Gatwick Airport Limited

Technical Report in response to Airports Commission Consultation

Congestion Charge

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Executive Summary

This report provides comment on the assessment of proposals for a congestion charge for all runway schemes by the Airports Commission (Commission) and specifically by the Commission's consultant (Jacobs) in the report entitled *Module 6: Air Quality - Local Assessment: Detailed Emissions Inventory and Dispersion Modelling.*

At this late stage in the evaluation of all three runway schemes, the Commission should take into account the issues below when considering a congestion charge:

- Gatwick does not require a congestion charge to support delivery of a second runway, either for capacity or to meet air quality requirements, as demonstrated in both Gatwick's R2 Airport Surface Access Strategy (which was agreed with stakeholders including Highways England and West Sussex County Council) and as demonstrated by the Commission's own analysis – "Investment on the M23 and M25 is also forecast to provide sufficient capacity to accommodate growth in road traffic from the expanded [Gatwick] airport".[1] The Commission should ask its consultant to remove any references to congestion charging at Gatwick from it assessment.

- By contrast, both Heathrow schemes' promoters do identify the need for congestion charging[2] as part of delivering runway expansion and the Commission agrees noting that "management of congestion on the M25 and M4 will be a significant issue and infrastructure interventions (including widening), demand management or a combination of both may be required".[3]

- In November 2014, the Commission's consultant's view was that "development and implementation of such a [congestion] charge is likely to be highly contentious with far reaching implications for the perception of Heathrow as an international hub and commercial gateway".[4]

- Whilst "an assessment on demand management measures in reducing car use at Heathrow Airport has been carried out for Appraisal Framework Module 4 (Jacobs 2015)",[5] this study has not been published by the Commission or been presented as part of any public consultation.

- A fundamental element of both Heathrow schemes' surface access strategies is based on achieving no more airport-related road traffic than

[1] p.43, 3.28, Airports Commission Consultation Document, 11th November 2014
[2] "We believe there is a case for introducing a new congestion charge zone to further reduce vehicle journeys to Heathrow" p.27, HAL, Taking Britain Further, Volume 1. The Heathrow Hub proposal acknowledges "a cordon charge, providing "the stick" for encouraging greater use of public transport to access the airport" p.vi and p.48, Heathrow Hub Limited, Heathrow Expansion - Updated scheme design - Surface Access, June 2014
[3] p.60, 3.79 and p.33, 3.134 , Airports Commission Consultation Document, 11th November 2014
[4] p.12, Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option.
[5] p.56, 4.6, Jacobs, *Module 6: Air Quality - Local Assessment: Detailed Emissions Inventory and Dispersion Modelling*, May 2015

today.[6] In November 2014, the Commission's consultant identified "6 million more passengers travelling to and from [Heathrow] airport by car" by 2030.[7] The disparity between the Commission and promoters' analysis has not been fully explored and the impact of the congestion charge cannot be understood.

- During this 3 week consultation, Arup has generated an indicative range for the congestion charge in order for it to be able to influence traffic, and specifically kiss-and-fly trips and trips on the M4 Spur and A4. We would have expected the Commission's consultant to have done this and published its findings as part of this consultation.
    - Considering the most popular origins of kiss-and-fly passengers and the differential in cost between trips made by car and trips made by public transport would suggest that a charge of £2 to £25 would be required to significantly change the behaviour of kiss-and-fly passengers, as only this level of charge would make the cost of travelling by public transport less than the equivalent kiss-and-fly car trip. Considering the existing distribution of kiss-and-fly users and weighting the charge range accordingly would suggest a charge between £12 and £13 would be appropriate.
    - For the M4 Spur, to deliver a 20% reduction for the most popular kiss-and-fly origins and destinations would imply a charge in the range of £15 to £55. As the charge would need to be fixed for all users irrespective of origin a mean value would be needed. Considering the existing distribution of kiss-and-fly users and weighting the charge range accordingly would suggest a charge between £35 and £40 would be appropriate using this method.
    - It is noted that the A4 Bath Road is where the Commission's consultant identifies an exceedance of the air quality limit value for the Heathrow schemes. Given the lower proportion of airport-related traffic on the A4 Bath Road, a charge in excess of this range would be necessary. It has been estimated, using the Design Manual for Roads and Bridges tool that a 20% reduction in AADT flows would only result in a reduction in NO2 concentrations of approximately 0.5µg/m^3. A 0.5µg/m^3 reduction would not achieve compliance with the PCM modelling limit value.
- Even if a congestion charge were implemented at Heathrow, the impact might be to displace people from one car mode to another i.e. from kiss-and-fly to taxi or parking which will increase other car trips. The Commission's consultant modelling has not explored this.[8] Nor does the

[6] Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Paragraph 5.3.7.1 Physical mitigation for improving air quality and p.vi and p.48, Heathrow Hub Limited, Heathrow Expansion - Updated scheme design - Surface Access, June 2014
[7] p.24, 3.4.2, Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport North West Runway, November 2014
[8] Appraisal Framework Module 4, 'Surface Access: Heathrow Airport North West Runway', 5th November 2014, paragraph 3.1.3.

Commission's consultant's modelling explore the potential for any gains made by a congestion charge in reducing airport-related traffic being backfilled by background traffic making use of released capacity on the road network. This may mean that any potential air quality gains cannot actually be achieved.

1 Introduction

1.1 Background

This report provides comment on the assessment of proposals for a congestion charge for all runway schemes by the Airports Commission (Commission) and specifically by the Commission's consultant (Jacobs) in the report entitled *Module 6: Air Quality - Local Assessment: Detailed Emissions Inventory and Dispersion Modelling.*

1.2 Context

A high public transport mode share is important for any airport to achieve its air quality targets.

The latest report by the Commission's consultant describes congestion charging to deliver improved public transport mode share and therefore air quality, both for the Heathrow schemes, which Heathrow's promoters acknowledge will be required, but also for Gatwick where it is not required.

By failing to differentiate between the actual need for a congestion charge, the Commission's consultant creates a misleading view about congestion charging at Gatwick (which is not required) and underplays the risks and uncertainties around congestion charging and public transport mode share targets at Heathrow.

Gatwick does not require a congestion charge to support delivery of a second runway, either for capacity or to meet air quality requirements.

In terms of capacity, Gatwick's R2 Airport Surface Access Strategy (ASAS) demonstrated sufficient capacity on the road and highway network to 2050 even assuming a high car mode share. Gatwick's R2 ASAS was agreed with stakeholders including Highways England and West Sussex County Council as part of developing the R2 proposition.

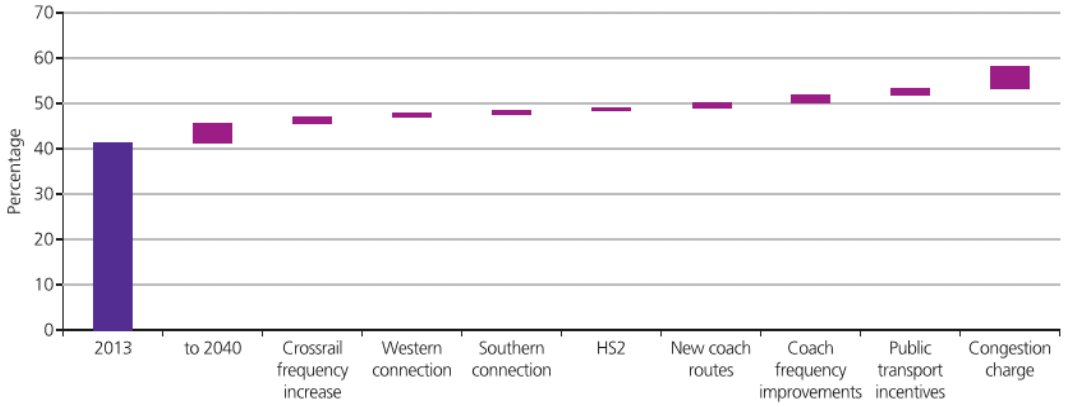
In addition, the Commission's own analysis identifies sufficient capacity at Gatwick without congestion charging, noting that "investment on the M23 and M25 is also forecast to provide sufficient capacity to accommodate growth in road traffic from the expanded [Gatwick] airport".[11] In previous reports, the Commission's consultant has also identified that congestion charging is not required at Gatwick, stating that with M23 Smart Motorways included in the Gatwick analysis, "no links on the road network would require capacity enhancements as a result of the second runway in 2030".[12]

The Commission should therefore ask its consultant to remove any references to congestion charging at Gatwick from it assessment.

[11] p.43, 3.28, Airports Commission Consultation Document, 11th November 2014
[12] P.7, Jacobs, Appraisal Framework Module 4. Surface Access: Gatwick Airport Second Runway, November 2014

In its promoter documents, *Taking Britain Further*, Heathrow proposes that highway demand management[13], and specifically road congestion charging, is required by 2040 to reduce vehicle journeys to the airport in future. It can be seen from **Figure 1** that for the Heathrow NWR, mode share assumptions include an almost 5% shift associated with a congestion charge.

Figure 1: Heathrow North West Runway – Mode Share Assumptions



Source: Heathrow Airport 'Taking Britain Further' Volume 1, page 235 Figure 4.22

Heathrow Hub Limited for the Extended Northern Runway scheme proposal acknowledge "a cordon charge, providing "the stick" for encouraging greater use of public transport to access the airport"[14] at Heathrow.

The Commission's consultant recognises that both Heathrow schemes require some form of congestion charge and indeed identify that this has been analysed, stating that "an assessment on demand management measures in reducing car use at Heathrow Airport has been carried out for Appraisal Framework Module 4 (Jacobs 2015)".[15] However, this study has not been published by the Commission nor has it been presented as part of any public consultation.

1.3 Structure of report

This report considers the range of factors that will influence the assessment of an airport congestion charge at Heathrow.

Section 2 provides evidence of the need for a congestion charge at Heathrow both in promoter and Commission documents.

Section 3 provides a comparison between the scheme promoter's and Commission's demand and mode share forecasts for Heathrow.

[13] "We believe there is a case for introducing a new congestion charge zone to further reduce vehicle journeys to Heathrow" p.27, HAL, Taking Britain Further, Volume 1.
[14] p.vi and p.48, Heathrow Hub Limited, Heathrow Expansion - Updated scheme design - Surface Access, June 2014
[15] p.56, 4.6, Jacobs, *Module 6: Air Quality - Local Assessment: Detailed Emissions Inventory and Dispersion Modelling*, May 2015

Section 4 outlines the type of assessment framework needed in order to review an airport congestion charge and outlines previous congestion charge work undertaken at Heathrow.

Section 5 provides an illustrative review of a congestion charge at Heathrow and identifies the areas that the Commission should focus on when evaluating this as a suitable means of achieving air quality standards.

Section 6 summarises the main areas of review for a Heathrow Congestion charge.

2 The need for a congestion charge at Heathrow

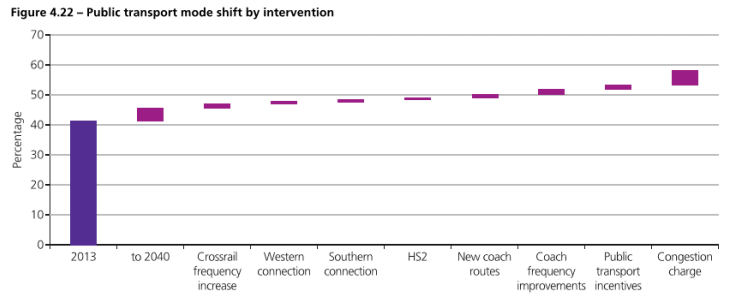
The following section provides statements from publicly available documentation on the congestion charge for each of the Heathrow runway schemes. In November 2014, the Commission's consultant's view was that "development and implementation of such a [congestion] charge is likely to be highly contentious with far reaching implications for the perception of Heathrow as an international hub and commercial gateway".[16]

There are a number of statements about demand management and congestion charging in the Heathrow North West Runway (NWR) promoter documents. These are listed in **Table 1**.

Table 1: Demand Management / Congestion Charging – Heathrow Airport Ltd

No.	Heathrow Statements in 'Taking Britain Further' (quotes with bold emphasis added to highlight relevant text)	Reference
1	Increase the proportion of passengers using public transport to access Heathrow to more than 50% by supporting new rail, bus and coach schemes to improve public transport to Heathrow and **considering the case for a congestion charge**.	Heathrow Airport 'Taking Britain Further' Volume 1, page 19 Figure B
2	We **believe there is a case for introducing a new congestion charge zone** to further reduce vehicle journeys to Heathrow.	Heathrow Airport 'Taking Britain Further' Volume 1, page 27
3	We have previously committed to a surface access strategy that was designed to ensure that there would be no more airport related cars on the road in 2030. Because of the importance of this issue to local people, we have now looked at how we can extend this commitment to 2040 when the full capacity added by the third runway will be in use. In Part 4 we detail how this can happen through the control of staff parking and **the introduction of an airport congestion charge zone**.	Heathrow Airport 'Taking Britain Further' Volume 1, page 164
4	We believe **there may be a case for introducing a congestion charge zone** at Heathrow, once public transport improvements are in place.	Heathrow Airport 'Taking Britain Further' Volume 1, page 208
5	To support the use of public transport and more efficient use of cars, **we will consult on a congestion charge zone** for Heathrow. **We will complete further feasibility work** to determine the geographical extent of the zone, charging levels and any legal powers required to implement a system.	Heathrow Airport 'Taking Britain Further' Volume 1, page 221
6	Modelled interventions in 2040 (additional): **Congestion charge applied to car modes.**	Heathrow Airport 'Taking Britain Further'

[16] p.12, Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option.

	A full list of more detailed assumptions can be provided, should these be needed to support the Airports Commission's appraisal process.	Volume 1, page 234 Figure 4.19
7	 Congestion has a greater impact on drop-off modes because delays occur in both directions given the empty return. **A congestion charge also has a greater impact** on these modes as the charge is applied to both the arriving and departing journey, whereas a parking passenger would only pay the charge once as part of their round trip.	Heathrow Airport 'Taking Britain Further' Volume 1, page 235 Figure 4.22
8	**There may be a case for introducing a congestion charge** for people travelling to the airport once improvements in public transport have been delivered. A congestion charge would reduce traffic congestion levels, help ensure there are no more airport related vehicles on the road, and therefore help improvements in air quality.	Heathrow Airport 'Taking Britain Further' Volume 1, page 274
9	The **burden on Government funding of surface access can be materially offset by revenues from a congestion charge scheme** for the road network around Heathrow	Heathrow Airport 'Taking Britain Further' Volume 1, page 346
10	In general in the UK upgrades to public transport infrastructure have been funded by public means. A number of major rail schemes at Heathrow have already been committed to by Government. We have therefore assumed that a large part of surface access costs will be funded by mechanisms other than the airport charge. These include part of the cost of motorway improvements and all rail scheme contributions. Many options exist for publicly financing these elements. These could include **hypothecating proceeds from a Heathrow congestion charging zone** of the kind that we are proposing as part of our future traffic demand management measures.	Heathrow Airport 'Taking Britain Further' Volume 1, page 414

It can be seen that in some sections of the promoter documents Heathrow's congestion charge proposals are not presented but the 2040 impact is.

However, in other sections it is confirmed as an assumption for 2040 and appears to contribute a significant proportion towards public transport mode share (item 7 in **Table 1**, particularly Figure 4.22). Analysis indicates this to be around 5% of public transport mode share in 2040, or the equivalent of 8,000 daily person trips that shift from car to public transport as a result of the congestion charge, though this would need to be confirmed by the Commission.

There are a number of statements about demand management and congestion charging in the Heathrow Hub promoter documents in relation to the Extended Northern Runway (ENR) scheme. These are listed in **Table 2**.

Table 2: Demand Management / Congestion Charging – Heathrow Hub Ltd

No.	Heathrow Hub Statements in 'Taking Britain Further' (quote with bold emphasis added to highlight relevant text)	Reference
1	**We believe that a cordon charge, providing "the stick" for encouraging greater use of public transport to access the airport, will be justified in the future** and would be entirely compatible with the dramatically improved public transport provision we propose - "the carrot". This would be particularly effective in helping to cap taxi journeys and reduce kiss and fly both of which have a disproportionate impact on road congestion and local air quality.	Heathrow Expansion - Updated scheme design - surface access, page vi
2	The Heathrow Hub interchange, together with a less comprehensive suite of rail enhancements than that those now proposed, could increase public transport mode share to ca. 60% (**assuming cordon charging of ca. £20 per vehicle at 2009 prices**).	Heathrow Expansion - Updated scheme design - surface access, page 2
3	Although we are not able to analyse the impact, **we believe that a cordon charge "the stick" for access to the airport will be inevitable in the future** and would be entirely compatible with the dramatically improved public transport provision "the carrot", this would be particularly effective in helping to cap taxi journeys and reduce kiss and fly.	Heathrow Expansion - Updated scheme design - surface access, page 48-9

There are a number of statements about demand management and congestion charging in the Commission documents from the November 2014 consultation. These are listed in **Table 3**, with the first 4 referencing the North West Runway scheme and item 5 referencing the Heathrow Hub proposal.

Table 3: Demand Management / Congestion Charging – Airports Commission Documentation

No.	Airports Commission Statements (quotes with bold emphasis added to highlight relevant text)	Reference
1	[For Heathrow Extended Northern Runway or North West Runway] The management of congestion on the M25 and M4 will be a significant issue and infrastructure interventions (including widening), **demand management** or a combination of both **may be required**.	Airports Commission Consultation Document, page 60 & 77
2	The Scheme Promoter has suggested a range of demand management measures that could be implemented to reduce levels of airport road traffic, such as congestion charging and incentives for employees to car-pool or switch modes. **These have not been presented to the Commission in sufficient detail to form part of the appraisal**, but the Commission has noted that potential mitigations exist which could be used to mitigate any increase in airport road traffic.	Airports Commission: Heathrow Airport North West Runway: Business Case and Sustainability Assessment, page 80
3	**The scheme promoter has further identified demand management measures such as road vehicle access charging** which, while not forming part of the core surface transport package,	Airports Commission: Heathrow Airport North

	could be used to further promote mode shift or the use of less polluting vehicles to access the airport.	West Runway: Business Case and Sustainability Assessment, page 81
4	The scheme promoter has modelled the impact of a series of suggested mitigation measures which the Commission has not modelled. The scheme promoter has identified a congestion charge as a possible fall back mitigation to drive down airport-only road traffic in the vicinity, and **the Commission has not considered such a sensitivity**.	Airports Commission: Heathrow Airport North West Runway: Business Case and Sustainability Assessment, page 120-121
5	It is speculated that medium-term development of proposals for a Heathrow central area cordon access charge will be advantageous to manage mode choices and infrastructure utilisation as part of the Surface Access Strategy. **Our view is that development and implementation of such a charge is likely to be highly contentious with far reaching implications for the perception of Heathrow as an international hub and commercial gateway.**	Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option, page 12

This shows that, as of November 2014, the Commission assessment acknowledged the two Heathrow runway schemes' proposals for a congestion charge but did not assess them. This was because the Commission concluded that the proposals had not been presented in sufficient detail. This is despite the Heathrow statement in its proposal *Taking Britain Further* that "a full list of more detailed assumptions can be provided, should these be needed to support the Airports Commission's appraisal process".[17]

There is no analysis of demand management or congestion charging in the supporting technical reports by the Commission's consultant from the November consultation.

In terms of the Heathrow Hub assessment, the Commission's consultant stated that the congestion charge is likely to be "highly contentious"[18] (as per item 5 in **Table 3**).

[17] p.234, Figure 4.19, Heathrow Airport Limited, Taking Britain Further, Volume 1
[18] p.12, Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option.

3 Comparison between promoter and Commission's surface access forecasts for Heathrow

This section summarises the assumptions for demand and mode share for both Heathrow schemes and provides reference and comparison to the Commission's analysis and findings.

In relation to the discussion on air quality impacts, a key point to note in the proposals for both Heathrow schemes is that the proposals are based on achieving "no more airport-related road traffic than today"[19] (Heathrow NWR) or "no more airport passenger and employee related traffic on the road network than today"[20] (Heathrow ENR). Therefore mode share assumptions are critical in achieving this target.

3.1 Airports Commission Assessment

In terms of passenger and employee mode share, the Commission's consultant's view of both the Heathrow NWR and ENR schemes is as follows:

- "The proportion of passengers arriving at Heathrow by car is expected to reduce from 59% in 2012 to 46% in 2030. This would mean that there will be over 56 million passengers using public transport compared to around 29 million today, and **6 million more passengers travelling to and from the airport by car**."[22]
- "In terms of road traffic, the Jacobs [the Commission's consultant] model forecasted a net impact of up to **1,200 additional car/taxi trips to the airport** in the AM peak hour in 2030 as a result of the new North West Runway/Extended Northern Runway, with up to **600 additional car/taxi trips leaving the airport**."[23]

This illustrates that the Commission's consultant does not agree with either promoter's view of no more airport-related road traffic than today.

The modelling undertaken by the Commission's consultant therefore cannot verify the forecasts for either Heathrow scheme by 2030. **We recommend the Commission further reviews the Heathrow scheme forecasts to determine the viability of the proposed impact of any congestion charge.**

[19] Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Paragraph 5.3.7.1 Physical mitigation for improving air quality.
[20] p.vi and p.48, Heathrow Hub Limited, Heathrow Expansion - Updated scheme design - Surface Access, June 2014
[22] p24 and p.26 respectively, 3.4.2, Appraisal Framework Module 4, 'Surface Access: Heathrow Airport North West Runway' and 'Surface Access: Heathrow Airport Extended Northern Runway', Jacobs, 5th November 2014
[23] 7.2.11, Appraisal Framework Module 4, 'Surface Access: Heathrow Airport North West Runway' and 'Surface Access: Heathrow Airport Extended Northern Runway', Jacobs, 5th November 2014.

3.2 Passenger and Employee Demand

For the Heathrow NWR scheme, assumed growth in passenger numbers to 103.6 million passengers per annum (mppa) by 2030 and 130.3 mppa by 2040. The airport employees are estimated to increase to 90,000 in 2030 and 110,000 in 2040, as shown in **Table 4**.

Table 4: Passenger Demand and Employees

Year	Passengers	Employees
2013	72.7 mppa	75,000
2030	103.6 mppa	90,000
2040	130.3 mppa	110,000

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.16

The forecast for daily terminating passenger and employee demand for 2013, 2030 and 2040 is shown in **Table 5**.

Table 5: Daily Person Trips

Year	Passengers	Employees	Total
2013	139,000	88,000	227,000
2030	202,000	104,000	306,000
2040	263,000	127,000	390,000

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.17

The daily terminating passenger demand is assumed to increase by 45% to 202,000 in 2030 and by 89% to 263,000 in 2040 from the existing demand.

The daily employee trips presented in **Table 5** are higher than the total number of employees at the airport. Based on the Commission report[24], the percentage of the total workforce working at Heathrow on a typical day is assumed to be 57%. So for example, in 2030 Heathrow forecasts 104,000 employee daily person trips from 90,000 employees; assuming the 57% figure we would expect only 51,300 trips. However, the employee figures published do not match this.

3.3 Mode Share

For the Heathrow NWR scheme, the annual passenger car demand and mode share are shown in **Table 6**. The data indicates that passenger car mode share is expected to decrease by approximately 17% over the next three decades. However, using these mode shares, actual passenger car demand will increase by 9.2 mppa by 2040 (from 26.1 mppa to 35.3 mppa).

[24] Long Term Options: Approach and Assumptions (2013).

Table 6: Annual Passenger Car Demand and Mode Share

Year	Kiss and Fly		Park and Fly		Taxi		Total	
	Mppa	%	Mppa	%	Mppa	%	Mppa	%
2013	10.5	23.5%	4.4	10.0%	11.2	25.2%	26.1	58.7%
2030	11.1	17.1%	6.1	9.4%	13.7	21.1%	30.9	47.6%
2040	12.9	15.3%	7.6	9.0%	14.8	17.6%	35.3	41.9%

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.20.

As shown in **Table 7**, the employee car mode share for single occupancy car trips is assumed to reduce to 10% in 2040 compared to the existing 51% mode share. Employee car sharing demand is claimed to increase from 3% in 2013 to 15% in 2040.

Table 7: Employee Car Mode Share

Year	Car Driver (alone)	Car Share	Total Car
2013	50.9%	2.7%	53.6%
2030	24.4%	17.0%	41.4%
2040	10.4%	15.2%	25.6%

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.23.

The information for the Heathrow NWR scheme on average daily traffic demand for passengers and employees is shown in **Table 8** and **Figure 2**. This indicates that the 2013 vehicle movements to/from the airport are 135,000 vehicles per day, with around 66% of the vehicle movements being passenger-related (89,000 vehicles per day) and the rest employee-related (46,000). These figures do not appear to match the annual passenger car demand figures shown in **Table 6** (assuming a standard 320 annualisation factor).

Table 8: Daily Car Trips

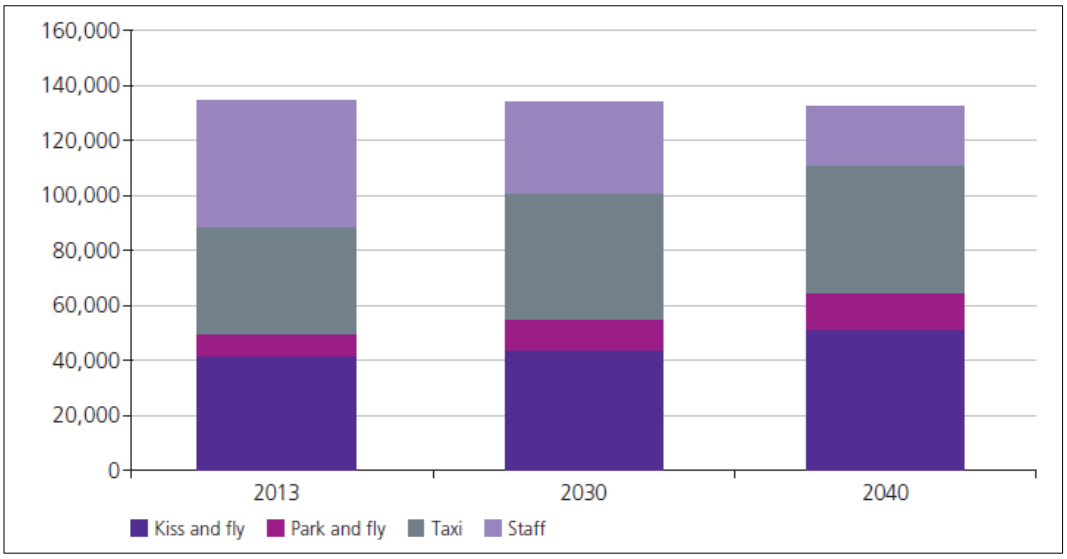
Year	Kiss and Fly	Park and Fly	Taxi	Employee	Total
2013	42,000	8,000	39,000	46,000	135,000
2030	44,000	11,000	46,000	33,000	134,000
2040	51,000	14,000	46,000	22,000	133,000

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.24.

For the Heathrow NWR scheme, total vehicle movements of 134,000 and 133,000 are forecast in 2030 and in 2040. An increase in passenger park and fly (+6,000 vehicles per day), kiss and fly (+9,000 vehicles per day), and taxi trips (+7,000 vehicles per day) in 2040 is offset by a reduction in employee daily vehicle movements from 46,000 in 2013 to 33,000 in 2030 (-28%) and 22,000 in 2040 (-52%). The promoter attributes this reduction in employee vehicle movements being due to an improved public transport offer, bringing more offices and employment close to public transport nodes, and by limiting staff car parking supply (although there are no specific details of this, particularly bringing employment close to public transport nodes, in the Heathrow submission). It is

not clear from the information provided if these figures include effects of the proposed congestion charge on suppressing car demand at the airport.

Figure 2: Heathrow Road Traffic Forecast



Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.1

3.4 Congestion Charge

The Heathrow NWR proposal includes plans to introduce a congestion charge to car modes at Heathrow. The promoter's documents do not state the specific format of a scheme but previous analysis on a scheme at Heathrow[25] suggests that it is likely to target drivers dropping off passengers at the airport.

Exemptions could be offered to blue badge holders, low emission vehicles, local residents and licensed taxis. The charge would only apply to those travelling to the airport – not those using surrounding roads like the A4, A30, M4 or M25.

The promoter suggests that the congestion charge would be introduced once proposed public transport improvements are in operation (post 2030). The promoter's aim is to use the revenue generated from the congestion charge to retrospectively fund major rail, London Underground and road infrastructure improvements.

For the Heathrow ENR scheme, the promoter describes "a cordon charge, providing "the stick" for encouraging greater use of public transport to access the airport"[26] at Heathrow. Heathrow Hub Limited go on to describe that "this would be particularly effective in helping to cap taxi journeys and reduce kiss and fly both of which have a disproportionate impact on road congestion and local air quality".

[25] Project for the Sustainable Development of Heathrow (PfSDH), 'Surface Access Report', November 2007
[26] p.vi and p.48, Heathrow Hub Limited, Heathrow Expansion - Updated scheme design - Surface Access, June 2014

The geographical extent of the zone, charging levels, the cost of providing the scheme, legal powers required to implement the system, and technical deliverability are yet to be provided in any published information for either scheme.

3.5 Public Transport Demand

For the Heathrow NWR scheme, information on annual passenger demand by public transport for 2013, 2030 and 2040 is shown in **Table 9** and **Figure 3**. The rail passengers include passengers using Heathrow Express and Heathrow Connect (2013), and Crossrail, Western Rail Access and Southern Rail Access (2030/2040).

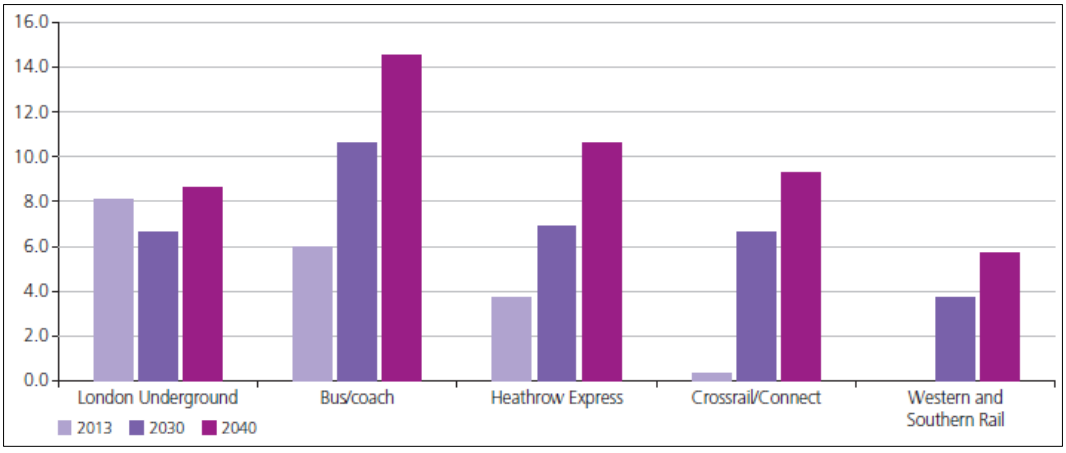
The sum of the public transport figures for each mode in **Table 9** does not match the total public transport figures (mppa) that of 2013 and 2030.

Table 9: Annual Passenger Public Transport Demand and Mode Share

Year	London Underground		Rail		Bus and Coach		Total	
	Mppa	%	Mppa	%	Mppa	%	Mppa	%
2013	8.2	18.4%	4.1	9.2%	6.1	13.6%	20.4	41.2%
2030	6.7	10.4%	16.5	25.5%	8.5	16.8%	38.8	52.3%
2040	9.0	10.7%	25.3	30.0%	14.5	17.3%	48.8	58.2%

Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.20.

Figure 3: Annual Airport Passenger Demand by Public Transport



Source: Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Figure 4.21.

The promoter forecasts that through implementing its surface access strategy, passenger public transport mode share will increase to 53% by 2030 and 58% by 2040 (from 41% in 2013). The total number of passengers travelling by public transport is expected to rise from the existing 18 mppa (12.3 mppa using rail and 6.1 mppa using bus and coach), to 31.7 mppa in 2030 (23.2 mppa using rail and 8.5 mppa using bus and coach), and 48.8 mppa in 2040 (34.3 mppa using rail and 14.5 mppa using bus and coach).

The promoter's information on the drivers of growth in public transport passenger demand by 2040 is shown in **Figure 3**. 12% of the shift to public transport is anticipated to be because of a combination of 'background change' to 2040, rail improvements, new coach routes and public transport incentives. A further 5% is attributed to the introduction of a congestion charge.

For the Heathrow ENR scheme, the hub proposal is for a remote public transport interchange, located above the Great Western Main Line some 2.5 miles away from the main airport, with people-mover connections and multiple interchanges to get to terminals. Heathrow Hub Limited state that the people-mover will be seamless and therefore "should not incur an interchange penalty" [27]. This is highly optimistic and Jacobs note that this "will overstate the benefits of the [Heathrow Hub] scheme"[28] including mode share by public transport.

3.6 Summary

The modelling undertaken by the Commission's consultant cannot verify the forecasts and mode share assumptions for either Heathrow scheme by 2030.

We recommend the Commission further reviews the Heathrow scheme forecasts to determine the viability of the proposed impact of any congestion charge.

[27] p.12 3.2.13 Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option, October 2014
[28] p.12 3.2.13 Jacobs, Appraisal Framework Module 4. Surface Access: Heathrow Airport Hub Station Option, October 2014

4 Assessing an airport congestion charge

4.1 Behavioural responses

Understanding how road users will respond to a congestion charge requires complex modelling that considers the full cost of travelling from origin to destination. Given the myriad of options for accessing an airport (e.g. car park / kiss and fly / taxi / bus / coach / rail etc), penalising one mode over another could result in a number of behavioural changes. For example, if a congestion charge targeted kiss and fly users, this could result in a higher use of taxis or car parking as well as affecting how public transport is used. **It is important that any assessment framework used to consider a congestion charge is capable of assessing these types of interaction and this is reflected in guidance from the DfT.**[32]

4.2 Assessment framework

Given the range of options that could be adopted for a congestion charge, it would be appropriate for the Commission to use an assessment framework capable of testing a variety of options including cordon access charging of all road users or for specific road users (taxi / car park / kiss and fly).

In 2007, assessments undertaken of a congestion charge at Heathrow[33] adopted the London Airports Surface Access Model (LASAM) and the Heathrow Employee Surface Access Model (HESAM). These models took account of the interaction between modes and the full journey cost from origin to destination.

The LASAM analysis adopted a complex choice modelling approach that considered the type of travel (business / leisure) and differentiated between UK and foreign residents. The modelling considered the interaction of individual modes and enabled testing of interventions (such as a congestion charge). **We believe this form of modelling is appropriate in order to establish the behavioural responses to charging options.** The form of modelling was sufficiently disaggregate (i.e. included sufficient categories of journey) to ensure that the impacts of a congestion charge were assessed robustly. It had sufficient coverage geographically to consider how the existing distribution of trips would respond.

Table 10 below illustrates the range of output elasticities from the LASAM model undertaken during 2007. The elasticities imply the change in demand by each mode with respect to changes in specific parameters. For example, a 10% increase in rail fares for UK residents travelling on business was predicted to reduce rail demand by 2%. Car costs within this table relate to fuel costs and would be relevant in the context of kiss and fly travellers. The parking cost

[32] TAG Unit M2, 'Variable demand modelling', January 2014, paragraph 4.7.10 *'in the case that more than one mode may offer a competitive alternative to car, the demand model should include a higher level private/public transport modal split mechanism'*.
[33] Project for the Sustainable Development of Heathrow (PfSDH), 'Surface Access Report', November 2007

elasticities are also relevant if considering a charge for these users. The elasticity's here illustrate that both for business and leisure the impact on parking demand would be higher indicating a 10% increase in parking costs would reduce business parking demand by 6.3% and leisure based parking demand by 19.4%[34].

Table 10: LASAM Elasticities

Sensitivity	UK Business	Foreign Business	UK Leisure	Foreign Leisure
All rail demand to rail fare	-0.20	-0.22	-0.28	-0.20
Coach demand to coach fare	-0.20	-0.21	-0.29	-0.28
Taxi demand to taxi fare	-0.59	-0.59	-0.77	-0.80
Car demand to car cost	-0.09	-0.05	-0.02	-0.01
Park demand to park cost	-0.63	-	-1.94	-
All rail demand to rail time	-0.52	-0.37	-0.50	-0.38
Coach demand to coach time	-1.03	-0.72	-0.75	-0.64
Car demand to car time	-0.23	-0.24	-0.39	-0.42

Source: PfSDH Table 7.

The assessment framework used by the Commission's consultant in Module 4: Surface Access Review, used to inform the Air Quality analysis, includes a mode choice component[35]. This was used to provide a review of the likely mode share at Heathrow following various enhancements. The structure of the mode choice model includes a split of car, bus & coach and rail. **The model did not include a mechanism to forecast changes in car sub mode (i.e. car kiss and fly, park and fly and taxi).[36] We believe this is essential in looking at the impact of congestion charging, in particular if it is targeted at specific car sub modes. Given the importance of road traffic on assessing air quality, we believe the Airport's Commission should review this assumption in evaluating proposals.**

We also note that in the NWR promoter's documentation[37] reference to the LASAM and HESAM modelling suite is made and it is noted that '*the models have been updated to reflect up-to-date Government guidance on values of time and fare assumptions'*. **In the event sufficient time is not available for the Commission to enhance their own models, we recommend they undertake a review of the updates made to the Heathrow models and review model outputs to consider the topics raised in this section.**

[34] Note no elasticities are provided for foreign residents on the basis these users would not own cars to park.
[35] Appraisal Framework Module 4, 'Surface Access: Heathrow Airport North West Runway Appendices', 28th October 2014, paragraph 2.3.23.
[36] Appraisal Framework Module 4, 'Surface Access: Heathrow Airport North West Runway', 5th November 2014, paragraph 3.1.3.
[37] Taking Britain further: Heathrow's plan for connecting the UK to growth (2014), Vol 1, Paragraph 4.4.1

5 Analysis of the Impact of a Congestion Charge on Road Traffic and Air Quality

In order to consider the impact of a congestion charge in the context of improving air quality, Arup has undertaken analysis of the highway network to determine how travel patterns would need to be influenced by a congestion charge. The road network around Heathrow carries high volumes of traffic and there are several locations recognised as suffering from poor air quality[38]. In the time available within the consultation period this is the most realistic approach and we are doing this to illustrate the issues the Commission should be considering.

Arup has not modelled the full behavioural responses outlined in the previous chapter but have focused on the distribution of trips using key access routes into Heathrow. This is undertaken to identify particular movements that the Commission should review as part of evaluating the viability of a congestion charge scheme.

It should be noted that this is just one view on the potential operation and assessment of a congestion charge and is adopted in the absence of available information. This is used to illustrate elements that should be considered by the Commission as part of a comprehensive review.

5.1 Heathrow demand forecasts assumptions

The analysis undertaken by Arup included adjusting Heathrow demand to align with the Commission's Low Cost is King Carbon Traded scenario. Two tests were undertaken. One assumed that Heathrow would open in 2025 as proposed and a second assuming opening would occur by 2029 (and the delivery of supporting measures would also be delayed). The 2025 scenario assumed annual passenger numbers of 98mppa and a 2029 scenario assuming 102mppa. Employee forecasts were estimated based on existing ratios of employees to annual passengers resulting in nearly 96k employees by 2025 and 98k by 2029. In relation to car mode share, we adopted the Commission's assumptions regarding mode shift and adjusted to consider the timing of interventions. This assumed car mode share of passengers was 56% for 2025 and 55% for 2029.

5.2 Basis of assessment

Arup has used Highways England's (HE's) M25 Dartford Free Flow Charging (DFFC) model to model road traffic routing around Heathrow in 2025 and 2029. This used the Commissions assumptions as outlined in the previous section. The modelling and assessment were undertaken using the AM peak hour model (08:00 to 09:00) and are thus only representative of this period. The modelled road network around Heathrow was updated to align with the promoter's proposals (as used by the Commission) as described within the promoter's documentation[39].

[38] Local authority / DEFRA monitoring data as outlined in their local air quality management reports.
[39] Taking Britain Further – Volume 1, Heathrow Airport Limited.

Background road traffic growth was taken from existing forecasts for 2025 and 2030 prepared by HE and 2029 forecasts were interpolated. The model includes all road based travel aggregated together and thus is not possible to differentiate between passenger and employee travel separately.

5.3 Road traffic forecasts and air quality

The effects of road traffic changes from the scheme were assessed using the ADMS-Roads v3.4 atmospheric dispersion model. Pollutant concentrations were predicted at worst case locations along the local road network around the airport.

The assessment follows the methodology set out in DEFRA's Local Air Quality Management Technical Guidance (TG.09) [40]. Sensitivity tests were also undertaken to account for uncertainties in future emissions from road vehicles and background concentrations.

Traffic data was extracted for the wider road network around Heathrow from the HE's traffic model. The data consisted of 24-hour Annual Average Daily Traffic (AADT) flows, Heavy Duty Vehicle (HDV) flows and average daily speeds. Emission rates for all road sources were calculated based on the data provided and using the UK DEFRA Emissions Factor Toolkit (EFT) v6.0.2[41].

The air quality assessment identified that receptors within the West Drayton and Harmondsworth area are likely to exceed the air quality standards in 2025 with the operation of the NWR scheme. However, these locations are influenced by the airport operations in a greater degree than changes to the road traffic. In February 2015 DEFRA released information about the "50 highest modelled NO_2 concentrations" [42] in the UK which showed that two locations along the A4 just to the north of the airport are predicted to be within the 50 most polluted roads in 2025 and to be the second and third most polluted in 2030. These locations are on the A4 to the east and west of the M4 spur respectively. The location to the east of the M4 spur has therefore been selected for further analysis and input to the congestion charge assessment.

It is important to note that compliance with the limit value is reported to the European Commission using the results of the PCM model. Therefore, even a small reduction in NO_2 concentrations (i.e. 0.5µg/m^3) has the potential to significantly affect compliance or non-compliance with the EU Directive.

The Design Manual for Roads and Bridges (DMRB) tool[43] has been used to estimate NOx and NO_2 concentrations at DEFRA's predicted location along the A4 to the east of the M4 spur. The assessment indicated that a 20% reduction in AADT flows would result in a reduction in NO_2 concentrations by approximately

[40] DEFRA (2009) *Local Air Quality Management Technical Guidance (TG09)*
[41] DEFRA, Emissions Factor Toolkit for Vehicle Emissions, Available from: http://laqm.defra.gov.uk [Accessed: January 2015]
[42] DEFRA, https://www.gov.uk/government/publications/50-highest-modelled-nitrogen-dioxide-no2-concentrations [Accessed February 2015]
[43] Department for Transport, DMRB Air Quality Spreadsheet, Available from: http://www.standardsforhighways.co.uk/guidance/air-quality.htm

0.5µg/m3. This was also confirmed using the ADMS-Roads atmospheric dispersion model.

For the purposes of evaluating the feasibility of a congestion charge, the feasibility in achieving this level of reduction in AADT for the A4 Bath Road and M4 Spur has been reviewed. This equates to a reduction of around 200 vehicles per hour for the A4 and around 800 vehicles per hour for the M4 Spur.

5.4 Distribution of traffic

Analysis using the HE's traffic model was undertaken to determine the distribution of traffic using both the M4 Spur and the A4 Bath Road to the east of the M4 Spur. The distribution of traffic was 'sectored' in order to simply the travel patterns at each location. The sector system adopted in shown in **Figure 4**.

Figure 4: Sector system

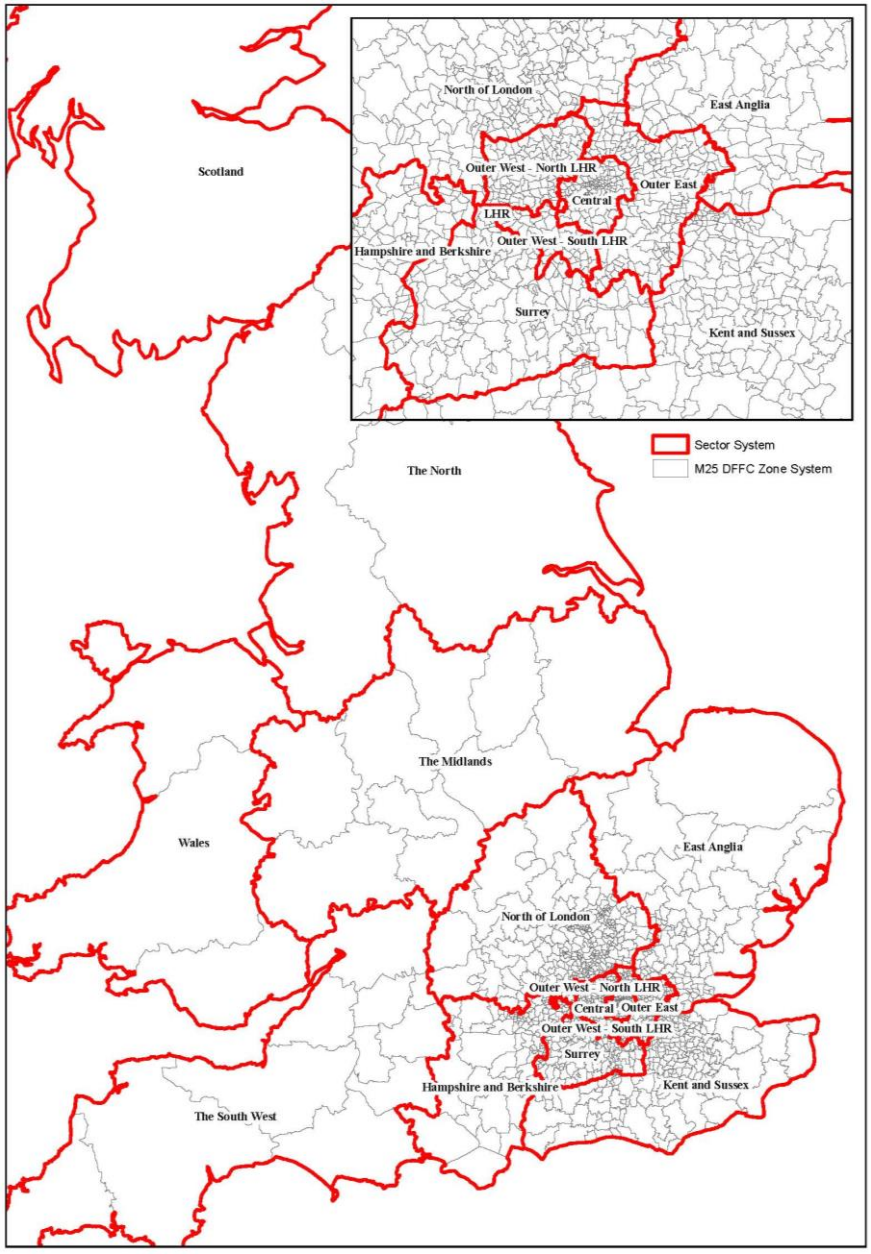


Table 11 provides a breakdown of the distribution of traffic forecast to use both the M4 Spur and the A4 to the east of the M4 Spur for 2029 assuming R3 is operational. The distribution was extracted from the HE's traffic model as described in section 5.2.

For the A4 the distribution indicates that the main origins and destinations of traffic are outer west London, Surrey, Hampshire and Berkshire. This is to be expected given the nature of the A4. It should also be noted the levels of airport related traffic by direction. Given the mix of non-airport related traffic, this will limit the impact of airport related mitigation measures in delivering air quality improvements.

For the M4 Spur the distribution is more strategic with the majority of trips being airport related. Main origins and destinations of traffic include Central London, north-west outer London, Hampshire and Berkshire and the area north of London. This is to be expected given the more strategic nature of the road.

Table 11: Traffic distribution by sector for A4 and M4 Spur

Sector	A4 Eastbound		A4 Westbound		M4 Spur Northbound		M4 Spur Southbound	
	O	D	O	D	O	D	O	D
Central London	0%	0%	2%	0%	0%	19%	14%	0%
Outer London - North West	74%	36%	56%	22%	0%	10%	14%	3%
Outer London - South West	0%	38%	43%	0%	0%	3%	1%	1%
Outer London East	0%	0%	0%	0%	0%	5%	4%	0%
Kent and Sussex	0%	0%	0%	1%	0%	6%	6%	0%
Surrey	0%	14%	0%	2%	0%	7%	10%	1%
Hampshire and Berkshire	11%	0%	0%	2%	0%	15%	19%	0%
North of London	5%	0%	0%	0%	0%	15%	15%	0%
East Anglia	0%	0%	0%	0%	0%	5%	3%	0%
The South West	0%	0%	0%	0%	0%	7%	5%	0%
The Midlands	0%	0%	0%	0%	0%	5%	4%	0%
The North	0%	0%	0%	0%	0%	1%	2%	0%
Wales	0%	0%	0%	0%	0%	1%	1%	0%
Scotland	0%	0%	0%	0%	0%	0%	0%	0%
Heathrow	9%	12%	0%	73%	100%	0%	0%	95%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: HE's M25 DFFC model. Note: O = proportion of trips on road originating from each sector, D = proportion of trip on road heading towards specific destinations.

In order to achieve the reductions in peak hour travel as stated in section 5.3, specific measures to reduce car travel will need to focus on journeys between Heathrow and these key origins and destinations. The mode share assumptions used in this analysis do not take account of the full package of public transport

proposals outlined by Heathrow such as Western Rail Access, Southern Rail Access and HS2. These rail projects are not yet fully planned or committed:

- Network Rail's October 2014 Western Route Study published as a draft for consultation notes that the most likely scheme to be built, Western Rail Access to Heathrow, is "subject to funding, a value for money assessment and agreement of acceptable terms with the aviation industry".[44]
- In the *Business Case and Sustainability Assessments* for both Heathrow runway schemes, the following reference is made to Southern Rail Access – "The Commission notes that with no design on the table, and considering the opposition to the previous Airtrack scheme, the delivery of this scheme must be considered to be subject to its own risks and uncertainties".[45]
- The Commission also assumes HS2 to be part of its Core Baseline of schemes, despite its Phase 1 Bill not having received Royal Assent. Moreover, the HS2 Spur to Heathrow is included though the Commission's consultant states "it is difficult to envisage the provision of a spur from HS2 to Heathrow will either have a material impact on passenger numbers at Heathrow".[46]

If included, these schemes are likely to have some impact for specific movements to and from the airport although it is not expected to significantly alter the distribution of traffic shown in the table above.

5.5 Congestion charge scheme

As outlined in section 3.4, details of the Heathrow congestion scheme were not provided as part of either promoter's documentation. Based on our understanding from previous work on a congestion charge at Heathrow, it is possible that a charge would operate on car kiss and fly (drop off) passengers[47] as these are the least sustainable (requiring two trips per arrival or departure) and potentially also the most price-sensitive. For the purpose of our analysis of a congestion charge we have focused on this type of travel.

Drop-off at Heathrow Airport can currently take place on the terminal forecourts (using the outside lane), but pick-up must be from the short stay car parks (waiting is not permitted and Police and airport staff patrol the forecourts).

Short stay parking costs £3 for up to 30 minutes at all terminals. Terminal 4 has additional peak period charges of £3.50 for up to 30 minutes from 06:00-08:30 and £4 for up to 30 minutes from 18:30-20:30 (standard tariff applies all other times).

[44] p.27, 02 Baseline, Network Rail Western Route Study Draft for Consultation, October 2014
[45] p.79, 4.22 Airports Commission, Heathrow Airport North West Runway: Business Case and Sustainability Assessment
[46] p.7, 3.1.3 Jacobs, Appraisal Framework Module 4. Surface Access: HS2 spur to Heathrow Airport, 28th October 2014
[47] Project for the Sustainable Development of Heathrow (PfSDH), 'Surface Access Report', November 2007

There are currently approximately 9.4 mppa (29.3k per day) kiss-and-fly passengers at Heathrow; this is 21% of all trips. The majority (77%) are travelling for leisure purposes, according to CAA data (2012). About a third of these passengers travel from London boroughs to the airport. The top locations for kiss-and-fly trips are shown in **Table 12**. The proportion of the remaining districts with kiss-and-fly trips is 1% or less. These locations are very representative of the mix of traffic on the A4 Bath Road as described in the previous section.

Table 12: Top Kiss-and-Fly Trip Locations for Heathrow

Location	Annual Kiss-and-Fly Trips
City of Westminster	302,386
Hillingdon	239,606
Ealing	234,507
Hounslow	198,351
Kensington and Chelsea	196,082
Richmond upon Thames	193,475
Windsor and Maidenhead	178,346
Brent	157,188
Harrow	146,683

Source: CAA Data, 2012

In order to shift kiss-and-fly trips to public transport modes, the congestion charge at Heathrow would need to be sufficient to make the overall generalised journey cost[48] for the kiss-and-fly trip greater than that of the equivalent public transport trip. Some examples of current costs for the top kiss-and-fly locations are shown in **Table 13**.

[48] Generalised journey cost is the financial equivalent of the time and cost of the whole journey, including access time and fare paid.

Table 13: Journey Costs for Kiss-and-Fly Trip Locations for Heathrow

Location	Car return trip*	Public Transport single fare per person**	Taxi single fare***
City of Westminster	£5.10	£24.70	£38-£44
Hillingdon	£1.60	£6.50	£24-£28
Ealing	£3.20	£6.50	£30-£34
Hounslow	£2.00	£4.20	£22-£25
Kensington and Chelsea	£4.50	£24.70	£34-£39
Richmond upon Thames	£3.70	£4.20	£29-£33
Windsor and Maidenhead	£5.40	£12.50	£38-£43
Brent	£4.60	£26.30	£34-£39
Harrow	£3.60	£27.50	£30-£35

* Car cost solely based on the cost of fuel (*source: transport direct.info*) for return trip to the airport.
** Public Transport cost based on a single fare for quickest journey to Heathrow Airport (*source: www.tfl.go.uk , www.heathrowexpress.com, www.nationalrail.co.uk*). *** *Source: www.airporttaxi-uk.co.uk.*

In addition to the public transport fare, an additional access cost should be added to reflect the time taken to access the rail station or bus stop in addition to the transfer time at Heathrow. This gives a more realistic generalised journey cost. For the purposes of this assessment a standard 15 minutes access time is assumed and converted to a cost using a standard £6.00 value of time[49], giving £1.50 additional cost to the public transport journeys.

Based on this information, it would seem that a charge of £2 to £25 would be required to significantly change the behaviour of kiss-and-fly passengers, as only this level of charge would make the generalised cost of travelling by public transport less than the equivalent kiss-and-fly car trip. Considering the existing distribution of kiss-and-fly users and weighting the charge range accordingly would suggest a charge between £12 and £13 would be appropriate.

In relation to the M4 Spur, following a similar method assuming that the majority of traffic was car kiss and fly, to deliver a 20% reduction for the top kiss and fly origins and destinations would imply a charge in the range of £15 to £55. As the charge would need to be fixed for all users irrespective of origin a mean value would be needed. Considering the existing distribution of kiss-and-fly users and weighting the charge range accordingly would suggest a charge between £35 and £40 would be appropriate using this method.

In the context of the A4 Bath Road, and focusing on outer London areas, a congestion charge would appear to significantly impact car competitiveness if operating at the range identified above.

[49] Based on DfT WebTAG guidance – Table A1.3.1 TAG Databook, Values of Time per person – Average market price for non working persons.

Given the proportion of airport related traffic on the A4, in order to drive a 20% reduction in AADT, it is estimated that Heathrow traffic in this location would need to reduce by 61%. Achieving this level of reduction for key kiss and fly origins and destinations, using the outturn elasticities outlined in section 4.2 would suggest a charge would need to operate well in excess of the range outlined above.

This section has outlined how a congestion charge scheme targeting car kiss and fly demand could influence air quality. The specific locations around Heathrow suffering from poor air quality are trafficked by a mix of airport and non airport demand. **To achieve a reduction in NO_2 to the north of the airport to provide air quality improvements suggests that a congestion charge targeting kiss and fly users would need to operate at a level between £2 to £55. This range is large and indicates the importance that a detailed assessment of an airport congestion charge should be undertaken by the Commission, in particular in determining the price impacts to airport users.**

6 Key topics to be reviewed by Airports Commission

This report has provided a summary of the Commission's review to date of the congestion charge. It has highlighted a number of areas that the Commission should take into account to ensure that a congestion charge and its impact at Heathrow is properly evaluated for both runway schemes. These are summarised as follows:

- The Commission's assessment of mode split at Heathrow has indicated that road traffic will increase over time and is inconsistent with both Heathrow promoters' claims of no net increase in traffic. This questions the viability of the Heathrow schemes' mode share assumptions and their analysis of future air quality. The Commission should further review the extent to which a congestion charge can impact sufficiently on car competitiveness to achieve this target.

- The Commission should update their modelling framework in order to fully assess different charging options. This should include ensuring that the choice between car sub modes is fully modelled and allowing Heathrow's mode share assumptions to be adequately reviewed. The framework used should be consistent with guidance from the DfT.

- As an alternative to updating the Commission's modelling framework, it should fully review the Heathrow mode choice model outputs to review their appropriateness and to ensure that updates are made in line with the latest TAG guidance.

- The Commission should consider the viability of a congestion charge providing sufficient reductions in car demand to impact on sensitive air quality locations around the airport. Evidence presented in this report suggests that a congestion charge to kiss-and-fly users would need to target a high proportion of journeys made within west London where existing car journey costs are significantly cheaper than equivalent journeys via public transport.