

Harrow South Harrow  
Northolt Yeading Hayes

Heathrow Airport

# ANNEX B

Impact Assessment

# Annex B Impact Assessment

Summary: Intervention and Options		
Department/Agency: Department for Transport	Title: Adding Capacity at Heathrow Airport	
Stage: Consultation	Version: Consultation	Date: 22 <sup>nd</sup> November 2007
Related Publications:		

Available to view or download at: [www.dft.gov.uk/heathrowconsultation](http://www.dft.gov.uk/heathrowconsultation)

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## What is the problem under consideration? Why is government intervention necessary?

The Future of Air Transport White Paper 2003 (ATWP) made clear the Government's support for further development of Heathrow by adding a short third runway and exploring the scope for making better use of the existing runways, subject to meeting strict conditions on air quality and noise, and improving public transport access<sup>29</sup>. The Project for the Sustainable Development of Heathrow (PSDH) was set up in 2004 to consider whether, and how, these environmental conditions might be met.

Government intervention is necessary because, following the ATWP, there is a need to report the outcome of the PSDH work and invite views on:

- a short third runway and associated passenger terminal facilities, and our assessment of how the conditions referred to above could be met;
- the introduction of 'mixed mode' on Heathrow's existing two runways as an interim measure ahead of a third runway, and our assessment of how the same conditions could be met;
- the results of a review of operational procedures on the existing runways – irrespective of any further changes.

### What are the policy objectives and the intended effects?

This is a consultation on ways in which Heathrow airport could be developed over the next 20 years or more. It reports on the outcome of work since the ATWP. It describes how additional runway capacity might be provided, the likely impacts and how these impacts might be addressed. It invites views before Government takes final policy decisions.

Such decisions would, of course, then be subject to the airport operator obtaining any necessary approvals, including planning consent through the planning process and any regulatory approvals required by the Civil Aviation Authority (CAA).

### What policy has been considered? Please justify any preferred option.

Three possible sequencing options on how the airport operator might provide more capacity at Heathrow Airport have been identified, which are assessed against the 'base case'. The base case assumes that no changes are made to the airport between 2010 and 2080 and the existing operating procedures and the current annual air transport movements (ATMs) limit of 480,000 per annum remain. Detailed descriptions of the sequencing options can be found under Section 2 (Options Analysis). Briefly these are:

- i. *Option 1* – Introduce additional capacity by means of a third runway around 2020 along with a new passenger terminal.
- ii. *Option 2* – A package of measures that includes the introduction of mixed mode within existing capacity around 2010. Mixed mode would then cease to operate with a third runway in place around 2020.
- iii. *Option 3* – A package of measures that includes introduction of mixed mode within existing capacity around 2010, then transition to full mixed mode with additional capacity by 2015. Mixed mode would then cease to operate with a third runway and new terminal in place around 2020.

These sequencing options outline the earliest dates that the full forecast ATMs could be utilised and environmental and surface access requirements met. The date at which infrastructure could be introduced is only indicative and would be subject to further design work and a planning application by the airport operator.

**When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?**

The ATWP committed the Government to develop an evaluation strategy. The ATWP Evaluation Framework, which sets out the feasibility and timescale of key ATWP policies including any possible ATWP airport development priorities such as Heathrow airport expansion, is due to be published in 2007.

**Ministerial Sign-off:**

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:



..... Date: November 2007

Policy Option: 1		Description: Heathrow third runway with new terminal around 2020	
<b>COSTS</b>	<b>ANNUAL COSTS</b>		Description and scale of <b>key monetised costs</b> by 'main affected groups'. This option would involve significant capital and refurbishment costs associated with the new runway, new terminal and surface access infrastructure estimated at £6.8bn – £7.6bn. Additional non-infrastructure costs in terms of climate change and air noise costs are estimated at £4.8bn and £0.3bn, respectively.
	One-off (Transition)	Yrs	
	£		
	Average Annual Cost (excluding one-off)		
	£		<b>Total Cost (PV)</b>
Other <b>key non-monetised costs</b> by 'main affected groups'. Option 1 may lead to adverse impacts on landscape due to the loss of greenbelt and agricultural land. It would also lead to the loss of the village of Sipson. The local air quality would get worse relative to the base case but will remain within the strict environmental limits set out in the ATWP. There may also be additional noise impacts from road congestion in the absence of demand management.			

<b>BENEFITS</b>	<b>ANNUAL BENEFITS</b>		Description and scale of <b>key monetised benefits</b> by 'main affected groups'. There are significant transport user benefits from additional capacity estimated at £17.1bn. These benefits include greater ability to travel, reductions in travel costs for passengers, greater frequencies of services between destinations, Government tax benefits through Air Passenger Duty, and benefits from additional freight movements.	
	One-off	Yrs		
	£			
	Average Annual Benefit (excluding one-off)			
	£		<b>Total Benefit (PV)</b>	<b>£17.1bn</b>
Other <b>key non-monetised benefits</b> by 'main affected groups'. Non-monetised benefits include potential benefits from reduced delay in the early years of opening, additional airport employment, wider productivity benefits, and greater resilience of the airport in times of severe disruption.				

**Key Assumptions/Sensitivities/Risks.** The net present value is sensitive to the infrastructure assumptions, which range from £0.2bn – £1bn. Detailed assumptions on air forecasts and appraisal methodology are set out in the DfT *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report.

Price Base Year 2006	Time Period Years 70	<b>Net Benefit Range (NPV) £4.4 – £5.2bn</b>	<b>NET BENEFIT (NPV Best estimate) £4.8bn</b>
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What is the geographic coverage of the policy/option?		Heathrow		
On what date will the policy be implemented?		2010, but no capacity is added until 2020		
Which organisation(s) will enforce the policy?		N/A		
What is the total annual cost of enforcement for these organisations?		N/A		
Does enforcement comply with Hampton principles?		N/A		
Will implementation go beyond minimum EU requirements?		N/A		
What is the value of the proposed offsetting measure per year?		N/A		
What is the value of changes in greenhouse gas emissions?		£4.8bn		
Will the proposal have a significant impact on competition?		YES		
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	N/A	N/A	N/A	N/A

<b>Impact on Admin Burdens Baseline (2005 Prices)</b>				(Increase – Decrease)
Increase of	N/A	Decrease of	N/A	<b>Net Impact N/A</b>

Key: Annual costs and benefits: Constant Prices (Net) Present Value

<b>Policy Option: 2</b>		<b>Description:</b> Mixed Mode within existing capacity around 2010 and Heathrow third runway with new terminal around 2020	
<b>COSTS</b>	<b>ANNUAL COSTS</b>		Description and scale of <b>key monetised costs</b> by 'main affected groups'. This option would involve significant capital and refurbishment costs associated with the third runway, new terminal, mixed mode infrastructure and surface access infrastructure estimated at £7.4bn – £8.2bn. Additional non-infrastructure costs in terms of climate change and air noise costs are estimated at £4.8bn and £0.3bn, respectively.
	One-off (Transition)	Yrs	
	£	70	
	Average Annual Cost (excluding one-off)		
	£		
		<b>Total Cost (PV)</b>	<b>£12.5bn – £13.3bn</b>
Other <b>key non-monetised costs</b> by 'main affected groups'. Option 2 may lead to adverse impacts on land take due to the loss of greenbelt and agricultural land. It would also lead to the loss of the village of Sipson. The local air quality would get worse relative to the base case but will remain within the strict environmental limits set out in the ATWP. There may also be additional noise impacts from road congestion in the absence of demand management.			

<b>ANNUAL BENEFITS</b>		<b>Description and scale of key monetised benefits</b> by 'main affected groups'. Additional capacity would deliver transport user benefits in the order of £17.1bn. The introduction of mixed mode within existing capacity could reduce airport delays between 2010 and 2019. These could be worth £1.5bn to airlines and passengers.	
One-off	Yrs		
£			
Average Annual Benefit (excluding one-off)			
£		<b>Total Benefit (PV)</b>	<b>£18.6bn</b>
Other <b>key non-monetised benefits</b> by 'main affected groups'. Key non-monetised benefits include additional airport employment, wider productivity benefits, and greater resilience of the airport in times of severe disruption.			

**Key Assumptions/Sensitivities/Risks.** The net present value is sensitive to the infrastructure assumptions, which range from £0.2bn – £1bn. Detailed assumptions on air forecasts and appraisal methodology are set out in the DfT *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report.

Price Base Year 2006	Time Period Years 70	<b>Net Benefit Range (NPV) £5.3 – £6.1bn</b>	<b>NET BENEFIT (NPV Best estimate) £5.7bn</b>
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What is the geographic coverage of the policy/option?	Heathrow			
On what date will the policy be implemented?	2010 (1st phase)			
Which organisation(s) will enforce the policy?	N/A			
What is the total annual cost of enforcement for these organisations?	N/A			
Does enforcement comply with Hampton principles?	N/A			
Will implementation go beyond minimum EU requirements?	N/A			
What is the value of the proposed offsetting measure per year?	N/A			
What is the value of changes in greenhouse gas emissions?	£4.8bn			
Will the proposal have a significant impact on competition?	YES			
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	N/A	N/A	N/A	N/A

<b>Impact on Admin Burdens Baseline (2005 Prices)</b>				(Increase – Decrease)
Increase of	N/A	Decrease of	N/A	<b>Net Impact N/A</b>

Key: Annual costs and benefits: Constant Prices (Net) Present Value



<b>Policy Option: 3</b>		<b>Description:</b> Mixed mode within existing capacity around 2010, full mixed mode around 2015 and Heathrow third runway with new terminal around 2020	
<b>COSTS</b>	<b>ANNUAL COSTS</b>		Description and scale of <b>key monetised costs</b> by 'main affected groups'. This option would involve significant capital and refurbishment costs associated with the third runway, new terminal, mixed mode infrastructure and associated surface access estimated at £7.5bn – £8.3bn. Additional non-infrastructure costs in terms of additional carbon emissions generated by the additional capacity less reduced delay impacts are estimated at £5bn. The air noise costs are estimated at £0.3bn.
	One-off (Transition)	Yrs	
	£		
	Average Annual Cost (excluding one-off)		
	£		
		<b>Total Cost (PV)</b>	<b>£12.7bn – £13.5bn</b>
Other <b>key non-monetised costs</b> by 'main affected groups'. Option 3 may lead to adverse impacts on land take due to the loss of greenbelt and agricultural land. It would also lead to the loss of the village of Sipson. The local air quality and noise contour size would get worse relative to the base case but will remain within the strict environmental conditions set out in the ATWP. There may also be additional noise impacts from road congestion in the absence of demand management.			

<b>ANNUAL BENEFITS</b>		Description and scale of <b>key monetised benefits</b> by 'main affected groups'. Additional capacity would deliver transport user benefits in the order of £17.3bn. The introduction of mixed mode within existing capacity in 2010, with full mixed mode by 2015 may reduce airport delays between 2010 and 2019. These could be worth £1.6bn to airlines and passengers.	
One-off	Yrs		
£			
Average Annual Benefit (excluding one-off)			
£			
		<b>Total Benefit (PV)</b>	<b>£18.9bn</b>
Other <b>key non-monetised benefits</b> by 'main affected groups'. Key non-monetised benefits include additional airport employment, wider productivity benefits, and greater resilience of the airport in times of severe disruption.			

**Key Assumptions/Sensitivities/Risks.** The net present value is sensitive to the infrastructure assumptions, which range from £0.2bn – £1bn. Detailed assumptions on air forecasts and appraisal methodology are set out in the DfT *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report.

Price Base Year 2006	Time Period Years 70	<b>Net Benefit Range (NPV)</b> <b>£5.4bn – £6.2bn</b>	<b>NET BENEFIT</b> (NPV Best estimate) <b>£5.8bn</b>
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What is the geographic coverage of the policy/option?	Heathrow			
On what date will the policy be implemented?	2010 (1st phase)			
Which organisation(s) will enforce the policy?	N/A			
What is the total annual cost of enforcement for these organisations?	N/A			
Does enforcement comply with Hampton principles?	N/A			
Will implementation go beyond minimum EU requirements?	N/A			
What is the value of the proposed offsetting measure per year?	N/A			
What is the value of changes in greenhouse gas emissions?	£5.0bn			
Will the proposal have a significant impact on competition?	YES			
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	N/A	N/A	N/A	N/A

<b>Impact on Admin Burdens Baseline (2005 Prices)</b>				(Increase – Decrease)
Increase of	N/A	Decrease of	N/A	<b>Net Impact</b> N/A

Key: Annual costs and benefits: Constant Prices (Net) Present Value

## 1. Scope of the impact assessment

1.1 This Impact Assessment (IA) assesses whether the Government should support one or more of the possible sequencing options for adding capacity at Heathrow airport against the criteria set out by the Impact Assessment Guidance<sup>30</sup>. The economic case for Government supporting additional capacity at Heathrow airport was set out in the ATWP and the environmental and surface access requirements are discussed in the main consultation document. The IA takes both positions as given and seeks to present, as far as possible, a factual assessment of the potential impacts of the possible sequencing options which may be available to the airport operator, subject to the outcome of the current consultation and future planning applications.

## 2. Options analysis

2.1 This section sets out the costs and benefits of possible sequencing options; the associated assumptions and sensitivities; and discusses the risks associated with each option. Judgements are made about which impacts are likely to represent a cost or benefit to society. Where impacts are likely to be neutral they are not discussed here. Further information on such impacts may be found under

Section 5 (Sustainable development assessment).

2.2 **Table 1** presents a summary of the quantified costs and benefits for the three possible sequencing options. The net economic benefits range from £4.4bn to £6.2bn depending on the nature of the sequencing option and the surface access requirements.

### Base case

#### Definition

2.3 The DfT WebTAG Guidance<sup>31</sup> requires that all options are assessed relative to a common 'base case', sometimes referred to as the 'do-nothing' scenario. The 'base case' is defined over the appropriate appraisal period of the relevant 'do-something' options. The base case is that there will be no changes to Heathrow airport between 2010 and 2080. The existing operating procedures and the current planning limit of 480,000 annual ATMs would remain. As stated in the consultation document (Chapter 2), the airport has two key operational procedures:

- segregated mode – in which arriving aircraft are generally allocated to one runway and departing aircraft to the other; and
- runway alternation on westerlies – in which the use of the two runways is switched over at fixed periods to provide predictable periods of relief from arrivals noise.

30 The New Impact Assessment Guidance came into force 14th May 2007. Further information can be found on Department for Business and Regulatory Reform website <http://bre.berr.gov.uk/regulation/ria/>.

31 [www.webtag.org.uk](http://www.webtag.org.uk)

**Table 1: Summary of Possible Sequencing Options**  
 (All sequencing options appraised relative to the base case scenario of 480,000 air transport movements limit operating in segregated mode from 2010 – 2080)

	Costs (£bn)				Benefits (£bn) <sup>1</sup>	Net Present Value (£bn)	
	Infrastructure		Climate Change Costs <sup>2</sup>	Air Noise Costs <sup>3</sup>		Light	Heavy
	Light	Heavy					
Option 1 – Heathrow third runway around 2020	6.8	7.6	4.8	0.3	17.1	5.2	4.4
Option 2 – Mixed Mode at 480,000 ATMs around 2010, Heathrow third runway in 2020	7.4	8.2	4.8	0.3	18.6	6.1	5.3
Option 3 – Mixed Mode at 480,000 ATMs around 2010, Mixed Mode at 540,000 ATMs by 2015, Heathrow third runway around 2020	7.5	8.3	5.0	0.3	18.9	6.2	5.4

1 For Option 1, the benefits include transport user benefits. Options 2 & 3 include both transport user benefits from additional capacity and the benefits from reduced delay associated with mixed mode operations.  
 2 For Options 2 & 3, the climate change costs take into account the impact of reduced delays from mixed mode operations. Option 1 takes into account potential reduction in delay  
 3 The noise costs are based on a mid-point estimate of the lower national WebTAG values of noise and the higher Heathrow values of noise from academic literature. Differences in noise costs between options have been lost in the rounding of numbers. Further explanation can be found in the rest of Section 2 (Options Analysis).

There are no *additional* costs and benefits associated with the base case. However, the profile of costs and benefits within the base case are likely to change over time relative to the 'current year'.

## Base case costs over time

**2.4** As stated in the ATWP (paragraphs 2.11-2.14), the lack of sufficient airport capacity is an important constraint on the future growth of UK aviation and the wider economy. At Heathrow the two runways are already full for virtually the whole day. Over time runway constraints may lead to greater delay costs and reduced competitiveness of UK aviation and the wider economy.

### *Increased delays*

- 2.5** The current runway constraints have led to increasing delays and reduced resilience. Punctuality statistics show that average delay at Heathrow has increased by 15 per cent since 2002, from 16.3 minutes in 2002 to 18.8 minutes in 2006.<sup>32</sup> This trend may continue without additional capacity.
- 2.6** Airport delays impose economic costs on society in terms of increased costs for airlines, passengers and the wider community. The airlines bear additional costs on the fleet as well as flying and ground personnel, since delays prevent them from operating in optimum conditions. This might also result in additional long-term costs from the loss of competitiveness. The delay-

related costs for users are mostly airline passengers' opportunity cost, measured by the value of their time. Delays also impose costs on the wider community through environmental costs (from increased emissions, noise, etc) as well as additional costs incurred by other parties involved in the air transport business such as travel agents, tour-operators and airport operators.

### *Declining competitiveness*

- 2.7** Heathrow is the UK's major 'hub' airport, providing a greater range of flights and frequencies than any other UK airport. In 2006, 25 per cent of Heathrow passengers (17.1m) were international to international transit passengers<sup>33</sup> (e.g. travelling from New York to Heathrow then to Lusaka). This compares to the UK's second biggest 'hub', Gatwick, where only five per cent (1.6m) are international to international transit passengers. International transit traffic is crucial in generating additional profits for both the airport and airlines, and offering an enhanced selection of services to both consumers and businesses.
- 2.8** A recent academic study<sup>34</sup> ranked Heathrow as the most accessible airport, both in western Europe and globally. Accessibility can be defined as the potential of Heathrow airport to be reached from other locations or to provide access to other locations, and it is related to the costs associated

<sup>32</sup> Civil Aviation Authority (CAA) Statistics

<sup>33</sup> CAA Airport Survey (2006)

<sup>34</sup> 'Accessibility and attractiveness of European airports: A simple small community perspective', *Journal of Air Transport Management* 12 (2006) 313-323.

with this access. The introduction of new routes to Heathrow extends Heathrow's air transport network and improves the accessibility enjoyed by potential passengers located at both ends of the service, due to the speed and convenience of new services relative to existing services.

**2.9** However, key 'hub' airports in other European countries are also investing in increased capacity. In the future, these airports may challenge Heathrow's international competitiveness where additional capacity supports additional routes, allows better connection times for passengers or reduces average delays. A report by BAA<sup>35</sup> notes that Heathrow has declined in the European ranking of the number of destinations served, from second in 1990 to fifth in 2004. Heathrow is currently running at 98.5 per cent<sup>36</sup> of expected 2010 capacity, which is a significantly higher utilisation level than its main European rivals: Frankfurt, Paris (CDG) and Amsterdam.

**2.10** A recent report by the Association of European Airlines (AEA) found Heathrow to have the worst delays of all European airports<sup>37</sup>. One in three flights from AEA airlines left Heathrow more than 15 minutes late. It is therefore likely that, unless capacity is added at Heathrow, its competitiveness relative to other European hubs will decline. Although

traffic will increase from the current level of 67 million passengers per annum following the opening of Terminal 5, this investment will not deliver the additional runway capacity needed in order to improve the ability of Heathrow to compete with other European hub airports in the long term. Potential decline in Heathrow's competitiveness is likely to impact on London's attractiveness to businesses that need rapid connections and greater travel reliability. Failure to attract such businesses may impose long term costs on the UK economy in terms of lost foreign direct investment.

### Base case benefits over time

**2.11** The main benefits of not increasing capacity relative to the current year would be a gradual improvement in the local air quality and a reduction in air noise.

#### *Local air quality*

**2.12** As stated in the consultation document, the air quality results show a much improved position compared to that predicted at the time of the White Paper. This reflects further significant reductions expected in road traffic emissions over the period, in the light of the latest developments in Euro standards; and latest assumptions on future fleet mix, including trends in cleaner aircraft engines and a higher proportion of twin-engined as opposed to four-engined aircraft.

35 'Economic benefits of Heathrow airport', BAA Heathrow

36 Current flights as a proportion of 2010 capacity

37 'AEA Airlines' delay rates by airports on intra European flights' – [www.aea.be/AEAWebsite/webrsc/SerQlty/DL/PRP-Q207.pdf](http://www.aea.be/AEAWebsite/webrsc/SerQlty/DL/PRP-Q207.pdf)

Table 2: Air Quality Impacts Over Time (2002 – 2030)

	2002	2015	2030
Number of properties in area of NO <sub>2</sub> exceedence	7,336	22	Nil

**2.13** Table 2 summarises the air quality impacts in the base case, taking the NO<sub>2</sub> exceedence as the appropriate measure (i.e. when the NO<sub>2</sub> impacts go beyond the 40µg/m<sup>3</sup> limit set out in the ATWP). The air quality modelling suggests that the number of properties in the areas of exceedence is likely to fall by 77 per cent between 2002 and 2015. In 2030 there will be no residential properties within areas of NO<sub>2</sub> exceedences.

**2.14** The calculations are based on the airport operator's current assessment of how the aircraft fleet mix would

evolve at a future constrained Heathrow. DfT has reviewed the assumptions and is content that they represent a realistic view of the future. However, the ultimate impacts on air quality will depend on how airlines react to increased capacity constraints (possibly with larger aircraft, emitting more NO<sub>2</sub>), and to the proposed European Emissions Trading Scheme which may put added pressure on airlines to use much more fuel efficient aircraft.

Table 3: Aircraft Noise Impacts Over Time (2002 – 2030)

	2002	2015	2030
Area of 57dBA Noise Contour (sq kms)	126.6	119.8	77.0
Population within 57dBA Noise Contour (000s)	257.8	261.9	142.2
Households within 57dBA Noise contour	107.6	110.7	59.0

## Noise

**2.15** As stated in the *Future of Air Transport Progress Report* (paragraph 3.13), improvements in technology and operational procedures have reduced noise from aircraft over recent years. The number of flights at Heathrow has been increasing but the population and ground area significantly affected by aircraft noise has reduced over time. The modelling results show that this trend will continue over the period to 2030 within a fixed 480,000 ATM limit.

**2.16** **Table 3** shows how the aircraft noise impacts change over time in terms of the area of the 57dBA noise contour and the number of households affected and population within the 57dBA contour area. The noise modelling suggests that the area of the 57dBA noise contour and households within the 57dBA contour are likely to reduce by 39 per cent and 17 per cent respectively, between 2002 and 2030.

## Option 1

### Description

**2.17** Introduce additional capacity by means of a third runway in 2020 accompanied by a new passenger terminal between the existing northern runway and the new runway. The new runway could be used by a range of aircraft types, but not the largest four-engined wide-bodied aircraft.

The new terminal would serve the new runway with links to local road and rail services. The forecast ATMs assumed under this scenario are as follows:

- 2010 – 2019: 480,000 ATMs (airport operates under existing conditions);
- 2020 – 2080: ATM capacity is assumed to grow linearly from 605,000 ATMs in 2020 to 702,000 ATMs in 2030 and then remain constant.

## Costs

### Monetised

**2.18** Option 1 would generate significant capital and refurbishment costs in terms of a new third runway, terminal and surface access infrastructure. There are also climate change and air noise costs associated with additional capacity.

### Infrastructure costs

**2.19** Using the indicative plans from BAA, we have estimated the infrastructure costs for Option 1 – see **Table 4**. The two main elements assumed are airport development costs and the associated surface access costs. The airport development costs have been inflated by 10 per cent to reflect the higher cost of capital works in the South East.

**2.20** As explained in the consultation document, our work has focused on measures to ensure that the air quality limit values could be met.



**Table 4: Estimated Incremental Infrastructure Costs  
(Undiscounted, 2006 Prices)**

Item	Option 1 (£m)
Runways and Taxiways	146
Aprons and Piers	349
Track Transit System (TTS) Link to Piers	468
Terminal Building and Baggage	608
Ancillary Facilities and Utilities	441
Inter-Terminal Connections	3
Enabling Works and Landscaping	428
Site Surface Access	109
<b>Total Airport Construction</b>	<b>2,550</b>
25 per cent On-Costs	638
25 per cent Contingency	797
10 per cent Regional Inflator	398
<b>Total Airport Construction</b>	<b>4,383</b>
Land Costs (including purchase, compensation, contingency)	2,076
Total Airport Construction including land	6,459
Surface Access Cost Sensitivity 1 (Light)	200
Surface Access Cost Sensitivity 2 (Heavy)	1,000
<b>Total Cost Light Infrastructure</b>	<b>6,659</b>
<b>Total Cost Heavy infrastructure</b>	<b>7,459</b>

We have not considered in detail demand management measures to reduce road traffic growth or contain congestion to specified levels. The design of any measures aimed at congestion relief is likely to be different from those aimed at mitigating air quality exceedences, and may be needed at different locations. Any work to prepare for a planning application to develop Heathrow would need to address such matters, including physical connections to the road and rail networks and measures to reduce travel by car and increase the use of public transport alternatives.

- 2.21 To reflect the uncertainty about the surface access measures we have included a surface access package sensitivity in our costings, ranging from £0.2bn to £1bn depending on the surface access infrastructure demand generated by additional Heathrow capacity.
- 2.22 We have taken the costs assumed above, discounted them (3.5 per cent from 2006 to 2036, and 3 per cent thereafter) and increased them by 44 per cent to reflect optimism bias to generate the present value cost (PVC) of infrastructure. The PVC for the light infrastructure development is £6.8bn in 2006 prices. The PVC for the heavy infrastructure is £7.6bn.

### *Climate change costs*

- 2.23 In line with the Stern Review, additional capacity appraisal should take into account climate change costs. The Department's analysis shows that Option 1 would generate additional air transport movements of around 222,000 per annum by 2030 or 180.8m tonnes of carbon dioxide from the time of opening (2020) to 2080. This is equivalent to 3.01m tonnes per annum from the time of opening or 2.6m tonnes per annum over the 70 year period, for comparison with the other options under consideration. Using the latest Defra Guidance<sup>38</sup>, the social cost associated with the additional carbon dioxide emissions is around £4.8bn (2005 prices) from the time of opening to 2080. The Department's forecasts include assumptions on technological progress and assume that aviation is meeting its external costs. Full discussion of the methodology and relevant assumptions are set out in the *UK Aviation Demand and CO<sub>2</sub> Forecasts* report.<sup>39</sup>
- 2.24 The calculation of the costs of carbon dioxide emissions associated with Option 1 has focused on aircraft generated emissions. It does not include any additional emissions that may emanate from additional traffic on the road due to additional ATMs. The position on road related emissions would depend on a future surface access strategy that may accompany

38 These calculations are based on the new Defra Shadow Price of Carbon Guidance ([www.defra.gov.uk](http://www.defra.gov.uk)).

39 DfT UK Air Passenger Demand and CO<sub>2</sub> – Update of national air traffic forecasts.

Option 1. A particular consideration will be the share of additional passengers that prefer to drive by car rather than use public transport.

### Noise

**2.25 Table 5** shows the incremental impact of Option 1 on aircraft noise based on noise modelling results. The size of the 57dBA noise contour and the population within the 57dBA noise

contour may increase by 46 per cent and 45 per cent respectively, with additional capacity in 2030, relative to the base case. We did not model a base case option for 2020. However, the overall noise contour generated by Option 1 in both 2020 and 2030 would still remain within the White Paper limit of 127 sq km (2002 baseline), albeit

**Table 5: Summary of Noise Impacts of Option 1**

	2020			2030		
	Area of 57dBA Noise Contour (sq kms)	Population within 57dBA Noise Contour (000s)	Households within 57dBA Noise Contour (000s)	Area of 57dBA Noise Contour (sq kms)	Population within 57dBA Noise Contour (000s)	Households within 57dBA Noise Contour (000s)
Base Case – No change to the 480,000 ATM limit	N/A	N/A	N/A	77.0	142.2	59.0
Option 1 – third runway in 2020	126.7	242.3	99.7	112.9	205.7	84.4

at a reduced level of 605,000 ATMs in 2020.

**2.26** The quantification of the impacts of Option 1 has relied on the following set of assumptions:

- the *difference* in the number of households affected between the base case (480,000 ATMs) and Option 1 (702,000 ATMs) in 2030 is indicative for the period between 2020 and 2080. We have assumed that technological improvements beyond 2030 would affect the base case and Option 1 equally, and therefore the difference in households affected over time and the direction of noise changes (between the base case and Option 1) in each of the years would remain broadly the same. For the period between 2020 and 2030 we have therefore slightly overestimated the noise impacts since capacity would be lower than the assumed 702,000 ATMs<sup>40</sup>.
- in the absence of specific Government recommended values for airport noise, we have relied on values from Pearce and Pearce (2000)<sup>41</sup> and the DfT WebTAG values for road and rail noise to provide an appropriate range of costs. In line with WebTAG, the noise values are assumed to grow in line with GDP from the current year to 2080.

- the analysis is based on noise changes assumed in **Table 6**. The table shows the winners and losers from moving from the base case (480,000 ATMs) to Option 1 (702,000 ATMs). For example, the table shows that 30,100 households experience an increase in noise of 1dBA  $L_{eq}$ . The contour column presents a cumulative impact of the changes in noise exposures, with the positive and negative signs representing losers and winners respectively. Only households exposed to noise changes above 57dBA are included in the analysis.
- all calculations are discounted to 2006 and expressed in 2006 prices.

**2.27** Option 1 would generate noise costs of around £212.3m – £328.7m in 2006 prices. The conclusions are preliminary and would be revisited in the final impact assessment. However, we have included these estimates here to give a sense of the scale of the potential impacts on the NPV figures.

### Non-monetised

**2.28** In addition to the monetised costs discussed above, Option 1 would generate a range of non-monetised impacts. These include the impacts on local air quality, which would get worse relative to the base case, but should remain within the environmental limits set out in the ATWP. Using indicative plans from the airport operator,

40 Between 2020 and 2030, Option 1 assumes that capacity is added linearly from 605,000 ATMs to 702,000 ATMs.

41 Setting Environmental Taxes for Aircraft: A Case Study of the UK (1999) – Brian Pearce and David Pearce

Table 6: 2030 702,000 ATMs R3 relative to 2030 base case (480,000 ATMs)

Contour (dBA L <sub>eq</sub> )	Area (km <sup>2</sup> )	Populations (000s)	Households (000s)
<-9	0.0	0.0	0.0
<-6	0.0	0.0	0.0
<-3	0.2	0.0	0.0
<-2	4.0	3.8	1.5
<-1	16.2	18.9	8.2
>+1	51.9	75.8	30.1
>+2	41.4	52.6	20.7
>+3	36.0	44.2	17.4
>+6	24.9	31.6	12.3
>+9	16.4	20.0	7.7

we have also identified impacts on landscape, housing, biodiversity, heritage and water.

#### *Local air quality*

**2.29** On the basis of latest fleet mix assumptions, our modelling suggests a much improved local air quality position compared to that predicted at the time of the ATWP. This reflects further significant reductions expected in road traffic emissions over the period, in the light of the latest developments on Euro standards; and latest assumptions on future fleet mix, including trends in cleaner aircraft

engines and a higher proportion of twin-engined as opposed to four-engined aircraft. In 2020 and 2030, all results were below the 40µg/m<sup>3</sup> limit.

**2.30** No quantification has been undertaken to reflect additional NO<sub>2</sub> emissions of Option 1 relative to the base case, mainly due to the absence of appropriate base case scenarios. Over the consultation period, work will be done to ensure that we have the full picture of the monetary impacts of Option 1 relative to the base case, in time for the post consultation Impact Assessment.

### *Heritage*

**2.31** Option 1 would result in the following high adverse impact on heritage:

- Substantial disturbance within an area of High Archaeological Importance, near the village of Harmondsworth, affecting 16 undesignated sites.
- A number of listed buildings would be lost under this option including four Grade II Listed Buildings. This assumes that only one of the Grade II Listed Buildings in Harmondsworth Village is in the airport's extended boundary. The medieval centre of the village, including the church and tithe barn (Grade 1 listed) would be preserved.
- The loss of about 22 per cent of the Harmondsworth Conservation Area.

### *Housing*

**2.32** Option 1 would result in the loss of Sipson Community Centre, Heathrow Primary School and Sipson village: around 700 properties. The compensation costs for Sipson village are included within the Land Costs shown in Table 4 and it is estimated that the loss of these properties would be spread over a period of time.

### *Landscape*

**2.33** Option 1 would result in the following adverse landscape/townscape impacts, in addition to the heritage and housing impacts described above:

- The loss of 195ha of agricultural land and scattered residential land. In addition, the land within the extended boundary includes 80ha of sand and gravel deposits.
- Land take from the Green Belt within the new airport boundary of 255ha.
- The construction works for this option would be in close proximity to several residential communities, in particular, Harmondsworth and Harlington.

### *Biodiversity*

**2.34** The direct biodiversity effect from Option 1 would be limited to loss of and disturbance to localised areas in proximity to the proposed development. However, there may be indirect effects beyond the boundaries of the development as a consequence primarily of air quality changes resulting from the proposal and especially associated with traffic generation. These effects may have consequences for sites of significant importance for nature conservation.

### *Water*

**2.35** Option 1 would result in the following impacts on water:

- *Surface water:* Option 1 is likely to have 'low adverse' impact on surface water. Indicative assessment shows that Option 1 does not involve culverting of river reaches and could be built

without diverting any rivers. The realignment of the M4 spur results in a minor change in catchment areas between the River Crane and the Duke of Northumberland River, with the latter having a slightly increased catchment area and the former a slightly reduced one. The impacts of this change could be compensated for by utilising clean water from the terminal buildings as a compensatory supply.

- *Ground water:* The impact is likely to be 'high adverse', due to the major aquifer. However, with appropriate management, mobilisation of contaminants could be 'low adverse'. The Terminal 5 project shows that diaphragm walls can be used to control ground water flows around key areas and so reduce the ground water impact to 'low adverse'.
- *Flooding:* The impact is likely to be 'low adverse'. Indicative assessment shows that there would be no increased risk of flooding downstream of the development for all flood events up to a 1 in 100 year event, with climate change allowance for a 20 per cent increase in run-off as part of the design.
- *Water resources:* The impact is likely to be 'high adverse' if there is persistently low seasonal rainfall. It may be difficult to meet the significant increase in demand,

even with supply and demand management and water saving technology. However, it is possible that a future water efficiency study across the whole airport, during the planning stage, may reveal areas for improvement.

## Benefits

### Monetised

- 2.36 Option 1 would generate significant monetised benefits to society. These mainly relate to transport user benefits of additional capacity.

#### *Transport User Benefits*

2.37 The transport user benefits have been estimated by the methodology described in the *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report. A 70 year appraisal period is assumed for comparability with the other options. However, no additional capacity is added between 2010 and 2019. The transport user benefits occur from the time of opening in 2020 to 2080. The benefits are estimated at £17.1bn in 2006 prices. The main transport user benefits from additional capacity are:

- Reduction in costs to passengers. For instance, in the absence of additional capacity at Heathrow, some passengers would be forced to transfer to 'less preferred' airports as a result of higher prices or capacity constraints. The fall

in travelling costs as a result of additional runway capacity may induce additional demand for air travel from those who may not have previously travelled by air. This could be in the form of substitution from other modes, or from induced demand from those who would not otherwise travel. There may be similar gains at other airports. For example, if there is a fall in average prices across the board due to increased capacity and competition between Heathrow and competing airports.

- Additional capacity may allow greater frequencies of services between destinations, reducing minimum connection times, reducing the impact of missed flights and increasing 'connectivity'. Passengers tend to place value on the convenience of frequent flights and the ability to catch flights at convenient times, which would reduce the costs faced by passengers, particularly in terms of the cost of their time.
- Airport operators and associated businesses may enjoy increased profits from capacity expansion arising from new passengers using Heathrow.
- Benefits from additional revenues from Air Passenger Duty (APD) resulting from increased numbers of air passengers using the new

capacity, where these arise from newly 'induced' demand.

- Finally, there are benefits from additional air freight movements. As in the case of air passengers, the major benefit here is from newly induced air freight demand. Air freight is an important and growing factor in supporting the UK's international trade, and is invaluable in many markets in which UK firms specialise. About a quarter of UK visible trade by value goes by air<sup>42</sup> and in 2005 air freight transported 2.3 million tonnes of cargo<sup>43</sup>.

## Non-monetised

**2.38** There are important additional benefits from increased runway capacity that are harder to quantify. Although the picture regarding these benefits is partial, they are nevertheless important in understanding the overall economic benefits of additional capacity. These are discussed below.

### *Benefits to airlines*

**2.39** The current approach to transport user benefits does not take into account the benefits to airlines of additional capacity over and above the welfare benefits to its passengers.

### *Benefits to existing air freight*

**2.40** The Department's existing approach to calculating the benefits to air freight focuses on new freight users but not



existing freight user benefits. Existing freight operations are constrained at Heathrow: relaxing this constraint through additional runway capacity may improve the efficiency of their operations.

#### *Delay reduction benefits*

**2.41** Option 1 assumes that Heathrow would operate at 605,000 ATMs around 2020 and rise to above 702,000 from 2030 onwards. Between 2020 and 2030 we can expect the airport to operate below capacity and therefore with potentially less aircraft delay to passengers. The appraisal analysis has not quantified the extent of these delay reduction benefits to passengers and airlines over the ten-year period. However, we would expect these to be fairly significant given the scale of the traffic movements under consideration. Over the consultation period we want to ensure that we have a full picture of the delay reduction benefits of Option 1 between 2020 and 2030, to inform the post consultation Impact Assessment.

#### *Resilience benefits*

**2.42** In addition to increased general delays, high levels of air passenger demand relative to the maximum physical capacity of the airport reduces the resilience of the airport in times of extreme weather and other disruption, as there is little spare capacity to recover from

problems experienced earlier in the day. This normally leads to increased cancellation of flights and potential transfer of passengers to less attractive services. Additional capacity may lead to fewer cancelled flights during severe weather as the added flexibility of three runways would allow the airport to operate more flights compared to a two-runway system.

#### *Tourism expenditure*

**2.43** The quantitative assessment of the benefits to date does not take account of the net expenditure of UK tourism. Additional airport capacity relative to the base case scenario would lead to *additional* foreign tourists visiting the UK (increasing UK exports). However this would have to be balanced against *additional* expenditure by UK residents spending money on tourism abroad as a result of additional capacity (increasing UK imports).

**2.44** It has been argued that there is no net economic gain to the UK in terms of tourism because in aggregate terms UK residents spend more abroad than foreign tourists spend in the UK annually. While this position is accurate it is misleading to argue that this potentially weakens the case for additional airport capacity. The UK is an open economy and it is broadly accepted that such imbalances exist. However, in appraisal terms, these effects are part of the base case. In appraising the impacts on tourism,

the relevant issue is the extent to which Option 1 may lead to a lower/greater outflow of tourism spending abroad than the inflow of tourism spending it may generate in the UK, relative to the base case.

- 2.45** We are currently exploring this question in the context of Heathrow airport. Preliminary assessments have focused on understanding tourism expenditure trends and exploration of the composition of the additional demand in terms of foreign leisure passengers and UK leisure passengers travelling abroad in 2020.
- 2.46** Tourism expenditure in the UK in 2004 stood at £550 per person. At the time a third runway opens, the average tourist would be spending around £999 in 2004 prices, assuming tourism spend grows in line with the real long term world GDP rate of 3.8 per cent<sup>44</sup> up to 2020. Preliminary assessments have focused on the composition of the additional demand in terms of foreign leisure passengers and UK leisure passengers travelling abroad in 2020 and assessing the tourism expenditure associated with the relevant distributions. In 2004 the average UK tourist abroad spent £513. At the time a third runway opens the average UK tourist would be spending around £762 in 2004 prices, assuming tourism spending grows in line with real long term UK GDP rate of 2.5 per cent up to 2020.

- 2.47** Taking on board assumptions on passenger mixes for Option 1, and adjusting to 2006 prices, our preliminary estimates suggest that Option 1 may well generate net tourism spending to the UK. This would be between £0.4bn – £3.2bn in 2020 (2006 prices), depending on the assumptions on how many UK leisure passengers would go abroad. However, due to the preliminary nature of this assessment, we have not included this analysis in our monetised calculations at this stage of the Impact Assessment.

#### *Employment benefits*

- 2.48** Additional runway capacity at Heathrow may lead to greater economic activity and associated employment, both on-site and in the South East as a result of benefits to other businesses. Briefly these are:
- direct employment and income that is wholly or largely related to the operation of the airport.
  - indirect employment and income generated in the economy in the chain of suppliers of goods and services.
  - induced employment and income generated in the economy by the spending of incomes by the direct and indirect employees.
  - catalytic employment and income generated in the economy by the

wider role of the airport in improving the productivity of businesses and in attracting economic activities, such as inward investment and inbound tourism.

**2.49** Our assessment of the employment impacts focuses on the first three bullet points. Option 1 is likely to safeguard around 8,000 additional on-site jobs by 2030 relative to the base case – see **Table 7**.

**2.50** In addition, figures from the South East Regional Air Study (SERAS) employment forecasts suggest that Heathrow currently generates around 10,000 jobs in the form of direct off-site employment, and should remain stable up to 2030. Option 1 would potentially increase this to around 12,000 by 2030.

**2.51** There are likely to be considerable further employment benefits in the form of indirect, induced and catalytic employment that are excluded from this analysis. Analysis in SERAS included

indirect employment arising in the chain of suppliers of goods and services, and assumed productivity growth of 1.5 per cent per annum. Including these indirect jobs suggests the airport accounts for 14.5 per cent of the jobs in its core catchment area (Hillingdon, Hounslow, Ealing and Spelthorne). With Option 1 this could potentially increase employment by 20 per cent (147,000 employees, up from 102,000 in 1998), then decline to 16 per cent by 2030 (117,000 employees), due to increased efficiency.

#### *Other wider benefits*

**2.52** In addition to the non-quantified benefits discussed above, there are other indirect benefits of additional capacity in the form of reduced costs to the economy, including lower business costs, and higher productivity in the wider economy. Closely linked to this is the idea of agglomeration benefits, whereby productivity and wages are boosted through a clustering of economic

**Table 7: Employment on Site (000s)**

	<b>2030</b>
Base Case	52.4
Option 1	60.4

Source: HCH Tribal

activity, as evidenced in London and the Greater South East. With 90 per cent of businesses in the South East rating Heathrow as either 'vital' or 'very important' to their business<sup>45</sup>, restricting capacity in the face of growing demand could impact considerably upon productivity and competitiveness. The importance of taking such effects into account when appraising transport schemes was emphasised in *The Eddington Transport Study*<sup>46</sup>.

- 2.53 Other indirect benefits include the positive impact of additional air services on foreign direct investment (FDI) and the UK's competitive position *vis-à-vis* other European countries.
- 2.54 Some studies have attempted to quantify the extent of the wider economic impacts of a third runway. Oxford Economic Forecasting recently estimated that a third runway at Heathrow may generate wider economic benefits of around £7 billion a year of additional GDP in today's prices by 2030 (0.3 per cent of GDP) with a net present value of £27 billion.

## Net impact

- 2.55 Option 1 would generate net monetised economic benefits ranging from £4.4bn to £5.2bn depending on the surface access infrastructure assumptions. However, we have noted that there are also likely to be non-monetised costs and benefits.

## Key assumptions

- 2.56 The analysis is based on the following assumptions:
  - the appraisal of Option 1 is against the base case (option) in line with Treasury Green Book Guidance (TGB), the Department's WebTAG and the Cabinet Office Impact Assessment (IA) Guidance 2007.
  - all the appraisal assumptions are consistent with TGB, WebTAG and Impact Assessment Guidance (2007) and Defra's latest guidance on the Shadow Cost of Carbon (2007).
  - assessment of the transport user benefits and climate change costs has been based on the Department's model runs as detailed in the *UK Air Passenger Demand and CO<sub>2</sub> Forecasts*. The economic analysis is consistent with the work done for the ATWP.

## Sensitivities

- 2.57 The net impact assessment is sensitive to the surface access infrastructure assumptions. We have undertaken low and high infrastructure cost scenarios to reflect potential uncertainty on the surface access strategy.

## Risks

- 2.58 None.

## Option 2

### Description

**2.59** A package of measures that includes the introduction of mixed mode within existing capacity around 2010. Mixed mode will then cease to operate once a third runway is in place around 2020. The new runway could be used by a range of aircraft types, but not the largest 4-engine wide-body aircraft. The new terminal would serve the new runway with links to local road and rail services. Mixed mode within capacity would require some modifications to the existing airport infrastructure. The forecast ATMs assumed under this scenario are as follows:

- 2010 – 2019: 480,000 ATMs (airport operates under mixed mode)
- 2020 – 2080: ATM capacity is assumed to grow linearly from 605,000 ATMs in 2020 to 702,000 ATMs in 2030 and then remain constant.

### Costs

#### Monetised

**2.60** Option 2 would generate significant capital and refurbishment costs in terms of new mixed mode, third runway and surface access infrastructure. There are also climate change and air noise costs associated with additional capacity.

#### Infrastructure costs

**2.61** Two elements of infrastructure requirements are considered under Option 2:

- 2010 – 2019: Infrastructure necessary for the airport to deliver mixed mode in the period 2010 – 2019. Based on indicative plans from BAA, we have estimated incremental infrastructure costs as shown in **Table 8**.
- 2020 – 2080: Infrastructure for the third runway, new terminal and surface access requirements from 2020 to 2080. These are set out under Option 1, Table 4.

**2.62** These costs have been discounted at 3.5 per cent and increased by 44 per cent to reflect optimism bias, in order to generate the present value cost (PVC) of infrastructure. The PVC is estimated at £0.6bn (2006 prices). Adding this to the PVC for Heathrow third runway and new terminal infrastructure costs, the total infrastructure PVC for Option 2 ranges from £7.4bn – £8.2bn.

#### Climate change costs

**2.63** Two elements of climate change impacts are considered under Option 2:

- 2010 – 2019: The introduction of mixed mode within capacity around 2010 would help *reduce* the level of carbon dioxide through reduction in delays, relative to

**Table 8: Estimated Infrastructure Costs of Mixed Mode within existing capacity (480,000 ATMs) – 2006 prices (undiscounted)**

Item	(£m)
Runways and Taxiways	101
Aprons and Piers	30
Track Transit System (TTS) Link to Piers	0
Baggage	35
Ancillary Facilities and Utilities	12
Inter-Terminal Connections	0
Enabling Works and Landscaping	0
Site Surface Access	0
<b>Total Base Airport Construction</b>	<b>177</b>
25 per cent On-Costs	44
25 per cent Contingency	55
10 per cent Regional Inflator	28
Borrowing for brought forward schemes	0
<b>Total Airport Construction</b>	<b>305</b>
Land Costs (incl. purchase, compensation, contingency)	130
<b>Total Airport Construction including land</b>	<b>435</b>

the base case. Delay imposes negative environmental impacts as planes are forced to burn fuel for longer periods as they are delayed on runways or held in holding stacks, leading both to increased carbon dioxide emissions and

additional noise. The Department has estimated the environmental carbon dioxide savings associated with reducing delay by three minutes within the existing planning capacity limit of 480,000 ATMs<sup>47</sup>.

47 NATS analysis showed that the introduction of mixed mode with additional capacity around 540,000 ATMs would deliver reduction in holding delay in the order of three minutes. NATS analysis for mixed mode within *existing* capacity of 480,000 ATM is not available. It is possible that mixed mode within capacity may generate a much greater reduction in delay. However, we have assumed the conservative estimates of three minutes for our delay calculations.

This equates to a reduction of 1.72m tonnes of CO<sub>2</sub> worth £0.04bn.

- 2020 – 2080: The introduction of Heathrow third runway and new terminal around 2020 would generate additional air transport movements in the order of 222,000 by 2030. The Department's analysis shows that an additional runway capacity in 2020 would generate *additional* carbon dioxide emissions of around 180.8m tonnes over the period 2010 – 2080, relative to the base case.

**2.64** Overall, Option 2 would lead to additional carbon dioxide emissions of around 179.1m tonnes over the period 2010 – 2080 (equivalent to 2.6m tonnes of CO<sub>2</sub> per year) or £4.8bn worth of climate change costs over the 70 years.

#### Noise

**2.65** **Table 9** shows the incremental impact of Option 2 on air noise based on noise modelling results. The size of the 57dBA noise contour and the population within that contour would broadly remain the same with mixed mode within existing capacity at 2015. The overall noise contour generated by Option 2 in 2015 would remain within the White Paper limits of 127 sq km (2002 baseline).

**2.66** No formal modelling has been undertaken for 2010. For the period 2020 onwards (third runway and new

terminal), the noise position is set out under Option 1.

**2.67** The welfare impacts of noise changes, relative to the base case, associated with Option 2 broadly fall under two areas:

- 2010 – 2019: The introduction of mixed mode within existing capacity over the period 2010 – 2019 may create winners and losers relative to the base case. **Table 10** shows the winners and losers of moving from the base case (480,000 ATMs) to Option 2 (mixed mode at 480,000 ATMs). Full methodological assumptions are set out under Option 1. Mixed mode within existing capacity over the period 2010-2019 would lead to £0.9m – £1.4m benefits (i.e. reduction in noise costs relative to the base case).
- 2020 – 2080: The introduction of additional runway and terminal capacity over the period 2020 – 2080 would generate noise costs set out under Option 1. These are estimated to range between £212.3m – £328.7m.

**2.68** The total cost of noise for Option 2 is £211.4m – £327.3m.

#### Non-monetised

**2.69** In addition to monetised costs discussed above, Option 2 would have a range of non-monetised

**Table 9: Summary of Noise Impacts of Option 2**

Year	Indicators	Base Case – No change to the 480,000 ATM limit operating in segregated mode	Mixed Mode at 480,000 ATMs (2015) and Heathrow third runway in 2020 and 2030
2015	Area of 57dBA Noise Contour (sq km)	119.8	119.7
	Population within 57dBA Noise Contour (000s)	261.9	248.1
	Households within 57dBA Noise contour (000s)	110.7	105.2
2020	Area of 57 dBA Noise Contour (sq km)	N/A	126.7
	Population within 57dBA Noise Contour (000s)	N/A	242.3
	Households within 57dBA Noise contour (000s)	N/A	99.7
2030	Area of 57dBA Noise Contour (sq km)	77.0	112.9
	Population within 57dBA Noise Contour (000s)	142.2	205.7
	Households within 57dBA Noise contour (000s)	59.0	84.4

impacts. These include the impacts on local air quality, which may get worse relative to the base case option, but should remain within the

environmental limits set out in the ATWP. Using indicative plans from BAA, we have also identified impacts



**Table 10: 2015 480,000 ATMs mixed mode relative to 2015 base case (480,000 ATMs)**

Contour	Area (km <sup>2</sup> )	Populations (000s)	Households (000s)
<-9	0.0	0.0	0.0
<-6	0.1	0.0	0.0
<-3	2.2	8.2	3.3
<-2	5.1	17.5	7.1
<-1	19.2	35.3	14.6
>+1	22.3	38.4	15.4
>+2	6.1	7.9	3.2
>+3	1.9	2.8	1.1
>+6	0.1	0.0	0.0
>+9	0.0	0.0	0.0

on housing, landscape, biodiversity, heritage, and water.

#### *Local air quality*

**2.70** No formal modelling has been undertaken to measure the impact of mixed mode within existing capacity (480,000 ATMs) on air quality exceedences between 2010 and 2019. For the period 2020 onwards (third runway and new terminal), the air quality position is set out under Option 1.

#### *Landscape/Biodiversity/Heritage/Water*

**2.71** Same as Option 1.

#### **Benefits**

##### **Monetised**

**2.72** Option 2 would generate significant monetised benefits to society. The two main benefits are delay reduction benefits of introducing mixed mode within existing capacity (2010 – 2019) and the transport user benefits from additional capacity (2020 – 2080).

### *Economic benefits from reduced delay*

**2.73** Introduction of mixed mode within capacity over the period 2010 – 2019 would help reduce economic costs on passengers and airlines. Airport delay imposes economic costs on society in terms of increased costs for airlines, passengers and the wider community. The airlines bear additional costs on the fleet as well as flying and ground personnel, since delays prevent them from operating in optimum conditions. The delay-related costs for users are mostly airline passengers' opportunity cost, measured by the value of their time. Economic benefits therefore occur in terms of reduced travel time savings for passengers and lower operating costs for airlines.

**2.74** We estimate that efficiency improvements generated with mixed mode within capacity are likely to lead to three minute delay reduction per year, worth around £1.5bn of economic benefits to society.

### *Transport user benefits*

**2.75** The transport user benefits from an additional third runway and new terminal in 2020 are the same as under Option 1.

**2.76** Option 2 would lead to total monetised benefits in the order of £18.6bn over period 2010 – 2080.

### *Non-monetised*

**2.77** The non-monetised benefits of Option 2 broadly fall under two areas:

- 2010 – 2019: The introduction of mixed mode within existing capacity over the period 2010 – 2019 would lead to resilience benefits, relative to the base case. In addition to increased airport delays, high levels of air passenger demand relative to the maximum physical capacity of the airport reduces the resilience of the airport in times of extreme weather and security disruptions, as there is little spare capacity with which to recover from problems experienced earlier in the day. This normally leads to increased cancellation of flights and potential transfer of passengers to less attractive services. Mixed mode within capacity would bring much needed operational resilience in times of severe weather as the flexibility of using both runways for landing and take-off may allow the airport to operate more flights compared to the current segregated mode system.
- 2020 – 2080: The introduction of additional runway and terminal capacity over the period 2020 to 2080 would generate non-monetised benefits the same as those set out under Option 1.

## Net impact

2.78 Option 2 would generate net monetised economic benefits ranging from £5.3bn to £6.1bn depending on the infrastructure assumptions. However, we have noted that there are also likely to be non-monetised costs and benefits.

## Key assumptions/sensitivities/risks

2.79 Same as Option 1.

## Option 3

### Description

2.80 A package of measures that includes the introduction of mixed mode within existing capacity in 2010, then a transition to full mixed mode with effect from 2015. Mixed mode will then cease to operate when a third runway is in place around 2020. The new runway could be used by a range of aircraft types, but not the largest 4-engine wide-body aircraft. The new terminal would serve the new runway with links to local road and rail services. Mixed mode within capacity would require some modifications to the existing airport infrastructure. The forecast ATMs assumed under this scenario are as follows:

- 2010 – 2014: 480,000 ATMs (airport operates under mixed mode)
- 2015 – 2019: 540,000 ATMs (airport operates under mixed mode)

- 2020 – 2080: ATM capacity is assumed to grow linearly from 605,000 ATMs in 2020 to 702,000 ATMs in 2030 and then remain constant.

## Costs

### Monetised

2.81 Option 3 would generate significant capital and refurbishment costs from mixed mode operations; a third runway and new terminal; and surface access infrastructure. There are also climate change costs associated with additional carbon dioxide emissions from Heathrow third runway capacity.

### Infrastructure costs

- 2.82 Two elements of infrastructure requirements are considered under Option 3:
- 2010 – 2019: Infrastructure necessary for the airport to deliver mixed mode within capacity (2010 – 2014 at 480,000 ATMs) and mixed mode with additional capacity (2015 – 2019 at 540,000 ATMs). The undiscounted costs are set out in Table 8.
  - 2020 – 2080: Infrastructure for the third runway, new terminal and surface access requirements from 2020 to 2080. These are set out under Option 1, Table 4.
- 2.83 Using the indicative plans from BAA, we have estimated the incremental

costs of mixed mode as shown in **Table 11**. These costs have been discounted at 3.5 per cent and increased by 44 per cent to reflect optimism bias in order to generate the present value cost (PVC) of infrastructure. The PVC is estimated

at £0.7bn (2006 prices). Adding this to the PVC for Heathrow third runway and new terminal infrastructure costs, the total infrastructure PVC for Option 3 ranges from £7.5bn – £8.3bn.

**Table 11: Estimated Infrastructure Costs of Mixed Mode with additional capacity (540,000 ATMs) – 2006 prices (undiscounted)**

Item	£m
Runways and Taxiways	118
Aprons and Piers	42
Track Transit System (TTS) Link to Piers	0
Baggage	37
Ancillary Facilities and Utilities	12
Inter-Terminal Connections	0
Enabling Works and Landscaping	0
Site Surface Access	0
<b>Total Base Airport Construction</b>	<b>209</b>
25 per cent On-Costs	52
25 per cent Contingency	65
10 per cent Regional Inflater	33
Borrowing for brought forward schemes	0
<b>Total Airport Construction</b>	<b>359</b>
Land Costs (incl. purchase, compensation, contingency)	130
<b>Total Airport Construction including land</b>	<b>489</b>

### Climate change costs

2.84 Three elements of climate change impacts are considered under Option 3:

- 2010 – 2014: The introduction of mixed mode within existing capacity would lead to a three minute reduction in delay and a reduction of 0.86m tonnes of carbon dioxide emissions.
- 2015 – 2019: The introduction of mixed mode with additional capacity (60,000 additional ATMs per annum) would generate around 2.0m tonnes of carbon dioxide emissions. However, over the same period, we estimate that a three minute reduction in delay would lead to reduction in 0.9m tonnes of carbon dioxide emissions. The overall increase in carbon dioxide emissions over this period, relative to the base case, is therefore 1.1m tonnes.
- 2020 – 2080: The introduction of Heathrow third runway and new terminal around 2020 would generate additional air transport movements in the order of 222,000 by 2030. The Department's analysis shows that capacity from an additional runway in 2020 would generate *additional* carbon dioxide emissions around 180.8m tonnes over the period 2020 – 2080, relative to the base case.

2.85 Overall, Option 3 would lead to additional carbon dioxide emissions of around 181.1m tonnes over the period 2010 – 2080 (equivalent to 2.6m tonnes per year) or £5bn costs over the 70 years.

### Noise

2.86 The noise modelling work suggests that, on current fleet mix assumptions, mixed mode at around 540,000 ATMs could be delivered without breaching the noise contour limit in 2015. The area of the 57dBA contour is estimated at around 125.5 sq kms. Our modelling suggests that expected improvements to the aircraft fleet over the subsequent five years to 2020 would further reduce the size of the contour. A more aggressive approach to retiring older, noisier aircraft would bring forward any such improvement. **Table 12** shows the incremental impact of Option 3 on noise.

2.87 The welfare impacts of noise changes, relative to the base case, associated with Option 3 would broadly fall under three areas:

- 2010 – 2014: The introduction of mixed mode within existing capacity over the period 2010 – 2014 may create winners and loses, relative to the base case. We estimate that mixed mode within existing capacity over the period 2010 – 2014 would lead to £0.5m – £0.7m benefits (i.e. reduction in noise costs relative to the base case).

- 2015 – 2019: The introduction of mixed mode with additional capacity over the period 2015 – 2019 would create winners

and losers. **Table 13** shows the winners and losers in moving from the base case (480,000 ATMs to 540,000 ATMs). Full methodological

**Table 12: Summary of Noise Impacts of Option 3**

Year	Indicators	Base Case – No change to the 480,000 ATM limit operating in segregated mode.	Mixed Mode at 540,000 ATMs (2015) and Heathrow third Runway in 2020 and 2030
2015	Area of 57dBA Noise Contour (sq kms)	119.8	125.5
	Population within 57dBA Noise Contour (000s)	261.9	274.0
	Households within 57dBA Noise contour (000s)	110.7	117.1
2020	Area of 57 dBA Noise Contour (sq kms)	N/A	126.7
	Population within 57dBA Noise Contour (000s)	N/A	242.3
	Households within 57dBA Noise contour (000s)	N/A	99.7
2030	Area of 57dBA Noise Contour (sq kms)	77.0	112.9
	Population within 57dBA Noise Contour (000s)	142.2	205.7
	Households within 57dBA Noise contour (000s)	59.0	84.4

assumptions are set out under Option 1. Mixed mode with additional capacity over the period 2015 – 2019, would lead to £1.7m – £2.6m costs relative to the base case.

- 2020 – 2080: The introduction of additional runway and terminal capacity over the period 2020 – 2080 would generate noise costs set out under Option 1. These are estimated to range between £212.3m – £328.7m.

**2.88** The total cost of noise for Option 3 is £213.5m – £330.6m.

### Non-monetised

**2.89** In addition to monetised costs discussed above, Option 3 would have a range of non-monetised impacts. These include the impacts on local air quality, which may get worse relative to the base case, but should remain within the environmental limits set out in the ATWP. Using indicative plans from BAA, we have also identified impacts on landscape/

**Table 13: 2015 540,000 ATMs Mixed Mode relative to 2015 base case (480,000 ATMs)**

Contour (dBA L <sub>eq</sub> )	Area (km <sup>2</sup> )	Populations (000s)	Households (000s)
<-9	0.0	0.0	0.0
<-6	0.0	0.5	0.2
<-3	4.2	14.6	5.9
<-2	6.7	19.8	8.1
<-1	18.1	34.2	14.1
>+1	35.2	71.6	29.1
>+2	10.0	10.1	4.0
>+3	2.7	4.1	1.6
>+6	0.1	0.0	0.0
>+9	0.0	0.0	0.0

townscape, biodiversity, heritage, and water.

### *Local air quality*

**2.90** Air quality modelling suggests, on the basis of latest fleet mix assumptions, that the NO<sub>2</sub> limit can be met in the immediate vicinity of the airport with mixed mode (540,000 ATMs) in 2015. There are likely to be residual areas of exceedence (fewer than 30 properties) around the M4 but this is not significantly worse than the position in 2015 with no airport development. Analysis suggests that exceedences on the M4 north of Heathrow could be eliminated by a number of possible measures. These are discussed in the consultation document.

**2.91** No quantification has been undertaken to reflect additional NO<sub>2</sub> emissions of Option 3 relative to the base case, mainly due to the absence of appropriate base case scenarios. Over the consultation period work will be done to ensure that we have the full picture of the monetary impacts of Option 3 relative to the base case, in time for the post consultation Impact Assessment.

### *Landscape/Biodiversity/Heritage/Water*

**2.92** Same as Option 1.

## **Benefits**

### **Monetised**

**2.93** Option 3 would generate significant monetised benefits to society. The

three main economic benefits are delay reduction benefits of introducing mixed mode within existing capacity; delay reduction benefits from mixed mode with additional capacity; and the transport user benefits from mixed mode with additional capacity and Heathrow third runway.

### *Economic benefits of reduced delay*

**2.94** The introduction of mixed mode over the period 2010 – 2019 would lead to a reduction in delay by three minutes, generating significant economic benefits to passengers and airlines:

- 2010 – 2014: Mixed mode within capacity (480,000 ATMs) over the period 2010 – 2014 would deliver £0.8bn worth of benefits to passengers and airlines.
- 2015 – 2019: Mixed mode with additional capacity (540,000 ATMs) over the period 2015 – 2019 would deliver £0.8bn worth of benefits to passengers and airlines.

### *Transport user benefits*

**2.95** In line with sequencing options 1 and 2, the transport user benefits have been undertaken based on the methodology described in the DfT *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report. Two elements of transport user benefits are considered under this option:

- Benefits from additional capacity generated by mixed mode from



2015 to 2019 – these have been estimated at £0.2bn.

- Benefits from additional capacity generated by Heathrow third runway and new terminal – these have been estimated at £17.1bn.

**2.96** Overall, Option 3 would lead to total monetised benefits in the order of £18.9bn over the period 2010 – 2080.

### Non-monetised

**2.97** The non-monetised benefits of Option 3 broadly fall under three areas:

- 2010 – 2014: The introduction of mixed mode within existing capacity over the period 2010 – 2014 would lead to resilience benefits, relative to the base case. In addition to increased airport delays, high levels of air passenger demand relative to the maximum physical capacity of the airport reduces the resilience of the airport in times of extreme weather and security disruptions, as there is little spare capacity with which to recover from problems experienced earlier in the day. This normally leads to increased cancellation of flights and potential transfer of passengers to less attractive services. Mixed mode within capacity would bring much needed operational resilience in times of severe weather as the flexibility of using both runways for landing and take-off may allow

the airport to operate more flights compared to the current segregated mode system.

- 2015 – 2019: The introduction of full mixed mode with additional capacity with effect from 2015 would lead to non-monetised benefits. These would include benefits to airlines over and above the welfare benefits to their passengers; increased operational resilience in times of severe weather; additional tourism expenditure from additional passengers; possible increase in employment relative to the base case; and wider productivity gains to the economy in terms of direct foreign investment and general UK competitiveness.
- 2020 – 2080: The introduction of additional runway and terminal capacity over the period 2020 – 2080 would generate non-monetised benefits as set out under Option 1.

### Net impact

**2.98** Option 3 would generate net monetised economic benefits ranging from £5.4bn to £6.2bn depending on the infrastructure assumptions. However, we have noted that there are also likely to be non-monetised costs and benefits.

## Key assumptions/sensitivities/risks

2.99 Same as Option 1.

### 3. Competition assessment

3.1 A full competition assessment is set out at Appendix A.

### 4. Small firms impact assessment test

4.1 The Impact Assessment Guidance states that *“any new proposal that imposes or reduces the cost on business requires a Small Firms Impact Assessment Test”*. The assessment of the potential impact of additional capacity has relied on the new Department for Business and Regulatory Reform Small Firms Impact Assessment Guidance (September 2007). Based on the latest advice we do not think the capacity sequencing options outlined in this document would have a direct impact on small firms. However, as part of the consultation we will be speaking to relevant stakeholders to ensure that any potential impacts on small businesses are reflected in the final Impact Assessment to inform Ministerial decisions.

### 5. Sustainable development assessment

5.1 This section assesses the consultation proposals against the five principles of sustainable development.

## Living within environmental limits

5.2 The first principle of sustainable development calls for *“respecting the limits of the planet’s environment, resources and biodiversity – to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations”*. We have interpreted this principle to mean that additional capacity at Heathrow as described by the possible sequencing options should take into account all the impacts on the environment. These include the impacts of noise and local air quality, which may get worse relative to the base case option, but should remain within the environmental limits set out in the White Paper. Using indicative plans from BAA, we have also identified impacts on water and biodiversity and have reviewed the impact on climate change. Specifically, we have ensured that the possible sequencing options for additional capacity meet the strict environmental conditions set out in the ATWP with respect to noise and air quality.

## Noise

5.3 The White Paper set out the following strict condition for noise: future development could only be supported if the size of the 57dBA  $L_{eq}$  contour does not increase beyond its size in 2002.

- 5.4 A third runway could operate from around 2030 at its maximum capacity (around 702,000 ATMs) without breaching the noise contour limit set out in the ATWP; and could operate from around 2020 at reduced level of activity (around 605,000 ATMs) within the same constraints.
- 5.5 For mixed mode, the work suggests that, on current fleet mix assumptions, mixed mode at around 540,000 ATMs at Heathrow could be delivered without breaching the noise contour limit in 2015. The modelling suggests that expected improvements to the aircraft fleet over the subsequent five years to 2020 would further reduce the size of the contour.
- 5.6 We have attempted to quantify the air noise impacts of additional capacity. Full assumptions are set out under the Options Analysis section. The general impacts on noise are:
- Option 1: We estimate that additional runway capacity between 2020 and 2080 would generate noise costs around £212.3m – £328.7m (mid-point is £270.5m).
  - Option 2: We estimate that mixed mode within existing capacity over the period 2010 – 2019 would lead to £0.9m – £1.4m benefits (i.e. reduction in noise costs relative to the base case). Additional runway capacity between the period 2020 and 2080 would lead to noise costs around £212.3m – £328.7m. The total noise cost for Option 2 is £211.4m – £327.3m (mid-point is £269.4m).
  - Option 3: Mixed mode within existing capacity over the period 2010 – 2014 would lead to £0.5m – £0.7m benefits (i.e. reduction in noise costs relative to the base case). Mixed mode with additional capacity over the period 2015 – 2019, would lead to £1.7m – £2.6m costs relative to the base case. Additional runway capacity during the period 2020 – 2080 would generate noise costs around £212.3m – £328.7m. The overall noise cost for Option 3 is £213.5m – £330.6m (mid-point is £272.5m).
- Local air quality**
- 5.7 The White Paper set out the following strict conditions from 2010, in line with the current European Union Directive on nitrogen dioxide (NO<sub>2</sub>) related pollutants<sup>48</sup>:
- Hourly limit value for the protection of human health – 200µg/m<sup>3</sup> NO<sub>2</sub>, not to be exceeded more than 18 times in a calendar year.
  - Annual limit value for the protection of human health – 40µg/m<sup>3</sup> NO<sub>2</sub> annual average.
- 5.8 A third runway could operate from around 2030 at around 702,000 ATMs, without breaching the NO<sub>2</sub> limits set out in the White Paper; and could

operate from around 2020 at reduced level of activity (around 605,000 ATMs) with the same constraints.

- 5.9 No special mitigation measures are needed on the road network to achieve compliance with the air quality limits in these periods, the main reason being the substantial reductions in NO<sub>2</sub> expected in the light of tighter road vehicle emission standards over time.
- 5.10 Mixed mode at around 540,000 ATMs with effect from 2015 would lead to some residual NO<sub>2</sub> exceedences around the M4 (27 properties in all) but this is not significantly worse than the base case in 2015 with no airport development. Analysis suggests that the exceedences on the M4 north of Heathrow could be mitigated by a variety of measures. Potential mitigation measures include lower speed limits, possible traffic management measures and the use of proprietary photo-catalytic surface treatments which can help absorb NO<sub>2</sub> although their effectiveness on a significant scale is as yet unproven.

## Climate change

- 5.11 In line with the Stern Review, we have quantified the impact of carbon dioxide from additional capacity sequencing options. The analysis shows that carbon dioxide emissions from additional aircraft movements would increase with additional

capacity, ranging from 179.1m tonnes – 181.1m tonnes (over a 70 year period from 2010 – 2080) depending on the option. It should be noted that these figures indicate the level of aircraft emissions. It does not include any additional emissions that may emanate from additional traffic on the road. The position on road-related emissions would depend on any future surface access strategy, in particular, the share of additional passengers that prefer to drive by car rather than use public transport. Further evidence on aircraft emissions is set out in the Carbon Assessment.

## Biodiversity

- 5.12 The direct biodiversity effect from additional capacity would be limited to loss of and disturbance to localised areas in proximity to the proposed development. However, there may be indirect effects beyond the boundaries of the development as a consequence primarily of air quality changes resulting from the proposal and especially associated with traffic generation. These effects may have consequences for sites of significant importance for nature conservation.

## Water

- 5.13 Heathrow airport is situated within both the River Crane and River Colne surface water catchments. The study area is bounded to the north by the Grand Union Canal, to the east by

the River Crane, and to the west by the River Colne and River Wraysbury. The Duke of Northumberland's River and Longford River pass around the western perimeter of the airport, having been diverted as part of the Terminal 5 development, and then flow eastward along the southern perimeter of the airport. There are two large reservoirs to the south-west of the study area, and numerous former gravel pits that now form lakes. The run-off from the airport flows into a number of balancing reservoirs, which provide temporary storage before gradually discharging into the Stanwell Ditch, River Wraysbury, Porlane Brook and the River Crane.

- 5.14 The airport is outside of the 1 in 100 year flood risk area identified by the Environment Agency. However, there is significant expanse of floodplain along the western side of the proposed third runway area corresponding to the Colne catchment, which is sensitive to flooding.
- 5.15 The proposed third runway area is located on the river gravels of the middle Thames valley. The permeable gravels are regarded as a major aquifer, and are highly productive and able to support large abstractions for public supply and other purposes. There are 23 licensed groundwater abstractions within the area, and groundwater resources available in the

middle Thames and in the confined chalk aquifer under London.

- 5.16 Additional capacity has been assessed, against a base case, which is in the current land-use planning system, and therefore only considers impacts that are *additional* to those assessed under the base case. The assessment considers the sensitivity of the water environment and the potential to cause harm, allowing scope for mitigation. The impacts are as follows:

- Surface Water: additional capacity is likely to have 'low adverse' impact on surface water. Indicative assessment shows that additional capacity would not involve culverting of river reaches and could be built without diverting any rivers. The realignment of the M4 spur results in a minor change in catchment areas between the River Crane and the Duke of Northumberland River, with the latter having a slightly increased catchment area and the former a slightly reduced one. The impacts of this change could be compensated for by utilising clean water from the terminal buildings as a compensation supply.
- Ground water: The impact is likely to be 'high adverse', due to the major aquifer. However, with appropriate management, mobilisation of contaminants could be low adverse.

The Terminal 5 project shows that diaphragm walls can be used to control groundwater flows around key areas and so reduce the ground water impact to 'low adverse'.

- **Flooding:** The impact is likely to be 'low adverse'. Indicative assessment shows that there would be no increased risk of flooding downstream of the development for all flood events up to a 1 in 100 year event, with a climate change allowance of 20 per cent increase in run-off as part of the design.
- **Water resources:** The impact is likely to be high adverse if there is persistently low seasonal rainfall. It may be difficult to meet the significant increase in demand, even with supply and demand management, and water saving technology. However, it is likely that a future water efficiency study across the whole airport during the planning stage may reveal areas for improvement.

### Ensuring a strong, healthy and just society

- 5.17 The second principle of sustainable development calls for *"meeting the diverse needs of all people in existing and future communities, promoting personal well being, social cohesion and inclusion, and creating equal opportunity for all"*. We have interpreted this principle to mean that additional capacity at Heathrow as

described by the possible sequencing options should take into account all the impacts on local communities; promote social inclusion; and encourage opportunity and choice.

### Community effects

- 5.18 Additional capacity at Heathrow airport would affect existing local and future communities through the impact on the townscape/landscape, local heritage and the surface access network around the airport. In general, the impact on community in terms of townscape and local heritage is likely to be negative. The impact on congestion in the area would depend on the future surface access strategy.

#### *Landscape/Townscape/Housing*

- 5.19 The landscape in the vicinity of Heathrow falls within the Thames Valley which comprises a broad floodplain of fragmented, poor agricultural land dominated by the urban influences of the towns of Reading, Bracknell, Windsor and Slough and metropolitan London. The landscape within 5km of the site at Heathrow is divided between Runnymede Hills rising above the otherwise flat and low-lying landscape and provide panoramic views across the floodplain; Colne Valley running north to south to join the River Thames in the vicinity of Staines; and the West London Suburbs which are characterised by late twentieth

century low rise urban expansion over flat and low-lying topography.

**5.20** The settlement pattern predominantly comprises a series of linked urban and suburban areas. Most of these developed in the twentieth century, partly in response to the expansion of the airport, and comprise a relatively unstructured pattern of residential neighbourhoods around local service centres. The linked urban and suburban areas are separated mainly by transport corridors, open spaces and gravel workings. A small number of settlements retain some village characteristics.

**5.21** Using the indicative plans from BAA we have estimated that the landscape/townscape impacts of the additional runway at Heathrow may lead to the following adverse impacts, in addition to the heritage impacts described above:

- The loss of 195ha of agricultural land (agricultural land and scattered residential). In addition, the land within the extended boundary comprises 80ha sand and gravel deposits.
- Land take from the Green Belt within the new airport boundary (255 ha).
- The loss of Sipson village which would result in the loss of around 700 properties, Heathrow Primary

School and Sipson Community Centre. It is estimated that the loss of these properties would be spread over a period of time. However, as stated in the ATWP, to meet the employment needs at Heathrow, 30,000 dwellings may be required by 2015.

- The construction works for this option would impinge on many residential communities. In particular, Harmondsworth and other areas close to the lost Sipson village.

#### *Heritage impacts*

**5.22** The heritage 'base case' for the study area contains 38 undesignated archaeological sites or groups of sites (considered for this optional appraisal to be of county/district value). The maximum area of expansion contains an additional such 32 sites with a further 55 sites lying in the wider corridor. The area contains one Scheduled Ancient Monument, the fourteenth century Tithe Barn at Harmondsworth. A further three Scheduled Ancient Monuments (SAMs) lie within the wider corridor of the study area.

**5.23** The area contains two designated areas of high archaeological potential. These comprise the historic cores of Harmondsworth and Harlington.

**5.24** *Archaeology* – The current airport site and its area of expansion lie within an area of high archaeological activity and potential as demonstrated by excavations within the current airport boundary and in the surrounding area. There is archaeological evidence in the area of historic activities dating from pre-historic times. The pattern of landscape and settlement probably changed little from the medieval to the post-medieval period. Much of this settlement pattern has now been swallowed up by the construction of the airport and the westward growth of suburban London.

**5.25** *Listed Buildings* – The study area contains 102 Listed Buildings. This includes: one Grade I Listed Building; the Manor Farm Barn at Harmondsworth which is also a SAM; two grade II\* Listed Buildings; and 95 Grade II Listed Buildings; three Grade B Listed churches and one Grade C Listed church. The exact level of the Grade A and Grade B buildings is uncertain: in the early days of the Listing programme, churches were exempt from Listed Building controls and were classified as A, B or C.

**5.26** *Conservation Areas* – The area of proposed land take contains the Conservation Area at Harmondsworth. The wider corridor contains four further Conservation Areas.

**5.27** We have estimated the heritage impacts of additional runway and terminal capacity relative to the base case described above. Additional capacity would generate high adverse impact on heritage:

- It may result in substantial disturbance within an area of High Archaeological Importance near the village of Harmondsworth and would affect 16 undesignated sites.
- A number of listed buildings would be lost including four Grade II Listed Buildings. This loss of the Grade II buildings would constitute a ‘high adverse’ effect. This assumes that only one of the Grade II Listed Buildings within the Harmondsworth Village is within the airports extended boundary. The medieval centre of the village, including the church and the tithe barn (Grade I listed) would be preserved.
- The loss of about 22 per cent of the Harmondsworth Conservation Area.

#### *Surface access*

**5.28** The 2003 White Paper highlighted that “ensuring easy and reliable access for passengers which minimises environmental, congestion and other local impacts” is a key factor in bringing forward any proposals for airport development. In the case of Heathrow, Government made clear that there are no further plans for motorway widening and that public



transport and possibly, in time, demand management would be the key to delivering such access and minimising the associated impacts on local communities.

**5.29** As our work has been focused on measures to ensure that the air quality limit values could be met, we have not considered in detail the precise traffic impacts of additional capacity on surrounding communities or the necessary demand management measures to reduce road traffic growth or contain congestion to specified levels. The design of any measures aimed at congestion relief is likely to be different from those aimed at mitigating air quality exceedences, and may be needed at different locations. Any work to prepare for a planning application to approve growth at Heathrow would need to address such matters, including physical connections to the road and rail networks, and measures to reduce travel by car and increase the use of public transport alternatives.

**5.30** We have, however, developed a scenario for surface access to a three runway airport, to underpin the detailed modelling work. We have looked at three kinds of surface access responses needed to meet the conditions set in the 2003 White Paper:

- physical, i.e. providing the physical connections required (primarily) for

a third runway and new passenger terminal;

- increase capacity and use of public transport;
- measures to manage car and taxi journeys.

**5.31** These factors would form an important part of any work preceding a planning application for further development at Heathrow.

### Social inclusion

**5.32** The impact of additional capacity on social inclusion is likely to be through greater local economic activity and associated employment, both on-site and in the South East as a result of benefits to other businesses in the region. In addition, in 2006 around 33 per cent of Heathrow's direct passengers were visiting friends or relatives. The impact of additional capacity is likely to be that it continues to support a multi-cultural, diverse community, especially in the London area. Further discussion can be found under the third principle of sustainable development.

### Promoting choice and opportunity

**5.33** Air travel is becoming a more commonly-used form of transport as the UK economy develops, people become richer, and the choices available to them increase. Additional capacity at Heathrow Airport would

contribute to promoting greater choice and opportunities for people to benefit from air travel. Additional capacity may lead to the following:

- New destinations may be created from Heathrow airport as new carriers enter and compete for passengers, due to the availability of additional landing slots.
- More frequent flights allowing passengers to plan their journey and access flights at the most convenient time for them.
- Reduced delays allowing new and existing passengers to save time and use that time for more productive activities.
- Greater capacity that may translate into greater competition for certain routes which may lead to cheaper fares.

### Achieving a sustainable economy

**5.34** The third principle of sustainable development calls for *“building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and in which environmental and social costs fall on those who impose them (Polluter Pays) and efficient resource use is incentivised”*. We have interpreted this principle to mean that additional capacity at Heathrow as described by the possible sequencing options should deliver net additional benefits

to society and those benefits should take into account the social and environmental costs on society.

### Net benefits to consumers

**5.35** Providing additional capacity at Heathrow could generate transport user benefits in terms of reductions in costs to passengers; additional capacity may allow greater frequencies of services between destinations, reducing the likelihood of missed flights and increasing ‘connectivity’; airport companies may enjoy increased profits from capacity expansion arising from new passengers using airports; and finally, there will be benefits from additional air freight movements. Additional capacity may also reduce delays.

**5.36** We have quantified the benefits to consumers and assessed them against the climate change costs that the various sequencing options might impose. **Table 14** sets out a summary of the quantified costs and benefits for the three possible sequencing options. The calculation of benefits above focuses on transport user and delay reduction benefits. The net economic benefits range from £4.4bn to £6.2bn depending on the nature of the sequencing option. The benefits of expansion, therefore, outweigh the costs on society, including the climate change costs.

**Table 14: Summary of Possible Sequencing Options**  
 (All sequencing options appraised relative to the base case scenario of 480,000 air transport movements limit operating in segregated mode from 2010 – 2080)

	Costs (£bn)				Benefits (£bn) <sup>1</sup>	Net Present Value (£bn)	
	Infrastructure		Climate Change Costs <sup>2</sup>	Air Noise Costs <sup>3</sup>		Light	Heavy
	Light	Heavy					
Option 1 – Heathrow third runway around 2020	6.8	7.6	4.8	0.3	17.1	5.2	4.4
Option 2 – Mixed Mode at 480,000 ATMs around 2010, Heathrow third runway in 2020	7.4	8.2	4.8	0.3	18.6	6.1	5.3
Option 3 – Mixed Mode at 480,000 ATMs around 2010, Mixed Mode at 540,000 ATMs by 2015, Heathrow third runway around 2020	7.5	8.3	5.0	0.3	18.9	6.2	5.4

<sup>1</sup> For Option 1, the benefits include transport user benefits. Options 2 & 3 include both transport user benefits from additional capacity and the benefits from reduced delay associated with mixed mode operations.

<sup>2</sup> For Options 2 & 3, the climate change costs take into account the impact of reduced delays from mixed mode operations. Option 1 does take into account potential reduction in delay.

<sup>3</sup> The noise costs are based on a mid-point estimate of the lower national WebTAG values of noise and the higher Heathrow values of noise from academic literature. Differences in noise costs between options have been lost in the rounding of numbers. Further explanation can be found in the rest of Section 2 (Options Analysis).

**5.37** In addition to the benefits set out above, there are other benefits to consumers which have not been quantified. These include *resilience benefits*. Additional capacity would make the airport more resilient to extreme weather disruptions and security related delays. As air passenger demand grows the resilience of an airport in times of extreme weather and security disruptions may reduce. This normally leads to increased cancellation of flights and potential transfer of passengers to less attractive routes. Additional capacity may lead to reduced cancellation of flights from Heathrow in times of severe weather as the flexibility of three runways would allow the airport to operate more flights compared to a two runway system. This would benefit consumers significantly.

### Benefits to UK industry

**5.38** Additional capacity is likely to generate significant benefits to the UK aviation industry and beyond. The Department's current methodology does not take these into account. However, we believe these benefits are no less important to the more quantifiable benefits to consumers, and together they provide a full picture of the economic impacts of additional capacity on society. The benefits to the aviation industry include the following:

- *Benefits to existing Heathrow freight carriers* – the Department's existing approach to calculating the benefits to air freight focuses on new freight users, but not existing freight user benefits. For new freight users, the benefits are held constant after 2030. The capacity constraints on air freight are likely to become more pronounced over time as passenger growth takes valuable slots in the South East. We would therefore expect to see significant growth in air freight beyond 2030 with extra capacity.
- *Impact on tourism expenditure* – quantitative assessment of the benefits to date does not take account of the net expenditure of UK tourism. Additional airport capacity relative to the base case scenario would lead to *additional* foreign tourists visiting the UK (increasing UK exports). However, this would have to be balanced against *additional* expenditure by UK residents spending money on tourism abroad as a result of additional capacity (increasing UK imports). Preliminary estimates discussed under Section 2 (Option 1) suggests the net impact on tourism expenditure from additional capacity at Heathrow might be between £0.4bn – £3.4bn (2006 prices) in 2020, depending on the assumptions made on how many UK leisure passengers

would go abroad. However, due to the preliminary nature of the calculations, we have not included this analysis in our monetised calculations.

- *Productivity benefits* – additional capacity may also generate benefits in the form of reduced costs to the economy, including lower business costs, and higher productivity in the wider economy. Closely linked to this is the idea of agglomeration benefits, whereby productivity and wages are boosted through a clustering of economic activity, as evidenced in London and the Greater South East. With 90 per cent of businesses in the South East rating Heathrow as either ‘vital’ or ‘very important’ to their business<sup>49</sup>, restricting capacity in the face of growing demand could impact considerably upon productivity and competitiveness. The importance of taking such effects into account when appraising transport schemes was emphasised in the Eddington Transport Report. OEF recently estimated that a third runway at Heathrow may generate wider economic benefits estimated at £7 billion a year of additional GDP in 2006 prices by 2030 (0.3 per cent of GDP) with a net present value of £27 billion.

## Benefits to local communities

- 5.39 Additional capacity at Heathrow would generate greater economic activity and associated employment, both on-site and in the South East as a result of benefits to other businesses in the region. In some respects, these benefits may be regarded as a subset of the ‘wider benefits’ already considered. Nevertheless, because of the considerable impact upon the social and economic fabric of the local area and potential regeneration benefits, the additional employment generated by increased capacity at Heathrow is considered here.
- 5.40 There is no doubting the importance of the employment Heathrow currently provides: in some local boroughs such as Hounslow, as many as one in every ten people in employment works at Heathrow. The 2004 Heathrow Employment Survey estimated total on-site employment at Heathrow airport as being around 63,500, which did not include around 5,000 employees of T5 construction companies.
- 5.41 We may take a view on the geographical distribution of these benefits by looking at the areas of residence of Heathrow airport employees. In 2004, around 40 per cent of Heathrow employees<sup>50</sup> lived in West London, with Surrey (19 per cent of employees) and Berkshire (13 per cent of employees) also benefiting

49 Oxford Economic Forecasting, 2006.

50 That is, excluding employees of construction companies working on T5.

significantly. At a more local level, boroughs that are home to more than 5,000 Heathrow staff include Hounslow (11,300), Hillingdon (8,000), Ealing (5,200) and Spelthorne (5,200).

**5.42** In the future, direct on-site employment at Heathrow is expected to fall under all scenarios, due to increases in productivity. Nevertheless, when appraising the employment impact of additional capacity, it is the additional or marginal employment generated by the additional capacity relative to a baseline that is relevant for consideration. For example, under the base case scenario, total employment at Heathrow is estimated at 63,000 jobs in 2010 before falling to 52,400 by 2030, representing a fall in employment of around 22 per cent from the 2004 level of 67,300. **Table 15** shows the impact of Heathrow's third runway relative to the base case. A third runway is likely to safeguard around 8,000 additional on-site jobs by 2030 relative to the base case.

**5.43** In addition, figures from SERAS employment forecasts suggest that Heathrow airport currently generates around 10,000 additional jobs in the form of direct off-site employment and should remain stable up to 2030. Additional runway capacity would potentially increase this to around 12,000 by 2030, representing an incremental increase of around 2,000 direct jobs over the period.

**5.44** There are likely to be considerable further employment benefits in the form of indirect, induced and catalytic employment that are excluded from this analysis. Analysis by SERAS includes indirect employment arising in the chain of suppliers of goods and services, and assumes productivity growth of 1.5 per cent per annum. Including these indirect jobs suggests the airport accounts for 14.5 per cent of the jobs in its core catchment area (Hillingdon, Hounslow, Ealing and Spelthorne). With the proposed additional runway this could increase to 20 per cent (147,000 employees up from 102,000 in 1998), then decline to 16 per cent by 2030 (117,000 employees).

**5.45** **Table 16** shows the local authority distribution of the majority of Heathrow employees and the associated Index of Multiple Deprivation (IMD). They range from Surrey Heath which by this score is the second least deprived local authority in England, to Hounslow and Ealing, both of which are in the bottom third. Therefore, while the employment role of Heathrow may not be centrally based upon a regeneration argument, Heathrow provides employment across a socio-economically mixed catchment area. Over a third of employees live in Hounslow, Hillingdon and Ealing, all of which are in the lower 50 per cent of local authorities in the IMD rankings.

Table 15: Employment by Sub-area of Residence, 2030

	Base Case	Additional Capacity
Central	1,469	1,693
East	494	569
North	550	634
South	3,032	3,495
West	20,959	24,159
<b>Greater London</b>	<b>26,504</b>	<b>30,551</b>
Berkshire	6,593	7,599
Buckinghamshire	2,239	2,580
East Sussex	411	474
Hampshire	1,520	1,752
Isle of Wight	53	61
Kent	229	263
Oxfordshire	484	558
Surrey	10,007	11,534
West Sussex	1,013	1,168
<b>South East</b>	<b>22,548</b>	<b>25,990</b>
Other Regions	3,348	3,859
<b>Total</b>	<b>52,400</b>	<b>60,400</b>

**Table 16: Heathrow Airport Employment and IMD Rankings**

Local Authority	Number of employees, 2004	IMD rank 2004	Rank percentile %
Hounslow	11,300	102	28.8
Hillingdon	8,000	166	46.9
Ealing	5,200	99	28.0
Spelthorne	5,200	284	80.2
Slough	3,300	129	36.4
Windsor and Maidenhead	2,700	326	92.1
Richmond-upon-Thames	2,400	301	85.0
Runnymede	2,100	331	93.5
Bracknell	1,600	319	90.1
Surrey Heath	1,500	353	99.7
Harrow	1,200	232	65.5
Elmbridge	1,100	337	95.2

Source: CLG Indices of Multiple Deprivation

### Promoting good governance

**5.46** The fourth principle of sustainable development calls for “*actively promoting effective, participative systems of governance in all levels of society – engaging people’s creativity, energy, and diversity*”. We have interpreted this principle to mean that the possible sequencing options for additional capacity at Heathrow

should have the support of the wider community and be subject to consultation. This Impact Assessment is part of the wider consultation on how Heathrow should develop in the next 20 years, and is asking the public for their views before decisions are made.



## Using sound science responsibly

- 5.47** The fifth principle of sustainable development calls for *“ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values”*. We have interpreted this principle to mean that the possible sequencing options for additional capacity at Heathrow should be based on robust evidence.
- 5.48** Our assessments are based on rigorous analysis and state-of-the-art modelling to predict as accurately as possible the likely future effects of development scenarios at Heathrow, taking into account aircraft and vehicle traffic forecasts and technology and market trends. The air quality modelling approach has been informed by a comprehensive review involving panels of independent experts. Noise modelling has been carried out by the CAA using their recently updated ANCON noise model. Surface access modelling has employed a range of demand and traffic models, including a variant of the Highways Agency’s M25 Rapid Widening Model developed specifically for the purposes of this work and was the subject of an independent peer review. We have also addressed issues surrounding uncertainty and sensitivity analysis.
- 5.49** Details of the modelling methodologies and validation are available in the various supporting technical documents within the consultation document.

## 6. Carbon assessment

### Context

- 6.1** To fully appreciate the forecasts and projections of carbon dioxide emissions in the context of additional capacity at Heathrow, it is useful first to consider the wider context of carbon emissions.
- 6.2** Worldwide carbon dioxide emissions were estimated to be over 26.5 billion tonnes of CO<sub>2</sub> in 2004 (over 7.2 billion tonnes of carbon) of which the UK accounted for just 2 per cent. Emissions from the EU in 2004 were some 3.9 billion tonnes of CO<sub>2</sub> (around 15 per cent of global emissions). The UK accounted for some 14 per cent of the EU share<sup>51</sup>. Of global emissions in 2004, transport accounted for just under a quarter with international aviation accounting for just 1.5 per cent. As a share of emissions, aviation and transport are both likely to account for greater shares in the future as they continue to experience strong demand growth.
- 6.3** In 2005 – the latest year for which data are available – the UK emitted some 554.2 million tonnes of CO<sub>2</sub> (MtCO<sub>2</sub>) in its domestic economy, or some 595.1

MtCO<sub>2</sub> including international aviation and shipping emissions<sup>52</sup>. Of this total, transport including international shipping and aviation accounted for some 29 per cent of UK emissions.

6.4 We have assessed the impact of additional capacity at Heathrow on carbon dioxide emissions. Full discussion of the methodology and relevant assumptions are set out in the DfT *UK Air Passenger Demand and CO<sub>2</sub> Forecasts* report. **Table 17** presents a summary of the carbon dioxide emissions of the three

sequencing options and associated costs.

### Base case

6.5 The base case against which all the possible sequencing options are appraised is the do-nothing scenario. This scenario is defined over the appropriate appraisal period of the relevant 'do-something' sequencing options and there are no additional costs or benefits associated with this. By this definition there are no additional carbon emissions.

**Table 17: Summary of Climate Change Impacts (All sequencing options appraised relative to the base case of 480,000 air transport movements limit operating in segregated mode, from 2010 – 2080)**

	Total CO <sub>2</sub> (million tonnes)	Average CO <sub>2</sub> per year (million tonnes)	Total Climate Change Costs (£bn)
Option 1 – Heathrow third Runway around 2020	180.8	2.6*	4.8
Option 2 – Mixed Mode at 480,000 ATMs around 2010, Heathrow third runway in 2020	179.1	2.6	4.8
Option 3 – MM at 480,000 ATMs around 2010, MM at 540,000 ATMs around 2015, Heathrow third runway around 2020	181.1	2.6	5.0

\* For appraisal consistency this is expressed over 70 years, although the additional total emissions occur over 60 years. The equivalent annual figure over 60 years is 3.01m.

6.6 However, failure to expand may also lead to increases in delays and reduced resilience as airlines seek to maximise passenger throughput within the existing ATM limit of 480,000. Delay imposes negative environmental impacts as planes are forced to burn fuel for longer periods as they are delayed on runways or held in holding stacks, leading both to increased carbon emissions and additional noise. Punctuality statistics show that average delay at Heathrow has increased by 15 per cent since 2002, from 16.3 minutes in 2002 to 18.8 minutes in 2006<sup>53</sup>. This delay reflects both airborne and ground delay. Assuming this trend continues, we can expect the increases in carbon dioxide emissions over time relative to the 'current year'.

### Option 1

6.7 Option 1 would generate additional air transport movements of around 222,000 per annum by 2030 or 180.8m tonnes of carbon dioxide from the time of opening (2020) to 2080. This is equivalent to 3.0m tonnes per annum from the time of opening or 2.6m tonnes per annum over the 70 year period for comparability to other options under consideration. We estimate that social cost associated with the additional carbon dioxide emissions is around £4.8bn (2006 prices) from the time of opening to 2080.

### Option 2

6.8 Two elements of climate change impacts are considered under Option 2:

- 2010 – 2019: The introduction of mixed mode within capacity around 2010 would help *reduce* the level of carbon dioxide through reduction in delays, relative to the base case. Delay imposes negative environmental impacts as planes are forced to burn fuel for longer periods as they are delayed on runways or held in holding stacks, leading both to increased carbon dioxide emissions and additional noise. The Department has estimated the environmental carbon dioxide savings associated with reducing delay by three minutes within the existing planning capacity limit of 480,000 ATMs. This equates to a reduction of 1.7m tonnes of CO<sub>2</sub> worth £0.04bn.
- 2020 – 2080: The introduction of Heathrow third runway and new terminal around 2020 would generate additional air transport movements in the order of 222,000 by 2030. The Department's analysis shows that the additional runway capacity in 2020 would generate *additional* carbon dioxide emissions around 180.8m tonnes over the period 2010 – 2080, relative to the base case.

6.9 Overall, Option 2 would lead to additional carbon dioxide emissions of around 179.1m tonnes over the period 2010 – 2080 (equivalent to 2.6m tonnes of CO<sub>2</sub> per year) or £4.8bn worth of climate change costs over the 70 years.

### Option 3

6.10 Three elements of climate change impacts are considered under Option 3:

- 2010 – 2014: The introduction of mixed mode within existing capacity would lead to a three-minute reduction in delay and a reduction of 0.9m tonnes of carbon dioxide emissions.
- 2015 – 2019: The introduction of mixed mode with additional capacity (60,000 ATMs per annum) would generate around 2.0m tonnes of carbon dioxide emissions. However, over the same period, we estimate that a three-minute reduction in delay would lead to reductions in 0.9m tonnes of carbon dioxide emissions. The overall increase in carbon dioxide emissions over this period, relative to the base case, is therefore 1.1m tonnes.
- 2020 – 2080: The introduction of Heathrow third runway and new terminal around 2020 would generate additional air transport

movements in the order of 222,000 by 2030. The Department’s analysis shows that the additional runway capacity in 2020 would generate *additional* carbon dioxide emissions around 180.8m tonnes over the period 2020 – 2080, relative to the base case.

6.11 Overall, Option 3 would lead to additional carbon dioxide emissions of around 181.1m tonnes over the period 2010 – 2080 (equivalent to 2.6m tonnes per year) or £5bn costs over the 70 years.

6.12 Although we have shown that there will be an increase in the emissions with additional capacity at Heathrow, we remain committed to ensuring that aviation reflects the full costs of its climate change emissions.

## 7. Health impact assessment

7.1 A full health impact assessment has not been carried out at this stage. If policy support is given, subject to the outcome of this consultation, a full health impact assessment would need to be conducted as part of any planning application by the airport operator in accordance with the White Paper commitment (ATWP para 12.2). An initial review of the health impacts of any airport expansion was set out in Annex E of the ATWP.

## 8. Race/disability/gender equality

- 8.1 There are no impacts on race/disability/gender equality.

### Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy sequencing options.

**Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.**

Type of testing undertaken	Results in Evidence Base?	Results annexed?
Competition Assessment	Yes	Yes
Small Firms Impact Test	Yes	No
Legal Aid	No	No
Sustainable Development	Yes	No
Carbon Assessment	Yes	No
Other Environment	Yes	No
Health Impact Assessment	Yes	No
Race Equality	Yes	No
Disability Equality	Yes	No
Gender Equality	Yes	No
Human Rights	No	No
Rural Proofing	No	No

## Appendix A

### Competition assessment

#### 1. Executive summary

- A.1** The competition assessment seeks to give an overview of the potential impact of the possible sequencing options for adding capacity at Heathrow airport. Deducing these effects on competition is difficult due to the “enabling” nature of the consultation sequencing options as opposed to “requiring” (in a mandatory manner) the airport operator to act. However, this “enabling” nature also reduces the risk that the sequencing options may harm competition, as expansion at Heathrow would remain subject to both the normal commercial requirements to generate a reasonable return on investment, in the context of the regulatory regime. Further, it is important to note that, if the Government gives support for Heathrow expansion, it would not preclude or prevent other airports from putting forward plans for expansion. The ATWP set out the Government’s support for a range of airport developments.
- A.2** At the core of this analysis is an inevitable uncertainty about the level of capacity that might be delivered if the airport development were to go through a successful planning process

and the nature of the slot allocation mechanism that might be used to allocate any additional capacity. In many ways, how that uncertainty is resolved will determine what the impact on competition is in practice.

- A.3** The assessment of the potential impact of additional capacity at Heathrow has relied on OFT Competition Assessment Guidance 2007 and focused on addressing four key competition filter questions. The findings are set out below:
- **Direct impacts on number of suppliers** – if Government gave support for Heathrow expansion it would not directly limit the number of suppliers in both the primary (airport) and secondary (air cargo, airline, etc) markets. Government support does not award exclusive rights or impose fixed quota on the number of suppliers in these markets. The nature of the proposal has no elements within it that would directly limit the number of suppliers in both the primary or secondary markets because it simply enables one of the existing suppliers (albeit the largest UK supplier) of airport capacity in the market to expand.
  - **Indirect impacts on the number of suppliers** – in general the sequencing options set out in the competition assessment do not increase the costs to new suppliers in the primary market.

However, for the secondary market (airline passenger and air cargo markets) the cost to airlines of using Heathrow may increase, reflecting the costs incurred in expanding the airport (depending upon the cost of expansion, the airport's pricing decisions and the regulatory regime), albeit that this would be accompanied by an increase in Heathrow's capacity and quality of service (e.g. reduced delays in the early years of development and increased resilience).

It is also possible that additional capacity at Heathrow may increase barriers to entry in the UK airport market, emanating from increased network economies and stronger brand loyalty relative to the base case. However, this potential impact has to be interpreted within the context of Heathrow's competition with other international hubs (especially in Europe) for international to international transit passengers, most of which already have substantially greater runway capacity. For the secondary market, the impact on competition may be favourable due to the existing slot allocation that guarantees 50 per cent of new slots to new entrants. Additional capacity in the secondary market is likely to lead to lower barriers of entry as new capacity would facilitate new entry and expansion by airlines at Heathrow.

- **Ability of suppliers to compete** – we do not believe that additional capacity at Heathrow per se would directly limit the ability of suppliers to compete. We have no reason to believe that the possible sequencing options set out in the consultation document would lead to control or substantial influences on the price BAA charges, the characteristics of the products supplied or limit innovation in the UK aviation industry. Additional capacity at Heathrow might be expected to intensify competition between Heathrow and its international competitors and other UK airports. It is not anticipated that this would lead to the exit of any of the major competitors to Heathrow.
- **Incentive of suppliers to compete** – additional capacity at Heathrow should not lead to a reduction in the incentives for suppliers to compete vigorously in both the secondary and primary markets. The sequencing options do not exempt suppliers from general competition law, introduce or amend the intellectual property regime, require or encourage the exchange between suppliers, or publication, of information on prices, costs, sales or outputs. Nor do they increase the costs to customers of switching between suppliers.

**A.4** The general picture is, therefore, that there is a mix of positive and negative impacts of additional capacity at Heathrow airport relative to the base case. However, the potential impact on competition on the secondary markets appears to be broadly positive – with additional capacity reducing the magnitude of barriers to potential new entrants, leading to a greater range of services provided. Furthermore, enabling additional airport capacity appears more likely to intensify competition between Heathrow and its competing airports in the UK and international markets.

**A.5** It should be noted that Heathrow airport is subject to independent economic regulation. Heathrow airport is ‘designated’ for price control by the CAA, under the Airports Act 1986. This places an obligation on the CAA to set a price cap on the airport that furthers the reasonable interests of airport users, promotes the efficient, economic and profitable operation of airports and encourages investment in new facilities. The regulatory regime therefore provides a check against action by the airport that unduly harms competing airports or that is detrimental to the interests of suppliers and customers in the secondary markets.

**A.6** It should also be noted that BAA is currently under investigation by the Competition Commission. Their

findings could have a substantial impact on what happens at Heathrow but this is not a matter for this consultation.

## 2. Competition implications of consultation sequencing options

### Extent of Government consultation

**A.7** The Government is consulting on how Heathrow airport could be developed in the next 20 years or more, whilst adhering to the environmental conditions for air quality and noise, and the conditions on surface access as set out in the ATWP.

**A.8** The Impact Assessment has outlined possible sequencing options under which the full forecast ATMs could be utilised and environmental and surface access requirements met. The date at which infrastructure could be introduced is also only indicative and would be subject to further design work and a planning application by BAA. The sequencing options are summarised below. More detailed descriptions of the sequencing options can be found under Section 2 (Options Analysis):

- i) *Option 1* – Introduce additional capacity by means of a third runway around 2020 along with a new passenger terminal.



- ii) *Option 2* – A package of measures that includes the introduction of mixed mode within existing capacity around 2010. Mixed mode will then cease to operate when a third runway and new terminal are in place around 2020.
- iii) *Option 3* – A package of measures that includes introduction of mixed mode within existing capacity around 2010, then a transition to full mixed mode with effect from 2015. Mixed mode will then cease to operate when a third runway and new terminal are in place around 2020.

**A.9** This competition assessment largely focuses on Option 1, and then goes on to briefly discuss Options 2 & 3. The sequencing options are assessed against the base case of no changes to the airport. The current annual air transport movement (ATM) limit would remain at 480,000 per annum with existing operating procedures.

### Potential response of BAA and the implications for competition

**A.10** The Government's support for expansion of Heathrow airport is permissive and BAA, working within the air quality and noise constraints and the planning system, will make their own decisions on how they wish to bring the infrastructure forward. Thus the BAA response will depend largely on its own financial and

business objectives. Therefore the range of possible outcomes is broad and difficult to predict with certainty.

**A.11** Outcomes, and thus the likely effects on competition, will vary with regard to both the timing and scale of infrastructure which BAA may wish to provide. For example, BAA may wish to slowly ramp-up capacity over time or it may wish to move swiftly and deliver the entire infrastructure allowed within the planning remit at once. BAA may also wish to pursue certain runway development sequencing options and avoid other elements such as mixed mode.

**A.12** However, the need to discuss competition issues arises from the possibility that Government support for the expansion of Heathrow brings some certainty to the process and may therefore translate into actual delivery of infrastructure that may have some impact on competition.

### Key questions

**A.13** The OFT Competition Assessment Guidance 2007 broadly sets out the key questions that should be addressed in the competition assessment for each of the sequencing options. This competition assessment addresses the following questions:

- What markets may be affected by the development sequencing

options set out in the Impact Assessment?

- How would the various development sequencing options affect competition in the affected markets? In addressing this question, attention would focus on the four questions set out in the impact assessment.

### 3. Affected markets

**A.14** This section identifies the markets that may be affected by the development sequencing options set out in the Impact Assessment. It briefly identifies the markets that might be affected, their size and level of segmentation. A distinction is made between the primary market, in which Heathrow airport immediately operates, and the secondary markets that are affected by the activities in the primary market.

#### Primary market

##### Airport market

###### *Market identification*

**A.15** The primary market that may be affected by the expansion of Heathrow airport is the UK commercial airport market. However, due to Heathrow's position as a major international hub airport, this market may extend to include some overseas airports (notably Charles De Gaulle, Schiphol and Frankfurt).

**A.16** Commercial airports hold licenses to operate landing and take-off facilities for scheduled and charter airlines for air passengers and air freight services. They generate their revenues principally from two sources:

- *Aviation revenues*: these take the form of passenger charges (including levies on departing passengers and baggage handling charges), runway movement charges (levied on aircraft, according to weight) and aircraft parking charges (based on a combination of aircraft weight and time parked). At Heathrow, Gatwick, Stansted and Manchester airports, passenger charges, runway movement charges and aircraft charges are currently regulated by the Civil Aviation Authority (CAA), according to a price formula linked to the retail price index (RPI).
- *Commercial revenues*: these include various forms such as duty free and tax free shopping, tax-paid specialist shops, catering, bureaux de change, car parking and rental, transport operations (such as BAA's Heathrow Express) and property services (including property development and rent from businesses located within the airport). Retailing, catering and revenues from car parks tend to be the main sources of commercial revenues.

**A.17** There are essentially three forms of demand for the aviation and commercial services provided by Heathrow airport:

- *Passenger demand:* Passengers are both direct and indirect consumers of airport services. We define direct demand as those airport services that passengers consume directly from an airport (e.g. shops, parking, etc). Indirect demand represents those airport services they consume as a result of purchasing a service from the airline that relies on airport provision (e.g. flights, check-in, interlining, etc). Put together, passenger direct and indirect demand are vital for airlines considering locating flights at any airport, as they reflect the extent to which passengers will be attracted to a particular airport and the services it provides. Passengers choice of any given airport will largely depend on a range of factors including: a) the destinations offered at the airport (together with their frequency and cost); b) the proximity to the airport and the associated surface access costs; and c) the quality and cost of airport services e.g. parking and retailing. The level of importance attached to these factors will depend on a passenger's level of income and journey purpose.
- *Freight Demand:* In addition to passengers, air freight represents a large proportion of demand for commercial airport services.
- *Airline Demand:* While passengers can switch between airports easily and businesses can change their demand for air freight, airlines in general tend to make plans over longer time horizons. For example, airlines change their service plans season-by-season (rather than day-by-day) and take a number of strategic decisions (such as which airports to operate from) over longer time horizons. They generally prefer to be located in places that provide a greater reach in terms of consumers and that allows them to reduce their cost of operation, although a number of airlines operate profitably from smaller airports. Airlines' demand for an airport will depend on the expected profitability of their operations, which depends on passenger and freight demand and other costs. Airlines' choice of an airport will be affected by a range of factors, including a) passenger and local freight demand; b) the presence of other airlines – from the airline's perspective this could be negative (too much competition or congestion) or a positive thing (allowing passengers to interline), or both; c) the current and anticipated future airport charges and operational costs at

the airport including any marketing support; and d) the level and quality of service from the airport – whether facilities allow airlines to operate a fast and reliable turnaround of flights while giving passengers an acceptable travelling experience. Poor quality of service from airports can affect their reputation and raise operating costs.

*Market size*

**A.18** The UK airport market has grown year on year with the revenue generated in 2006 standing at nearly £3bn. Between 2002 and 2006, the airport market grew overall by 23 per cent. The largest increase in revenues occurred between 2003 and 2004, where the revenue generated by the sector grew by 9.1 per cent. **Table A1** shows the total

UK airport revenues and the sector breakdown.

**A.19** In 2006, UK airports generated revenue of nearly £3bn, an increase of 3.5 per cent from the previous year. This represents an increase of 23 per cent since 2002 – slightly below the growth in passenger numbers. Commercial activities accounted for 58 per cent of UK airport revenues in 2006, down from 58.3 per cent in 2005.<sup>55</sup> Commercial revenues (which include catering, retailing and property services) are estimated to have increased in value by 22.5 per cent between 2002 and 2006, to £1.7bn. Aviation revenues (airport traffic charges and related income) are estimated to have reached £1.2 billion in 2006 – a four per cent increase on

**Table A1: UK Airport Revenues by Type<sup>54</sup>**  
(£m and %), 2002 – 2006

	2002	2003	2004	2005	2006
Commercial Revenues	1,393	1,433	1,545	1,641	1,694
% of total	58.3	58.8	58.1	58.2	58.0
Aviation revenues	991	1,006	1,115	1,117	1,226
% of total	41.7	41.2	41.9	41.8	42.0
Total	2,374	2,439	2,660	2,820	2,920

<sup>54</sup> Source: Keynote Airports Report, 2007

<sup>55</sup> Source: Keynote Airports Report, 2007

the figure for 2005 and a 23.7 per cent rise since 2002.

**A.20** Passenger traffic is a key driver of revenue for an airport. In 2006, UK airports handled 235 million passengers – an increase of three per cent in 2005 (**Table A2**). Passenger traffic at the five main London airports (Heathrow, Gatwick, Stansted, Luton and London City) grew by 2.5 per cent during the year to 137 million. The growth in passenger traffic has largely been driven by the continued expansion of European scheduled services, growth in long-haul operations and establishment of new routes. The increasing prosperity of the low cost model and the expansion and refurbishment of many airport facilities have also contributed to the ongoing rise in terminal passengers numbers.

### *Market segmentation*

**A.21** The analysis of market segmentation has focused on assessing the share of UK airports in three key areas: passenger services, aircraft movements, and freight services. The overall picture of the UK airport market is one dominated by BAA, with control of more than 53 per cent of the airport sector in terms of ATMs and passengers. Heathrow airport has the largest share of the market under all three indicators. **Table A3** shows the sectoral breakdown of the market by ownership.

**Table A2: Terminal passengers (million), aircraft movements (million) and Freight Moved at UK Airports (million tonnes), 2002-2006<sup>56</sup>**

	2002	2003	2004	2005	2006
Terminal Passengers	188	199	215	228	235
ATM	3.3	3.5	3.5	3.6	3.6
Freight Moved	2.2	2.2	2.4	2.4	2.3

**Table A3: UK airports by ownership in 2006 – passengers, ATMs and freight moved<sup>57</sup>**

Owner	Airport	Passengers		ATMs		Freight [tonnes]	
		(m)	%	(000)	%	(000)	%
BAA	Heathrow	67.4	18.3	471	19.8	1,263.1	54.6
	Gatwick	34.1	9.3	254	10.7	211.8	9.2
	Stansted	23.7	6.5	190	7.9	224.3	9.7
	Glasgow	8.8	2.4	97	4.1	6.3	0.3
	Edinburgh	8.6	2.4	116	4.9	36.4	1.6
	Aberdeen	3.2	0.9	98	4.1	4.0	0.2
	Southampton	1.9	0.5	46	1.9	0.2	0.0
Manchester Airport Group	Manchester	22.1	6.0	213	8.9	148.9	6.4
	Nottingham	4.7	1.3	56	2.4	272.3	11.7
	Bournemouth	0.9	0.3	12	0.5	5.1	0.2
	Humberside	0.5	0.1	13	0.6	0.1	0.0
Abertis Aena	Belfast	5.0	1.4	48	2.0	38.4	1.7
	Cardiff	2.0	0.6	22	0.9	2.2	0.1
	Luton	9.4	2.6	79	3.3	17.9	0.8
Peel Holdings Plc	Doncaster	0.9	0.3	7	0.3	0.2	0.0
	Durham	0.9	0.3	12	0.0	0.4	0.0
	Liverpool	4.9	1.4	48	2.0	5.7	0.3
Others	Others	167.8	45.7	594	25.0	77.8	3.4
<b>Total</b>		<b>366.9</b>	<b>100.0</b>	<b>2,376</b>	<b>100.0</b>	<b>2,315.0</b>	<b>100.0</b>

## Secondary markets

### Passenger airline market

#### Market identification

- A.22** The passenger airline market can be broadly divided between scheduled and non-scheduled services; and domestic and international services.
- A.23** Scheduled services operate according to a published timetable and are open to use by members of the public. Non-scheduled, or charter services include all air transport movements other than scheduled services. Domestic services are services that are flown entirely within the UK, the Isle of Man and the Channel Islands. International services are services flown between the UK, the Isle of Man, the Channel Islands and points overseas.
- A.24** Non-scheduled air services are usually operated by UK-based tour operators and are part of the air inclusive tour (AIT) or package holidays marketed by tour operators.

#### Market size and segmentation

- A.25** In recent years there has been a dramatic rise in the number of passengers served by UK airlines and the number of kilometres flown – see **Table A4**. In 2006, UK airlines carried 127.4 million passengers on scheduled and non-scheduled flights – a 19.6 per cent rise on 2002. The number of seat kilometres used was also up by 22.9 per cent over the same period. These increases largely resulted from the growth of the scheduled air service sector, especially the low cost airline market.
- A.26** The scheduled services airline sector has developed steadily since 2002, with both international and domestic passenger numbers increasing yearly up to 2006. International flights are the largest segment of the market, accounting for 74.7 per cent of the passenger total in 2006. Growth in the international sector has tended to outpace that in the domestic market

**Table A4: Scheduled service of UK airlines by passenger served (million)<sup>58</sup>**

	2002	2003	2004	2005	2006	% change 2002/2006
Passengers served by UK airlines	107	110	115	124	127	19.6
Seat kilometres used	245	257	266	290	301	23

since 2002, with a rise of 42.6 per cent up to 2006, compared with a 15.7 per cent increase in domestic travel – see **Table A5**.

**A.27** The non-scheduled, or charter, air transport market is more or less totally dependent on demand for overseas flights. Most of the charter services are operated by, or undertaken in conjunction with, the leading tour operators. They usually include the flight as part of the overseas package holiday. The domestic market for non-scheduled services is very modest on all measures.

### Air cargo market

#### Market identification

**A.28** Air cargo includes freight, mail and excess baggage of passengers and air crews (i.e. baggage outside permitted allowances). The market can be segmented into four main sectors:

- Domestic scheduled air freight
- Domestic non-scheduled
- International scheduled air freight
- International non-scheduled air freight

#### Market size and segmentation

**A.29** UK air cargo traffic has grown rapidly over the last 15 years, and is now more than double the level it was in 1990. Over the last ten years, air freight has increased by one third. However, the average growth rate for 1995-2000 (seven per cent) is far higher than that of the last five years (0.2 per cent)<sup>59</sup> – see **Figure A1**. This is largely due to the sharp fall in 2001 following September 11th and the subsequent slowdown in economic growth. Whilst air freight volumes did recover with high growth of 7.4 per cent in 2003, surpassing the peak reached in 2000, freight volume growth slowed in 2004/05

**Table A5: Non scheduled services of UK airlines by passengers served (million)<sup>60</sup>**

	2002	2003	2004	2005	2006
International	34	33.5	32.1	30.3	29.7
Domestic	0.3	0.3	0.2	0.2	0.2
Total	34.3	33.8	32.3	30.5	29.9



with freight growth falling behind passenger growth. The global air freight industry was hit by weaker demand in some key sectors (e.g. IT), changing global trade patterns and by fuel surcharges.<sup>61</sup> There are signs that global freight growth is now beginning to recover.

**A.30** Much of the sharp fall in freight volume in 2001 was due to a fall in belly-hold freight (i.e. in the holds of passenger aircraft), reflecting a reduction in long-haul passenger

services in the wake of September 11th. The 2005 slowdown however saw both belly-hold and dedicated freighter volumes fall.

**A.31** In 2005, over 2.3 million tonnes of air freight were carried at UK airports. Of this, 1.5 million tonnes (64 per cent) was as belly hold with a further 0.9 million tonnes (36 per cent) in dedicated freighter aircraft<sup>62</sup>. Over 80 per cent of all UK belly-hold freight is carried on just over ten per cent of flights to, from or within the UK, these

**Figure A1: Freight by aircraft configuration 1996–2005**



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being long-haul flights operated by wide-bodied aircraft<sup>63</sup>. The historic growth of belly-hold freight has accordingly paralleled the growth in long-haul passenger traffic, increasing by over 60 per cent between 1993 and 2003. The growth in intra-European services has not affected belly-hold freight growth because they are largely operated by narrow-bodied aircraft, with significantly less belly hold cargo capacity. Growth in No Frills Carriers (NFCs) has also had little effect on air freight capacity, as services require very swift turnarounds, making freight operations unsuitable and undesirable, and requirements of swift turnarounds

that make such operations generally unsuitable for the carriage of freight.

**A.32** **Table A6** below presents the regional airport picture in 2006. There are five main airports that handle over 100,000 tonnes of freight per annum and together they handled 92 per cent of all freight that passed through the UK in 2006. About three-quarters of all freight handled goes through airports in the South East, the majority going through Heathrow which acts as a major freight hub for the UK.

**A.33** The vast majority of belly-hold freight (mainly on long-haul flights operated by wide-bodied aircraft) is handled

**Table A6: UK Air Cargo by Airport, 2006<sup>64</sup>**

Airport	'000 Tonnes	of which Belly-hold	of which Dedicated Freighter	% of UK Total	% Belly-hold	% Dedicated Freighter
Heathrow	1,263	1,191	72	55	94	6
East Midlands	272	0	272	12	0	100
Gatwick	212	179	33	9	84	16
Stansted	224	2	222	10	0	100
Manchester	149	83	65	6	56	44
Other UK Airports	195	29	167	8	15	85
<b>Total UK</b>	<b>2,315</b>	<b>1,484</b>	<b>831</b>	<b>100</b>	<b>64</b>	<b>36</b>

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by Heathrow. However, Gatwick and Manchester are also significant airports in terms of belly-hold freight. Most dedicated freighters are handled by East Midlands and Stansted airports. Nearly all freight that goes through these two airports is carried on dedicated freighter aircraft.

**A.34** Whilst these five airports are by far the most significant in tonnage terms, there are other airports that serve a very important regional role in air freight. Particularly important are Belfast International for Northern Ireland and Edinburgh and Prestwick airports for Scotland. Air freight moved from Wales is limited. Most is trucked, either to London airports in the case of South Wales, or Manchester, Liverpool and East Midlands for North Wales.

**A.35** In 2000, total non-mail air freight at Belfast International amounted to some 31,000 tonnes, representing around seven per cent of air freight at regional airports (fourth highest after East Midlands, Manchester and Prestwick). As it is situated in a sparsely populated area, Belfast International is able to operate 24 hours a day. As a result, it is the major freight and flown mail airport in Northern Ireland.

**A.36** Domestic freight traffic is very important in Scotland and Edinburgh airport is the focus of express freight and flown mail operations serving Scotland. Prestwick is already a major freight hub for both Scotland and the UK with an increasing number of scheduled all-cargo services. The range of dedicated freight services to Prestwick allows a greater range of freight to be carried than in the belly-hold space of passenger aircraft as operated at Glasgow.

#### 4. Competition impact of the possible sequencing options

**A.37** In line with the OFT Competition Assessment Guidance, assessment of the impact on competition in each of the markets affected focuses on addressing four key questions against the base case:

- i. Does the option directly limit the number of suppliers, relative to the do minimum case?
- ii. Does the option indirectly limit the number of suppliers, relative to the do minimum case?
- iii. Does the option limit the ability of suppliers to compete, relative to the do minimum case?
- iv. Does the option reduce suppliers' incentives to compete vigorously, relative to the do minimum case?

## Option 1

### Directly limits the number of suppliers?

**A.38** This criterion assesses the extent to which Option 1 (development of Heathrow third runway and new terminal in 2020) would directly limit the number of suppliers in the market. For a policy proposal to directly limit the number of suppliers in the market, it must have the following features:

- the award of exclusive rights to supply; or
- procurement from a single supplier or restricted group of suppliers; or
- the creation of a form of licensing scheme; or
- a fixed limit (quota) on the number of suppliers.

**A.39** The nature of the proposal has no elements within it that would *directly* limit the number of suppliers in both the primary (UK airport market) or secondary markets (air cargo, airline market, etc) because it simply enables the existing supplier to provide more capacity.

### Indirectly limits the number of suppliers?

**A.40** This criterion assesses the extent to which Option 1 (development of Heathrow third runway and new terminal in 2020) would indirectly limit the number of suppliers in the market. This is likely to happen if Option 1 significantly increases the costs (relative to the base case) of:

- new suppliers relative to existing suppliers; or
- some existing suppliers relative to others; or
- entering or exiting an affected market;

The extent to which there might be indirect impacts on suppliers will depend on the appropriate market.

#### *Primary Market*

**A.41** The potential release of additional capacity would not raise the costs to existing or new non-BAA airports. The development under consideration does not prevent airport owners from providing additional capacity or creating new airports. It is concerned simply with increasing additional capacity at Heathrow Airport.

A.42 However, it could be argued that this option might impact on the cost of entering the airport market. The key question therefore is the extent to which additional capacity may potentially increase these barriers. We have identified a range of barriers to the airport market and assessed the extent to which those barriers may worsen with additional capacity at Heathrow relative to the do-nothing scenario.

- *Relative scarcity of land* – This barrier is critical to the functioning of the airport since availability of land may impede small airports from expanding or small bidders from entering the market. Additional capacity at Heathrow Airport is not likely to increase the cost of accessing land nor will it lead to intense price competition for land.
- *Network economies* – Heathrow is a major hub airport which benefits from the network economies that arise from the range and frequency of services from the airport and the ability of passengers to connect between a large number of destinations. In this respect, it is unlikely that the major airline customers would be willing or able to relocate their whole business

to an alternative airport. However, airlines may choose to relocate some of their services between different hub airports, particularly for services that do not rely on a large number of connecting passengers. Additional capacity may increase these network economies to existing airlines. With additional capacity the range and frequency of services at Heathrow is likely to increase, which may lead to making Heathrow more attractive to new airlines who may want to obtain a share of the network economies relative to other airports. To the extent to which additional capacity leads to a greater switch of airlines from non-BAA airports or entrenching existing airlines at Heathrow, additional capacity can be argued to have raised the barriers to entry. However, the extent to which this impact is additional relative to the base case is unclear. In particular, a number of airlines appear entrenched at Heathrow even without additional capacity due to the other advantages of Heathrow (e.g. strategic position in the South East). It is therefore possible that the additional network economies that Heathrow expansion might generate may well be limited. Importantly, for

those airlines and airline services that rely on network economies and interconnecting passengers, it is likely that Heathrow operates in competition with other international hub airports. In this respect, an increase in the available capacity in this (international) market would be expected to intensify competition, rather than act to reduce it. Indeed, Heathrow has fewer runways than all of the major European hubs.

- *Ownership of key sites* – Most airports derive their advantage from key locations with wide catchment areas. This feature puts the new potential providers of airport capacity at a disadvantage and has helped reduce competition in small cities. The key question is whether additional capacity as set out under Option 1 would lead to greater ownership of key airport sites relative to the base case. Additional capacity will not worsen the strategic ownership of airports in the UK above and beyond the do-minimum. Option 1 seeks to add additional capacity to an *existing* airport, it does not generate a new key site. For similar reasons we do not believe that additional capacity at Heathrow would prevent the emergence of another key site elsewhere, since subject to other barriers, airport operators are not constrained by this development from doing so.
- *Long term aspects of demand for infrastructure* – Benefits from airport capacity to airlines are likely to occur after a given period, inevitably this gives most of the product a long-term element to its demand. This feature makes it harder for new airports to gain a customer base, and compete against existing airports. The question is whether additional capacity at Heathrow would increase this long term aspect of demand for the infrastructure relative to the do-minimum. We have no reason to believe that this might be the case.
- *Brand loyalty* – The reputation of certain airports to offer high quality services to airlines that they serve may be quite important where capacity constraints are less severe. The question is whether additional capacity at Heathrow would increase the brand loyalty of Heathrow Airport and therefore increase the barriers of entry to new airports relative to the base case. In the base case, lack of capacity may well lead to the worsening of the Heathrow brand due to increased delays and lower levels of resilience as passenger throughput puts additional pressure on the airport, increasing the relative attraction of alternative airports to existing or new airlines. In so far as additional capacity may make Heathrow more attractive relative

to the worsening base case, it might be argued to have raised the barrier to entry relative to the base case. However, the extent to which that may happen could depend on the potential trade-offs airlines make between worsening service quality and network economies. It is possible that even with a worsening position at Heathrow in the base case, airlines may still find it attractive to remain at Heathrow due its strategic nature and the existing network economies. It is therefore difficult to state with certainty whether additional capacity would raise the Heathrow brand sufficiently to reduce the contestability of the market relative to the base case.

- *Legislation* – Legislative measures can exert a significant influence on the market by imposing standards on airport operators, which may have the effect of influencing the structure of the industry. Additional capacity would not impose or direct how the market should operate. In general, all the sequencing options set out in this impact assessment are enabling and it will ultimately be up to the airport operator to develop Heathrow accordingly, acting within the planning system.

**A.43** From the analysis above, it's quite clear that the potential impact of additional capacity on the airport market is likely to be mixed. Where barriers to contestability may increase relative to the do-minimum position, these are likely to emanate from increased network economies and potential brand loyalty.

#### *Secondary markets*

**A.44** The potential increase of capacity at Heathrow may increase the costs to new or existing suppliers in the airline, cargo, retail or handling baggage industries beyond the base case. Assessment of the impact on competition in secondary market has focused on the potential impact on the barriers to entry of the airlines and air freight markets. We now discuss both of these markets and their associated barriers in turn.

**A.45** For the airline market, additional capacity may impact on the following barriers of entry and exit:

- *Landing slots* – the impact of additional capacity on competition is largely dependent on how many additional landing slots are created and how those slots would be allocated between new and existing carriers. At Heathrow Airport, incumbent carriers have

“grandfather rights” to about 97 per cent of available slots, and the remaining 3 per cent are at times unsuited for transatlantic operations (the most profitable routes for dominant players). The loss rate for grandfathered slots from use-or-lose is less than 0.5 per cent per season. No landing slots have been added between 06:00hrs and 12:59hrs since 1998. However, with increased capacity and with the 50 per cent new entrant rule, the slot barrier to entry would weaken and we may see more flights on those routes that had been previously restricted. Increased new routes may encourage greater competition among carriers leading to lower fares for consumers.

- *Economies of scale and scope* – for those airlines already operating at Heathrow with access to the remaining 50 per cent of new slots, extra capacity may allow them to expand their services further as they seek to reap the benefits of economies of scale and scope. Increased economies of scale and scope for airlines might make it difficult for new airlines to compete on the more attractive and thicker routes.
- *Long-term, exclusive use of terminals* – in addition to runway constraints, airlines using Heathrow Airport face terminal constraints.

Terminals are crucial to airlines as they form a significant part of the passengers’ airport experience. Better and well designed terminals are more resilient to terminal congestion in times of peak demand and other disruptions. For this reason, airlines tend to demand terminal access on exclusive and long-term agreements since it is closely related to their brand and general business model. Additional terminal capacity would not alter the long-term and exclusive nature of terminals use. However, it may allow greater choice to new airlines relocating to Heathrow on which terminals to use. The extent to which this is possible with additional capacity would depend on how BAA may choose to allocate new terminal capacity among different competing users.

- A.46** The impact of additional capacity on barriers of entry to the air cargo market is likely to be limited to those barriers that affect the belly-hold sector. As shown in Table A6, 94 per cent of Heathrow cargo is belly-hold, which reflects both the night noise constraints in the South East airport system to support dedicated night flights for air freight, and the extreme competition from air passenger flights. We can expect the belly-hold share to increase as additional passenger ATMs are added.



**A.47** The question, therefore, is the extent to which additional capacity will increase the barriers to entry of the belly-hold market in the UK, and in particular at Heathrow Airport. As we have noted the belly-hold sector benefits from growth in passenger travel since it increases the amount of cargo capacity available as a by-product in the belly-holds of passenger aircraft. The extent to which belly-hold sector may become more or less competitive will thus depend on whether the airline market would become more or less competitive as a result of additional capacity.

### Limits the ability of suppliers to compete?

**A.48** This criterion assesses the extent to which Option 1 (development of Heathrow third runway and new terminal in 2020) might generate indirect impacts on suppliers. This is likely to be the case if Option 1 controls or substantially influences:

- the price(s) a supplier may charge;
- the characteristics of the product(s) supplied, for example by setting minimum quality standards;
- innovation to introduce new products or supply existing products in new ways;

- the sales channels a supplier can use or the geographic area in which a supplier can operate;
- the ability of suppliers to advertise their products; or
- the suppliers' freedom to organise their own production processes or their choice of organisation.

**A.49** We do not believe that additional capacity at Heathrow would lead to the controls described above in both the primary or secondary markets. Moreover, as a regulated industry, the CAA has oversight of these matters and that role continues with or without additional capacity at Heathrow.

### Limits the incentive of suppliers to compete?

**A.50** This criterion assesses the extent to which Option 1 (development of Heathrow third runway and new terminal of 2020) would reduce suppliers' incentives to compete vigorously. This is likely to be the case if Option 1 leads to the following:

- exempts suppliers from general competition law;
- introduces or amends intellectual property regime;
- requires or encourages the exchange between suppliers, or publication of information on prices, costs, sales or outputs.

- increases the costs to customers of switching between suppliers;

We do not believe that additional capacity at Heathrow would lead to any of the effects described above in both the primary or secondary markets.

## Option 2

**A.51** Option 2 is a package of measures which includes the introduction of mixed mode within capacity around 2010 and Heathrow third runway around 2020. As capacity would stay within the limit between 2010 and 2019, we do not believe the impact on competition would be too dissimilar to the discussion presented under Option 1.

**A.52** However, it should be noted that, with respect to the barriers of entry, mixed mode within existing capacity is likely to reduce delays and thereby raise the brand loyalty of the airport relative to the base case. This may generate both positive and negative effects:

- *Positive:* In so far as Heathrow competes with other international airports for international to international transit passengers, reduced delay would increase Heathrow's competitive position against other airports and generate positive competitive outcomes for airlines and passengers.

- *Negative:* In so far as Heathrow competes in the UK airports market, improvement in Heathrow's brand loyalty may raise the barriers of entry to potential entrants in the airports market relative to the base case.

## Option 3

**A.53** Option 3 is a package of measures which includes the introduction of mixed mode within capacity around 2010, a transition to mixed mode with additional capacity around 2015 and then a third runway around 2020. This option brings some capacity forward by five years through mixed mode. The impacts on competition would be similar to Options 1 & 2.