scheme. The future development of the airline industry is inherently difficult to predict, particularly over a 60 year period. Therefore five possible scenarios of future demand have been constructed, building on the analysis presented in the Interim Report. Details of these scenarios, and different approaches to handling carbon emissions, can be found in the introduction to business case.

**2.13** The forecast outputs are described in the strategic case, for both carbon-capped and traded systems and are set out in detail in the document, "Strategic Fit: Forecasts". These also form the basis for this economic appraisal. The rest of the economic case summarises results for each relevant area of the scheme assessment. All the outputs here have been drawn from the analysis produced by the Airport Commission and its advisors and further detail can be found in the technical reports.

14 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/73143/aviation-demand-forecasting.pdf

**2.14** Table 2.2 below summarises which appraisal results have been calculated. This shows which assessment will be monetised in this case and which are analysed on a qualitative and quantitative, but non-monetised, basis.

### Table 2.2: Appraisal results presented in the economic case

| Appraisal results | Assessment of need | | Global growth | | Relative decline of Europe | | Low-cost is king | | Global fragmentation | |
|---|---|---|---|---|---|---|---|---|---|---|
| Carbon traded (CT)/ capped (CC) | CT | CC | CT | CC | CT | CC | CT | CC | CT | CC |
| Monetised | | | | | | | | | | |
| Transport economic efficiency | Y | | Y | | Y | | Y | | Y | |
| Delays | Y | | Y | | Y | | Y | | Y | |
| Noise | | Y | Y[14] (LHR) | | | | Y[14] (LGW) | | | |
| Air quality | | Y | | | | | | | | |
| Carbon emmissions | | Y | | Y | | Y | | Y | | Y |
| Biodiversity | | Y | | | | | | | | |
| Scheme and surface access cost | Y | Y | Y (LHR) | | | | Y (LGW) | | | Y |
| Non-monetised | | | | | | | | | | |
| Wider economic impacts | | | | | | | | | | |
| Surface access | | | | | | | | | | |
| Quality of life | | | | | | | | | | |
| Community | | | | | | | | | | |
| Place | | | | | | | | | | |
| Local economy | | | | | | | | | | |
| Water and flood risk | | | | | | | | | | |

**2.15** It has not been possible to assess the transport economic efficiency or wider economic impacts under a carbon-capped forecast. This is because carbon prices are much higher in the scheme option than the 'do minimum' 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 that the same technology is in use, 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 aircrafts. This risks implying greater dis-benefits attached to cutting carbon than may be realistic.

15 Noise disbenefits under these scenarios have not been monetised, but a quantified noise assessment has been carried out to understand the differential impact compared to the *assessment of need* carbon-capped case.

**2.16** To test the sensitivity of its economic analysis to more stringent measures to control carbon emissions, the Commission has tested the impact of DECC's high carbon price on its calculations of transport economic efficiency benefits, as opposed to the central carbon price used as the basis for its carbon-traded scenarios.

**2.17** What is also clear from the carbon-traded forecasts is that the carbon emitted by the sector in 2050 is above the CCC's planning assumption in both the baseline and 'do something' options for all scenarios. In the upper end scenarios, (*global growth* and *low-cost is king*) baseline emissions are more than 9 $MtCO_2e$ higher than the planning assumption and around 12-13 $MtCO_2e$ higher with runway expansion. If this was to be incorporated within the UK economy's target of reducing overall emissions by 80% relative to 1990 levels, it would require the remainder of the economy to accommodate it by making further reductions of a similar amount. However, the Commission notes the CCC's advise that there is "limited confidence" in the feasibility of this. Although reductions are relatively small compared to the total reductions required (an addition of 12-13 $MtCO_2e$ to an existing reduction of over 600 $MtCO_2e$), they imply cuts in $CO_2e$ emissions of 85% or more.

**2.18** 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 37.5 $MtCO_2e$ for its final report in summer 2015.

## Welfare impacts

**2.19** All the following impacts have been monetised using methods detailed in the Appraisal Framework. The majority of these are consistent with a standard DfT WebTAG and HM Treasury Green Book approach, though some, such as the delay assessment, follow new approaches developed by the Airports Commission.

**2.20** All appraisal results are presented in Present Value (PV) terms in 2014 prices over a 60 year appraisal period, starting from an opening of Gatwick's second runway in 2025.

**2.21** Non-monetised impacts are considered qualitatively and quantitatively and these are included in the overall weighing up of cost and benefits. As with the monetised impacts, these broadly follow the DfT WebTAG and HM Treasury Green Book approach, with some exceptions, such as the assessment of wider economic impacts, which is drawn from the Commission's macroeconomic S-CGE work. Some monetised results on wider impacts are included in the last section of this document but given the nature of this analysis they have not been incorporated into the overall welfare cost-benefit comparisons.

## Monetised impacts

### Direct impacts – Transport Economic Efficiency

**2.22** Many of the costs and benefits attached to airport capacity expansion fall directly on airports, airlines, passengers and the public finances. Quantifying such impacts is important as part of the complete economic appraisal. The table below sets out the estimated transport economic efficiency impacts (including impacts on Government revenues) from a second runway at Gatwick, allowing capacity at the airport to increase to 560,000 air traffic movements a year.

**2.23** There are significant passenger benefits from expansion as it allows passengers to access the air network more conveniently and/or at lower cost. The expansion lowers the shadow cost[16] for airports that are constrained without the addition of extra capacity; to the extent the airline market is competitive (and airports are appropriately regulated if necessary), this will lead to a reduction in fares. As well as providing a direct benefit to those who already use the airport, it also generates further benefits for passengers who now choose to access the newly expanded airport. In addition, passengers enjoy benefits associated with greater frequency – so being more likely to be able to travel at their preferred time – and access to a greater range of destinations without having to transfer. The connectivity benefits of expansion are discussed in the strategic case.

**2.24** The lower fares enjoyed by passengers are largely a direct transfer from airlines to passengers. If reductions in shadow costs did not translate into reductions in fares – but instead into a more pleasant travelling environment – then the producer surplus dis-benefit would be lower than reported in Table 2.3 below. Partially offsetting this, airlines may receive 'new' shadow cost revenue (that is, scarcity rents) attached to greater demand if the airport becomes capacity constrained again even after capacity has been added. There will also be the possibility for airlines to increase passenger volumes as new capacity becomes available.

16 Shadow costs represent the extra cost of flying required to reduce passenger demand to a level within an airport's runway or terminal capacity. It can be thought of as a congestion premium, representing a fare increase to passengers or general inconvenience of using an overloaded airport.

**Table 2.3: Passenger, producer and government impacts, present value (£ billion, 2014 prices)[17]**

| | Assessment of need | Global growth | Relative decline of Europe | Low-cost is king | Global fragmentation |
|---|---|---|---|---|---|
| Passenger benefits excluding I to I[17] | 45.4 | 127.7 | 45.8 | 95.7 | 31.4 |
| Producer shadow cost impact | (41.8) | (110.4) | (43.3) | (64.0) | (29.7) |
| Government revenue impact | 2.5 | 8.4 | 3.1 | 5.2 | 1.0 |
| ***Net Total excluding I to I*** | ***6.1*** | ***25.6*** | ***5.6*** | ***36.9*** | ***2.8*** |
| | | | | | |
| Passenger benefits to I to I | 1.7 | 4.3 | 1.4 | 7.2 | 1.0 |
| **Net Total including I to I** | **7.8** | **30.0** | **7.0** | **44.1** | **3.7** |

Source: Airports Commission analysis.

**2.25** Passenger benefits are heavily driven by passenger demand forecasts. *Low-cost is king* and *global growth*, with the highest levels of forecast demand, have the greatest benefit associated with adding capacity. These scenarios also, however, see the highest levels of carbon emissions from aviation, in both the 'do minimum' and 'do something' forecasts.

**2.26** Table 2.4 below splits passenger benefits into UK origin, foreign origin and international to international interliners (I to I) transfers. WebTAG recommends both UK and foreign origin passengers be included in the appraisal, though the costs and benefits should be identified separately.

**2.27** Currently WebTAG recommends I to I transfer passengers should be excluded. This raises a difficulty in this context, as a proportion of the costs of the scheme (in which some proportion will be privately funded) are likely to be borne by such passengers through higher aeronautical charges. So, to ensure consistency across the appraisal, benefits to such passengers have been considered.

17 All values are shown in 2014 market prices, and in the case of discounted and present values, are discounted to 2014.

18 International to international interliners i.e. passengers who are transferring via a UK airport with their origin and destination outside the UK.

**Table 2.4: Passenger benefits split by passenger type, present value (£ billion, 2014 prices)**

| | Total | UK | Foreign | I to I |
|---|---|---|---|---|
| Assessment of need | 47.1 | 32.9 | 12.6 | 1.7 |
| Global growth | 132.0 | 90.7 | 37 | 4.3 |
| Relative decline of Europe | 47.2 | 31.6 | 14.2 | 1.4 |
| Low-cost is king | 102.9 | 66.3 | 29.3 | 7.2 |
| Global fragmentation | 32.4 | 23.1 | 8.2 | 1.0 |

Source: Airports Commission analysis.

**2.28** As noted above, it has not been possible to assess these benefits for the Commission's carbon-capped forecasts. Therefore, a sensitivity test has been carried out on the *assessment of need* scenario using the DECC high carbon price to assess the potential impact of raising carbon prices. This sees passenger benefits fall by approximately a quarter due to lower levels of demand growth but Government revenues rise. The result is that net total benefits are reduced by 17% from £7.8 billion to £6.5 billion. The overall effect of higher carbon prices will, however, vary according to the degree to which reductions in demand growth are offset by higher Government revenues, and it is possible that in some cases the impact on the economic case may be positive.

**2.29** The Commission has also reviewed the strategic capacity and connectivity benefits of a second runway at Gatwick in both its carbon-traded and capped cases, drawing upon the demand forecasting results set out in "Strategic Fit: Forecasts". This is also discussed in the Strategic Case.

## Delay impacts

**2.30** The delay impacts capture the benefits to airlines, passengers and the environment of a reduction in delays at UK airports as a result of a Gatwick Airport Second Runway scheme.

**2.31** The methodology used has been formulated using the UK CAA Runway Resilience Study[19] and a study on the European airline delay cost reference values[20] conducted by the University of Westminster. This is applied to the Commission's passenger forecasts across our five demand scenarios (see Table 2.5) for the carbon-traded system.

19 UK CAA Runway Resilience Study (2008).

20 European airline delay cost reference values Final Report (Version 3.2) (2011).

**2.32** The benefits of reduced delays from the scheme range from £0.7 billion to £1.8 billion, depending on the demand scenario under consideration. Under the *global growth* scenario, the benefits experienced by airlines account for 85% of the total benefits.

**Table 2.5: Total benefits from reduced delays, across scenarios, present value (£ billion, 2014 prices)**

| | Total benefits | Total benefits (exc. foreign) |
|---|---|---|
| Assessment of need | 1.04 | 0.99 |
| Global growth | 0.73 | 0.70 |
| Relative decline of Europe | 1.81 | 1.43 |
| Low-cost is king | 1.13 | 0.93 |
| Global fragmentation | 1.63 | 1.37 |

Source: Airports Commission analysis.

**2.33** The benefits of reduced delays are highest under the *assessment of need* scenario since delay benefits are driven by a combination of delay time savings and the number of passengers or ATMs that these savings accrue to. When compared to the 'do minimum', delay time savings are higher when the additional capacity remains spare longer and so delays do not start to build up. This is the reason benefits from reduced delays are lowest for the *global growth* scenario where a large number of passengers leads to the additional capacity filling up quickly, causing delays to occur earlier than in other scenarios. In addition, it is likely that there will be further additional benefits related to having a more resilient airport system which are not captured in the monetised numbers above.

## Noise

**2.34** The noise impacts of the Gatwick Airport Second Runway have been considered at a national and local level based on the *assessment of need* carbon-capped scenario, alongside sensitivities to consider other demand scenarios.

**2.35** A wide range of noise metrics have been considered, details of which are available in the Noise: Local Assessment report,[21] in 2030, 2040 and 2050. The local appraisal is based on detailed contour maps modelled using the UK Civil Aircraft Noise Contour model (ANCON). On a national level, 13 UK airports were modelled, the short listed airports by ERCD and the other 11 modelled by Bickerdike Allen

21 Noise: Local Assessment (2014).

using the widely available Federal Aviation Administration (FAA) Integrated Noise Model (INM).

**2.36** The noise impacts are monetised at a local level using noise contour and population estimates to consider Annoyance, Sleep Disturbance, Acute Myocardial Infraction (AMI) and Hypertension on Quality Adjusted Life Years (QALYs).[22] The calculations for these are based on guidelines found in the WHO Environmental Burden of Disease as well as the ERCD report 1209,[23] with an adjustment to make the measure consistent with the Appraisal Framework. Essentially, this approach values noise impacts by estimating the number of years of life lost or spent with a disability and multiplying these by well-established values for each QALY lost to provide the total monetised noise impact.

**2.37** The analysis suggests that the scheme creates noise dis-benefits valued at £0.4 billion (PV, 2014 prices) using the mid-range figure using the *assessment of need* carbon-capped forecast.

**2.38** These monetised carbon-capped impacts are likely to represent a lower bound dis-benefit. Carbon traded noise impacts have not been monetised, but a noise analysis under the *low-cost is king* carbon-traded forecast, representing a high end forecast for the Gatwick scheme, has been carried out. The size of the additional population affected by noise compared to the 'do minimum'[24] in this forecast across a number of key metrics[25] is between 2.0 and 3.9 times higher than for the *assessment of need* carbon-capped forecast in 2030, falling to 1.2 to 1.7 times higher in 2050.

## Air quality

**2.39** This module assesses the scheme's impact on air quality levels nationally and locally. Within the assessment, the impacts of the pollutants $NO_x$, $PM_{10}$ and $PM_{2.5}$ are considered, though for monetisation purposes only $NO_x$ and $PM_{10}$ are costed since $PM_{2.5}$ is a subset of $PM_{10}$. The total UK impacts have been monetised using DEFRA values.[26] The damage cost per tonne of $NO_x$ is £1,038 in 2014 prices, which is a standard for all sources and a fixed unit across the UK. This includes following HM Treasury Green Book guidance to uplift 2010 pollutant prices by 2%.

22 Quality Adjusted Life years are a measure of years spent in perfect health, free of disability or disease.

23 There are limitations and uncertainties associated with such monetisation, for further detail of these and the methodology used please refer to 5. Noise: Local Assessment, ERCD Report 1209: "Proposed methodology for estimating the cost of sleep disturbance from aircraft noise"(2013) and the WHO Environmental Burden of Disease guidelines.

24 These figures may represent an over-estimate as the baseline for the *low-cost is king* carbon-traded forecast. would in practice be higher than the baseline used from the *assessment of need* carbon-capped forecast.

25 54 $dB_{LAeq}$, 57 $dB_{LAeq}$, 55$dB_{Lden}$, and N70 >50.

26 DEFRA – Department for Environment, Food and Rural Affairs.

A deviation from this was made to follow the WebTAG price adjustment, which uplifts 2010 prices by the rise in gross domestic product (GDP) and household income. Also, the cost placed on a tonne of $PM_{10}$ is dependent on the area within the UK the pollutant is being emitted within and the source of the pollutant. Results of the analysis are shown in Table 2.6 below.

**Table 2.6: Value of monetised air quality impacts, present value (£ million, 2014 prices)**

| | Monetised value, over 60 year appraisal period |
|---|---|
| $NO_x$ | 76.8 |
| $PM_{10}$ | 92.4 |
| **Total emissions dis-benefit** | **209.5** |

Source: Airports Commission analysis.

**2.40** These impacts are small compared to other monetised elements of the economic case reflecting the limited impact of airport expansion on air quality at a national level. They do not, however, take account of changes in the risk of exceeding regulated limit values at local level, which are covered in the Sustainability Assessment.

**2.41** The values presented above are based on a carbon-capped forecast (carbon-traded values have not been calculated). The carbon-capped figures above are likely to represent a lower bound to the air quality dis-benefit due to the higher number of passengers and journeys to the airport under a carbon-traded system.

## Carbon

**2.42** The carbon emissions from increased ATMs have not been monetised in this economic analysis. This is because it is assumed that aviation is part of an aviation emissions trading scheme, meaning that there is no need to monetise carbon emissions in such scenarios as the scheme does not increase overall emissions – this is in set out in WebTAG Unit A3.[27]

**2.43** Carbon impacts of surface access, airport operations and construction and associated infrastructure are set out in tables 2.7 and 2.8 below.

27 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/313826/webtag-a3-environmental-impact-appraisal-may2014.pdf

**Table 2.7: Carbon assessment for Gatwick Airport Second Runway, change in $MtCO_2$**

| Area of Emissions | Additional $MtCO_2$ over 60 year appraisal period |
|---|---|
| Passenger surface access | 6.5 |
| Airport operations energy & fuel use | 0.8 |
| Construction of airport facilities & surface access infrastructure | 3.9 |
| **Total** | **11.3** |

Source: Airports Commission analysis.

**Table 2.8: Value of monetised carbon impacts for Gatwick Airport Second Runway, present value (£ million, 2104 prices)**

| Area of Emissions | Additional £m over 60 year appraisal period |
|---|---|
| Passenger surface access | 422.2 |
| Airport operations energy & fuel use | 48.1 |
| Construction of airport facilities & surface access infrastructure | 146.6 |
| **Total dis-benefit** | **617.0** |

Source: Airports Commission analysis.

**2.44** The carbon impacts are the largest of the monetised dis-benefits for the scheme. However, the carbon-capped figures above represent a lower bound of the dis-benefits due to the higher number of passengers and journeys to the airport under a carbon-traded system.

## Biodiversity

**2.45** This module aims to assess the impact on the biodiversity of areas surrounding the airport, paying particular attention to protected habitats and species. As such, sites of interest were identified within various distances of the site according to the species in question and assessments made of the likely extent of impact.

**2.46** The loss of over 70 hectares of woodland, including 14 hectares of ancient woodland, is the main biodiversity impact of the proposal and along with loss of

421 hectares of agricultural land make up the main ecosystem services losses.[28] Outline cost for provision of compensatory mitigation for direct habitat loss is estimated to be between £4.8 million and £9.1 million (the range is based on considering either management agreement or land acquisition options for delivering the habitat compensation).[29]

**2.47** Looking at these impacts from an ecosystem services perspective, the total present value of lost ecosystem services is estimated to be between £6 million and £9 million over the course of the 60 year assessment period. These impacts are small compared to other monetised elements of the economic case.

## Non-monetised impacts

### Wider economic impacts

**2.48** In its Interim Report, the Commission found the costs to the economy of a capacity constraint could be between £30 billion and £45 billion (PV 2013 prices 2021-2080). This analysis produced clear evidence that these effects are significant and potentially large driven by impacts on trade, Foreign Direct Investment (FDI) and tourism effects.[30]

**2.49** These findings were supported by findings from a literature review undertaken by Steer Davis Gleave for the Commission. Trade in services, industries with the highest propensity to fly, were found to be of significant economic value to the UK. For example, the financial sector makes up around 28% of UK service exports and 23% of total global financial exports.[31] Trade in many goods, particular high-tech sectors such as pharmaceuticals and high-tech machinery, are highly dependent air freight which accounted for 31% of the UK's total non-EU imports and 46%of the UK's total non-EU exports in value terms in 2011.[32]

**2.50** The literature review also found aviation has an important role in attracting FDI. Strauss-Kahn and Vives (2009), for example, found that the probability of firms in the US relocating to a particular location increased by 90% if there is large airport nearby or 40% if there is a small airport. In addition, tourist spending, which is also significant, was worth £19 billion to the UK economy in 2012, with over 80%

28 GAL notes that it believes its strategy for managing the remaining woodland has a positive benefit. The Commission notes the strategy but does not consider that it changes its judgement that the scheme is ADVERSE with respect to the Commission's biodiversity objective.

29 These indicative habitat offsetting costs are adapted from the Defra 2011 'Costing Potential Actions to Off-set the Impact of Development on Biodiversity' and do not cover construction costs for the river diversions or other capital works.

30 https://www.gov.uk/government/publications/airports-commission-interim-report

31 BIS (Feb 2012) "UK trade performance across markets and sectors".

32 HMRC analysis.

arriving by air. The value of outbound tourism from the UK was £32 billion in 2012, which negatively affected the overall UK trade balance.[33]

**2.51** Further work has been undertaken by the Commission to consider the possible size of some of the possible wider economic impacts alongside its S-CGE modelling programme. The only impact listed in this work potentially affecting the wider economy from a WebTAG perspective is related to productivity, which feeds through only from trade in the model, amounting to between £1.8-9.0 billion.[34] However, results have not been incorporated into the welfare cost-benefit analysis since they exclude other likely wider economic impacts such as FDI and tourism and are not calculated using techniques from a standard WebTAG appraisal.[35] The developing nature of this analytical approach means that these results are subject to significantly more uncertainty than those generated through the more established WebTAG approach.

**2.52** On the basis of analysis done as part of the Interim Report and the size and scale of the results from the S-CGE work, the wider economic impacts are expected to have a strongly positive impact on the economic case. The impact would be largest under the *global growth* and *low-cost is king* scenarios, and smallest under the *global fragmentation* scenario.

## Local economy

**2.53** The Gatwick Second Runway scheme will bring about both positive and negative impacts for the local community in terms of changes to employment, local transport links, housing stock, social infrastructure and land use.

**2.54** Depending on the scenario, the estimated additional jobs ranges between 200[36] -23,600 jobs in 2030, and 7,900-32,500 jobs in 2050[37]. The upper end of the figure represents the *global growth* scenario, while *global fragmentation* represents the lower end of the range. The direct jobs related to the airport are anticipated to remain relatively low skilled, as in the 'do minimum'. The additional jobs are summarised in Table 2.9 below.

33 ONS IPS 2012.

34 These numbers are in present value terms, 60 years appraisal in 2014 prices.

35 The current approach currently only considers the productivity impacts associated with additional trade, not FDI or tourism as found in the previous literature, and other wider economic impact such as those from increased competition. An Equivalent Variation technique has been used to convert the GDP figures into welfare units, which is not consistent with a standard WebTAG appraisal.

36 There are no additional direct jobs forecast when the effect of productivity improvements on the required workforce is approximately equal to the need for additional employees as passenger demand rises.

37 This is a gross estimate, so does not take into account any negative employment effects in other areas as a result of the inflow to the airport's local economy. This approach is not fully WebTAG compliant.

**Table 2.9: Additional jobs for Gatwick Airport Second Runway**

| Year | Assessment | Number of jobs |
|---|---|---|
| **2030** | *Additional jobs (compared to baseline)* | 200-23,600 |
| | *Jobs (total)* | 27,800-58,400 |
| **2050** | *Additional jobs (compared to baseline)* | 7,900-32,500 |
| | *Jobs (total)* | 28,400-63,000 |

Source: Airports Commission analysis.

**2.55** An alternative approach to assessing the number of jobs created comes from the S-CGE model, with an estimated 49,600 jobs created under the *assessment of need* scenario by 2050, rising to 90,400 by 2060. This figure is the net impact of the scheme, so takes into account any displacement effects, but it is still larger than the Commission's estimates as it includes the catalytic impacts of the scheme. These effects arise as a result of the wider benefits that air travel provides, improving connectivity and reducing costs through reduced travel times, a greater choice of destinations and more regular flights, as well as reduced country to country trade costs. This increase in available destinations also expands the potential markets for businesses, which benefit workers, intermediate goods and services. There may be increased competition across countries with the ability of firms to access new markets which would improve efficiency. These effects lead to an increase in employment in the economy, with the largest gains in the manufacturing and services sectors, which are trade intensive.

**2.56** Growth of jobs and businesses associated with the airport has the potential to put pressure on housing in the local area. In order to consider the potential maximum need for additional housing in 2030 as a result of airport expansion, Table 2.10 below demonstrates the range in the forecast of homes required as a result of airport expansion if all employees are new to the area. Of the additional employees, the number seeking residences in the local area is assumed to be consistent with the baseline, at 79% of direct employees and 87% of indirect and induced employees.

**Table 2.10: Additional homes need for Gatwick Airport Second Runway**

| 2030 | Low | High |
|---|---|---|
| Additional homes (direct employees) | Close to 0[37] | 13,500 |
| Additional homes (total employees) | 150 | 18,400 |

Source: Airports Commission analysis.

**2.57** There are many reasons why the additional housing required is unlikely to be as high as the top end of these figures, depending on the assumptions made about population growth, net migration, unemployment and out-commuting. This housing will typically be provided in a phased manner and across the entire assessment area[39] and the demands on an individual local authority are likely to be relatively small. Increased housing densities and renovation of brownfield land could be considered in meeting this need (which could result in additional costs). This additional housing will need to be supported by a limited amount of additional social infrastructure.

**2.58** The local economic impacts are expected to have a positive impact on the overall economic case. This would be strongest in the *global growth* and *low-cost is king* scenarios, and smallest in the *global fragmentation* scenario.

## Community

**2.59** The objectives associated with the community assessment are to manage and reduce the effects of housing loss on local communities and to reduce or avoid disproportionate impacts on any social group.

**2.60** The main impact on the local community would be felt in terms of lost housing, with 168 homes expected to be lost to enable the delivery of the second runway at Gatwick and associated infrastructure. In addition, a small number of community facilities would also be lost, including two places of worship and a care home. Financial support and the likely availability of alternatives nearby would mitigate the lost facilities, and compensation would need to be provided for housing loss.

38 There are no additional direct job forecast when the effect of productivity improvements on the required workforce is approximately equal to the need for additional employees as passenger demand rises. This feeds through to the additional homes estimate.

39 The assessment area consists of the local authorities of Crawley, Reigate and Banstead, Tandridge, Mid Sussex, Horsham, Mole Valley, Epsom and Ewell, Croydon, Wealden, Eastbourne, Lewes, Brighton and Hove, Adur, Worthing and Arun.

**2.61** The unmitigated community impacts would have a negative impact on the economic case. If appropriate and effective mitigation is provided, this impact could be neutral. This would not be expected to vary significantly across the demand scenarios.

**2.62** A high level equalities screening identified potential disproportionate impacts on certain groups, but insufficient data was available to confirm this. A fuller assessment may be necessary as detailed plans are developed.

## Place

**2.63** The aim of the module is to assess the impacts of a Gatwick second runway expansion upon existing landscape character and heritage assets. This assessment considers four aspects; *land take*, *landscape*, *waste* and *heritage* impacts.

**2.64** The land take requirements for the Gatwick Airport Second Runway scheme are relatively small. In total, 624 hectares and 78 hectares will be required for airport and surface access development[40] respectively. The majority of the land is low (or unknown) grade agricultural land. 60 hectares of the land would lie within designated Green Belt. A total of 168 residential properties lie within the airport land take, including surface access, and are likely to need to be demolished. An additional 37 residential properties lie close to the surface access routes and could also be lost depending on detailed route and construction design.

**2.65** The assessment for landscape considered the potential changes to physical elements in the landscape along with visual perception. The impacts on views and landscape at Gatwick Airport are likely to be more pronounced during the construction phase than operation but some areas would continue to experience moderate adverse effects during operation. Some of these effects would be permanent and may require compensation. The scheme is also likely to lead to increased noise levels in a number of areas of moderate tranquillity.

**2.66** The waste assessment found the greater number of passengers would increase the production of waste by approximately 12,000 tonnes in the *global growth* scenario, which is a minimal increase compared to overall local area plans. Gatwick Airport Limited have suggested 70% of operational airport waste could be recycled which, if implemented, would reduce this dis-benefit.

**2.67** The heritage assessment assesses impacts on designated cultural heritage assets. 22 designated heritage assets have been identified within the land take area for

40 The land take requirement for surface access is based on an indicative 200m buffer around the details of routes for new infrastructure or capacity improvements provided within the promoters' submissions. Actual land take will be subject to change depending on detailed route and construction design.

the second runway at Gatwick which would be directly affected, although Gatwick Airport Ltd have made proposals for mitigation (two of these assets were removed some time ago, but are still formally listed). In addition, a further 10 assets have been identified within the Intermediate[41] Study Area (up to 300m outside the development footprint) and 160 in the Outer Study Area (up to 2km outside the development footprint).

**2.68** On the basis of this assessment, impacts on place are considered to have a negative impact on the economic case. This is not expected to vary significantly across demand forecast scenarios, although the negative impacts on tranquillity would be smaller in lower demand scenarios.

### Quality of life

**2.69** The Commission has published a study and literature review considering how airport expansion may affect quality of life. Analysis of this kind for major infrastructure scheme has not previously been undertaken.

**2.70** The analysis considered quality of life impacts associated with changes in subjective wellbeing measures (life satisfaction, sense of worthwhile, happiness, anxiety and positive affect balance). The project found there are both local and national quality of life impacts associated with airport development and, particularly at local level, there is a degree of 'bundling' of effects, in which positive and negative effects, whilst felt acutely by individuals, broadly balance out over a larger population.

**2.71** For the Gatwick Airport Second Runway scheme the national impact on quality of life is likely to be positive, with negative impacts due to increased carbon emissions more than offset by the net positive impact on jobs and increased connectivity for leisure trips. Locally, the main impacts would be expected to be from noise alone (which would be negative) and increased local employment (which would be positive), leading to a broadly neutral overall impact.

**2.72** On this basis, the overall effect on the economic case is expected to be neutral. This would not vary significantly across forecast scenarios.

### Water and flood risk

**2.73** The Gatwick scheme is estimated to create demand from the airport for an additional 35% of potable water per year by 2025 rising to 85% by 2050, compared to 2012. Sutton and East Surrey Water, which fulfils all of Gatwick Airport's water requirement, has confirmed that it can meet this additional water requirement.

41 Size suggested in HA208/07 for scoping studies.

**2.74** Approximately seven kilometres of existing watercourse would be 'lost' with diversion of the River Mole and diversion of the Crawters Brook. The addition of a weir at the confluence of Crawters Brook and River Mole confluence is likely to have a significant residual impact. No culverting is proposed and there is a potential positive impact from removal of existing culvert at River Mole. There could also be residual water quality impacts arising from polluted runoff.

**2.75** Despite recent surface water flooding, the scheme itself is not expected to have substantial impacts on flood risk, as long as appropriate mitigations are put in place.

**2.76** Based on the assessment of the scheme's impact on the water environment, we consider the scheme to have a small adverse impact on the economic case, which could be reduced by good practice mitigation strategies. This would not vary significantly across demand scenarios.

### Surface access

**2.77** The surface access components of the scheme are based on three broad categories of surface transport project:

- those which are already committed and funded;
- those which are likely to be required by 2030 to meet background demand regardless of airport expansion; and,
- those which are required specifically to support the scheme.

**2.78** The scheme's surface access package is based heavily upon infrastructure and rail service improvements which are either already committed and funded or likely to form part of any investment strategy to meet background demand by 2030 regardless of decisions on airport expansion.

**2.79** The cost of these improvements, which include managed motorway operations on the M23, infrastructure improvements to remove pinch-points on the Brighton Main Line and an enhanced rail service pattern (building on the newly-let Thameslink Southern and Great Northern franchise) have not, therefore, been associated with the scheme. On this basis, economic benefits stemming from those improvements have also not been associated with the scheme.

**2.80** A number of surface access projects are required specifically to support the scheme. However, these are either capacity-relief schemes designed to ensure that levels of congestion on local and strategic roads do not become unacceptable

in the face of increased airport traffic or the diversion of local roads around the expanded airfield site, which, while necessary, do not produce wider benefits.

**2.81** The economic impacts of the surface transport components of the Gatwick Airport Second Runway are, therefore, believed on the basis of the available evidence to be neutral. This would not be expected to vary significantly across forecast scenarios.

## Scheme and surface access cost

**2.82** The scheme cost is made up of several elements. On the airport site these include the runway itself, any associated airport infrastructure such as taxiways, aprons, terminals, navigation and other technical equipment, as well as the geological works required to prepare the site. Outside the airport, these costs include any possible compensatory habitats, flood defences or other mitigations that are likely to be necessary, additional surface transport infrastructure (over and above any investment to meet background demand growth) would also be required to accommodate additional passengers to and from the expanded airport.

**2.83** The Commission makes no judgement as to who should bear these costs and in its analysis recognises that historically these have been split between the public and private sectors. However, in its analysis the Commission considers the situation where the public sector funds the surface transport requirements and the private sector airport funds the remainder of costs on and off the airport site. The Commission also considers the case where the private sector airport funds all on and off airport costs.

### Airport development cost

**2.84** 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. In addition, the Commission has included appropriate allowances for risk and a range of values for optimism bias in these scheme cost estimates.

**2.85** The costs of building the Gatwick Airport Second Runway depend upon the level of traffic expected as the scheme can be optimised and phased to ensure that the provision of terminal and other airport infrastructure is built to coincide with when it will be required by the numbers of passengers using the airport. The Airports Commission's view of the total cost of building the airport infrastructure to be capable of handling up to 95 million passengers is £9.3 billion with risk and mitigated optimism bias applied. However, in scenarios seeing lower levels of demand, it is possible that there would not be sufficient passenger growth before

2050 to require the construction of the final phase of infrastructure. In these scenarios, the cost to build to 2050 would be £7.4 billion, with risk and mitigated optimism bias applied, though this price would increase if subsequent demand growth over the course of the appraisal period justified the completion of the new infrastructure.

### Surface access development

**2.86** As part of its Surface Transport appraisal process, 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 on the transport networks, 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. Surface transport costs which are required to support expansion specifically, however, have been included in the assessment of scheme costs, shown in Table 2.11.

### Total scheme cost

**2.87** The total costs of delivering the scheme are set out in Table 2.11 below for the four forecast scenarios considered in the Commission's commercial and financial analysis. As benefits are calculated on a present value basis, scheme costs have been converted into a present value to enable a consistent comparison.

**Table 2.11: Scheme capital expenditure costs per scenario (£ billion, 2014 prices)[42]**

| Scenario | AoN carbon-capped | AoN carbon-traded | Low-cost is king carbon-traded | Global fragmentation carbon-capped[42] |
|---|---|---|---|---|
| Scheme Capex (2014, Real) | 7.4 | 9.3 | 9.3 | 7.4 |
| Scheme Capex (2014, PV) | 4.7 | 6.5 | 6.5 | 4.7 |
| Surface Access Costs (2014, Real) | 0.8 | 0.8 | 0.8 | 0.8 |
| Surface Access Costs (2014, PV) | 0.5 | 0.5 | 0.5 | 0.5 |
| **TOTAL (2014, Real)** | **8.2** | **10.1** | **10.1** | **8.2** |
| **TOTAL (2014, PV)** | **5.2** | **7.0** | **7.0** | **5.2** |

Source: Airports Commission analysis.

**2.88** Scheme costs include 20% risk and 20% mitigated optimism bias. This represents one view of the Commission's assessment of costs taking into account the level of development of the concept undergone to date but still reflecting a considerable amount of uncertainty that remains at this stage. The surface access costs include the cost of building, operating and maintaining the infrastructure as well but do not include any revenues. Surface access costs include an optimism bias allowance of 44% for road schemes (the surface access costs for the Gatwick scheme do not include any expenditure on rail schemes).

## Weighing up the cost and benefits

**2.89** There are many ways to weigh up the pros and cons of airport expansion ranging from a commercial assessment for an investor to the broader societal impact that

42 Further details can be found later in the business case under the commercial and financial case. These figures present a range of around just scenarios and treatment of carbon, for further sensitivity analysis and other possible ranges, please consult the cost and commercial case.

43 The phasing could be taken further under this lower demand scenario which would result in a lower PV cost estimate than the *assessment of need* carbon-capped figure.

would normally accompany a government spending decision. The unique nature of the airports funding model in the UK means that many different approaches are relevant to this question. Although the Commission is not defining relative contributions it seems likely that the majority of financing will be determined by the commercial decisions of investors, but also that some key elements of the proposal will require some investment of public funds.

**2.90** The financial case views the question through the prism of the commercial investor whilst this economic case looks at the proposal from the broader perspective of investing public funds and the social costs and benefits. To that end the varied nature of the sources of funding raise questions about the suitability of established government appraisal methods which normally deal with schemes where the majority of funding is coming from the public purse.

**2.91** Table 2.12 below summarises the Commission's monetised and non-monetised appraisal results.

**Table 2.12: Gatwick Airport Second Runway costs and benefits, present value (£ billion, 2014 prices)**

| Appraisal results | Assessment of need | | Global growth | | Relative decline of Europe | | Low-cost is king | | Global fragmentation | |
|---|---|---|---|---|---|---|---|---|---|---|
| Carbon traded (CT)/ capped (CC) | CT | CC | CT | CC | CT | CC | CT | CC | CT | CC |
| Monetised | | | | | | | | | | |
| Transport economic efficiency | 7.8 | | 30.0 | | 7.0 | | 44.1 | | 3.7 | |
| Delays | 1.0 | | 0.7 | | 1.8 | | 1.1 | | 1.6 | |
| Noise | | (0.4) | | | | | | | | |
| Air quality | | (0.2) | | | | | | | | |
| Carbon emmissions | | (0.6) | | | | | | | | |
| Biodiversity | | (0.05) to (0.09) | | | | | | | | |
| Scheme and surface access cost | (7.0) | (5.2) | | | | | (7.0) | | | (5.2) |
| Non-monetised | | | | | | | | | | |
| Wider economic impacts | | | | | | | | | | |
| Surface access | | | | | | | | | | |
| Quality of life | | | | | | | | | | |
| Community | | | | | | | | | | |
| Place | | | | | | | | | | |
| Local economy | | | | | | | | | | |
| Water and flood risk | | | | | | | | | | |

**2.92** To assess the non-monetised impacts colour coding is used to represent the Commission's view as to the likely direction of the impact compared to the 'do minimum'. Dark red is strongly negative, light red is slightly negative, grey is neutral, light green is slightly positive and dark green is very positive.

**2.93** Considering the scheme by comparing total costs to the overall benefits the analysis shows there is a strong case for a Gatwick Airport Second Runway under certain scenarios, with greater risks associated with others.

**2.94** Taking the monetised benefits first, with scheme and surface access costs amounting to £7.0 billion in PV terms and with noise and other environmental dis-benefits totalling £1.3 billion,[44] under *low-cost is king* and *global growth* there is a clear positive net benefit associated with such a scheme, via the large transport economic efficiency benefits of £30 billion – £44 billion. The significant potential wider economic benefits would strengthen the case further. Conversely, however, it is important to note that these scenarios see carbon emissions significantly in excess of the CCC's planning assumption for aviation in 2050. Any action to address this would be likely to affect the scale of benefits achieved.

**2.95** Passenger growth at the airport would drive significant increases in ATMs and destinations served at Gatwick. At the national level, the Gatwick Second Runway would facilitate growth in capacity and connectivity, with both seat capacity and the overall size of the UK route network growing compared to the 'do minimum'. Further details of the connectivity impacts can be found in the strategic case.

**2.96** Under the *assessment of need* and *relative decline of Europe* scenarios the economic case is less strong though still positive, largely due to lower passenger demand driving lower transport economic efficiency benefits. Transport economic efficiency impacts are lowest under the *global fragmentation* scenario, at £3.7 billion, meaning this scenario delivers the lowest benefits and the case for the Gatwick Airport Second Runway is weakest here.

**2.97** Nonetheless, there are likely to be wider benefits which are not picked up in the welfare analysis. There will be benefits to passengers in terms of improved connectivity and access to new markets and destinations, reduced delays as constraints are relieved across the system and possible further benefits from improved resilience. In addition the non-monetised positive impacts on the local economy and wider economy are likely to be significant, even under the *global fragmentation* scenario. Particularly under *global fragmentation* these impacts become important in determining the overall case for expansion.

44 This dis-benefits figure is calculated for the *assessment of need* carbon-capped scenario. Looking at a wider range of scenarios would allow further analysis of the scale of dis-benefits to inform the assessment.

**2.98** The ratio of costs to benefits when looking specifically at public sector expenditure would depend on the level of contribution made. On the basis that the public sector might only contribute the costs of surface access, the benefits clearly outweigh those costs under any scenario, but that is only one potential option. The overall cost to the public sector could be higher or lower.

## GDP/GVA impacts

**2.99** To understand the GDP impacts associated with the Gatwick Airport Second Runway scheme the Airports Commission have worked with PwC to develop an S-CGE model. This analysis is not a welfare analysis but considers the possible scale of GDP impacts of the Gatwick Airport Second Runway scheme. The S-CGE model developed for this phase of the Commission's work is a significant extension to the CGE model used to estimate the impacts in its Interim Report.[45] It should be noted that this is a relatively novel way to consider the impact of airport expansion, with only one recent example (Sydney) where it has been applied to airport infrastructure investment. The outputs should therefore be treated with some caution.

**2.100** Given the scale of investment and possible economic impacts found in the Commission's previous work, airport expansion is expected to impact on the macro-economy. In light of this, the Commission have chosen to use a CGE model to gain better understanding of how these impacts transmit through the macro-economy to effect GDP via interactions between firms (domestic and international), households and Government.

**2.101** In order to estimate these impacts five channels have been identified through which airport expansion could have such an impact:

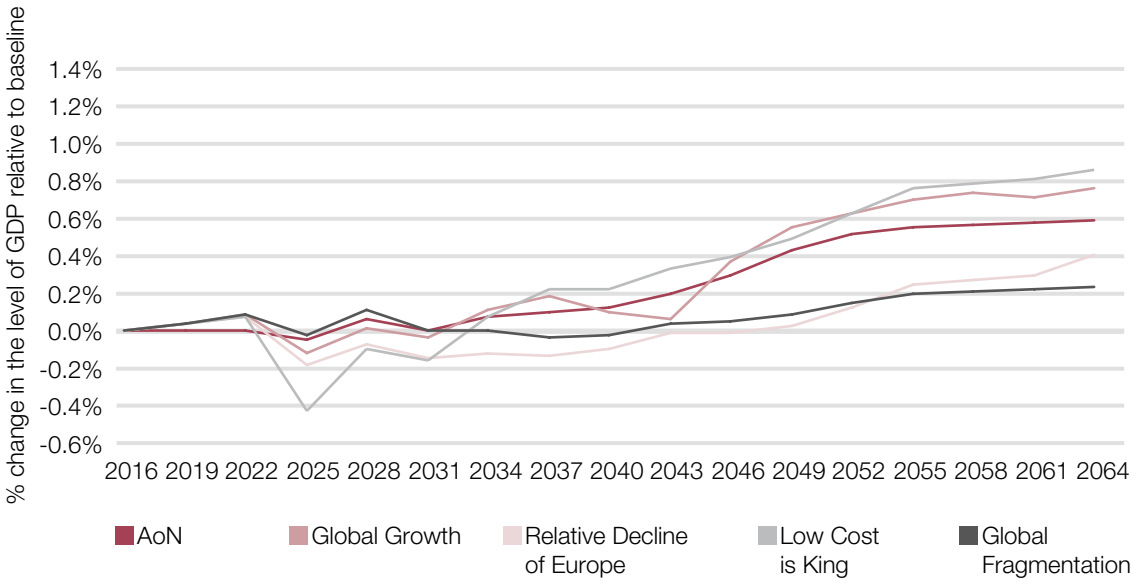
- Changing **passenger flows** resulting in changes in the level of spending by households and firms in the UK and overseas;
- **Productivity** impacts associated with changes in the level of trade (eg. companies becoming more efficient as a result of being better connected to international markets);

45 For its Interim Report the Airports Commission undertook work with PwC to estimate the cost associated with a capacity constrained airport system. PwC undertook econometric analysis to evaluate the relationship between seat capacity and GDP and found there to be bi-directional causality between the two variables. Using the elasticities from this econometric work a Total Factor Productivity change related to this elasticity was fed into the CGE model based on the reduced seat capacity in a constrained airport system. This year we have taken quite a different approach which produces spatial and sector level outputs and the impacts have been fed in to the model via 5 separate channel as listed above. The larger number of channels included leads to higher benefits and a richer analysis but with a higher level of uncertainty.

- **Frequency impacts** feeding through to Total Factor Productivity (TFP) across the economy and those sectors most closely linked to the aviation sector;
- Changes in the **Transport Economic Efficiency** (transfers of producer and consumer surplus) filtering through the economy via changes in household spending and airline revenue streams; and,
- Infrastructure (airport and surface access) **construction** can boost the economy as economic resources are diverted to relatively more productive use.

**2.102** The Commission's analysis considers all five demand scenarios in a carbon-traded world. The transmission mechanisms are numerous and the results included here provide only a summary of the main impacts under the Gatwick Airport Second Runway scheme across the five scenarios. The profile of Gatwick Airport Second Runway's GDP impact results across all scenarios is shown in Figure 2.2 below.

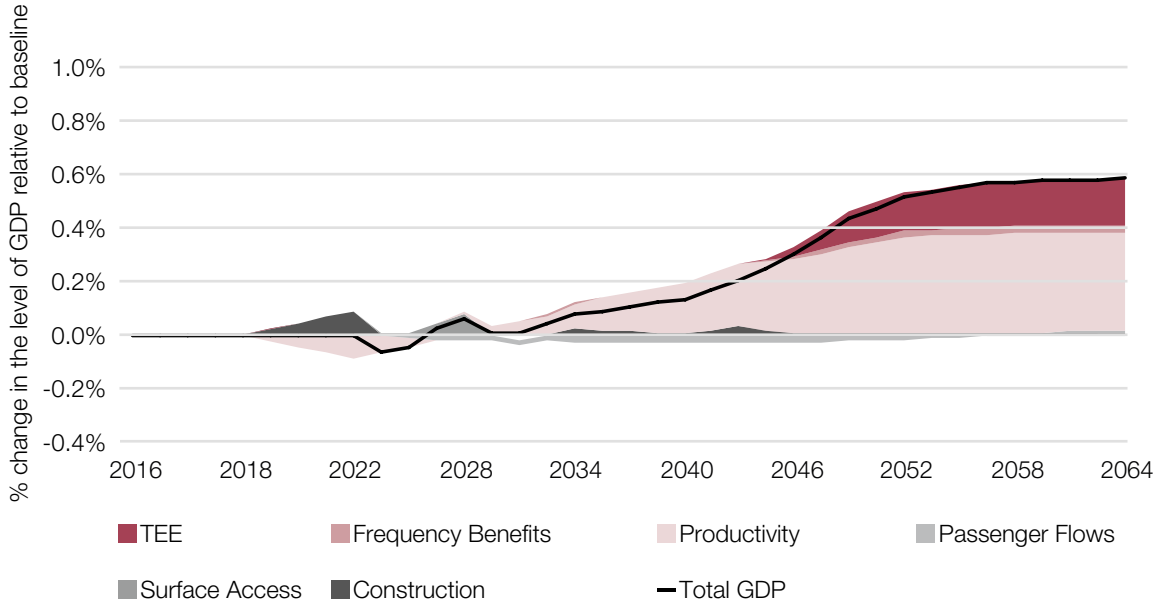
**Figure 2.2: Overall GDP impacts for all scenarios**




Source: Airports Commission analysis.

**2.103** This explanation focuses the impact of each of these channels on overall GDP under the *assessment of need* scenario. This scenario is in the middle of the range between 2 distinct groups of scenario results: at the upper end of the range *low-cost is king* and *global growth*; and at the lower end *relative decline of Europe* and *global fragmentation*. Figure 2.3 below provides a breakdown of results via the contribution of each of the five channels highlighted above. Table 2.13 below covers a short explanation based on how the S-CGE model tracks these impacts through the economy to the modelled level of GDP generated.

**Figure 2.3: GDP results in an *assessment of need* scenario on level of real GDP compared to the 'do minimum'**




Source: Airports Commission analysis

**Table 2.13: *Assessment of need* GDP impact description**

| | Impact |
|---|---|
| Phase 1 – construction phase | • Initially GDP impacts are driven by construction of both the airport and surface access infrastructure. This is driven by demand and supply side factors.<br>– Demand side factors: where the economy orientates itself towards construction, having multiplier effects via procurement of materials and other inputs to the construction process; and,<br>– Supply side factors: More capital availability should stimulate workers' productivity. It is also likely that wages in the sector will increase and unemployment decrease, putting a further upward pressure on GDP.<br>• While the construction sector expands other (relatively less productive) areas may contract. It is also worth noting that construction is largely funded by a reduction in consumption, and that during and just after this phase growth in GDP is negatively offset to a degree by small reductions in consumption from households, restricting their consumption in anticipation of higher future returns. |

| | Impact |
|---|---|
| Phase 2 – operating phase | • Upon scheme opening in 2025 GDP impacts start to rise at a steady rate until the late 2040s. This is mainly driven by productivity impacts associated with increased trade (as businesses are better connected to and able to access international markets and able to benefit from knowledge spillovers). This is a supply-side boost to productivity and output potential.<br>• Further build phases also boost GDP during this phase via the links mentioned in the construction phase;<br>• In the late 2040's both the transport economic efficiency and frequency benefits start to kick in as passenger numbers start to rise:<br>– The transport economic efficiency[45] demand side benefits start to appear as airlines are unable to charge scarcity rents as compared to the 'do minimum', with consumers being charged lower airfares than otherwise would have been the case. This makes businesses more efficient and provides non-business passengers with more available disposable income, which is spent elsewhere, having multiplier effects on the economy. The reduction in airline profits has a slight countering effect on this depressing GDP, which later reduce due to the expanded size of the sector via increased passenger numbers from high capacity; and<br>– Frequency benefits also start to boost productivity as business passengers experience lower effective journey times as a result of new routes, more frequent flights and higher resilience of flight and airport operations.<br>• However positive GDP impacts in phase 2 are offset slightly due to changes in passenger flow. This is driven by a larger number of outbound tourists compared to inbound tourists up until the 2060s, where this pattern reverses. Outbound tourists have a higher multiplier effect, due to supply chain impacts on products which are no longer consumed in the UK, than inbound tourists with a smaller multiplier, due to the relative productivity of the related spending in sectors such as accommodation and restaurants. |

**2.104** The pattern of results and transmission through the economy is broadly similar in the other scenarios but there will be differences in the scale and timing. In order to better understand how these impacts differ PVs have been calculated in 2014 prices for each scenario, which are presented in Table 2.14 below. Construction economic impacts are not normally included, since we would assume 100%

46 The final impact of the transport economic efficiency numbers does not include the impact of higher aeronautical charges.

displacement.[47] Though this is unlikely to be so clear cut it is difficult to estimate an appropriate level, especially given factors such as the potential use of foreign labour or equipment and possible outflows on the cost side.

**Table 2.14: GDP impacts all scenarios, present value, (£ billion, 2014 prices)**

| | Total impacts (exc. construction) |
|---|---|
| Assessment of need | 89 |
| Global growth | 115 |
| Relative decline of Europe | 63 |
| Low-cost is king | 127 |
| Global fragmentation | 42 |

Source: Airports Commission analysis

**2.105** We have also undertaken a sector analysis to better understand how these impacts filter through the economy. Unsurprisingly the air passenger transport and freight sector is £3.7 billion (21%) larger when compared to the 'do minimum' in 2050. Likewise sectors with international linkages also benefit, seeing sectors such as manufacturing around 1.5% larger in 2050 compared to the do minimum. This is driven by the lower cost of transport making these sectors more competitive and therefore more productive.

**2.106** The air freight industry will help facilitate some of the GDP increase, increasing the ability of UK businesses to supply more customers in more overseas markets, and in quicker time. Expansion at Gatwick suggests that the freight sector's contribution to GDP will be 1.4% above baseline in 2050. Freight activity around Gatwick could increase but the extent that this comes at the expense of LHR or other airports is uncertain, due their more central location within the UK freight distribution network.

**2.107** Further work is required to test and validate the approaches taken in some areas. For example, the analysis presented here provides the results for a carbon-traded world and the Commission may wish to consider further what the economic impacts are in a carbon-capped world, where demand may need to be to some degree lower. We would also be keen to review how the inputs (such as consumer and producer surplus) are channelled into the economy and investigate other possible mechanisms which may impact upon the results.

47 The impact of construction can be found in the 'Economy: wider impact assessment' PWC paper.

**2.108** The overall scale of benefits therefore is uncertain at this stage. Nonetheless, the analysis does provide a clear indication that there may be substantial positive GDP/GVA effects from investment in aviation capacity and connectivity. The Commission has published as part of its consultation materials a detailed report by PWC setting out the approach taken and the results obtained, and the Commission would welcome responses on how this analysis may be developed further.

**2.109** The analysis suggests that under the *low-cost is king* and *global growth* scenarios the GDP/GVA impact could potentially be substantial, and even under *global fragmentation* you see GDP benefits outweighing costs. However, the analysis also indicates that under any scenario it may be some time before the Gatwick Airport Second Runway scheme delivers some of the largest GDP/GVA benefits. This is driven by the fact that the transport economic efficiency and frequency benefits start to surface after the steady build-up of productivity impacts from new trade, and when inbound tourism starts to offset outbound tourism.

**2.110** The difference in the size of these impacts from the transport economic efficiency benefits is driven by the differences between a partial equilibrium analysis, as used in the welfare analysis, and a general equilibrium approach. The general equilibrium approach estimates the secondary economic impacts, dynamic interaction between sectors, regional impacts and assumption around imperfect competition, which differ from those calculated for a welfare appraisal.

## Conclusions

**2.111** Both the welfare impact and GDP/GVA results show that the Gatwick Airport Second Runway scheme has the potential to deliver a net positive benefit across all scenarios. The direct benefits listed under the welfare approach are potentially a net substantial positive under *low-cost is king* and *global growth* scenarios, net positive under *assessment of need* and *relative decline of Europe* scenarios and marginally net positive under *global fragmentation*. The additional non-monetised impacts are driven by potential wider economic benefits and local economy benefits, lifting all scenario results, though *global fragmentation* is marginal here.

**2.112** The GDP/GVA impacts tell a positive story with impacts ranging from £42 billion in *global fragmentation* and £127 billion in *low-cost is king* scenario. However, it takes more than a decade or two after opening for the largest impacts to feed through to UK GDP/GVA. This approach excludes environmental and other social impacts but accounts for how the benefits of airport expansion can transmit through to the wider economy. The approach is far more novel so results should be treated with some caution.

# 3. Financial and Commercial case

## Introduction

**3.1** In the Airports Commission Appraisal Framework the purpose of the financial case is to assess the overall cost and sources of funding for the scheme; and the purpose of the commercial case to assess the risks around commercial deliverability, including discussing options for public sector contribution. In conducting its assessment against this framework the Commission has also, where appropriate, applied the principles of HM Treasury Green Book.

**3.2** The Green Book advises that the financial and commercial cases should demonstrate that the 'preferred option' results in a viable procurement and a well-structured fundable and affordable deal. However, HM Treasury's Green Book is intended to develop an already identified preferred option and ensure the best value for money for the public spending required to deliver that option. The Airports Commission has not yet identified a preferred scheme, nor how that scheme should be delivered. Moreover, the Commission is assessing the business case for schemes which will ultimately largely involve delivery by the private owners of the relevant airports using privately raised financing.

**3.3** The Commission has, as suggested by the Green Book, made an assessment of the overall cost requirements and of the financial and commercial risks associated with the Gatwick Airport Second Runway scheme. It has identified a number of financial implications for the scheme for ongoing consideration and assessment. This document discusses these implications, within the context of the objectives outlined below in Section 2. Given that they are closely linked and at the early stage of development, it considers the financial and commercial assessments together.

**3.4** It is important to make clear that the assessment outlined here is an ongoing process and will be refined as the Commission's work progresses and in light of the responses to the consultation.

## Objectives

**3.5** The Commission's objectives, set out within its Appraisal Framework, are to assess that the schemes are affordable and financeable, and to identify the conditions that would need to be in place to credibly provide a reasonable return on investment

for infrastructure investors, including any public expenditure that may be required, taking into account the needs of airport users.

**3.6** The objectives of this financial and commercial case are therefore to:

1. Assess the overall credibility of funding and financing the schemes and thus the affordability implications of the schemes to the consumer and the taxpayer.
2. Identify the key risks for funding and financing and therefore delivering the schemes
3. Identify options for mitigating these risks and the role for different parties in managing/supporting this.

## Approach

**3.7** To achieve these objectives, the Commission has assessed the major factors influencing funding and financing for each scheme. These are: the overall projected costs of the scheme; the passenger demand forecasts (which drive overall costs and revenue); and the potential charging and financing arrangements. These are summarised in Section 4 below, and more detail is provided in the cost and commercial viability reports.[48]

**3.8** Alongside this, the Commission has developed a risk framework that identifies the key risks associated with these factors. This framework is summarised in the table below, and a fuller description of the risks incorporated is found in the Literature Review. The Commission has then used this framework to assess the impact of these risks on the overall affordability and commercial deliverability for each scheme.

48 The six cost and commercial viability reports are as follows:
- Cost and Commercial Viability: Literature Review" (Literature Review);
- Cost and Commercial Viability: Financial Modelling Cost Inputs" (Cost Input Report); and
- Cost and Commercial Viability: Funding and Financing" (Funding and Financing Report)
- Cost and Commercial Viability: Cost Revenue Identification Report. Note: There are three versions of this report, one for each Scheme Promoter.

**Table 3.1: The Commission's Financial and Commercial Risk Framework**

| Risk | Description |
|---|---|
| **1. Demand and revenue** | The risks associated with the demand for new capacity, its make-up, the type of aircraft and passenger, prospective growth, and the volatility of this growth. These directly impact the level of certainty around future revenues and operating costs, and hence the subsequent pricing and availability of finance. |
| **2. Cost and integration** | The risks associated with the construction and operation of the additional runway, with key risks being whether the price is higher than forecast and whether the various elements of the project properly integrate together. Important here is the size and complexity of all the proposed schemes. |
| **3. Contracting** | The risk associated with the approach to contracting for the delivery of the schemes. The scale of the investment means that it may not be possible to sub-contract all the risks. In this event, the associated level of exposure will remain with the airport operator. |
| **4. Financing** | The risks around the capacity and ability to raise finance, taking into account the scale of investment the scheme promoters will be looking to access. |
| **5. Investment** | As explained in full in paragraphs 3.21-3.25 of this case, for simplicity the Commission has assumed use of a Regulated Asset Base (RAB) model in examining the impacts of the scheme. This requires that assets are procured economically and efficiently. Inefficient expenditure may not qualify for addition to the RAB and the airport cannot then earn a return on that asset. Scheme promoters would be required to manage this risk as well as consider the question as to how the cost of capital for an investment of this scale is treated under a RAB based model. |

| Risk | Description |
|---|---|
| **6. Regulatory and policy** | Delivery of airport capacity will take several years, and there are risks associated with possible changes to the wider regulatory and policy environment (including economic, environmental and safety regulations, and operational delivery considerations e.g. airspace design) during that time. These risks are discussed in full in the Delivery: Risk Assessment and Mitigation Report, but it is important to note here that investors will price to take account of such risks. |
| **7. Timing and delivery** | Linked to a number of the categories above, there are risks associated with the speed with which the project is implemented, the revenue built up to the forecast levels and the overall affordability of the project. |

## Assessment of Gatwick Airport Second runway scheme

### Passenger demand forecasts and overall cost requirements

**3.9** Table 3.2 below illustrates the passenger demand forecasts used by the Airports Commission and Gatwick Airport Limited (GAL). These passenger forecasts drive the costs of the scheme by dictating the point at which the airport requires new capacity, and therefore the profile of the airport's capital and revenue requirements.

**Table 3.2: Passenger demand forecasts used by the Airports Commission and GAL**

| Scenario | Passengers per annum (m) Carbon-traded | | | | Passengers per annum (m) Carbon-capped | | |
|---|---|---|---|---|---|---|---|
| | 2011 | 2030 | 2040 | 2050 | 2030 | 2040 | 2050 |
| S0 assessment of need | 35 | 50 | 62 | 82 | 46 | 56 | 69 |
| S1 global growth | | 58 | 84 | 94 | 44 | 49 | 60 |
| S2 relative decline of Europe | | 49 | 62 | 83 | 42 | 49 | 61 |
| S3 low-cost Is king | | 72 | 91 | 96 | 53 | 78 | 86 |
| S4 global fragmentation | | 40 | 53 | 68 | 39 | 50 | 63 |
| *Gatwick Airport Ltd forecast* | | *65* | *83* | *95* | | | |

Source: Airports Commission analysis and GAL submission to the Airports Commission.

**3.10** For the purposes of the financial and commercial assessment, a subset of these demand forecasts were taken to assess the costs associated with the scheme under different demand scenarios, and the implications of these forecasts on the projected aero charges that would need to be paid to the airport. The four demand scenarios used for Gatwick Airport Second Runway reflected a range of passenger traffic that encompasses the lowest and highest demand forecasts and are as follows:

- *Assessment of need* – carbon-capped (AoN-CC)
- *Assessment of need* – carbon-traded (AoN-CT)
- *Low-cost is king* – carbon-traded (LCIK-CT)
- *Global fragmentation* – carbon-capped (GF-CC)

**3.11** A number of the Airports Commission's demand forecast scenarios predict a less optimistic passenger forecast profile for the Gatwick Airport Second Runway scheme than as forecast by GAL. With the exception of the *global fragmentation* carbon-capped scenario, the Commission's forecast profiles reflect a scenario in which the additional runway is built and opened by 2025. GAL has assumed a sharp increase in passenger numbers immediately following this, broadly in line with the Commission's *low-cost is king* carbon-traded scenario, whereas the majority of the Commission's forecast scenarios predict a more gradual increase in passenger demand. GAL's overall forecast volume is close to the upper end of the Commission's forecast range.

**3.12** The overall cost requirements for the Gatwick Airport Second Runway scheme are a function of the following categories:

1) The costs required to deliver the new capacity:

   a) **Scheme Capex**: the capital expenditure associated with building both the additional runway capacity and the ancillary infrastructure required to deliver this capacity.

   b) **Surface Access Costs**: the capital expenditure, investment and operating expenses associated with building the transport links to and from the airport.

2) **Core Capex**: the capital expenditure associated with the airport's existing infrastructure, and which would be incurred irrespective of a decision to adopt the proposal for new capacity.

3) **Asset Replacement**: The capital investment required to maintain or replace the capital assets of the airport and to update the infrastructure to retain a modern airport.

4) **Operating Expenditure (Opex)**: The expenses associated with operating the airport, including staff costs, facilities management and utilities.

**3.13** There is a level of uncertainty to these projected costs because of the risks described in the risk framework (see Table 3.1). The Commission has reflected this uncertainty by adding a risk premium to its cost estimates. The Commission has also, in line with HM Treasury Green Book guidance, added a further risk allowance – Optimism Bias (OB) – to reflect that a procuring entity's initial risk evaluation and pricing tends to assume relatively positive outcomes for the project, whereas in practice the overall price may prove to be higher, particularly for a complex project such as this where a number of risks interplay. Two levels of OB have been considered: full OB; and a mitigated OB where key factors contributing to the uncertainty are considered to have been managed to some extent. A summary of the risk premia and OB assumptions applied to the different cost categories is provided in the Cost and Revenue Identification Gatwick Airport Second Runway Report. GAL have also applied a risk premium of 25% across their cost estimates. They have not made an allowance for OB.

**3.14** The total project costs vary depending on the demand scenario, sensitivities run and the risk premium and OB applied. The table below summarises the range of projected cost requirements for the Gatwick Airport Second Runway scheme, based on four demand forecast scenarios used in this analysis. Full detail of how these estimates were derived is provided in the Cost and Revenue Identification Gatwick Airport Second Runway Report.

**Table 3.3: Gatwick Airport Second Runway – Airports Commission cost estimates** (all costs in £ million, 2014 prices and with Risk and Mitigated Optimism Bias adjustments applied)

| | AoN-CC | AoN-CT | LCIK-CT | GF-CC | Gatwick demand forecast |
|---|---|---|---|---|---|
| Scheme Capex | 7,387 | 9,340 | 9,340 | 7,387 | 9,340 |
| Surface Access Costs[48] | 787 | 787 | 787 | 787 | 787 |

49 Surface Access Costs include Capex, Asset Replacement and Opex costs.

| | AoN-CC | AoN-CT | LCIK-CT | GF-CC | Gatwick demand forecast |
|---|---|---|---|---|---|
| Core Capex | 3,224 | 3,224 | 3,224 | 2,550 | 3,224 |
| Asset Replacement | 4,408 | 4,830 | 6,350 | 3,908 | 5,957 |
| Opex | 14,521 | 15,923 | 19,076 | 13,582 | 17,938 |

Source: Airports Commission analysis.

**3.15** The table below summarises GAL's projected cost estimates, inclusive of risk.

### Table 3.4: GAL cost estimates

| | GAL estimate (inclusive of risk) £m, real |
|---|---|
| Scheme Capex | 7,389 |
| Surface Access Costs | 582[49] |
| | |
| Core Capex | 2,479[50] |
| Asset Replacement | 4,020[51] |
| Opex | 14,765 |

Source: GAL submission to Airports Commission.

**3.16** Differences between the Commission's estimates and GAL's reflect differing views on optimism bias and different construction profiles.

**3.17** GAL is proposing a four-phased delivery approach which includes one transition phase, Phase 0 (during which the runway and remote passenger pier are built and surface access infrastructure begins) and three subsequent phases (during which the main passenger terminal and other supporting satellite and surface access infrastructure is completed). The three subsequent phases are contingent on meeting specific passenger number milestones. This phased approach is described in detail in the Cost and Revenue Identification Gatwick Airport Second Runway Report.

50 This cost estimate is based on GAL's submission to the Commission in July 2014.

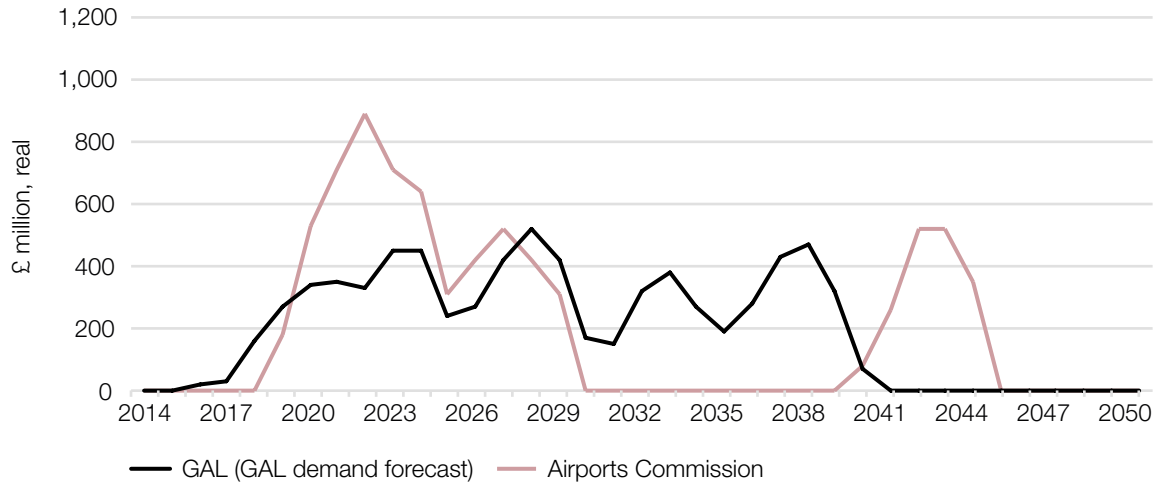
51 This core capex estimate does not include the first three years of Q6 as GAL's capex estimates commenced in 2016/17. Inclusion of the first three years of Q6 work add an additional £467 million.

52 This Asset Replacement estimate does not include the first three years of Q6, as GAL's Asset Replacement estimates commenced in 2016/17. Inclusion of the first three years of Q6 would add an additional £169 million.

**3.18** Figure 3.1 describes the profile of the estimated scheme capex requirements for the Gatwick Airport Second Runway scheme in real terms, based on the Commission's AoN-CC demand forecast. This scenario is towards the lower end of the Commission's demand forecasts. Figure 3.1 illustrates the importance of the passenger demand forecasts in estimating the project cost.

**3.19** As set out in more detail in the Management Case, the Commission has based its appraisal upon a more conservative approach to phasing than that proposed by GAL, moving more directly to the first phase of new terminal infrastructure in order to accommodate the increased passenger numbers associated with opening of the new runway. Under the AoN-CC demand forecast, the passenger milestones are therefore met at later dates and so the second phase of terminal development does not begin until 2041; and the third phase is not required within the assessment period (2014-2050). In other demand forecast scenarios, higher levels of demand mean that the third phase is constructed during the assessment period, giving rise to the differing scheme costs across scenarios illustrated in Table 3.3. It is important to note that the Commission recognises that final commercial decisions on phasing may be made later, during detailed design, by the airport operator.

**Figure 3.1: Scheme Capex requirement under the AoN-CC demand scenario**




**3.20** The Commission has considered a range of surface access works that would be required if the runway scheme is implemented. Differences between GALs estimate of surface access costs and the Commission's are due to the Commission believing a greater number of works are required. The allocation of surface access costs would be a matter for negotiation between scheme promoters and the government of the day. The analysis presented in this document does not include surface access costs, however the Commission has run a sensitivity in which the full surface access costs fall to the scheme promoter to understand the full range of

potential impacts of these costs. Full details of the surface access cost estimates and the outputs of these sensitivities can be found in the Cost Input Report and the Funding and Financing Report.

## Financing arrangements

**3.21** Gatwick Airport is currently privately owned and operated by Gatwick Airport Limited. It is predominantly financed through the long term bond market, with current debt of c. £1.5 billion made up of Class A bonds. It also has £300 million of revolving credit facilities. It has equity of c. £336 million in ordinary share capital. Its current capital structure is summarised in the Literature Review and Funding and Financing Report.

**3.22** As an airport assumed as having substantial market power, Gatwick airport is subject to economic regulation by the Civil Aviation Authority. In recognition of Gatwick's competitive position, this regulation is based on licence-backed price commitments agreed with its airline customers, alongside a number of commitments in relation to service provision, all of which is monitored by the CAA. There is a so-called 'shadow RAB' sitting behind these commitments to give an idea of the level of price control the airport would likely face in the absence of price commitments. This is calculated on the basis of the airport's estimated Regulatory Asset Base (or RAB – its core capex and core asset replacement costs). The return on this asset base (its cost of capital), allowing for depreciation and efficient operating expenditure, is used to derive an estimated allowable average revenue yield per passenger – the price that the airport would be permitted to charge the airlines per passenger if it faced a traditional price control.

**3.23** A full description of how GAL's aero charge is calculated is provided in the Literature Review.

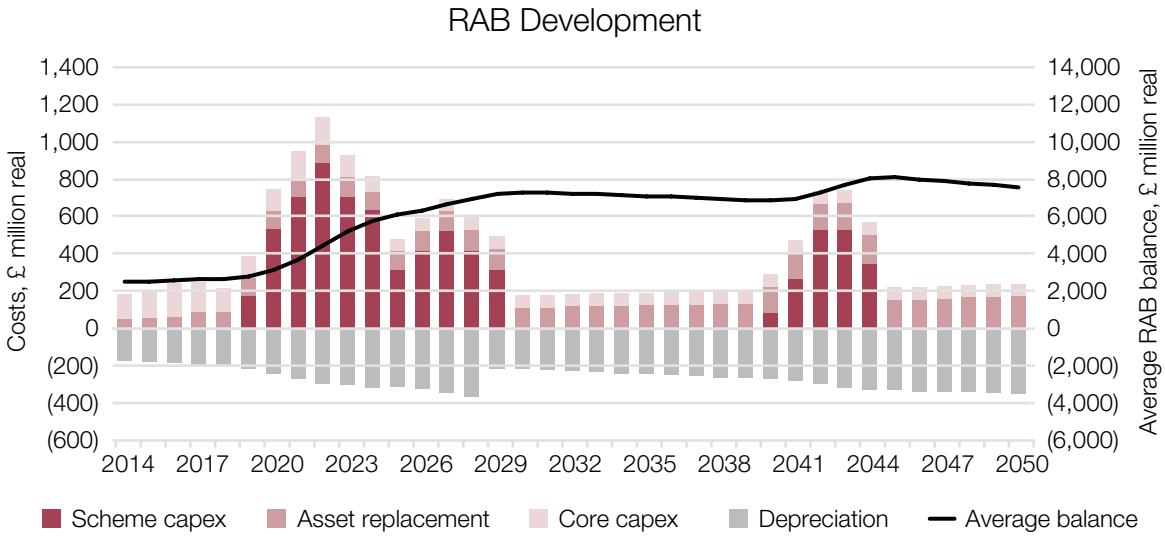
**3.24** Gatwick airport's current aero charge is c. £9 per passenger. Its total revenues are £593.7 million (£317.4 million from aero charges and £276.3 million from non-aero revenues such as shops, restaurants and parking). Its total RAB is, as of 31 March 2014, c. £2.5 billion.

**3.25** To determine the impact of the scheme on passenger aero charges, a number of approaches could be adopted. The Commission has considered that as the CAA still requires GAL to undertake a shadow RAB calculation, for simplicity a RAB-based approach is relevant to considering the impact of the Gatwick Airport Second Runway scheme. It is assumed that assets are added to the asset base in the year in which the expenditure is incurred and that revenue will increase accordingly thereafter rather than at the next review period. This assumption sits between a scenario where the RAB only increases at each regulatory review period

following expenditure and a scenario where the regulator allows a degree of pre-funding of a RAB before the necessary expenditure has actually taken place. The possibility of the latter is discussed in more detail in Section 4.4.

**3.26** Figure 3.2 demonstrates the impact of development of Gatwick's second runway on the average RAB balance for the airport using the Commission's AoN-CC demand scenario.[53] The RAB balance increases significantly from 2024-2030 to a peak of £7.3 billion in 2030, owing to the capital costs incurred during construction of the runway and the first phase of terminal development. There is a slight net decrease between 2030 and 2042 owing to depreciation of these capital assets. The RAB balance then increases again due to the capital expenditure associated with the second phase of terminal development, reaching a peak of £8.1 billion in 2045. The RAB balance then starts to decrease again as a result of depreciation of capital assets. The RAB balance is used not only to derive aero charges but also to determine one of the target ratios that the credit rating agencies expect to be met (the net debt to RAB ratio) and thus the airport's credit rating and its ability to access finance from the bond markets (see the Funding and Financing Report for further details).

**Figure 3.2: Average RAB balance based on the AoN-CC demand scenario**




**3.27** Taking the profile for Scheme Capex, and coupling it with the airport's Core Capex, Asset Replacement, Opex and Non-aero Revenues, the Commission has assessed one financing structure that it believes could plausibly meet the requirements to deliver the scheme. The approach adopted looks to finance the scheme capex through the issuance of bond financed debt where allowed to maintain GAL's

53 Since April 2014, GAL has been regulated by the CAA on a licence based approach which allows GAL some flexibility in setting aero charges. The CAA however still requires GAL to undertake a shadow RAB calculation in case the CAA opts to regulate on a different basis. As such, the RAB analysis is still considered relevant to the Commission.

current BBB+ credit rating.[54] Where this is not possible, equity is injected. The subsequent build-up of debt and equity is illustrated for the AoN-CC demand scenario in Figure 3.3 and summarised for the four demand scenarios used in this analysis in the table below. Surface access costs have not been included.

**Figure 3.3: Gatwick Airport Second Runway Scheme Debt and Equity Balances vs. Capex for AoN-CC demand scenario**

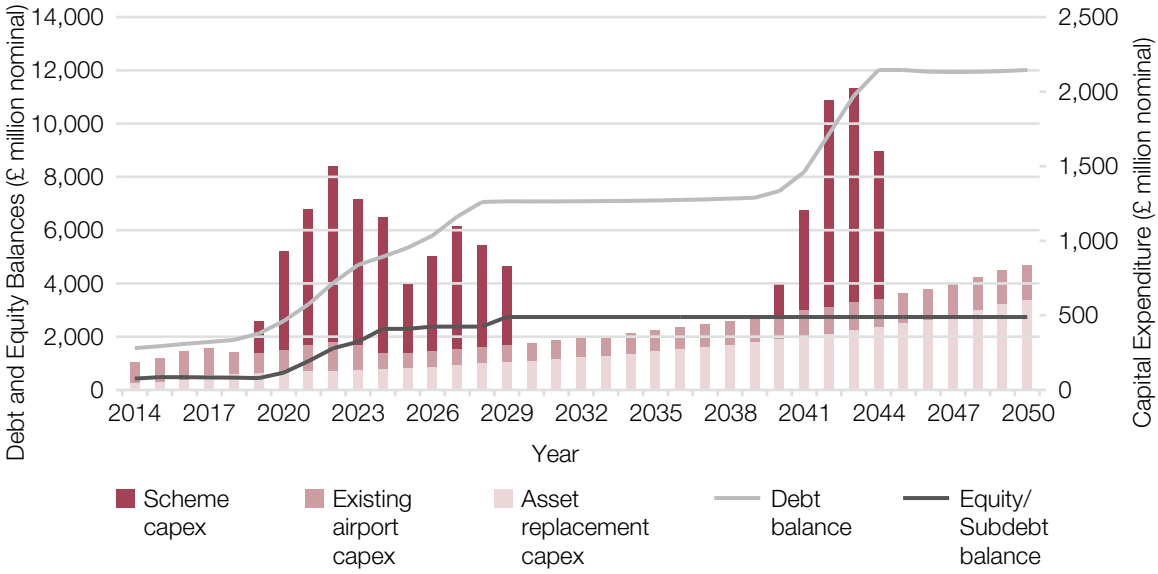



**Table 3.5: Additional nominal debt and equity requirements for delivery of the scheme under the Commission's four forecast demand scenarios[55]**

| Scenario | AoN-CC | AoN-CT | Low-cost is king | Global fragmentation |
|---|---|---|---|---|
| Additional debt requirement | £10.4bn | £14.3bn | £9.3bn | £12.3bn |
| Additional equity requirement | £2.4bn | £2.5bn | £3.7bn | £3.1bn |

**3.28** Across the four demand scenarios funding scheme would require additional debt financing in the range £9.3-14.3 billion; and additional equity in the range £2.4-3.7 billion. The illustrated increase in debt and equity over the assessment period (2014-2050) reflects the likely availability of debt during that period. In the early stages, the RAB value is smaller and therefore the net debt to RAB

54 Details of the approach used to assess this are found in Costs and Commercial Viability: Funding and Financing Report.

55 Full details of how these have been calculated are found in Cost and Commercial Viability: Funding and Financing Report.

requirement has a greater restriction on the quantum of debt that can be drawn. In later stages, the increasing RAB value allows for the capital expenditure to be funded by a greater proportion of debt.

**3.29** The costs of this additional financing as well as the ongoing costs of the airport are met through a combination of aero and non-aero revenues. For a given demand scenario, the aero revenue can be used to determine the average per passenger charge that would be needed to meet the financing requirements. The resulting impact to passenger aeronautical charges across the Commission's four demand scenarios for Gatwick is an increase from £9 per passenger to a weighted average of c. £15-19 and a potential peak of c. £23 per passenger, as summarised in Table 3.6 below.

**Table 3.6: Estimated passenger charges across the Commission's four demand scenarios**

| Scenario | AoN-CC | AoN-CT | Low-cost is king | Global fragmentation |
|---|---|---|---|---|
| Charge peak | £21.34 | £23.48 | £16.46 | £22.31 |
| Weighted average (2019-2050)[55] | £18.76 | £19.28 | £16.33 | £18.29 |
| Weighted average (2014-2050)[56] | £16.95 | £17.55 | £15.36 | £16.19 |

Source: Airports Commission analysis.

**3.30** These projected aeronautical charges are higher than those estimated by GAL, which are forecast to increase from £9 currently to £12-15 as the phased construction of the scheme progresses. These lower estimates reflect differences in cost per phase (driven mainly by different risk and optimism bias assumptions), a more optimistic demand profile, broadly equivalent to the *low-cost is king* scenario and a more conservative approach to project phasing.

56 Average aero charge weighted by forecast passenger volumes.

57 Average aero charge weighted by forecast passenger volumes, including the Q6 (2014-2019) regulatory period.

## Application of risk framework

**3.31** The table below applies the risk framework to the overall cost and financing requirements for the Gatwick Airport Second Runway scheme.

| Risk | Description |
|---|---|
| **Demand and revenue** | The level of uncertainty associated with long-term passenger demand growth levels at Gatwick, coupled with a projected doubling of the aero charges to generate the equity required for development of the new runway introduces a risk that, because of competition with other airports, Gatwick may develop capacity that is not utilised to its fullest extent. This in turn increases the investment risk, as discussed below, and the price which investors will place on this risk will depend on the design of the future regulatory mechanism. |
| **Cost and integration** | The phased approach to delivery of the project proposed by GAL, where construction of new capacity is linked to meeting passenger demand milestones, could introduce additional complexity and hence risk associated with the price of construction and operation. This would have knock-on implications on the cost exposure of the airport and on the financing and contracting risks. GAL's cost estimates for each phase are lower than the Commission's, and if these are achieved these risks may be reduced. |
| **Contracting** | For an investment of this size and with significant interdependencies it is unlikely to be possible to sub contract and so transfer all the risk as the level of risk implied will likely be too great for the balance sheets of the contractors. The airport may therefore retain a large portion of the cost risk, and contracts would likely be based on a form of risk share arrangement or target price arrangement rather than the traditional fixed price arrangement used for infrastructure projects. The level of exposure to this risk will depend on the extent to which it is recognised via the regulatory mechanism. |

| Risk | Description |
|---|---|
| **Financing** | The RAB based approach under which Gatwick currently operates provides a level of certainty to credit rating agencies and investors and would to an extent facilitate attraction of lower cost and longer term finance. The Commission's cost and revenue estimates suggest that GAL may have to raise an additional c. £2.4 billion in equity and c. £10.4 billion of debt (under the Commission's AoN-CC scenario), and potentially up to c. £3.7 billion additional equity and c. £14.3 billion additional debt. Taking into account the level of maturity of its current bonds this will require debt issuances of up to £2 billion in any given year. This is significantly larger than the company's bond issuances to date, and may require the airport to issue bonds in a number of currencies rather than just GBP bonds. However, this level of finance is not unprecedented for infrastructure projects and airports. The UK's largest individual bond issuance for 2013 was £3.5 billion by Vodafone and the funding requirements for Gatwick Airport's Second Runway are well within this range. |
| **Investment** | The major element of investment risk for the Gatwick Airport Second Runway scheme is the extent to which any uncertainty around levels of passenger demand will impact investor's assessment of risk, and be treated when determining the costs of capital and therefore returns on investment under a RAB based model. The equity financing would need to command sufficient returns to attract investors, particularly longer term investors with a different risk appetite. |
| **Regulatory and policy** | Risks associated with changes to the wider regulatory and policy environment and their consequent impact on pricing will need to be assessed and managed by Gatwick Airport Limited. |
| **Timing and delivery** | For an investment of this size a key element may also be whether timing can be used to mitigate risk: GAL's proposals already allow for phased development; and completing revenue generating elements such as the new runway as quickly as possible will ensure the RAB is built up, helping to control costs. |

Source: Airports Commission Analysis.

### Assessment of implications for affordability and commercial deliverability

**3.32** The risk framework identifies a number of risks associated with the Gatwick Airport Second runway scheme around demand and revenue, and investment. Raising additional financing of up to c. £3.7 billion in equity and up to c. £14.3 billion in debt may be challenging in a context where there is a level of uncertainty around future passenger demand and where the airport is likely to need to raise its aero charges from £9 per passenger to a weighted average of c. £15-18 and a potential peak of c. £23 per passenger within a competitive environment.

**3.33** The Airports Commission is considering options that may mitigate this level of challenge, identifying measures that could be implemented to support delivery of the scheme.

**3.34** It may be appropriate to consider different funding structures for delivering the scheme. Measures could include: ensuring that the revenue-generating elements of the scheme are completed as early as possible so that the RAB is built up quickly, costs are controlled and aero charges are brought down; taking steps to increase non aero revenues at the airport so that they contribute a larger proportion of total scheme costs; or value engineering to control the costs of construction.

**3.35** The role of the regulator is also key to creating an environment that promotes efficient investment and unlocks the airport's ability to raise finance whilst protecting the interests of consumers. Ultimately, the design of the future regulatory framework and the level of assurance it provides to potential investors will impact the price they place on the investment risk. The principle that risk should be allocated to those parties who can best manage it is one of a set of draft principles currently being considered by the Civil Aviation Authority in their consultation on the economic regulation of new runway capacity. The CAA also include consideration of the principle that, subject to this being in the user's interests, capacity could be paid for both before and after the new runway opens – through a level of pre-funding, which could serve to reduce overall costs and smooth the impact of passenger aero charges. The regulatory approach has been flexed in the past to support the significant level of infrastructure associated with Heathrow's Terminal 5.

**3.36** It is likely that Government will need to fund some or all of the surface access requirements, and a commitment to do so may provide investors with a level of assurance and so reduce the price they place on the risks discussed above. There may be other options for public sector involvement that the Government of the day wishes to explore, for example a role in the delivery partnership or in managing financing risks.

**3.37** The Commission has not taken a view on any of these mitigating options; but is interested in consultation responses on their credibility, and on how they might be implemented.

## Concluding remarks

**3.38** As stated in the introduction, this is not the final assessment of the affordability or commercial deliverability of the schemes. It is an ongoing process that will need to be refined as work progresses. The case put here contains assumptions and gives ranges that reflect a number of different factors influencing overall cost, demand and affordability which the Commission will continue to consider. As noted above, GAL has put forward its own estimates for projected costs and details of these are found in the Cost Input Report.

**3.39** The Commission is seeking views on the evidence and the risk framework presented here and in the supporting technical documents; and the credibility of the options for mitigating the identified risks.

# 4. Management Case

## Introduction

**4.1** The Airports Commission's Appraisal Framework describes the Management Case thus:

*Management Case – assessing the overall achievability of the proposal, including its engineering and operational viability, and the risks associated with this.*

**4.2** The HM Treasury Green Book (Green Book) five business case model indicates that the Management Case may address issues such as programme and project management methodology, contract management arrangements, contingency plans and plans for benefits realisation and risk management.

**4.3** As the Airports Commission's process does not exactly align with that envisaged by the Green Book, in that it is intended to select a preferred option from a number of schemes rather than developing an already identified preferred option, the Management Case presented here does not precisely follow the Green Book format. However, it does replicate much of the function implied by the Green Book, in that it makes an assessment of the potential benefits realisation, risk management, contingency plans and structures that would enable robust management of delivery following the Commission's Final Report.

**4.4** The key building blocks of the Management Case are:

- **Module 14: Operational Efficiency**
- **Module 15: Operational Risk**
- **Module 16: Delivery**

**4.5** The Management Case also draws upon findings of reports undertaken in respect of **Module 4: Surface Transport**, though the outputs of that module are chiefly reflected in the Strategic, Economic and Financial Cases. Findings arising from other modules may also be relevant to the Management Case, but are chiefly captured through their impacts upon **Module 16: Delivery.**

**4.6** The Management Case addresses the extent to which the scheme satisfies the objectives set out in **Modules 14, 15 and 16**. It can also, however, be seen as addressing three key questions in relation to the scheme:

**4.7** The Commission has already begun the process of exploring these issues in a non-scheme-specific sense through **Discussion Paper 7: Delivery of New Runway Capacity.** The Management Case has been structured around these three questions specifically in relation to the individual schemes.

## Delivery of capacity

**Question 1: Do the design components of the scheme as now envisaged have a credible level of potential to satisfy the Commission's assessment that there is a need for one net additional runway's worth of capacity, capable of delivering 170,000-200,000 additional air traffic movements (ATMs) annually, by 2030?**

**4.8** Since the publication of the Interim Report, the Commission has further refined its understanding of various aspects of the Gatwick Second Runway proposal, informed by the Updated Scheme Design submitted by the scheme promoter, as well as the appraisal reports prepared by the Commission's Secretariat and consultants. To determine whether the scheme's components still present a credible means of satisfying the Commission's *assessment of need*, the Management Case must assess:

- Whether the proposed airport infrastructure (runways, terminals, taxiways and other ground infrastructure) is likely to be capable of supporting safely at least an additional 170,000-200,000 ATMs.
- Whether it is likely that airspace structures can be delivered to accommodate additional traffic at this level, taking into account any impacts the scheme may have on other airports in the London and South East system.
- Whether the proposed surface transport infrastructure and services present a credible means of supporting the growth in capacity without undue impacts upon other users of surface transport networks.
- Whether there are credible solutions to other challenges associated with airport expansion, such as increased waste output and increased need for water resources.

## Airport Infrastructure

**4.9** Gatwick Airport Limited (GAL) indicated in its Updated Scheme Design that it estimated that the Gatwick Second Runway scheme would allow the airport to accommodate 560,000 ATMs, an increase of 280,000 on the maximum current runway capacity. Analysis carried out by the Commission's consultants has confirmed that this is a realistic estimate of the capacity provided and consistent with maintaining or improving current levels of resilience at Gatwick.

**4.10** The Commission's consultants have advised of a number of potential congestion "pinch points" that might emerge as the utilisation of the expanded airfield nears full capacity, but the Commission acknowledges that these may be alleviated through detailed design and are not, in any event, expected to have a significant negative impact upon capacity or resilience.

**4.11** The Commission's analysis has indicated that in future fleet-mix scenarios which see a large rise in the number of Code F aircraft (such as the present Airbus A380 and any similarly sized successors that may emerge) using Gatwick, the taxiway infrastructure supporting the midfield terminal may give rise to some operational constraints on the basis of the assessed layout. Other layouts might be achieved via detailed design which would alleviate this, but these could carry their own consequences. Conversely, however, in scenarios where growth comes predominantly from a rise in Code C aircraft (such as the present Airbus A320 and Boeing 737 families and any similarly sized successors that may emerge) operated by low-cost carriers prioritising rapid turn-around, the midfield infrastructure may prove exceptionally efficient. The Commission's overall assessment is that the proposed airport infrastructure is compatible with a broad mix of fleet-mix scenarios, including many scenarios which see an increase in the number of Code F aircraft.

**4.12** The scheme promoter has proposed a phased introduction of terminal capacity, with new terminal facilities being introduced as required by growth in demand. The Commission's analysis has highlighted some concerns regarding the promoter's proposed first phase of this terminal development process, which involves no significant increase in terminal capacity and some passengers being delivered to a remote pier by bus. Accordingly, the Commission has based its appraisal upon a more conservatiive approach to phasing which moves more directly to the first phase of new terminal infrastructure, though recognising that final decisions on phasing may be made later, during detailed design. On the basis of this adjustment, the Commission is at present satisfied that scheme should ensure no worsening of the present passenger experience with some potential for improving upon it.

**4.13** The Commission has taken advice from the CAA regarding the safety of the proposed infrastructure. The CAA has undertaken a preliminary safety review, which has identified a number of issues that would need to be resolved via detailed design. These are, however, issues of a nature and scale which would normally be expected at this stage in the process of planning new airport infrastructure and the Commission is satisfied that they do not present a challenge to the overall credibility of the proposal.

**4.14** The Commission's assessment is that considering the likely planning, legal and construction stages, the new runway might plausibly be delivered by 2025. As with any project of this scale, estimated delivery dates must be treated with a degree of caution at this stage in the process, but on the available evidence, the Commission believes that the degree of risk associated with the 2025 date is relatively low and that the level of confidence that the scheme can provide one new runway's worth of capacity by 2030 is very high. New terminal infrastructure would be delivered in a phased manner in line with demand. This is compatible with the Commission's *assessment of need*.

**4.15** The scheme promoter has identified that a new energy from waste plant could form part of the scheme's waste strategy. The planning and construction of such a plant is a substantial exercise in its own right, whose timescales are not substantially shorter than the delivery of new runway infrastructure. The process of planning and provision of this facility would, therefore, need to begin soon after a decision to proceed with airport expansion. The Commission does not, however, believe on the basis of the available evidence that this is an essential component of the scheme to the extent that it must be considered a risk to overall scheme delivery.

### Airspace Structures

**4.16** The Commission has received advice from NATS regarding the airspace structures that would be required to support the Gatwick Second Runway proposal.

**4.17** NATS have confirmed that the promoter's estimated capacity increase can plausibly be delivered within the required timescales. The delivery of any new capacity within the London and South East system will require substantial redesign of current airspace structures, but the Gatwick Second Runway proposal does not contain any exceptional features that would heighten the level of risk or challenge.

**4.18** The scheme is not expected to have a negative impact upon the capacity of any other major airport in the London airspace system, though there may be impacts upon the airspace available for general aviation at some facilities. Fast-time simulation will be used to verify this position.

**4.19** The Commission has noted that recent trials of revised flight paths at Gatwick have met with considerable public opposition. Processes for discussion of and consultation on new flight path designs will need to be considered carefully to ensure the delivery of a credible final airspace design. The establishment of an Independent Aviation Noise Authority may support this process.

### Surface Transport

**4.20** The scheme promoter's Updated Scheme Design indicated that in terms of rail access, those enhancements required to support airport expansion would, in any event, be required to support background demand growth.

**4.21** The Commission's appraisal process has indicated that this is likely to be the case. The Brighton Main Line will experience substantial capacity challenges over the coming years and decades on the basis of background traffic alone. The new Thameslink, Southern and Great Northern franchise provides a significant increase in both capacity and service quality on the line, but is not, in itself, sufficient to satisfy 2030 background demand.

**4.22** A further package of improvements to the line has been identified and might potentially be delivered during Control Period 6 (2019-2024). If delivered, this package of improvements (or a similar package of comparable scale) would ensure that most sections of the line had sufficient capacity to satisfy both background demand and airport expansion in 2030, with additional traffic due to airport expansion accounting for only a marginal component of increased demand for use of the line. Some morning peak trains between East Croydon and London Bridge may be experiencing very high load factors by 2030, though this is true with or without airport expansion.

**4.23** The Commission notes, however, that outputs for Control Period 6 have not yet been set and that Government may choose to prioritise investment in other routes. Without a package of improvements of this nature, capacity constraints on the Brighton Main Line may present a serious challenge for airport expansion by 2030.

**4.24** The Commission's work has identified the potential for further issues regarding Brighton Main Line capacity in the period beyond 2040. The Commission expects that, even with the potential Control Period 6 enhancements, sections of the line will have more demand than they can accommodate from that point onwards, although airport expansion would still only be a small contributing factor. With less scope for incremental capacity improvements on the line once the potential Control Period 6 package has been delivered, more substantial infrastructure investments may be required. The Commission's consultants have identified some of the possible

options for this (though their list is not exhaustive) and it is clear that these options all bring significant challenges. On the basis of the available evidence, however, the Commission believes that given the timescales involved, it is likely that a suitable solution can be identified and implemented.

**4.25** In terms of road access, the scheme promoter identified a number of changes to local roads required to accommodate the expanded airport site, as well as managed motorway schemes (most of which are already planned) and enhancements to junctions expected to serve the airport. The reports prepared by the Commission's consultants have largely validated this proposition, although the consultants have identified a possibility that the M23 may require additional widening to accommodate longer term demand growth.

### Other Challenges

**4.26** **Management of flood risk:** The Gatwick site and its environs have not typically been prone to flooding. However, during December 2013, the airport experienced flooding during severe weather, which had a material and negative impact upon its operations. Since then, the airport operator has taken mitigating actions to protect against a recurrence. Flood risk issues also exist regarding areas adjacent to the airfield site. Appropriate flood risk measures would be required in relation to any new infrastructure at Gatwick including the proposed diversion of watercourses.

## Key risks

### Question 2: What are the key risks (in terms of planning, financing, construction, public and political deliverability and resilience to legal challenge) that must be mitigated if the scheme is to be delivered?

**4.27** The Commission's **Module 16: Delivery** has enabled the identification of the key risks associated with the schemes under consideration. Some of these risks are common to all proposals, as they reflect general risks associated with airport expansion schemes. Some risks, however, are specific to the Gatwick proposal. The Commission has identified a number of such risks, of which the highlights are:

**4.28** **Sensitivities may exist in relation to future developments in the airline industry:** The scheme is, in some respects, optimised towards providing new capacity to accommodate growth in short-haul traffic, particularly within the low-cost sector. The proposed airfield site presents an extremely efficient option for accommodating airlines within this sector using predominantly Code C aircraft (A320 and 737 series and any successors), able to offer high capacity and quick turn-around times. This is not to say that the scheme can only support short-haul

low-cost growth. The infrastructure is sufficiently flexible as to be able to respond to a wide range of fleet mix scenarios, with only disproportionate growth in the proportion of Code F aircraft (A380 and any successors) likely to present significant congestion issues.

4.29 **Tensions regarding utilisation of Brighton Main Line Capacity:** The Commission's appraisal of the surface transport package associated with the scheme has indicated that there is sufficient capacity to meet airport and background demand by 2030. However, this is based upon a particular service pattern. Different service patterns will produce different levels of crowding and service quality for different types of user of the line (eg. inner and outer London commuters, airport users and Brighton commuters). As background demand growth renders capacity on the line scarcer (despite the delivery of new capacity via incremental upgrades to the line), guaranteeing a service pattern which meets the needs of airport users may grow more difficult. The Commission believes that these difficulties will grow beyond 2030, as background demand continues to increase, but the scope for incremental infrastructure improvements diminishes.

4.30 **Local airspace design likely to be complicated:** The process of low-level airspace design would likely be complicated. Recent trials of airspace change at Gatwick have highlighted the difficulties involved in making changes to established traffic management procedures. The lack of change in London airspace over a period of decades reflects the difficulty of making changes of this type. As with other proposals, the successful delivery of new capacity at Gatwick is likely to be dependent upon the successful delivery of the Future Airspace Strategy and London Airspace Management Programme.

4.31 **Local stakeholder support:** The Commission has noted mixed levels of support from local stakeholders for the proposed expansion. Some local government bodies have indicated opposition, while others have indicated potential support, contingent upon appropriate environmental mitigations.

4.32 All of the above risks, as well as the wider group of risks discussed in **Module 16: Delivery** present significant challenges that would need to be considered and, where appropriate, mitigated to ensure the delivery of new capacity by 2030. However, the Commission's view on the basis of the available evidence is that none of the risks are, in isolation, insurmountable and that the overall scale of risk to the scheme is not unexpected for a project of this nature at this stage of development.

## Transition

**Question 3: How would the transitional steps towards the delivery of new infrastructure be managed and can the Commission be satisfied that robust structures are in place to allow these steps to proceed?**

**4.33** The delivery of new airport infrastructure is not a simple process. The Management Case covers the specific processes required to deliver the components of the scheme, specifically:

- Airport Infrastructure
- Airspace Design
- Surface Transport

**4.34** The Commission has raised general issues relating to the delivery of these in **Discussion Paper 7: Delivery of New Airport Infrastructure** and will consider responses to that discussion paper alongside responses to this consultation.

### Airport Infrastructure

**4.35** The Updated Scheme Design submitted by Gatwick Airport Limited reflects well-understood international standards and principles. It is not expected that there would be any particularly complicated issues related to the construction phase which would result in longer timescales than those typically associated with the delivery of new runways and terminals at existing airports.

**4.36** The Commission expects that following a recommendation in the Final Report, the scheme promoter would continue with detailed design work, resulting in further refinements of the proposal, though not to the extent of substantially changing the design's capacity. The Commission expects that this process would take place in parallel with political and planning processes.

**4.37** The Commission notes the well-understood nature of the scheme and does not believe that there would be any particular problems associated with the procurement of specialist resource to undertake detailed design and construction.

### Airspace Design

**4.38** UK airspace systems are already undergoing a period of substantial redesign as part of the Future Airspace Strategy and London Airspace Management Programme. Based on submissions from NATS, the Commission's view at this time is that the airspace design work for the Gatwick Second Runway proposal could be integrated into these programmes to ensure timely delivery. Careful management of

these programmes, some elements of which require sign-off from the Secretary of State for Transport, will be important.

**4.39** The Commission notes the difficulties associated with recent trials of airspace design changes at Gatwick and is clear that better involvement of noise-affected communities in the airspace design process will have an important role to play in mitigating risks in this area.

### Surface Transport

**4.40** Rail infrastructure funding decisions in the UK are, with the exception of certain very large projects (such as HS2), made within the framework of a regulatory system which fixes outputs and funding over five year control periods. Some of the enhancements required to support the Gatwick Second Runway proposal form part of the already-agreed Control Period 5 (2014-2019) settlement. The remainder would likely need to be delivered during Control Period 6 (2019-2024). The Government typically states its preferred outputs for an upcoming Control Period at least two years before the Control Period commences. It is clear, therefore, that should Government decide to move forward with the Gatwick Second Runway proposal, it would need to make rapid decisions regarding rail infrastructure funding.

**4.41** Rail services are specified in franchise agreements, which exist between the Secretary of State for Transport and a Train Operating Company. The Government has recently re-let the franchise for services on the Brighton Main Line, as part of the new, integrated TSGN franchise. This franchise is due to be re-tendered by 2024, which aligns well with the opening of any new runway at Gatwick, allowing any service changes that may be required to support expansion to be specified in advance of the opening date.

**4.42** On the basis of the evidence available at this point, the Commission's view is that the UK's processes for planning and delivering rail infrastructure and services are sufficient to allow high confidence that the improvements assumed to form part of the Gatwick Second Runway proposal could be delivered.

**4.43** In respect of road infrastructure, the Commission has noted that the UK does not currently have a system parallel to that which exists for planning rail infrastructure, although the Highways Agency's direction of travel points towards an eventual closer alignment. The Commission notes that the Highways Agency is continuing to develop its strategic plans for the network and that the nature and scale of the improvements required to support the Gatwick Second Runway proposal is compatible with what might reasonably be delivered through current planning and delivery mechanisms.

**4.44** The delivery of surface access improvements may require negotiations between Government and the Scheme Promoter regarding the allocation of costs. The Commission has tested a range of scenarios regarding the funding of surface transport infrastructure as part of its work on cost and commercial viability. The Commission recognises, however, that eventual decisions on such funding (including, potentially, the funding of schemes in the extended baseline) will be a matter for commercial negotiation between the Government and the airport operator and that the Commission cannot prejudge the outcomes of any such negotiations.

## Conclusions

**4.45** On the basis of the evidence available at this time, the Commission's view is that the updated design of the Gatwick Second Runway proposal provides a credible option for the delivery of capacity in line with the Commission's *assessment of need*.

**4.46** A number of risks and challenges exist, but these are not of an unusual nature or scale for a project of this type at the current level of the development and may indeed be relatively low for an airport expansion proposal. The Commission does not believe on the basis of its current evidence base that any of these risks are significant enough to undermine the viability of the scheme.

**4.47** The transitional arrangements for the delivery of the scheme would be complicated and would require rapid action by both the scheme promoter and Government following the Commission's Final Report if a 2025 opening date were to be achieved. On the basis of the available evidence, however, the Commission believes that extant planning and delivery mechanisms are sufficient to ensure the timely delivery of the scheme.

# Part 2: Sustainability Assessment

# 5. Purpose of Sustainability Assessment

**5.1** UK National planning guidance describes the role and value of sustainability appraisal as:

*an opportunity to consider ways by which the plan can contribute to improvements in environmental, social and economic conditions, as well as a means of identifying and mitigating any potential adverse effects that the plan might otherwise have. By doing so, it can help make sure that the proposals in the plan are the most appropriate.*[58]

**5.2** The aim of the Commission's sustainability assessment, as set out in its Appraisal Framework, is to provide robust information about the performance of each proposal against a range of relevant environmental, social and economic indicators. Where potential significant adverse effects are identified, the sustainability assessment is intended to review and take account of options for avoiding or mitigating these. The process also allows for the identification of opportunities to undertake social, economic and environmental enhancement.

58 http://planningguidance.planningportal.gov.uk/blog/guidance/strategic-environmental-assessment-and-sustainability-appraisal/strategic-environmental-assessment-and-sustainability-appraisal-and-how-does-it-relate-to-strategic-environmental-assessment/

# 6. Appraisal Structure

## Objectives

**6.1** The Sustainability Assessment contains the objectives below, which each scheme is assessed against.

| Module | Objectives | Pg |
|---|---|---|
| Economy impacts | To maximise economic benefits and support the competitiveness of the UK economy. | 89 |
| Local economy impacts | To promote employment and economic growth in the local area and surrounding region.<br>To produce positive outcomes for local communities and the local economy from any surface access that may be required to support the proposal. | 94 |
| Noise | To minimise and where possible reduce noise impacts. | 100 |
| Air quality | To improve air quality consistent with EU standards and local planning policy requirements. | 111 |
| Biodiversity | To protect and maintain natural habitats and biodiversity | 118 |
| Carbon | To minimise carbon emissions in airport construction and operation | 122 |
| Water and flood risk | To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk. | 126 |
| Place | To minimise impacts on existing landscape character and heritage assets. | 129 |
| Quality of life | To maintain and where possible improve the quality of life for local residents and the wider population. | 133 |
| Community | To manage and reduce the effects of housing loss on local communities.<br>To reduce or avoid disproportionate impacts on any social group. | 137 |

## Approach

**6.2** The Business Case preceding provides assessment of the scheme based on the Commission's assessment of expected economic, commercial and connectivity benefits and/or dis-benefits, and the risks and opportunities to delivering these. Some environmental aspects can be monetised, and these are included in the Business Case along with other economic, connectivity and commercial factors.

**6.3** Further to this work the Commission is undertaking a sustainability assessment to consider how the scheme, as well as delivering these monetised benefits, can contribute to social, environmental and economic conditions, or how any potentially adverse impacts can be mitigated.

**6.4** The Commission uses a 'do minimum' assessment to develop the baseline, which assumes no airport expansion at the three short-listed sites. In the case of the Gatwick Airport Second Runway scheme this do minimum case is based on Gatwick Airport's most up to date Masterplan, which covers both what the airport is like now and agreed plans for how to develop the airport with only two runways. This Masterplan is published online.[59]

**6.5** The Sustainability Assessment plots scheme performance against the projected sustainability (social, economic and environmental) trends associated with the 'do minimum' case. For each module, performance is measured in relation to the baseline and these projected trends, and defined in terms of the following five levels:

| |
|---|
| **Highly supportive:** positive impacts are substantial, or substantially accelerate an improving trend, or substantially decelerate a declining trend. |
| **Supportive:** positive impacts are notable, or accelerate an improving trend, or decelerate a declining trend. |
| **Neutral:** no impacts, or on balance (taking account of positive and negative impacts) a neutral outcome occurs. |
| **Adverse:** negative impacts are notable, or decelerate an improving trend, or accelerate a declining trend. |
| **Highly adverse:** negative impacts are substantial, or substantially decelerate an improving trend, or substantially accelerate a declining trend. |

**6.6** These impacts are defined and considered both in relation to the model of airport operations central to the Commission's assessments, and in relation to potential further mitigations that might be applied.

59 http://www.gatwickairport.com/publicationfiles/business_and_community/all_public_publications/2012/2012-07-16-gal_masterplan-appendix.pdf

**6.7** Where appropriate, the Commission has undertaken this measurement against a number of demand forecasting scenarios, in order to identify a broad range of potential impacts. In some cases we expect different scenarios will have no substantive impact on the result but where there are substantive differences the Commission has noted these below.

**6.8** Assessments are based on evidence-based analysis and judgement. For example, judgement on whether an impact will be 'notable' or 'substantial' with respect to the levels above is based on a range of considerations, depending on the subject in questions, such as:

- with regard to a feature under consideration:
  - its strategic importance;
  - its intrinsic value;
  - its susceptibility to change; and
  - its uniqueness or replaceability;
- with regard to the nature of the impact likely to occur:
  - the magnitude of the impact;
  - the probability of the impact occurring;
  - the temporal scale of predicted impacts;
  - the spatial scale of predicted impacts
  - the duration of the predicted impacts;
  - the durability or reversibility of any predicted impacts; and
  - cumulative impacts.

**6.9** Performance against these levels (e.g., supportive, neutral, adverse) reflect the Commission's present judgement on the information currently available. This consultation seeks comment on these judgements, and the Commission will review them in light of responses received. As such these impact level judgements may change between this consultation document and the Commission's final report.

**6.10** This Sustainability Assessment is not intended to be a means of defining a total scheme impact (for example, through the process of summing predicted impacts), and the Commission will not process its assessment outputs in this manner. Neither does poor performance in one area or a number of areas imply that a scheme is not suitable for progression. The process does allow, however, for a consideration

of the cumulative impacts of a scheme, in line with the principles of the Strategic Environmental Assessment Directive.

**6.11** The judgements in the Sustainability Assessment rely on the methodologies set out in the following appraisal modules: Economy impacts, Local economy impacts, Surface access, Noise, Air quality, Biodiversity, Carbon, Water and flood risk, Place, Quality of life and Community. If respondents wish to understand the detailed methodologies used in these assessments please refer to the relevant consultancy reports and the Commission's Appraisal Framework.

# 7. Assessment: Economy impacts

**7.1** The national economic value associated with any airport expansion is created in several ways, such as through the impacts of increased transport efficiency, the removal of the "cost" of delays currently experienced because of the constrained airport system in the South East and associated wide GDP impacts on, for example, trade and productivity.

**7.2** GDP growth would be beneficial for people across the UK through increased employment opportunities, both in terms of the economic value of having a wage, but also the wellbeing impact associated with having a job (discussed further in the Quality of Life report and Sustainability Assessment section 15) and the diminution of community dis-benefits associated with large numbers of people in an area being unemployed.

**7.3** The detail of these different transmission mechanisms, how they interrelate and how they should be considered is set out in the Economic Case, but a summary of the impacts in respect of transport economic efficiency, reduced delays, and GDP at a national level is shown below. These vary by scenario.

## Transport Economic Efficiency impacts

**7.4** The transport economic efficiency impacts attached to airport capacity options accrued directly to airports, airlines, passengers and the public finances.

**Table 7.1: Passenger, producer and government impacts, present value, (£ billion, 2014 prices)[60]**

| | Assessment of need | Global growth | Relative decline of Europe | Low-cost is king | Global fragmentation |
|---|---|---|---|---|---|
| Passenger benefits excluding I to I[60] | 45.4 | 127.7 | 45.8 | 95.7 | 31.4 |
| Producer shadow cost impact | (41.8) | (110.4) | (43.3) | (64.0) | (29.7) |
| Government revenue impact | 2.5 | 8.4 | 3.1 | 5.2 | 1.0 |
| *Total excluding I to I* | *6.1* | *25.6* | *5.6* | *36.9* | *2.8* |
| Passenger benefits to I to I | 1.7 | 4.3 | 1.4 | 7.2 | 1.0 |
| *Total including I to I* | **7.8** | **30.0** | **7.0** | **44.1** | **3.7** |

Source: Airports Commission analysis.

**7.5** The economic impacts of transport economic efficiency of the scheme vary by scenario as passenger benefits are heavily driven by passenger demand forecasts. *Low-cost is king* and *global growth*, with the highest levels of forecast demand, have the greatest benefit associated with adding capacity. However, under *global fragmentation* the impacts are much weaker. These figures are based on carbon-traded forecasts, the benefits would likely be lower under a more stringent carbon framework, this is an issue discussed in more detail in the economic case.

60 All values are shown in 2014 market prices, and, in the case of discounted and present values, are discounted to 2014.

61 International to international interliners i.e. passengers who are transferring via a UK airport with their origin and destination outside the UK.

## Delay impacts

**7.6** The delay impacts capture the benefits to airlines, passengers and the environment of a reduction in delays at UK airports as a result of scheme development.

**Table 7.2: Total benefits from reduced delays, across scenarios, present value (£ billion), 2014 prices**

| | Total benefits | Total benefits (exc. foreign) |
|---|---|---|
| Assessment of need | 1.04 | 0.99 |
| Global growth | 0.73 | 0.70 |
| Relative decline of Europe | 1.81 | 1.43 |
| Low-cost is king | 1.13 | 0.93 |
| Global fragmentation | 1.63 | 1.37 |

Source: Airports Commission analysis [note this analysis is still subject to quality assurance].

**7.7** The benefits of reduced delays from the scheme range from £0.7 billion to £1.8 billion, depending on the demand scenario under consideration. Under the *global growth* scenario, benefits experienced by airlines account for 85% of the total benefits.

## Wider impacts: Macro-economic modelling

**7.8** To understand the GDP impacts associated with the scheme the Airports Commission have also worked with our consultants to develop an S-CGE (Spatial Computable General Equilibrium) model. This analysis is not a typical welfare analysis, but considers the possible GDP impacts of the Heathrow extended northern runway scheme. These impacts vary by scenario and are set out below.

**Table 7.3: PV GDP impacts all scenarios (£ billion, 2014 prices)**

| | Total impacts (exc. construction) |
|---|---|
| Assessment of need | 89 |
| Global growth | 115 |
| Relative decline of Europe | 63 |
| Low-cost is king | 127 |
| Global fragmentation | 42 |

Source: Airports Commission analysis.

**7.9** Initially GDP impacts are driven by construction of both the airport and surface access infrastructure. From scheme opening in 2026 to the late 2030s GDP impacts rise rapidly, mainly driven by productivity impacts associated with improved trade links allowing firms to access larger markets and benefit from knowledge spillover. In the late 2030's both the transport economic efficiency and frequency benefits start to become more significant as airlines are unable to charge the level of scarcity rents as compared to the 'do minimum', with consumers being charged lower airfares and having more available disposable income, they spend this elsewhere having multiplier effects on the economy, but the reduction in airline profits has a slight countering effect on this.

**7.10** The Commission's assessment of GDP/GVA impacts is drawn from the Commission's macroeconomic analysis above. The monetised results are included in this document and the economic case but given the nature of this analysis they have not been incorporated into the overall cost-benefit comparisons in the economic case.

## Conclusion

**7.11** Looking at the analysis of transport economic efficiency and delay impacts, under *low-cost is king* and *global growth*, the scheme clearly delivers a **HIGHLY SUPPORTIVE** impact against the Commission's objective to maximise economic benefits and support the competitiveness of the UK economy, with the possibility of this being limited to **SUPPORTIVE** under the other scenarios.

**7.12** In assessing the overall economic value of any expansion proposal, these national economic benefits need to be considered alongside other impacts, including environmental disbenefits and local economic impacts, such as job creation, and assessed against the costs of the scheme. This is done in the economic case.

**7.13** While the overall scale of benefits is uncertain at this stage, the S-CGE analysis does provide a clear indication that there may be substantial positive GDP/GVA effects from investment in aviation capacity and connectivity, and as such would represent a **HIGHLY SUPPORTIVE** impact against the Commission's objective to maximise economic benefits and support the competitiveness of the UK economy. It should be noted that that S-CGE modelling is a relatively novel way to consider the impact of airport expansion. The outputs should therefore be interpreted with some caution.

# 8. Assessment: Local economy impacts

**8.1** The development at the airport will bring about both positive and negative impacts for the local community in terms of changes to employment, local transport links, housing stock, social infrastructure and land use.

*Direct, Indirect, Induced and Catalytic Employment*

The direct employment provided by an expanded airport is defined as those staff employed directly by the airport or the airlines and concessions based there, for instance baggage handlers or customer service staff in the terminals.

The indirect impacts provided by an expanded airport are those generated by the activities of the airport's supply chain. So an indirect job would be, for instance, a chef at a facility that cooks airport meals which are then sold to airlines.

Induced impacts are those generated by the spending of those employed directly or indirectly by the airport. For example, someone employed at a café frequented mainly by airport staff.

Catalytic effects arise as a result of the benefits that air travel provides. These impacts include reduced travel times, a greater choice of destinations and more regular flights. It also includes the consumer benefit of reduced cost of leisure travel. The economic model the Commission uses attaches values to the impacts – for instance, each minute of travel time reduced for the potential future users of the airport – and adds these together to provide a total catalytic effect. The catalytic impacts could lead to, for instance, a business that is located in the South East of the UK travelling more easily to meet customers in Asia, and securing a new contract with them, then hiring new staff as their production grows.

**8.2** To understand the impact of development of the scheme we have considered three levels of assessment area: the most local consists of the areas of Gatwick Diamond which are closest to airport (Crawley, Tandridge, Reigate and Banstead, Epsom and Ewell, Mole Valley, Horsham, Mid Sussex), the second tier consists of the closest fifteen local authorities (which correspond with the Coast to Capital Local Economic Partnership (LEP) area), and the third is the wider city region of London and the South-East.

**8.3** The Commission uses the traffic forecasts from its *low-cost is king* to calculate the top range of impacts, and the traffic forecasts from its *global fragmentation* scenario to calculate the bottom range of impacts of its local economy assessments.

## Employment

**8.4** Any development at Gatwick will deliver direct, indirect, induced and catalytic job growth.

**8.5** **Direct job growth:** The Commission's different scenarios drive different passenger forecasts, and therefore each scenario models different numbers of people directly employed on the airport site. In 2030 the Commission's modelling suggests that Gatwick, at the lower end of the range, may not need to employ any more staff (due to productivity improvements), but at the top end would need to employ 17,100 more staff against a do minimum baseline (dependent on scenario). The results show that in 2050 no matter what the scenario some additional jobs will be required, ranging from 5,500 to 24,000. GAL's forecast for the expansion is an increase in local employment to 5.5% (currently 3.5%), which falls in the range of the Commission's estimates.

**8.6** **Indirect and Induced job growth:** As with direct jobs the range of scenarios mean a range of possible indirect and induced job numbers in 2030 and 2050. At its highest in 2030 a GAL expansion scheme could create 1,500 new indirect jobs and 5,100 new induced jobs (to a do minimum baseline) but at its lowest these could be as few as 200 and 300 respectively. In 2050 these ranges are between 600-1,600 for indirect, and 1,800-7,000 for induced.

**8.7** Crawley is currently a strong focus of direct, indirect and induced jobs associated with Gatwick airport. Crawley accounts for approximately one third of current airport staff and a high proportion of staff in the area are employed in airport related businesses. The population in Crawley is relatively low skilled, with less than 1.1% of workers holding an NVQ level 4 or above, and with relatively high unemployment at 9.8% in 2013. On average under 40% of workers in the air transport industry have level 4 qualifications and GAL's current workforce is relatively consistent with this trend. As such there is a relatively strong match between the new direct jobs and some of the lower skill indirect/induced jobs created and the current skills of the population in Crawley.

**8.8** In contrast the wider group of 15 LAs show a wider range of industries, lower unemployment (averaging 5.15 in the 7 LAs closest to the airport) and higher skills. While there is nothing to suggest these areas could not benefit from development, the overall scale of additional jobs created by the GAL scheme, and the lack of

specialisation in airport related industries currently, would suggest a more limited impact within each local authority.

**8.9** **Catalytic effects:** An alternative approach to assessing the number of jobs created comes from the S-CGE model, with an estimated 49,600 jobs created under the *assessment of need* scenario by 2050, rising to 90,400 by 2060. This figure is larger than the estimates discussed above as it includes the catalytic impacts of the scheme. These effects arise as a result of the wider benefits that air travel provides, improving connectivity and reducing costs through reduced travel times, a greater choice of destinations and more regular flights, as well as reduced country to country trade costs. This increase in available destinations also expands the potential markets for businesses, which benefit workers, intermediate goods and services. There may be increased competition across countries with the ability of firms to access new markets which would improve efficiency. These effects leads to an increase in employment in the economy, with the largest gains in the manufacturing and services sectors, which are trade intensive.

**8.10** The catalytic impact would be concentrated in London and the South East, which already has strong labour market performance trends (e.g. GVA per head). Part of the reason for the strong catalytic impacts in this region is the effect of agglomeration. Agglomeration benefits arise as similar firms located close together benefit from productivity gains as a result of the spatial concentration. These effects can arise from shared supply chains (leading to greater competition and specialisation of suppliers) and economies of scale and scope. This implies that the productivity of individual firms will rise with the overall amount of activity in other nearby firms, or with the number of nearby workers or consumers. This can create a virtuous cycle, where agglomeration benefits support the performance of firms, which draws more firms to the area, which increases agglomeration benefits.

**8.11** Agglomeration benefits are already evident in London and the South East, which have several areas with high employment, low unemployment and high resident and workplace salaries. Two areas that could be a focus of this agglomeration effect are the Wandle Valley (South London towards Gatwick Airport) and the London-Luton-Bedford strategic coordination corridor, which would be directly linked to Gatwick via Thameslink. These are already highlighted as key development areas in the London Plan. The catalytic benefits of the airport would therefore be underpinned by the London Plan itself, which is inherently focused upon greater economic cohesion across the London area.

**8.12** In a scenario where Gatwick attracts greater numbers of transfer passengers (e.g. *low-cost is king*) there is the potential that more business headquarters could locate near Gatwick, which would need a more varied skill mix compared to current

airport employment, and this could deliver induced, indirect and catalytic job figures higher than our quantitative forecasts suggest. This scenario could increase the positive impact of the scheme on employment in the wider assessment area. At the moment out-commuting is a common occurrence in many of the local authorities, such as Mid Sussex where 45% of the workforce commute outside the authority. In an expansion scenario like this in particular new jobs could be filled by the existing residents who are currently out commuting, although this is also dependent on other factors such as skill level.

## Housing & Social Infrastructure

**8.13** Growth of jobs and businesses associated with the airport has the potential to put pressure on housing in the local area. The Commission's modelling suggests that in 2030 the range of additional households associated with the GAL scheme (direct, indirect and induced) could be between zero and 18,400 (dependant on the scenario).

**8.14** This housing would typically be provided in a phased manner and across the entire assessment area, and therefore the demands on any individual local authority are likely to be relatively small. For example, if we assume these properties are provided over a 10 year period (2020-2030) and split evenly across the 14 local authorities, then the additional housing need for each LA would be only 130 houses per year at the highest end of the range. There are also many reasons the additional housing required is unlikely to be as high as these figures, depending on assumptions about population growth, net migration, unemployment and commuting. For instance the relatively high unemployment figure in Crawley could lead to a situation where many of the jobs are filled by people who already live in Crawley, and so fewer new homes would be needed. Local authorities in the areas neighbouring Gatwick are taking steps to increase housing provision to 2030 given already existing pressures, and in particular Crawley, the authority most dependent on the airport for local employment, has already identified its town centre as a location for long-term residential developments. As such, the scale of change associated with development at the airport is unlikely to significantly increase housing pressures on the local authorities' plans.

**8.15** The need for additional housing provision to house the increase in residents in the area around the airport will also need to be supported by the provision of additional social infrastructure such as schools, hospitals and leisure centres. The Commission's assessment suggests that provision of additional housing will need to be supported by the provision of additional form entries in local schools and two additional GPs per local authority to 2030.

## Business Space

**8.16** The businesses delivering the indirect and induced jobs growth discussed above will also need commercial premises. How closely these businesses need to locate to the airport is very dependent on the sector and nature of the business.

**8.17** For those businesses less dependent on immediate geographical proximity to the airport it is likely that across the entire assessment area sufficient space for business expansion would not be a constraint on realising the benefits of the airport expansion. While there are substantial areas of green belt to the north of Crawley borough, amongst other constraints, if the opportunities noted above in the jobs section were shared equally across the 15 LAs around Gatwick per year up to 2030, it is likely only a fairly small amount of commercial floor space would be required to accommodate demand, even if this is based on the highest number of jobs considered in the assessment.

**8.18** However, for those businesses that have very specific geographical needs, developments very close to the airport may be constrained if land-use policies set out in current Local Plans prevail. Some parts of north Crawley are already heavily developed and many remaining green spaces in the borough are designated as Sites of Nature Conservation Importance. The large open area to the north east of Crawley (south of the airport) is already allocated for development, and a large area west of Crawley is allocated for a mixed use development. These allocations and uses mean that these areas are unlikely to be available for development in the future and are not obvious areas of opportunity to find a substantial amount of land for development in the longer term in Crawley borough.

**8.19** One possible area which could be developed for business space is a large area to the north of the Borough (south of Gatwick) which is allocated as 'Gatwick Safeguarding' in the local plan. It is noted that this area is designated a potential area for employment and residential development in Crawley's emerging local plan if the Gatwick expansion did not go ahead. However, if development did take place this large area could be a suitable area for further growth in the long term.

## Surface Access

**8.20** As well as the benefits to airport users, surface transport improvements can provide benefits to non-airport users who are residents in the area, in the form of improved labour and market access. This will lead to some additional benefit to individuals and potentially the local economy.

**8.21** Already committed improvements such as the high speed Thameslink-Southern-Great Northern (TSGN) timetable post 2018 and a number of additional schemes

are likely to be needed regardless of expansion and are anticipated to be sufficient to meet the additional demand associated with a second runway. Similarly the committed and planned Highways Agency (HA) improvements to the Strategic Road Network by 2025 will provide enough capacity to accommodate airport users as well as background demand. Although the baseline in 2030 may deliver significant benefits for residents (for example as a result of TSGN services) the Commission's focus is on the incremental impact of the airport demand on the network. On this basis, there is unlikely to be any significant impact on local residents and employees beyond the baseline.

## Conclusion

**8.22** Given the modest net positive impact on local and wider regional employment set against very limited additional pressures on housing and other local services the AC determines that the impact of GAL's scheme on the objective to 'promote employment and economic growth in the local area and surrounding region' would be **SUPPORTIVE**.

**8.23** This positive impact is in some scenarios, however, quite limited in scale, and as such if only the lower end of our scenario range is achieved, this impact on the *surrounding region* could be reduced to **NEUTRAL**, with impacts on the *local area* (of Crawley and its immediate environs) remaining broadly **SUPPORTIVE**. On the other hand, if a scenario develops in which Gatwick accommodates more transfer passengers and a greater number of connections, the likelihood of business headquarters locating near the airport is enhanced, and dramatic shifts in both total induced and indirect job numbers, and the skill levels of those jobs may occur. In this instance, the impact on the *local area* could be dramatic, and the scheme's performance against our objective would likely be **HIGHLY SUPPORTIVE**.

**8.24** Given that the assessment is based on the surface access impacts of the scheme itself (rather than baseline improvements already scheduled for the area in general) the impact on the local community of any surface access is considered to be **NEUTRAL**.

**8.25** Both of these sets of benefits would need to be combined with other relevant benefits and offset against the costs of the scheme. The Commission's cost and commercial analysis, and economic case, sets these benefits in this context.

# 9. Assessment: Noise

*The Commission's Approach to Assessing Noise Impacts*

One of the key findings of the Commission's 2013 discussion paper on *Aviation Noise* was that people respond to noise in different ways. Response to noise is subjective, and likely to be affected not only by the magnitude of the sound but also its duration, regularity, and the time of day at which it occurs.

In order to help people understand the likely noise impacts of the three expansion options, the Commission has assessed noise impacts in a range of different ways. The full set of measurements can be found in our supporting annexes. In this document, we present noise impacts in the following ways:

- day noise ($L_{Aeq}$16h 0700-2300) and night noise ($L_{Aeq}$8h 2300-0700), looking particularly at the 57 decibel level (which in the Government's Aviation Policy Framework marks the approximate onset of significant community annoyance), and the lower 54 decibel level;
- the European 24 hour $L_{den}$ measure, which puts more weight on noise that occurs in the evening (1900-2300) or the night (2300-0700) than the daytime (0700-1900);
- N contours, which capture how many times in a day or night a population will be exposed to a very noisy aircraft flyover (with a 70 decibel threshold for the day, and a 60 decibel threshold for the night).

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 'lower end' case, and a 'top end' case has also been assessed to understand the implications of scenarios showing higher levels of demand. For the Gatwick Second Runway scheme the *low-cost is king* carbon-traded scenario comprises the high end traffic scenario, which results in very sharp traffic increases at Gatwick in the years immediately following the opening of a new runway and a corresponding increase in noise impacts. This chapter first considers the lower end case, then compares these outputs with those from the upper end.

*The Commission's Approach to Assessing Noise Impacts (continued)*

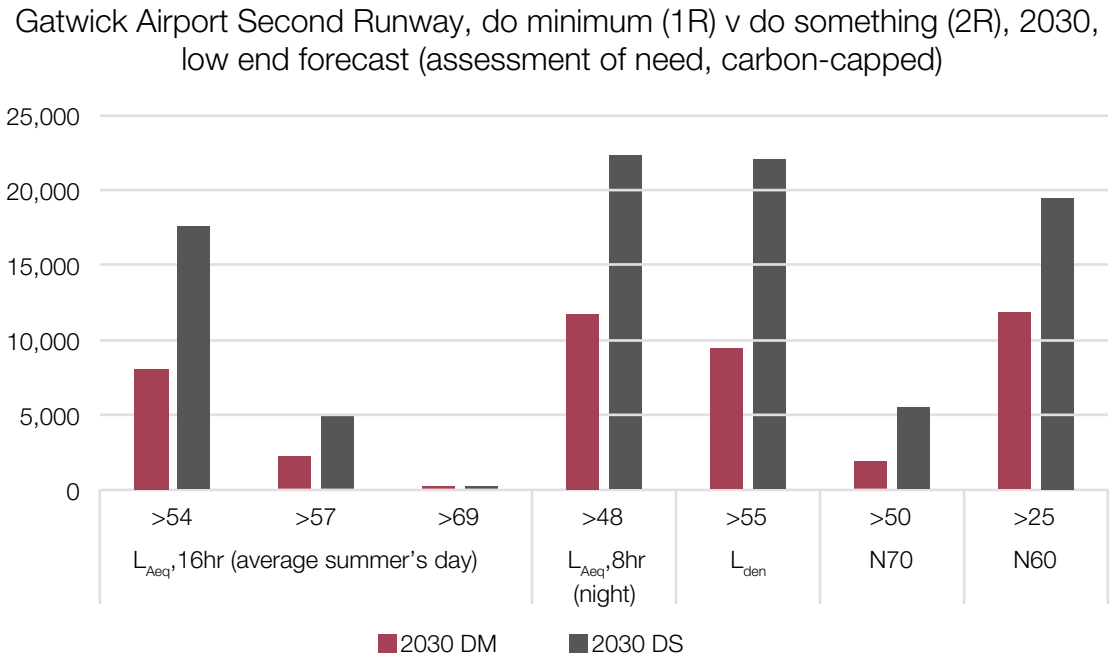
The Commission's modelling has been undertaken by the noise forecasting unit (ERDC) at the CAA using their ANCON model. The Commission's assumptions on the types of aircraft using the airport, the population changes in overflown areas, the rate at which aircraft ascend and descend and other important inputs to the model are all set out in report *Noise: Local Assessment*. Input assumptions for the noise model can be expected to impact the results significantly. This can be seen by comparing the results from scheme promoters and the Commission's modelling in the supporting annexes. A range of noise impact results can therefore be created, depending on which particular view of the future and associated assumptions are input into the model.

The indicative flight path designs used for noise modelling should not be taken as showing where future flight paths would in practice be located. Creating and agreeing airspace plans for any new runways would require significant development and public consultation, which the Commission has not undertaken; and careful consideration of mitigation options, as well as the impacts of new technology, could lead to significant changes to the indicative designs.

## Changes between the do minimum (1 runway) and do something (2 runway) scenarios, 2030, 2040 and 2050

**9.1** Figure 9.1 illustrates the differences between the Gatwick Airport Second Runway 2030 do minimum (Gatwick Airport without expansion) and do something (Gatwick Airport with a second runway) forecasts in the lower-end, carbon-capped scenario. In the do something scenario, higher numbers of people are forecast to fall within the airport's noise footprint. As a broad rule, the population exposed to noise could be seen to approximately double. This prediction is born out across each of the metrics; the effect is as true for day flights as it is for night flights. However, very few numbers of people are predicted to fall within the very noisiest contours, closest to the airport perimeter.

**Figure 9.1: In the do something scenario, higher numbers of people are forecast to fall within the airport's noise footprint using both day and night measures**

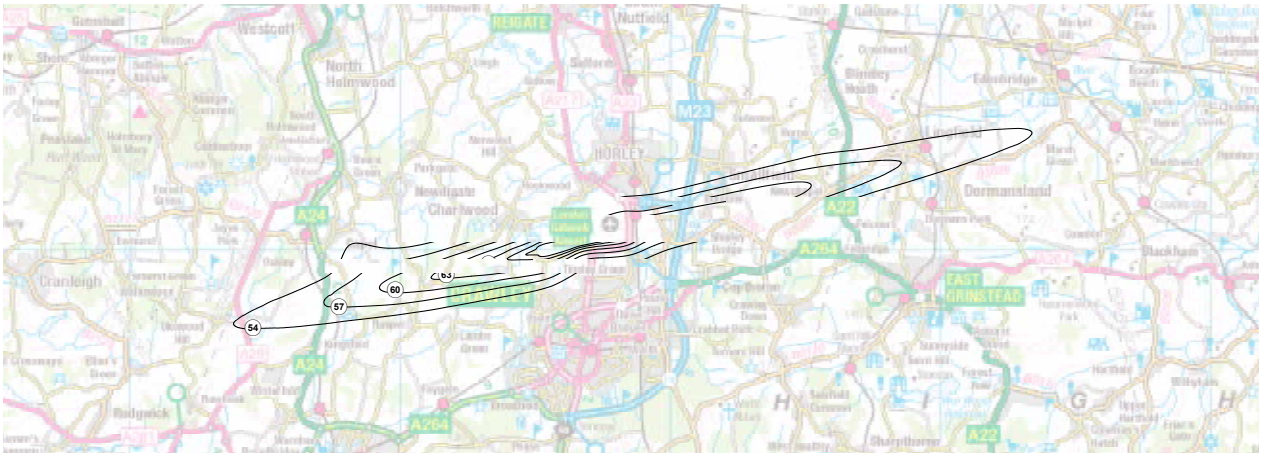



Source: Airports Commission analysis.

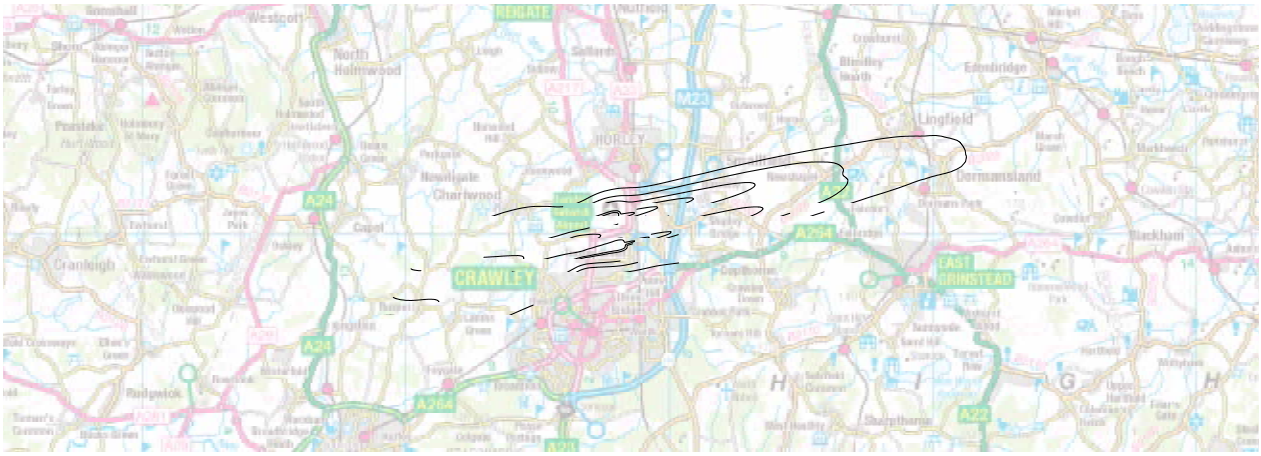
**9.2** The reason for the growth in affected populations can be seen with reference to the airport's expanded noise contour. As Figures 9.2 and 9.3 demonstrate, a second runway at Gatwick may expand noise contours to the north and the south, bringing more noise into the suburbs of densely populated Crawley in particular. In general terms, the noise impacts could be expected to shift further to the south and south west.

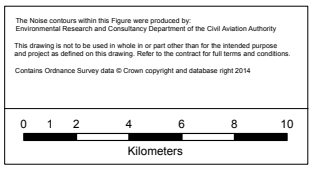
**Figures 9.2 and 9.3: A second runway at Gatwick may expand noise contours to the north and the south. In general terms, the noise impacts could be expected to shift further to the south and south west.**

*2030 carbon-capped do minimum (one runway) $L_{Aeq}$, 16hr contours, low end forecast*




*2030 carbon-capped do something (two runway) $L_{Aeq}$, 16hr contours, low end forecast*



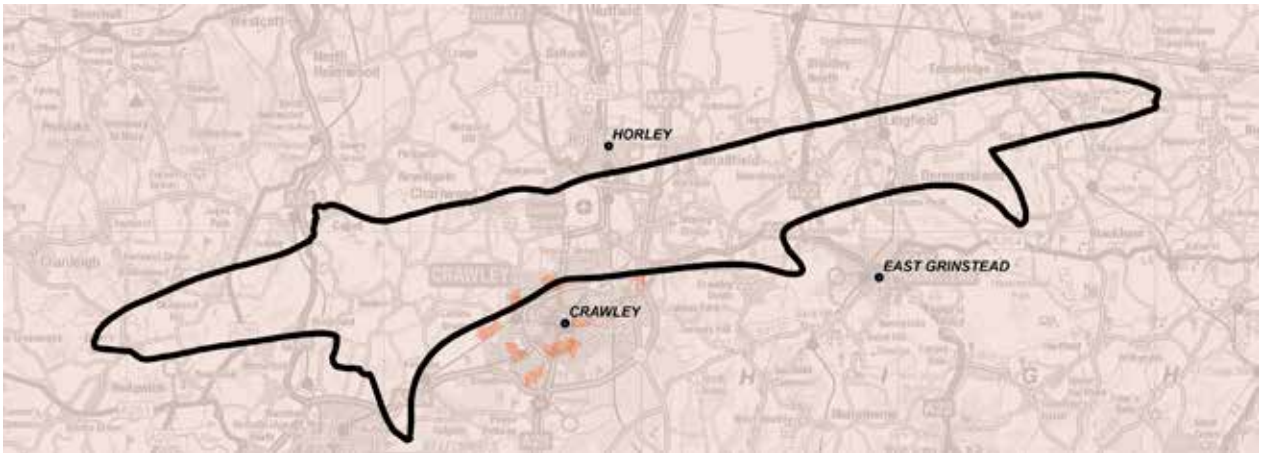




Source: Jacobs, CAA.

**9.3** As can be seen from Figure 9.4 below the change in forecasted population around Gatwick is from 0-500 people per km$^2$ except around the Crawley area. As the contour reaches the higher density areas the impact is higher, particularly as these are the areas where the population is forecast to grow at a higher rate.

**Figure 9.4: The population is predicted to increase marginally in most areas under the contours impacted by Gatwick Airport Second Runway except over northern reaches of Crawley**

*2030 vs 2050 difference in population densities around Gatwick Airport*



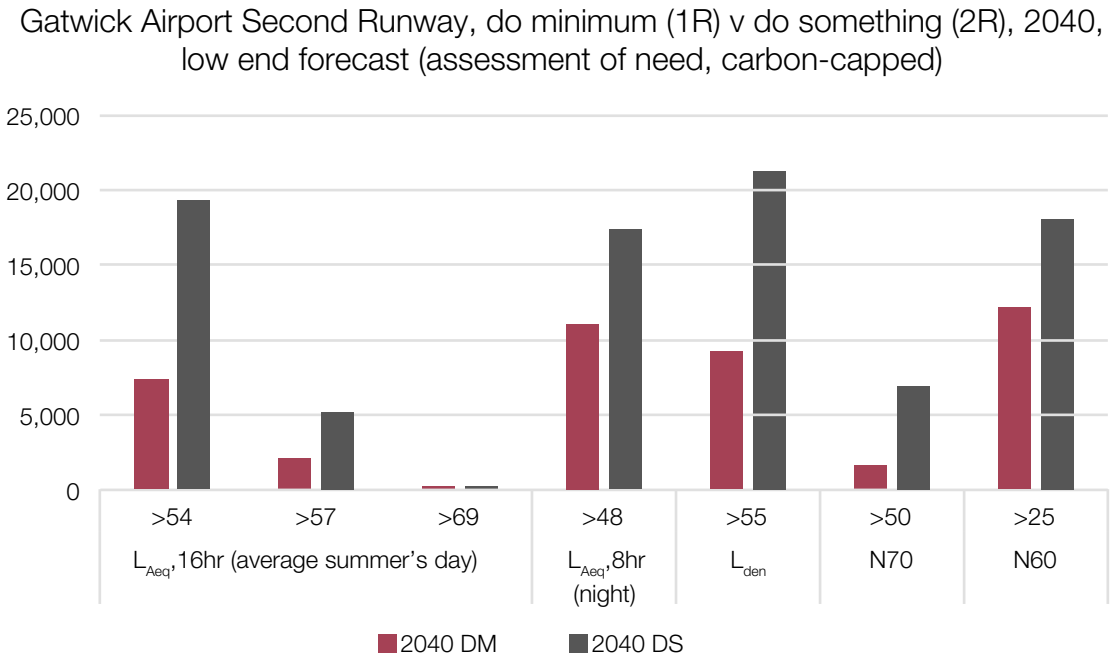

**Population Density Difference 2030-2050 (km²)**

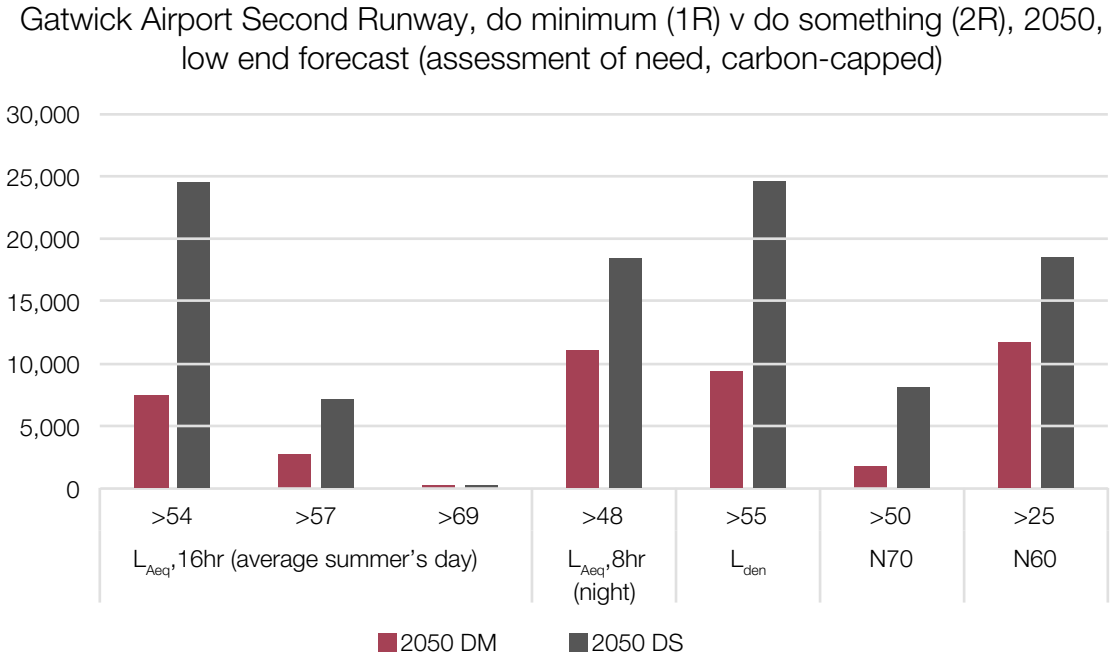
| | | |
|---|---|---|
| -5000 - 0 | 1000 - 1500 | > 2500 |
| 0 - 500 | 1500 - 2000 | |
| 500 - 1000 | 2000 - 2500 | |

Source: Jacobs.

**9.4** Very similar patterns to the 2030 analysis can be seen when comparing the differences between the 2040 and 2050 do nothing and do something scenarios. In both cases, the contour patterns of the one runway and two runway airports remain broadly as set out above, and this in turn drives similar patterns in the numbers and proportions of people affected.

**Figures 9.5 and 9.6: In 2040 and 2050, like 2030, higher numbers of people are forecast to fall within the noise footprint of the airport, across most types of noise measurement**




Source: Airports Commission analysis.

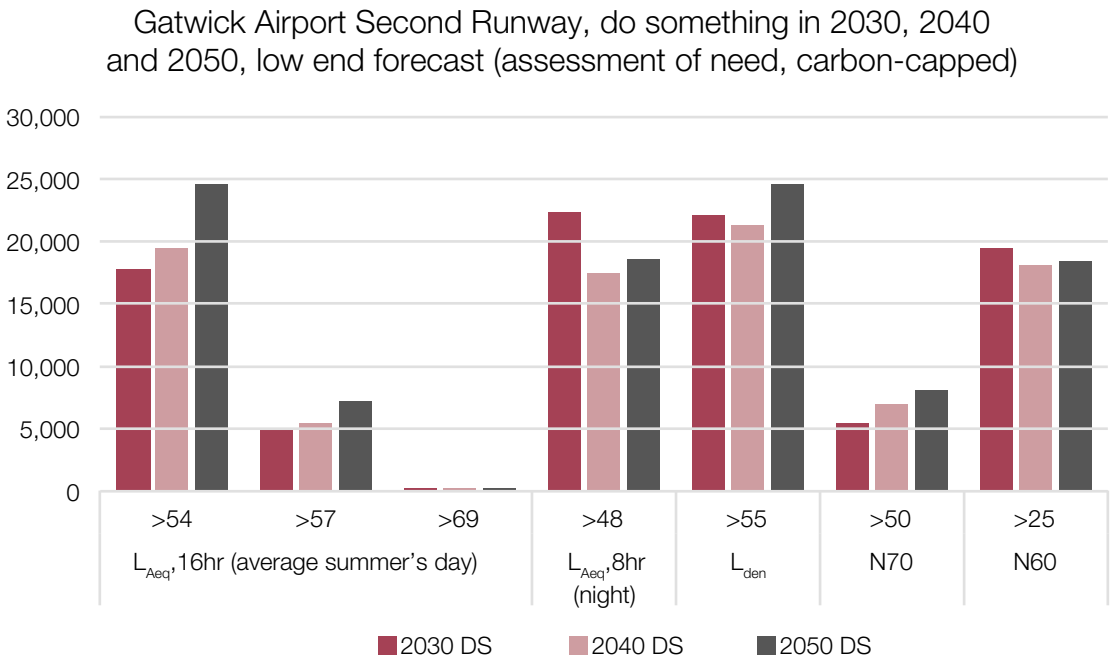
**9.5** A particularly pronounced increase in populations exposed to noise is evident when considering the daytime N or 'number above' metric (N70), which captures how many times in a day a population will be exposed to a noisy aircraft flyover. With this metric the Commission's analysis suggests that numbers of persons can be expected to triple between 2030 do nothing and do something scenarios, and quadruple between 2040 do nothing and do something and 2050 do nothing

and do something scenarios. This is a reflection of the increased proportion of the population likely to be overflown in the area in the event of expansion.

## Changes from carbon-capped 2030 do something (2 runways) to 2050 do something (2 runways)

**9.6** From 2030 to 2050 traffic at the airport is forecast to increase, from 319,000 ATMs in 2030 to 380,000 ATMs in 2040 and 476,000 ATMs in 2050. In addition, the size of the planes serving the airport is expected to grow slightly. These predicted developments do not lead, however, to a uniform growth in noise levels from 2030 to 2050, as Figure 9.7 shows.

**Figure 9.7: Increases in ATMs do not lead to a uniform growth in noise levels from 2030 to 2050**




Source: Airports Commission analysis.

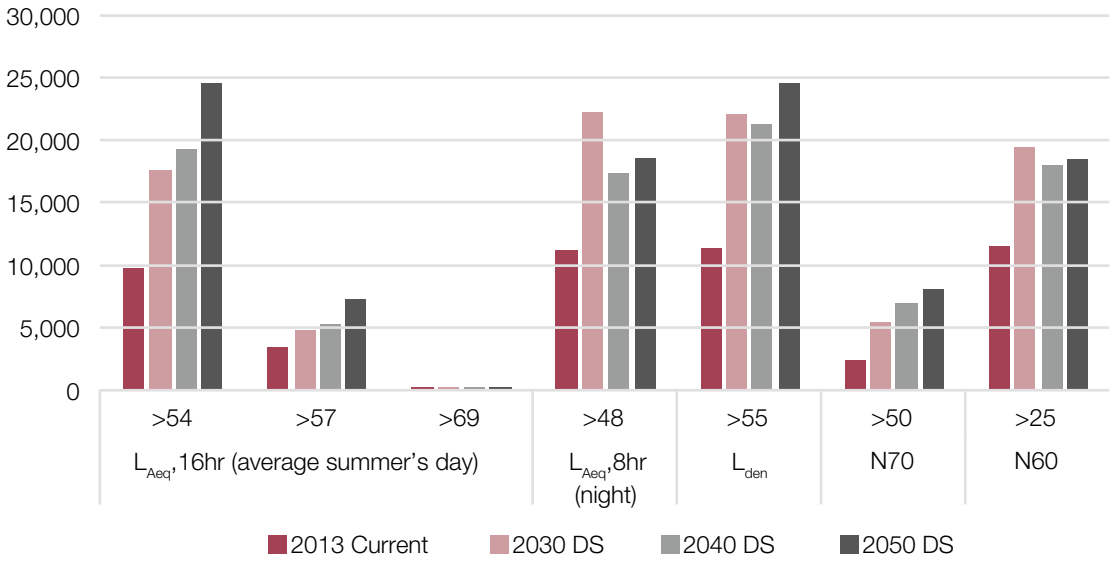
**9.7** For the night flight metrics in particular ($L_{Aeq}$8hr N60), the airport is seen to cause less noise pollution in 2050 than in 2030. This is because of the limited growth in traffic over the night periods assumed by the Commission's forecasting. With night flight limits in place the expected improvements in airplane technology, which will see quieter planes entering most airlines' fleets, can drive clear reductions in noise impacts. In the daytime, when no such limits are in place, these technological improvements are offset and outweighed by the forecast growth in traffic as well as a growth in population, hence the steady growth in noise impacts across all daytime metrics.

## Comparison of 2030, 2040 and 2050 carbon-capped do something scenarios with current day

**9.8** As a point of contrast, it is useful not just to consider the scheme against future do minimum scenarios but against the current noise situation in and around Gatwick, as shown by Figure 9.8. Across all metrics Gatwick would be expected to cause more noise impacts in future scenarios than currently. This seems intuitive: it is what would be expected with a more than doubling in airport traffic as well as projected future population growths.

**Figure 9.8: Across all metrics, the scheme is forecast to impact more people in 2050 than Gatwick Airport does currently**

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




Source: Airports Commission analysis.

## Comparison of carbon-capped and carbon-traded scenarios

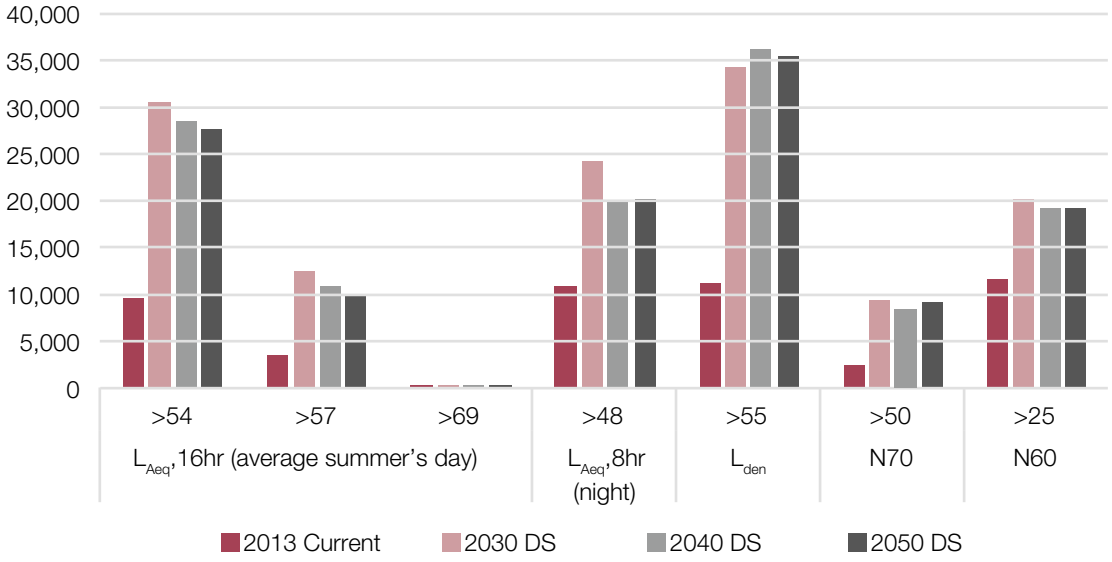
**9.9** Figure 9.8 can be compared with Figure 9.9, which displays the results of the Commission's carbon-traded do something forecasts. In this scenario substantially more traffic is forecast at GAL throughout the assessment period, and particularly in the period to 2030, and this shows itself in the almost doubling of the numbers of people affected in a number of the contours.

**9.10** In contrast to the carbon-capped scenario, in the carbon-traded scenario the airport is at its noisiest in 2030, and declines slightly thereafter. By 2050, the noise impacts from a carbon-traded scenario are only slightly higher than they are for carbon-capped.

**9.11** The daytime noise impacts displayed in the 54dB, 57dB and 55$L_{den}$ contours are markedly higher in the 2030 carbon-traded assessment than the carbon-capped assessment, with approximately 13,000 more people affected in the 54dB and 55$L_{den}$ contours. And the 2030 reduction of noise impacts compared to current day operations is much less marked.

**Figure 9.9: In contrast to the carbon-capped scenario, in the carbon-traded scenario the airport is at its noisiest in 2030, and declines slightly thereafter**

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




Source: Airports Commission analysis.

## National noise assessment

**9.12** If the Gatwick Second Runway scheme were to be developed, the national situation would be largely similar to the do minimum case, with relatively small decreases in some metrics and small increases in others. This is because the forecast increase in exposed population at a developed Gatwick site would be broadly offset by reductions in exposed populations at other airports, where traffic would not grow as sharply as in a do minimum scenario.

**9.13** Looking at the 57$L_{Aeq}$ daytime metric in the carbon capped scenario Gatwick expansion has a marginally positive impact on national noise levels in all of 2030, 2040 and 2050. This is to a large extent due to reductions in the populations exposed by operations at other London airports. Looking at night time and 24 hour metrics, the impact of a Gatwick expansion moves between marginally positive and marginally negative over the assessment periods, with no clear pattern emerging.

## Limitations of the modelling, further potential mitigations and commentary on scheme promoter's noise assessments

**9.14** The above data cannot and does not capture the full noise impacts that might accrue from an expanded Gatwick. For instance, it is well understood that people who live beyond an airport's noise contours can often be irritated and upset by the overflight of planes. This may be particularly the case in rural or tranquil areas, which comprise some of the areas around Gatwick.

**9.15** Gatwick Airport Ltd's proposal to the Airports Commission contained a number of mitigations which have not formed part of the Commission's assessments, but which could reasonably be expected to improve the noise situation at the airport. These include ensuring that planning applications considered by neighbouring planning authorities account for the noise contours of any new runway, and extension of a noise compensation scheme to all households within the $57L_{Aeq}$ contour entitling them to annual compensation equivalent to Band A Council Tax (£1000).

**9.16** Equally, the Commission has only modelled one set of representative flight paths for an expanded Gatwick option. It is possible that further optimisation of flight paths may reduce the modelled noise impacts. Future developments in plane routing technology and air traffic management could help in this regard, as could consideration of a scheme for providing predictable respite. The scheme promoter has also suggested that night operations could be grouped onto the airport's northern runway, further from the large population centre of Crawley.

**9.17** The promoter has not submitted modelling of 2030 noise impacts, but it has submitted modelling of 2040, which can be compared directly with the Commission's work. Using the Commission's upper end carbon-traded assessments, which are similar to the scheme promoter's own forecasts, the modelling submitted by the scheme promoter accords well with the assessments undertaken by the Commission. When compared with a lower-end carbon-capped traffic forecast, the scheme promoter's noise impacts come out substantially higher than the Commission's.

## Conclusion

**9.18** In relation to the objective of minimising and where possible reducing noise impacts, the Commission considers that the Gatwick Second Runway scheme will have an **ADVERSE** impact. This is because the Commission's modelling shows that with an expanded Gatwick daytime and night time noise impacts will rise in comparison

with future do minimum scenarios across all metrics, and this is also true in relation to current day impacts.

**9.19** It is also important to compare the scheme's performance with benchmarks other than the Commission's do minimum scenarios. In relation to comparator national and international airports the noise from an expanded Gatwick would impact a relatively small number of people. Even after expansion, at least six UK airports could be expected to have substantial noise impacts on more people than Gatwick. For instance a two-runway Heathrow could be expected to adversely affect more than 20 times more people than an expanded Gatwick.

**9.20** The Commission notes the potential for compensation schemes and future improvements to flight path design to further mitigate the noise impacts at Gatwick. A number of these options are proposed by the scheme promoter, the airport operator, and the Commission considers that these are likely to be valuable and effective mitigations. The Commission does not judge it likely, however, that the Gatwick scheme's impacts could be sufficiently mitigated as to be considered **NEUTRAL**.

# 10. Assessment: Air Quality

*The Commission's Approach to Assessing Air Quality Impacts*

To assess the air quality impacts associated with airport expansion, the Commission has compared a future year's 'do minimum' case (the harmful emissions produced by airports and their associated surface access without airport expansion) against a 'do something' case (the harmful emissions produced by airports and their associated surface access with expansion). This allows the change in emissions associated with the new development to be calculated.

The Commission has considered possible changes to emissions of nitrogen oxides ($NO_x$), particulate matter of 2.5 microns diameter ($PM_{2.5}$) and particulate matter of ten micron diameter ($PM_{10}$). These compounds have the potential to damage the health of humans and ecosystems. Potential damages associated with these changes at a national level are monetised based on environmental damage costs per ton emitted specified in the HM Treasury Green Book, and accounted for in the Commission's economic assessment, as set out in the preceding business case. This does not currently include the local effects of $NO_2$.

The UK and its local authorities are obliged to limit concentrations of these three compounds at local and national levels, and the Commission's assessment describes the potential risks to future compliance. At the national level the assessment considers emissions associated with the airport schemes relative to total projected UK emissions, which are subject to national emissions ceilings set at international and European level. For local assessments the Commission considers two types of location: locations where Air Quality Objectives (AQOs) have been set by local authorities; and locations where EU limits are considered in the PCM model used by Defra for projections of air quality across the UK.

Predicting future air quality impacts of airport expansion is not a simple process. It requires modelling of vehicles (road, rail, aircraft) using the airport and related transport infrastructure, the emissions generated and then how those pollutants behave in the local atmosphere. Any modelling is very sensitive to the assumptions that underpin it such as likely pollution generated by engine, brake and tyre activity or the use of transport by both airport and other users, as well as the role of future technology including road vehicles. Many such assumptions can profoundly affect the results.

*The Commission's Approach to Assessing Air Quality Impacts (continued)*

At this stage in the assessment of the three options, the Commission has modelled the mass emissions associated with airport traffic (vehicle emissions within the airport perimeter) and road and rail traffic on journeys to and from the airport in its *assessment of need* carbon-capped scenario to inform a risk based assessment. The Commission intends to test further the findings of this analysis with more detailed dispersion modelling to better understand the impacts of each option on local concentrations of air quality pollutants with a finer spatial resolution and address uncertainties. It is acknowledged that it would have been preferable to have available the outcome of this more detailed modelling exercise prior to consultation. Although a fuller picture may be provided by more detailed work, the high level modelling undertaken to date identifies the key challenges which the scheme faces in air quality terms and provides a sufficient evidential basis for consultees to express their views on the questions asked in the consultation document.

Given the uncertainties around future background air quality levels, coupled with insufficient data on aircraft and surface access emission levels post 2030, the Commission has only undertaken quantitative assessments for the scheme's opening year (2025 for Gatwick Airport Second Runway) and 2030, with qualitative assessment of potential impacts in 2040 and 2050 where appropriate.

**10.1** Table 10.1 sets out the projected mass emissions associated with the airport including airport related road traffic emissions.

**Table 10.1: Baseline $NO_x$, $PM_{10}$, $PM_{2.5}$ annual projected mass emissions by source**

| Pollutant t/y | $NO_x$ | | | $PM_{10}$ | | | $PM_{2.5}$ | | |
|---|---|---|---|---|---|---|---|---|---|
| Emissions Source | 2030 | 2040 | 2050 | 2030 | 2040 | 2050 | 2030 | 2040 | 2050 |
| Aircraft engine | 3,473.50 | 3,429.60 | 3,020.90 | 14.9 | 15.4 | 14.8 | 14.9 | 15.4 | 14.8 |
| Brake and tyre wear | – | – | – | 18.2 | 17.6 | 16.5 | 12.7 | 12.4 | 11.6 |
| APU | 475.3 | 468.2 | 452.1 | 18.3 | 18.4 | 18.8 | 18.3 | 18.4 | 18.8 |
| GSE | 176.8 | 169.9 | 165.1 | 10.9 | 10.5 | 10.2 | 9.5 | 9.1 | 8.8 |
| Road traffic – airport only | 261.8 | 281.9 | 296.9 | 28.7 | 30.9 | 32.6 | 16.9 | 18.2 | 19.1 |
| Total | 4,387.40 | 4,349.60 | 3,935.00 | 91 | 92.9 | 92.8 | 72.3 | 73.5 | 73.1 |

Source: Jacobs.

**10.2** The Commission's assessment predicts that from scheme opening to 2050 emissions of $NO_x$ are set to rise in the event of expanded operations at Gatwick Airport, if no mitigation is taken. This is likely to be the case in all of its scenarios, though the modelled scenario is the *assessment of need* carbon-capped. The primary source of increased $NO_x$ is emissions from aircraft engines, but these are generated at elevated heights during the take-off and landing cycle, significantly reducing their impact on local air quality at ground level. This results in emissions of NOx from road transport around the airport in populated areas becoming a more significant factor for health impacts.

**10.3** Emissions of $PM_{2.5}$ and $PM_{10}$ are also set to rise from scheme opening to 2050 in the event of expanded operations at Gatwick Airport, if no mitigation is taken. The primary source of emissions of both types of particulate matter in these future years is emissions from brake and tyre wear and surface abrasion, where road transport is the most significant cause[62].

**10.4** Based on the HM Treasury Green Book guidance the national level damage costs of the increases in emissions of $NO_x$ and $PM_{10}$ associated with the Gatwick Airport Second Runway scheme over the 60 year appraisal period is calculated to be £207.4 millon and £2.1 million, respectively.

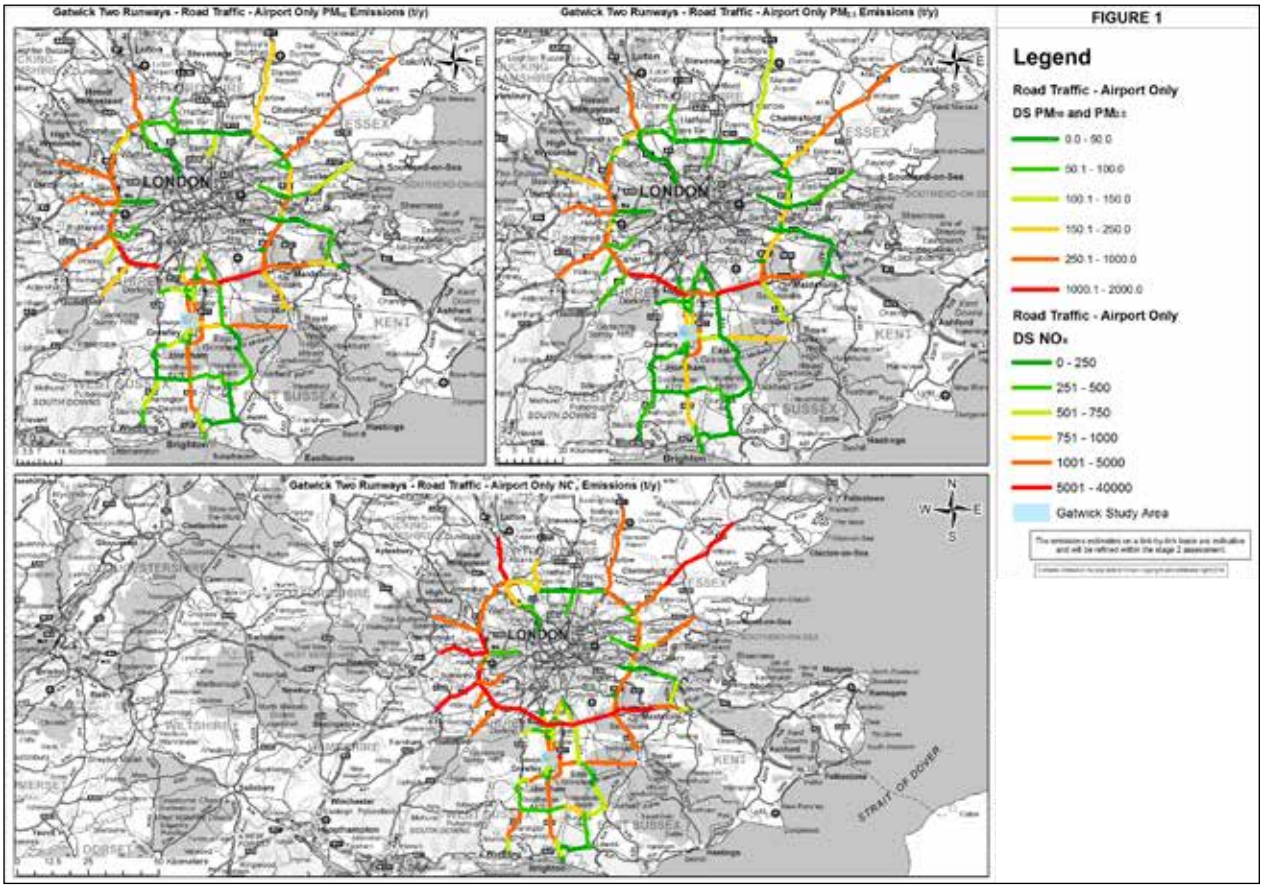
**10.5** Changes to air quality around Gatwick are not forecast to have any likely impacts upon protected ecosystems or other important environmental sites.

## National Risk Assessment

**10.6** Figure 10.1 demonstrates the extent of the Commission's modelling of surface access and also indicates the baseline emissions expectation for $NO_x$ emissions in 2030.

62 For further details of these emissions in the UK see "Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom", Air Quality Expert Group, DEFRA, http://uk-air.defra.gov.uk/library/reports?report_id=727

**Figure 10.1: Map of study area and baseline emissions for 2030**




**10.7** The UK is subject to emission ceilings on its total emissions of a range of air quality pollutants including $NO_x$ and $PM_{2.5}$. The UK expects to meet ceilings to be achieved by 2020 for these pollutants as set by the Gothenburg Protocol under the Convention on Long-Range Transboundary Air Pollution of the UN ECE. However tighter emission ceilings for 2030 have been proposed by the European Commission, specified as percentage reductions to be achieved by 2030 relative to emissions in 2005 as the base year[63]. Hence this assessment also considers projected emissions from the airport scheme in terms of percentage contributions to projected total UK emissions in 2030, which are 589 kt of $NO_x$ and 59 kt of $PM_{2.5}$.

63 For further details of the European Commission's Clean Air Package including the proposal for a revision to the current Directive see http://ec.europa.eu/environment/air/clean_air_policy.htm

**Table 10.2: Annual Mass Emissions of Gothenburg Protocol pollutants and projections, kt/y**

| | $NO_x$ | $PM_{2.5}$ |
|---|---|---|
| Gothenburg Protocol 2020 Targets | 711 | 57 |
| NAEI emissions pollutant projections for 2030 | 589 | 59 |
| Airport without expansion 2030 | 4.4 | 0.072 |
| Change due to Airport expansion in 2030 | 0.6 | 0.013 |
| New total airport emissions as a percentage of national projection in 2030 | 0.9 | 0.1 |

Source: Jacobs

**10.8** From the table above it is clear that although expansion results in increases in emissions these are small when viewed in the national context, making up a modest 0.9% of projected national $NO_x$ emissions and 0.1% of projected national $PM_{2.5}$ emissions.

## Local Risk Assessment

**10.9** The legislated air quality targets are important for health impacts. For $NO_2$ there is a potential risk of exceedance associated with the baseline situation without any expansion although this is much lower than equivalent risks at Heathrow. These risks are only likely to be exacerbated by the unmitigated emissions associated with the additional traffic caused by expansion. The PCM modelling would also suggest that expansion without mitigation would increase airport related road transport emissions of $NO_x$ by 32% in 2030 and by 78% in 2050.

**10.10** The emissions of $PM_{2.5}$ and $PM_{10}$ are not as significant a problem in these areas and levels are projected to have low risk of exceeding limit values. However, in general construction related activity does have the potential to create new localised problems that the Commission has not modelled, but which would need to be recognised and managed. There is, however, a substantially lower risk with these pollutants than with $NO_2$ concentrations that airport expansion will be a contributory factor in causing limit values to be breached.

## Potential mitigations and commentary on scheme promoter's air quality assessments

**10.11** Gatwick Airport Limited's air quality assessment did consider the same locations as the Commission's as it did not extend as far. It also focussed primarily on air quality impacts in 2040, with no directly comparable quantitative assessments of 2025 or 2030. The scheme promoter has concluded that there are no significant adverse impacts and that therefore no further mitigation action is required. The Commission will carry out dispersion modelling to ascertain the necessity of further mitigation work to tackle the potential risks identified.

**10.12** Where for 2040 the scheme promoters' figures can be compared to the Commission's assessment, the Commission has predicted 32% higher $NO_x$ emissions, 44% higher $PM_{10}$ emissions and 59% higher $PM_{2.5}$ emissions than the scheme promoter. This is in spite of Gatwick Airport Limited modelling 31% more ATMs at the airport in 2040 than in the Commission's *assessment of need* carbon-capped forecasts.

**10.13** The different assessments results are due to a variety of different assumptions used in the two sets of modelling. Most importantly, the Commission has modelled a far larger surface access assessment area than the scheme promoter, which has resulted in substantially more emissions in the final total.

**10.14** There are also a number of different assumptions used, which have driven the divergent results the key differences being:

- the scheme promoter has included future technological advancement benefits on engine emissions
- the scheme promoter has modelled the impacts of 30% more ATMs than the Commission
- the Commission has used average values for certain elements of the assessment which may over-estimate emissions compared to the aircraft and airport specific values that the promoter has used

**10.15** In the light of the impact of the different assumptions made and their impact on the promoter's modelling e.g. of technology uptake in both aircraft and ground support equipment, the scheme promoter has not specified any further specific mitigation measures beyond those implicit in the modelling assumptions.

## Conclusions

**10.16** Without mitigation as modelled by the Commission, the Gatwick Airport Second Runway scheme will increase emissions of local air quality pollutants in 2025 and 2030, in a local area where there is currently limited risk of exceedance in future. The unmitigated emissions associated with expansion could potentially increase the risk of exceedance in at least one location.

**10.17** The strong influence of related and unrelated road transport to the air quality performance of any airport expansion scheme means that critical assumptions over matters outside the airport's control will determine the fundamental and underlying air quality performance of the local area. Currently the UK is breaching concentration limits in specific urban areas (not around Gatwick) and by the time of scheme opening, action at both a national and local level will have been considered to ensure these limits or any replacements or enhancements are respected. These include any changes in the road network including orbital and access routes to London. Such action would fundamentally alter the context in which the scheme's performance on this issue should be viewed, resulting in reduced emissions and potentially improved performance nationally from national level policy measures. The Commission will be developing a better understanding of these effects.

**10.18** Due to the increase in harmful emissions resulting from the Gatwick scheme the Commission judges that without mitigation measures the scheme performance is **ADVERSE** in relation to the objective of improving air quality consistent with EU standards and local planning policy requirements.

**10.19** However, at a local level the assessment predicts limited risk of exceedances against local monitoring thresholds, so the scheme cannot be considered severely adverse. In addition, the Commission notes that some of the technological mitigations modelled by the scheme promoter in their more detailed and dynamic modelling have the potential to reduce air quality emissions and if coupled with other mitigations could potentially reduce the impact of the scheme towards **NEUTRAL**. However, the Commission will model in more detail the nature of the risk and the related concentrations of pollutants to develop a better understanding of these relationships at this location.

# 11. Assessment: Biodiversity

**11.1** The Gatwick Airport Limited proposal involves direct landtake impacts on two local designated sites, one statutory, one non-statutory, and would result in losses of priority habitats including deciduous and ancient woodland, traditional orchard, hedgerows and rivers. The land take impact on designated sites, habitats and species will have high magnitude, medium to long term duration and varying reversibility (dependant on habitat type). Given this, the Commission has assessed that replacement of sites at a 2:1 ratio is required for most land take impacts, with 5:1 for ancient woodland. This represents a total of 291ha (including a 10% contingency for indirect impacts). GAL has assumed only 124.2ha of land take mitigation is required.

**11.2** There will also be impacts that are not the result of land take, for instance from noise, air quality and water quality, as well as marginal impacts on bird populations from potential bird strike mitigations. The magnitude, duration and reversibility of these non land-take impacts are shown in the table below.

**Table 11.1: Magnitude, Duration and Reversibility of non-land take impacts on Biodiversity, associated with the LGW-2R scheme**

| Impact | Magnitude | Duration | Reversibility |
|---|---|---|---|
| Noise | Low | Short term effect repeated over Long term period | High |
| Air quality | Low | Long term | Medium |
| Water quality | High | Long term | Medium |
| Bird strike | Low | Short term effect repeated over Long term period | High |

Source: Airports Commission analysis.

**11.3** With good provision of alternative sites the biodiversity impacts above can be mitigated. However, it is important to note that given the high ecological value and low replaceability of some of the sites directly affected by the proposal (*e.g.* areas of ancient woodland), providing extra land does not entirely mitigate the impacts.

**11.4** With respect to birdstrike in particular because the proposed new runway is on a similar alignment to the existing one and will sit in the same habitat type, the overall birdstrike risk per flight on the new runway is likely to be similar to that on the existing site, providing that any environmental mitigation for lost habitats is appropriately designed and sited.

## Ecosystem Services

*What are ecosystem services?*

The UK Government has in recent years been encouraging the adoption of an Ecosystem Services Approach to environmental assessment and management. This approach adopts a perspective of the environment focussing on these services and the functioning ecosystems which support them, rather than interaction environment as a static asset.

Ecosystem services are the processes which provide the environmental goods and services on which human life is dependent.

Within literature and common understanding, ecosystem services are widely accepted to fall under the following four categories:

- Provisioning services – these are physical goods such as food, biomass for energy generation and water resources.
- Regulating services – these are benefits obtained from the regulating function of ecosystem processes, such as the regulation of water quality and water flow, the filtration of air and the sequestration of carbon.
- Cultural services – these are non-material benefits that people obtain from ecosystems, such as a sense of place or inspiration and recreational benefits.
- Supporting services – these are the services that are necessary for the production of all other ecosystem services, including biodiversity. For example, pollinating insects provide a supporting service that contributes to the delivery of provisioning services such as food.

**11.5** The proposed development may impact the local environment through loss of ecosystems such as woodland and hedgerow and disturbance to waterways. It may also have the potential to enhance the provision of some ecosystem services through mitigation measures.

**Table 11.2: Monetisation of ecosystem services impacts with respect to the LGW-2R scheme**

| Broad Habitat | Total Land Lost / Gained | Total Assessment Period Loss (PV, '000 2014£) | Total Assessment Period Mitigation (PV, '000 2014£) | Total Assessment Period Net Value (PV, '000 2014£) |
|---|---|---|---|---|
| Rivers and Lakes | 14ha loss / 29ha gain | £698 to £5,616 | £508 to £3,991 | -£190 to -£1,625 |
| Inland Wetlands | - | - | - | - |
| Grasslands | - | - | - | - |
| Woodlands | 76ha loss / 285ha gain | £33 to £14,447 | £32 to £13,879 | -£1 to -£549 |
| Sub – Total | | | | -£191 to -£2,175 |
| Agricultural Land | 421ha loss | £5,823 to £6,987 | - | £5,823 to £6,987 |
| Total | | | | -£6,014 to -£9,162 |

Source: Airports Commission analysis.

**11.6** The loss of over 70ha of woodland, as well as a large amount of agricultural land, are the main drivers of the negative impact. A key impact in terms of ecosystem services is loss of agriculture land, for which no mitigations are identified.

**11.7** The proposed mitigation for this loss is the planting almost 300 hectares of deciduous woodland and hedgerows, though due to the length of time required to establish woodland ecosystems, the loss of irreplaceable ancient woodland, and the general reduced perceived value of environmental gain compared with losses, mean that even this level of mitigation may not fully compensate for ecosystem service loss.

**11.8** Given the possible negative impacts on ecosystem services, and the limited mitigation available for some of the low replaceability habitats such as ancient woodland, at present the scheme's impact on the Commission's biodiversity

objective to protect and maintain natural habitats and biodiversity is **ADVERSE**.[64] However, this is reliant on fully developed mitigations, on ecosystem services in particular, given the promoters aspirational proposal to implement positive mitigations and compensation.

64 GAL notes that it believes its strategy for managing the remaining woodland has a positive benefit. The Commission notes the strategy but does not consider that it changes its judgement that the scheme is ADVERSE.

# 12. Assessment: Carbon

**12.1** The carbon impact of scheme development can be split into the below areas:

- increased airport capacity leading to a net change in air travel;
- departure and arrival route changes through altered flight operations;
- airside ground movements and airport operations;
- changes in non-aviation transport patterns brought about by a scheme's surface access strategy;
- construction of new facilities and surface access infrastructure.

**12.2** The first four items produce carbon on an ongoing basis, while the carbon associated with construction costs is a one off carbon "cost".

**12.3** Our carbon assessment below uses a carbon-capped scenario, which implies that increases in carbon production due to the scheme would need to be offset by reductions elsewhere to allow the UK to maintain a carbon-cap of 37.5 megatonnes (a carbon-traded scenario would imply increases due to the scheme would need to be accommodated within an overall carbon funding mechanism).

**12.4** At this stage of airport expansion proposals, route changes and flight operations are not developed in sufficient detail to estimate emissions impacts and so are not assessed below. More information on this is available in the carbon assessment report.

**12.5** The impacts against these areas are shown in the table below, showing additional carbon output in addition to the calculated baseline.

**Table 12.1: Carbon assessment findings for Gatwick Airport under the LGW-2R proposal, change in mt$CO_2$**

| Area of Emissions | 2030 | 2040 | 2050 | Additional $tCO_2$ over 60 year appraisal period | Total $CO_2$ over 60 year appraisal period |
|---|---|---|---|---|---|
| **Air travel** | 0.3 | 0.7 | 1.5 | 69.0 | 307.3 |
| *Ground movements component* | 0.02 | 0.05 | 0.09 | 4.4 | 12.7 |
| **Passenger surface access** | 0.03 | 0.07 | 0.1 | 6.6 | 25.1 |
| **Airport operations energy & fuel use** | 0.01 | 0.01 | 0.01 | 0.8 | 2.4 |
| **Total operational $CO_2$ emissions** | **0.4** | **0.8** | **1.6** | **76.2** | **334.7** |
| **Construction of airport facilities & SA infrastructure*** | n/a | n/a | n/a | 3.9 | 6.9 |

*Construction emissions are calculated as $tCO_2e$.

**12.6** The largest factor by far is the carbon associated with an increase in flights. The level of emissions for air travel at Gatwick Airport under the LGW-2R proposal is expected to exceed the baseline level by approximately 63.9 $MtCO_2$ over the 60 year appraisal period, rising from 4.2 to 5.3 $MtCO_2$ per year over this period (the baseline remains around 3.9 $MtCO_2$ per year over this period). The carbon value of this change is estimated at £4.4 billion. The chart below sets out this increase, alongside a chart showing ATM increase at the airport.

**Figure 12.1**[65]

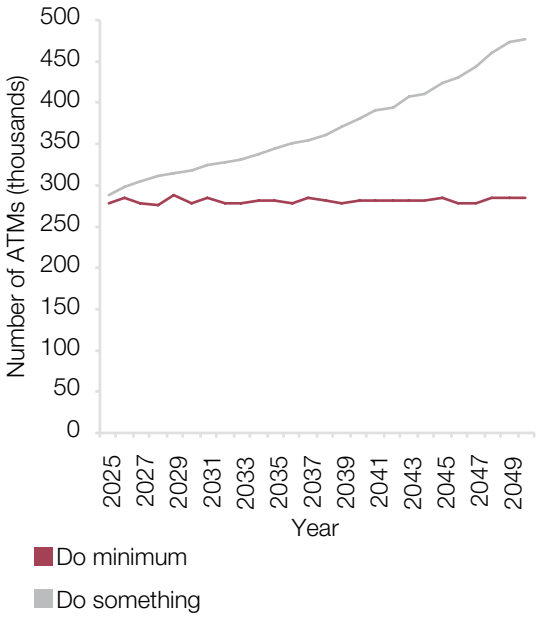
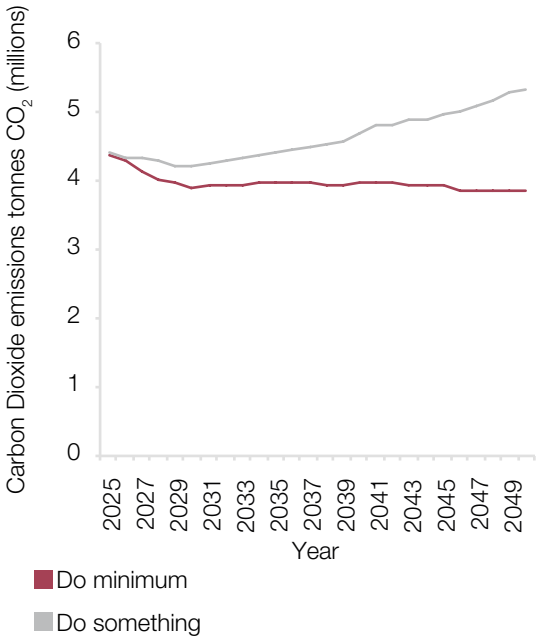



**Figure 12.2**[66]






**12.7** As the charts show the increase in ATMs is higher than the increase in carbon (49.2% increase in ATMs compared to 26.5% increase in carbon). This reflects a predicted reduction in carbon per ATM. This is due to a combination of aircraft fleet changes and alternative fuels. This impact could be mitigated by, for instance, increasing airport charges for older aircraft, or mandated "green slots" which require planes of a certain standard to take up the new capacity. Despite this positive trend in terms of carbon per ATM, it is important to remember that an expanded Gatwick would still be producing a significant proportion of UK carbon from aviation: in 2050 the carbon emissions from departing flights at Gatwick would represent 14.2% of the UK total.

**12.8** The other impacts are much smaller in terms of scale but also show some quite high percentage increases compared to baseline.

**12.9** The differences in carbon associated with airside ground movements are driven by the same factors as those associated with the increased number of flights, with ATMs being the driving factor, but improvements in plane technology limit the impact of this. Due to the increase in ATMs in the LGW-2R scenario, the emissions associated with airside ground movements increase rapidly, diverging by more than 66% from baseline by 2050.

65 Carbon emissions from departing flights at Gatwick Airport, with two runways, for 2025-2050 for the 'do minimum' and 'do something' scenarios.

66 Passenger numbers and air transport movements (ATMs) during the period 2025-2050 at Gatwick Airport Second Runway.

**12.10** The emissions associated with airport operations increase rapidly compared with the baseline, diverging by more than 75% by 2050. It's important to note however that total emissions reduce from the 2025 levels both in the baseline and under the scheme. This is due to the reduction in carbon emissions associated with grid electricity use, which makes up nearly 60% of the 2025 carbon emissions. The emissions associated with gas and fuel use are expected to remain stable, so these increase with the increase in usage. GAL has suggested efficiency improvements, such as new lighting, heat recovery and building management systems in place by 2040.

**12.11** The above table presents the emissions due to surface access at Gatwick Airport only. The combined total for all airports (e.g. including Heathrow, Stansted etc.) under the Gatwick Airport Second Runway proposal actually produces a slight decrease in total surface access emissions. This is due to the fact that under the base model Gatwick has a higher public transport modal share than many other airports; passengers substituting into an expanded Gatwick will do so from airports where their surface transport emissions would have been higher.

**12.12** The construction of new facilities and infrastructure has a 'one-off' carbon impact over the construction period. The Commission expect this to be 3,891,468 tonnes, much of this occurring in 2025. The promoter has suggested several mitigations to reduce this impact. However, these reductions were not quantified so are not included in the table above.

**12.13** Given the large increase in carbon and the limited extent to which these can be minimised the Commission has determined that the carbon impact of the scheme is **ADVERSE** with respect to the Commission's objective to minimise carbon emissions in airport construction and operation. The only reason this is not **HIGHLY ADVERSE** are some of the system wide surface transport impacts, which show a comparative carbon "saving" of developing at Gatwick as opposed to airports with higher surface access carbon impacts and the fact that our assessment assumes a carbon-cap or trading scheme, both of which would limit the adverse impacts.

# 13. Assessment: Water and flood risk

**13.1** The water conditions around Gatwick currently are sensitive, with examples of recent groundwater flooding, water quantities in the region already stressed and water quality at risk from local sewage treatments and agriculture sources. In this context even limited further development at the site has the potential to substantially negatively impact the quality and quantity of the surrounding water and increase flood risk.

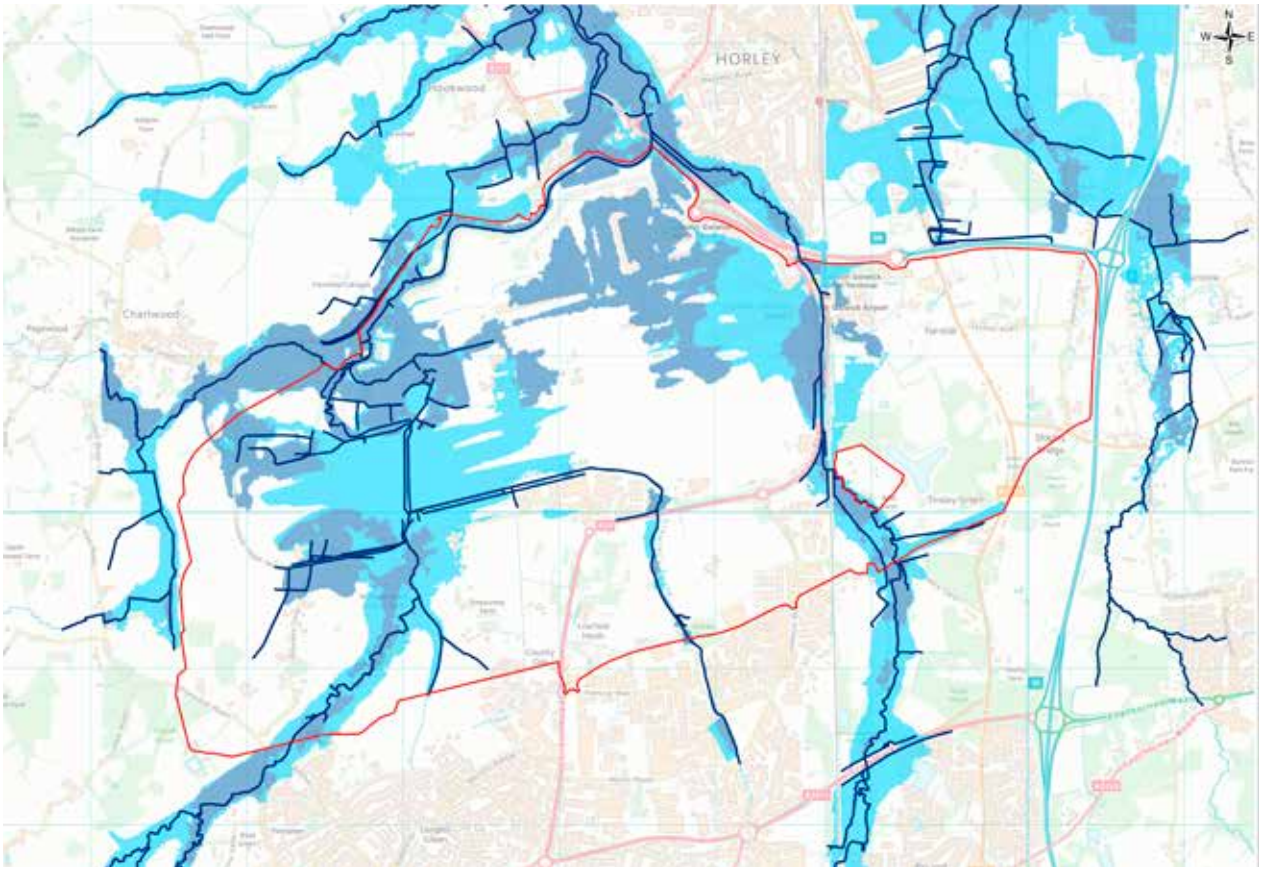
**13.2** The airport is in a region of water stress, however, the very local environment is more positive in terms of water quantity. Sutton and East Surrey Water (SESW), who supply 100% of the airport's potable water, have confirmed that the forecasted increase in demand at Gatwick Airport in the GAL Submission can be met by the existing, and forecast, surplus in the Sutton and East Surrey Water (SESW) supply zone until 2050. This is dependent on some reduction in water use per passenger through mitigation activities by GAL, but given GAL's track record in this area these volume per passenger reductions seem reasonable.

**13.3** The scheme at Gatwick leads to substantial modifications to the River Mole and Crawter's Brook, particularly to the south-west of the airport where the design shows a near-90° bend in the river. Some of these changes (and associated mitigations) could produce positive water quality effects (for instance the de-culverting of 600m of the River Mole, returning the river to a more "natural" state) and some negative (for instance the introduction of a weir which could create a barrier to sediment and flow processes). Because the scale of the changes are so extensive it is difficult to determine without very detailed plans, which are not available at this stage of design, exactly how the potential positives and negatives would interrelate in impacting water quality.

**13.4** Similarly, despite recent surface water flooding, the assessment of flood risk at Gatwick itself is that the scheme will have no substantial impacts, as long as appropriate mitigations are put in place. However, it is important to note that the baseline likelihood of surface water flooding is substantive and any flood mitigation strategy would need to consider these impacts carefully. The significant changes to the rivers mean that without substantial and ongoing mitigation there is a considerable potential downstream impact of fluvial flooding, a risk which GAL identified in its submission. The ongoing mitigation suggested by GAL is possible, but the extent to which it can be delivered is dependent on a detailed and well-

implemented flood mitigation strategy, which would not be possible to develop at this stage of design.

**Figure 13.1: Environment Agency Indicative Flood Map showing Scheme Boundary (red line)**




**Key to flood risk map:**

| | |
|---|---|
| Dark blue: | Flood Zone 3 – More frequent than 1% (1 in 100) annual probability event for fluvial flooding |
| Light blue: | Flood Zone 2 – Between 1% and 0.1% (1 in 100 and 1 in 1,000) annual probability events for fluvial flooding |
| No shading: | Flood Zone 1 – Less frequent than 0.1% (1 in 1,000) annual probability event for fluvial flooding. |
| Purple dotted line: | Flood defences *(none indicated on map)* |

Source: Airports Commission analysis using Environment Agency and Ordnance Survey data.

**13.5** Given the substantial watercourse changes and their uncertain impacts and mitigations, but low likelihood of water shortage and low risk of negative impacts on water quantity, the Commission considers that the scheme at the current level of design would have an **ADVERSE** impact in relation to the water objective, but with a good possibility of this achieving a **NEUTRAL** impact with further design and mitigation strategies. However, whether the scheme could achieve such a **NEUTRAL** impact, particularly with respect to flood risk downstream of the mitigation, would not be known until well into a detailed design period and possibly not until the airport was operational.

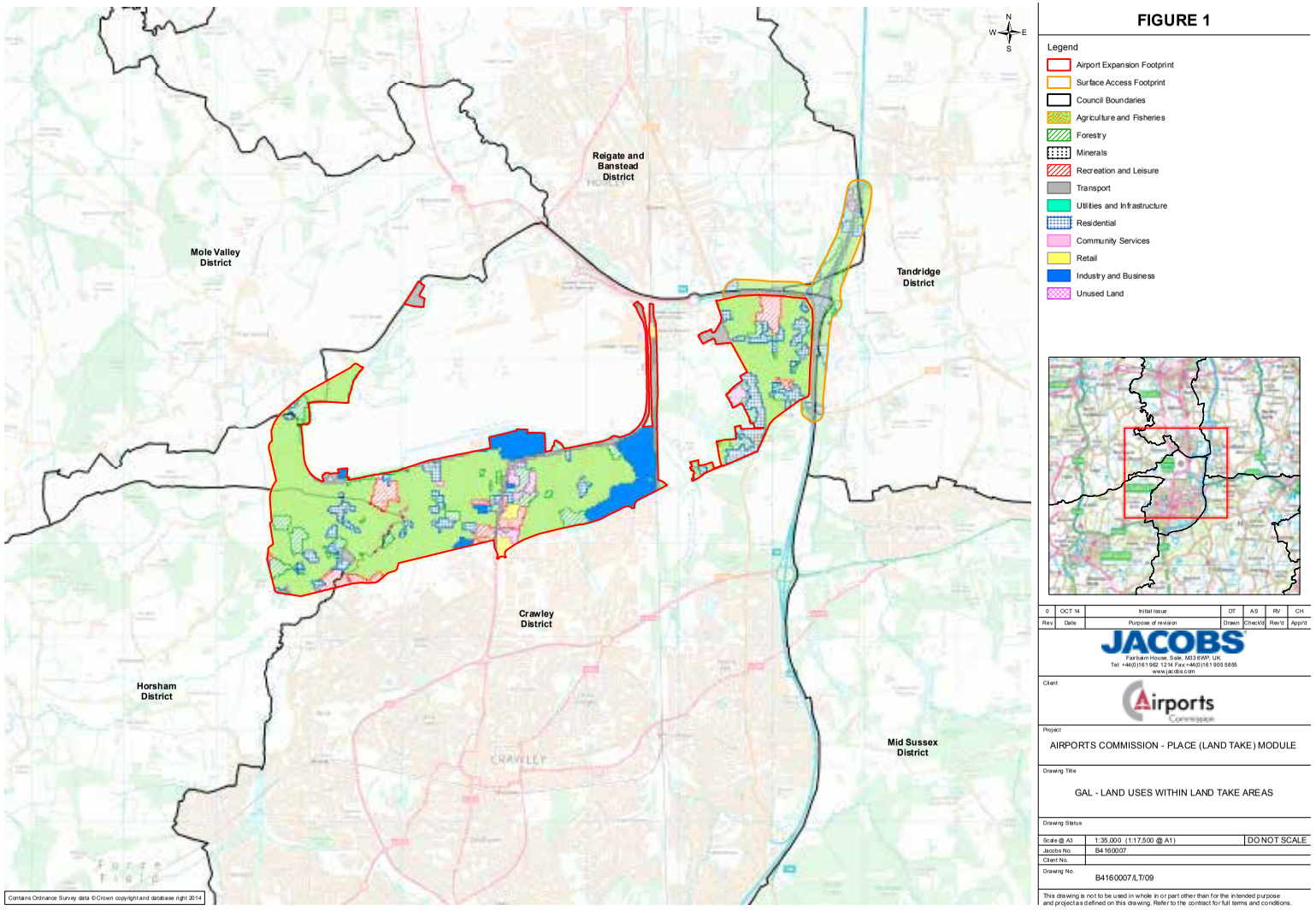
# 14. Assessment: Place

**14.1** The Commission's Place assessment takes information from several areas of appraisal: land take, landscape, waste and heritage impacts, to assess schemes against the Commission's place objective: to minimise impacts on existing landscape character and heritage assets.

**14.2** The land take of the scheme is focussed in general to the south of the airport where the new runway would be located, although some development to the east to make space for ancillary services and surface access space will also be required. In total 624 ha and up to 78 ha would be required for airport and surface access development respectively. A majority of the land is low (or unknown) grade agricultural land. A total of 168 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. Approximately 60 ha of this total would lie within designated Green Belt.

**14.3** The visibility of the scheme would be relatively constrained by rising topography to the north and south and by the high density of vegetation within the surrounding area. The most significant views towards the scheme would be from the immediate south, west and east. The impact on views and landscape are more pronounced during construction than operation but three areas continue to experience moderate adverse effects during operation: West Sussex Northern Vales, Ifieldwood (an area of high sensitivity due to recreational value and relatively open views) and the Tandridge Border Path which would be diverted around the airport, leading to open, close range views into the site.

## Figure 14.2: LGW-2R land take by land type




Source: Airports Commission analysis.

**14.4** The Gatwick Second Runway scheme increases the amount of waste created by Gatwick Airport, simply by increasing the number of passengers flowing through it. The amount is dependent on whether, and by how much, the amount of waste generated per passenger changes over time. In its submission, GAL has suggested some schemes to limit this impact, which if delivered could provide valuable mitigation. In total GAL's target is 70% recycling of all operational airport waste. However, some uncertainties mean that the extent of mitigation is difficult to determine. GAL proposes the development of an Energy from Waste facility at the airport. These facilities are often challenging to achieve planning consent for in their own right (due to local opposition that can occur) and in this case the additional factor of being potentially adjacent to flight paths could increase this risk in terms of planning. At present no detailed analysis has been carried out by GAL of existing or future regional capacity to manage operational waste, although the submission acknowledges this as being required should the scheme progress.

**14.5** Twenty-two designated heritage assets have been identified within the Landtake Study Area and have the potential to be impacted by Gatwick Second Runway; two of these were in fact removed some time ago, but are still formally listed. A further 10 sites have been identified within the Intermediate Study Area and 160 in the Outer Study Area. Those sites located within the Landtake Study Area are at greatest risk from physical impacts (i.e. whole or partial removal of associated remains or fabric) during construction of the proposed option. Several mitigations proposed by GAL to limit the impact on heritage sites are both feasible and practical but, particularly for those assets within the Landtake Study Area, the residual impact is predicted to remain significant.

**14.6** The noise impacts of the scheme are discussed in detail in the noise section. With relation to Place the Commission reviewed whether any of the schemes had a noise impact on areas of tranquillity. In areas of moderate tranquillity,[67] the indication is that a potentially wider corridor of areas will be affected by the noise levels, via two minor noise spurs to the north east and north west of Crawley. At high elevation (at which noise from planes would be more limited), the Commission's assessments identify some overflight of areas of high tranquillity to both the east and west of the airport.

**14.7** The place impacts of the scheme development will be consistently negative. The negative impacts in terms of views are limited by local topography to areas in the immediate vicinity of the airport but the impact on these areas, particularly the Tandridge Border Path, will be notable. Some areas of high tranquillity may be impacted by new flight paths associated with the scheme.

67 Technical definitions of tranquillity levels are available in the relevant consultants report.

**14.8** The mitigations proposed by GAL are valuable and will help to limit the impact but, particularly with respect to tranquillity, are unlikely to be able to make the impact of the development **NEUTRAL**. As such the Commission considers that the impact of the GAL scheme on our Place objective is **ADVERSE**.

# 15. Assessment: Quality of life

**15.1** This is the first time an integrated Quality of Life analysis has been undertaken with respect to airport development, and we would be interested in consultees' views on the examination that has been undertaken.

**15.2** The impact of airport development on wellbeing is felt locally and nationally. Locally the impacts have the potential to be very broad, with, for instance, the impacts of aircraft noise, loss of parks of other social and community amenities, as well as some positive impacts, such as the jobs provided on or very near the airport site, the local surface transport benefits, and of course ease of access to flights for business or leisure. The AC's literature review has shown that there is a significant amount of evidence which links the majority of outcomes assessed in our appraisal framework to subjective wellbeing (with the exceptions of Biodiversity, Water and flood risk and, to an extent, Community).

**15.3** Nationally the impacts will be felt in general through economic and connectivity benefits. Economic benefits will be realised through job creation (catalytic, induced and indirect) that can be driven over a wider area, as well as the benefits to business of greater connectivity. However, benefits of connectivity are not just for business, with more flights also being valuable for leisure purposes, most obviously holidays, and keeping in contact with friends and relatives abroad.

## Locally

**15.4** We undertook analysis of two datasets: the Annual population Survey is a combined statistical survey of households in Great Britain, which is conducted quarterly by the ONS. Since 2011 it has contained the four ONS wellbeing questions and hence we have used waves 2011-2012 and 2012-2013 (the latest available wave) in our analysis. Airport Proximity and noise contour information was then added for all Census Output Codes (OA) within 5km of 17 UK airports. Mappiness is an iPhone application that permits individuals to record their wellbeing scores via their phone. The data contain more than one million observations from tens of thousands of individuals in the UK, collected since August 2010. We merged the Mappiness data with the Department for Transport's noise contours for London Heathrow (LHR), London Gatwick (LGW), and Stansted (STN)[68] to link with the associated decibel level from the three airports.

68 these were the only available noise contours for the Mappiness data.

**15.5** Our analysis suggests that locally:

- *Living near an airport* (5km) has no statistical impact on subjective wellbeing measures- this may well be because of "bundling": the positive effects (for instance availability of jobs and airport associated surface transport) and the negative impacts (noise, congestion, urbanisation etc.) cancel each other out.
- *Being near an airport* does not have an effect on happiness in the moment, but is negatively associated with feeling relaxed: the negative effect of being near an airport is larger for people who are working or studying at that time.
- *Being at an airport* is positively associated with happiness and, at the same time, negatively associated with feeling relaxed: airports are associated with happiness and excitement, but are also stressful experiences.
- *Living in a daytime aircraft noise contour (over 55 dB)* is negatively associated with all subjective wellbeing measures: life satisfaction, sense of worthwhile, happiness, levels of anxiety and positive affect balance. There is a marginal negative effect on all five subjective wellbeing measures for every additional decibel from aircraft noise over the 55 dB threshold. The negative effect of day time aircraft noise was greater for people living in social housing.[69] To provide a sense of scale, the negative effect of aircraft noise on peoples' sense of "worthwhile" is around half that associated with being a smoker, and less than a third that of being underemployed.[70] The negative effect of aircraft noise on peoples' happiness is less than half that of being divorced and less than the negative effect associated with living in social housing.
- *Living in a night time aircraft noise contour* was not associated with any effect on subjective wellbeing
- *Being in a high level aircraft noise contour* was negatively associated with happiness and
- feeling relaxed at that time

**15.6** These results obviously have limitations, which are set out in full in the Quality of Life Assessment. Also, as noted above, this analysis has not been undertaken before with respect to airport development and so its suitability is to be determined as a measure. We would be interested in consultees' views on this. As such these

69 PWC's analysis also confirmed this result is not driven by the possibility that more social housing is located near to airports.

70 Being underemployed can include those who are unemployed, involuntarily in part-time work (i.e. those who work part-time but wish to or could work full-time) and those who are overqualified or underutilised in their current positions.

results should be seen as providing an interesting and useful commentary on impacts, rather than a full assessment.

## Nationally

**15.7** A consistent finding in the wellbeing literature is that employment is positively associated with a number of measures of subjective wellbeing, including life satisfaction. Although the wellbeing effect of the job will be internalised in wages to some degree, the available evidence suggests a residual effect of employment on wellbeing after controlling for income.

**15.8** Our analysis found no statistical difference between jobs based in airports and those based outside airports on measures of happiness and relaxation. We make the assumption, therefore, that the value of employment estimated for the general population (which will include some people that work in airports) is applicable to jobs created as part of airport development.

**15.9** There is also a benefit to people nationally (as well as locally) through the leisure impacts of increased connectivity. The outcome that being in an airport is positively associated with happiness and excitement, seems to support this positive impact.

**15.10** Overall, the possible areas of impact on people's Quality of Life, with respect to our Appraisal framework, are set out below:

**Table 15.1: Possible airport impact factors by geographical range and individual impact**

| Impact area | Possible Impact factors | Individual Impact |
|---|---|---|
| Local- within 5k | Local economy impacts (jobs) | POSITIVE |
| | Community | POSITIVE |
| | Noise | NEGATIVE |
| | Air quality | NEGATIVE |
| | Biodiversity | NOT EVIDENCED |
| | Water and flood risk | NOT EVIDENCED |
| | Place | NEGATIVE |
| | Surface Access | POSITIVE |
| | Strategic Fit (connectivity) | POSITIVE |

| Impact area | Possible Impact factors | Individual Impact |
|---|---|---|
| Local- outside 5k within flight path | All above | UNQUANTIFIED |
| | Noise | NEGATIVE |
| National | Economy impacts | POSITIVE |
| | Carbon | NEGATIVE |
| | Strategic Fit (connectivity) | POSITIVE |

Source: Airports Commission analysis

**15.11** Given the information above, one approach to mitigating negative impacts on Quality of Life would be to:

- Increase the positive impacts of living near the airport (e.g. development of local job opportunities) and limit the negative impacts (e.g. loss of green space, impact of noise) to attempt to keep the "bundled effect" either neutral, or move it to positive
- Limit the number of people living in 55db plus noise contours
- Increase the positive national and local impact of job creation

**15.12** All three short-listed schemes have negative impacts on some of these "bundled impacts" and the promoters set out mitigation measures of all three types above. The quantitative impacts of these, where possible, are covered in the relevant Sustainability Assessment section (for instance Noise) or the Economic and Strategic Cases.

**15.13** For this scheme in particular the promoter has suggested providing generous compensation scheme terms and support for local community groups, as well as focusing their development on an area that is relatively sparsely populated and with a limited amount of valuable community space, all of which could help influence the "bundled" effect of living near the airport. The promoter has also suggested some specific operational mitigations that could reduce the noise impact on communities.

**15.14** Nationally, the impact on Quality of Life, given the net positive impact on jobs, increased leisure connectivity benefits is **SUPPORTIVE**. Locally, we expect the impact with respect to noise alone to be **ADVERSE** and Local Economy alone to be **SUPPORTIVE**. However, these two impacts combined, along with all other impacts included locally, leads to an overall local impact of **NEUTRAL**

# 16. Assessment: Community

**16.1** Gatwick Airport is situated in a largely rural area, with the urban centre of Crawley to the south. 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 not intruding into the existing urban boundary of Crawley. 168 residential properties lie within the airport land take and are likely to need to be demolished many of which are in the airport's safeguarded development zone. Further housing loss could be required as a result of surface access works, depending on detailed route and construction design and potential mitigation options. GAL conducted a study of existing community resources and recreational facilities within the study area.

**16.2** GAL propose financial compensation for housing (house values in the safeguarded area are protected by a 2005 agreement). Similarly GAL propose financial compensation for community facilities, such as places of worship and the Crawley Rugby club, as well re-linking public rights of way and cycle paths.

**16.3** At the moment there is limited information available on the secondary impacts of development, for instance where displaced households will be relocated to, and their effect on existing communities. Where the scheme promoter has proposed the relocation of amenities it is not clear whether there is any significant impact in terms of journey times to the new pre-schools and nurseries (for staff and for parents), to the places of worship and to the charity.

**16.4** The Commission has conducted a high level equalities screening, based on the current community profile and the impacts that have been identified so far. This high level analysis indicates that the loss of community facilities may disproportionately impact some of the groups, depending on the extent to which alternative accessible facilities can be provided. Only a more detailed equalities screening would confirm this preliminary assessment.

**16.5** The Commission considers that without mitigation, the impact of Gatwick's Second Runway scheme on the Community objective would be **ADVERSE**. With the mitigation proposed the effect would be **NEUTRAL**, but more information on the secondary impacts of development is needed to be confident this is deliverable.

**16.6** The Commission does not consider enough information is available at present to make a judgement on whether the development would have a disproportionate impact on any social group.

**Contact Information**

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