Transport for London

Airports Commission Inner Thames Estuary: Feasibility Study 4

Surface Access

The Mayor of London's response

August 2014

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1. Purpose of Paper

1.1. In July 2014, the Airports Commission published four feasibility studies, related to building a new hub airport in the Inner Thames Estuary (ITE).

1.2. The Airports Commission has invited responses, and they have asked that respondents focus on i) the factual accuracy of the Commission's work, and ii) if there is any new evidence and information that the Commission should consider.

1.3. This paper comprises the Mayor's response to the Commission's feasibility Study 4: Surface Access Impacts Study, authored by Jacobs ('the study').

2. Summary of the Mayor's response

2.1. A number of the findings of feasibility Study 4 are welcome:

- The new transport links associated with the ITE airport could deliver high levels of surface access connectivity, with attractive journey times, and levels of service.
- A new hub airport in the Inner Thames Estuary can be accessible from a wide catchment area.
- An ITE airport could achieve a higher sustainable mode share than that currently achieved by either Heathrow or Gatwick.
- An acknowledgement that the Commission's Interim Report cost estimate was an overestimate.

2.2. However, there are also a number of fundamental flaws in the approach adopted by the study:

- The capital cost of the new surface access infrastructure required remains an overestimate. The scale of risk and optimism bias rates used is questioned.
- No allowance has been made for the wider benefits, including to non-airport

users, which would accrue from the new surface access infrastructure serving an ITE airport, including transport, regeneration and wider economic benefits.

2.3. In this document, TfL has highlighted some similarities and some differences between its surface access appraisal of the ITE airport and the one conducted by the Airports Commission. Once on the shortlist, there will be an opportunity to share analysis, agree which methodologies are best to adopt and to conduct a more thorough and robust appraisal of ITE airport surface access demand, costs and also benefits.

3. Key observations

3.1. The below list of observations from a review of the study is split into the following areas: establishing a credible surface access network; meeting the Airports Commission's surface access objectives for schemes assessed at Phase 2; the study's methodology and assumptions; and the study's cost estimates.

Establishing a credible surface access network

3.2. Drawing on the network put forward by TfL and others the study broadly accepts that a credible surface access network could be established to support a new ITE airport- this is welcome.

3.3. The approach the study takes, with a series of rail option packages of increasing scale, mirrors the characterisation which TfL outlined in its May 2014 submission (low, intermediate, high and optimal). This recognises that an increased scale of new infrastructure correlates to the ability of the network to meet airport needs and do so without impacting other users of the transport network. It also facilitates like for like comparison with the surface access propositions put forward by Heathrow and Gatwick. Their surface access propositions are at the lower end of the spectrum, with corresponding impacts on other users of the transport network, while eroding the network's ability to meet the requirements of airport passengers and staff.

3.4. The study's preferred surface access scenario is in large part similar to the design of the Mayor's proposal. There are, however, fundamental differences, impacting upon cost and potential network efficiency.

3.5. The study states that its 'Option 4' rail scheme scenario, which is largely similar to the Mayor's proposal, is the only credible long term strategy which maximises the use of sustainable modes, to support a new ITE airport. TfL agrees with this. There are, however, some fundamental differences between the study's 'Option 4' and TfL's proposals, as detailed below.

3.6. **Rail – HS1 to HS2 link**: The study has omitted the HS1-HS2 rail link proposed by TfL, Foster+Partners and Metrotidal Tunnel and Thames Reach Airport Ltd (MTTRA). Despite exclusion from the HS2 Hybrid Bill, it is inappropriate that the scheme has been immediately discounted on this basis, especially since Sir David Higgins highlighted in the HS2 Plus report to "*consider an alternative, which would deliver the benefits of a link without compromising existing services*"[1], and the Government is to "*commission a study into options for ways to improve connections to the continent*

[1] http://assets.hs2.org.uk/sites/default/files/inserts/Higgins%20Report%20-%20HS2%20Plus.pdf (August, 2014)

which could be built once the initial stages of HS2 are complete"[2]. The link would benefit rail connectivity to the ITE, increasing its public transport catchment area and potentially rail mode share. The Commission should include this link in proposals for an ITE airport so as not to prevent it meeting its surface access objectives.

3.7. **Rail – HS1:** TfL understands, from its liaison with HS1, that there is reasonable scope for accommodating new services at St. Pancras within the existing platform arrangement. In the absence of detailed work on service patterns it is premature for the Commission to attribute £230m (inc. risk and optimism bias) in cost for a new platform at St. Pancras to support the ITE.

3.8. TfL agrees that four train paths are likely to be available on HS1 for airport express (AEX) services in the future, although further capacity would be available if AEX connects to the HS1 line at Riverside as proposed, by-passing bottlenecks at Ebbsfleet station and the HS1 river crossing. There is also scope for (some or all) HS1 Kent services to switch to the new Airport Express line to Waterloo, freeing up paths on HS1 north of Riverside.

3.9. **Rail – shuttle to Strood**: The shuttle to Strood was not explicitly included in the proposals by either TfL or Foster+Partners – though sufficient provision was allowed for in the junction with the North Kent line to enable such a service. As such, it is not clear that the additional £210m (inc. risk and optimism bias) introduced by the study is merited and therefore it should not be included in the proposed costs for the ITE.

3.10. **Highways – extent of widening:** TfL contests the study's forecasts that new lanes are required for western and northern sections of M25, accounting for an estimated £5bn (calculated using the study's rate of £50m per km, plus risk) of the study's highway costs. The study shows several hundred trips from the East Midlands/ North East assigned to the M1. Analysis undertaken by TfL indicates that a proportion of these trips would use the A1 and M11, thus relieving the pressure on the M25 between junctions 21 and 22, that the study forecasts.

3.11. The study has also included in its cost estimate a considerable amount of upgrade to major roads across a wide area. It is expected that the same scope of scrutiny is applied to Heathrow and Gatwick for a robust comparison. It is noted that Heathrow and Gatwick's current proposals account for road upgrades across a much more localised area, than this study does for an ITE airport.

Meeting the Airports Commission's surface access objectives for schemes assessed at Phase 2

3.12. TfL acknowledges the Commission's view that a new ITE airport should

[2] http://assets.hs2.org.uk/sites/default/files/HS2%20Property%20Compensation%20Consultation%20press%20release.pdf (August 2014)

maximise sustainable modes of transport. It also acknowledges the study's finding that a higher sustainable transport mode share can be achieved than at Heathrow and Gatwick currently.

3.13. The study's assumption of a 52% public transport mode share for the ITE airport is considered by TfL to be lower than would be achieved in practice, but remains higher than the 41% and 44% achieved at Heathrow and Gatwick today respectively.

3.14. TfL would like to see the Commission acknowledge that a new hub airport could achieve a public transport mode share as high as 65% (as set out in Section 0 below) – still conservative compared to the mode share which some airports achieve.

3.15. TfL acknowledge the Commission's view that surface access for an ITE airport could accommodate the requirements of other users of the transport network.

3.16. Whilst TfL does not wholly agree with the package or cost of highway improvements outlined by the study, it is evident that highway improvements for ITE surface access can accommodate future ITE demand and the needs of other road users, without increasing congestion. Furthermore, the study's 'Option 4' rail scenario predicts 2050 high-scenario loadings of 42% and 48% on HS1 and AEX, respectively, indicating sufficient capacity to accommodate the needs of other network users. TfL agrees with the study that future overcapacity issues highlighted on the Chatham Main Line and Crossrail are mainly attributed to growth in background demand, rather than as a result of ITE airport traffic.

3.17. The study has not fully addressed the needs of other users of the transport networks, such as commuters, intercity travellers and freight. The Commission should add the ITE proposal to their shortlist to enable a like-for-like comparison of the impacts on these users alongside Heathrow and Gatwick options.

3.18. TfL welcomes the Commission's view that a new ITE airport would be accessible to a wide catchment area, and that the new surface access links could provide the connectivity and journey quality required.

3.19. Assessment conducted by TfL in 2013 identified that the population within 45 minutes travel time by public transport could exceed 10million. This is comparable with the 11million people within the same travel time contour from Heathrow.

3.20. The study is clear that rail journey times to an ITE airport would be comparable with those to Heathrow for trips from key stations, both nationally and within London. For example, on average, 'express rail trips' from stations within London will take 58 minutes to get to an ITE airport, compared to 63 minutes to Heathrow (figures

derived from Table 23, page 91, Jacobs study report, distribution of demand not taken into account). While journey times from stations outside London are predicted to take slightly longer, the study's assessment does not include the HS1-HS2 link, which would allow airport rail services to run directly through to Old Oak Common (29 mins) with onward connectivity via HS2 to Birmingham and the North, and to other areas west of London, including routes via the Great Western Mainline (GWML).

The study's methodology and assumptions

3.21. The study has omitted an important part of the Department for Transport's recommended transport appraisal methodology; to review the benefits of transport infrastructure as well as the costs.

3.22. TfL considers that the full range of benefits arising from the transport investment package for all users of the new infrastructure should be considered alongside the costs. The construction of new highway and rail links and stations will permit substantial additional capacity on key corridors, both to central London and beyond for non-airport and airport users. This will provide journey time savings, congestion and crowding relief, unlock development land and offer regeneration and agglomeration benefits. A comparison between the benefits, or disbenefits, of Heathrow and Gatwick proposals should be conducted on a similar basis. The Commission should add the ITE proposal to their shortlist to enable a like-for-like comparison of the full range of benefits to all users, across all options.

3.23. The study's estimation of overall ITE passenger demand is similar to TfL's.

3.24. The approach adopted by the study to forecast potential levels of surface access passenger demand generated by the ITE airport is broadly consistent with that adopted by TfL. TfL forecast 20,200 and the study 20,000 passengers (TfL assume a 150 million passengers per annum airport (mppa), the study 143 mppa).

3.25. A comparison of the assumptions which have been used by TfL to derive passenger surface access demand forecasts is set out in Table 1.

Table 1: Comparison of Passenger Surface Access Demand Forecast for a 2050 ITE

Assumption	May 2014 TfL Estimate		July 2014 Study 4 Estimate	
	ITE (2050)	Assumption	ITE (2050)	Assumption
Passengers - Annual Demand				
Annual passengers (mppa)	150,000,000		143,000,000	
Total annual terminating passengers	97,500,000	65%	91,500,000	64%
Total passenger demand 'visitors'	9,079,677	9.31%	758,065	0.83%
Total passenger demand + visitors	**106,579,677**		**92,258,065**	

Total Daily Demand	**330,397**	0.310%	**286,000**	0.310%
Passengers - AM Peak Hour Demand				
Total AM peak hour 2-way	20,171	6.1%	20,020	7.0%
Total AM peak hour 2-way PT	13,111	65%	10,410	52%
Total AM peak hour 2-way Rail			8,008	40%
Outbound AM pk hr total trips	11,747	58%	10,010	50%
Outbound AM pk hr PT	7,636	65%	5,205	52%
Outbound AM pk hr Rail			4,004	40%
Inbound AM pk hr total trips	8,424	42%	10,010	50%
Inbound AM pk hr PT	5,476	65%	5,205	52%
Inbound AM pk hr Rail			4,004	40%

3.26. The study's sustainable surface access mode share for an ITE airport remains too conservative.

3.27. The study has adopted different surface access mode share assumptions to TfL. TfL believe a sustainable transport mode share of 65% for passengers and 75% for staff is achievable. For highway provision, a 35% and 25% mode share for private vehicles is implied for passengers and staff respectively.

3.28. The study has adopted an approach to try and predict the future ITE airport mode share using current or past observations from London and airports round the world. They predict a modal share for passengers and staff of 40% and 25% by rail, 48% and 65% by private vehicle, and 12% and 10% for bus, coach and other modes, respectively.

3.29. TfL consider these assumptions to be pessimistic, particularly for staff travel. The study also excludes the HS1-HS2 rail link, proposed by three of the four ITE airport promoters, which would further increase the rail mode share.

3.30. Overall, it would be unrealistic to plan a new airport to have the low rates of public transport mode share that the study has adopted. It is considered prudent to adopt rates more comparable to Hong Kong, Oslo and Copenhagen airports, as shown in Table 2, which have rail at the core of their strategy and exhibit a minimum of 60% public transport modal share for passengers.

Table 2: Comparison of Airport Surface Access Modal Share (Passengers)

Airport	**Mode Share (%)**			
	Private Vehicle	**Public Transport Total**	***Public Transport Bus/Coach***	***Public Transport Rail/Metro***
Paris Charles de Gaulle	60	40	*13*	*27*

Zurich	53	47	*5*	*42*
Copenhagen Kastrup	40	60	*2*	*58*
Oslo Gardermoen	37	63	*25*	*39*
Hong Kong	37	63	*35*	*28*
London Heathrow	59	41	*13*	*28*

3.31. The study's methodology for assessing highway impacts entails substantial new road infrastructure being attributed to the airport if the road becomes substantially busier – yet no responsibility if the road is already full. This perversely favours an airport location adjacent to the highway network which is forecast to already be over capacity.

3.32. The methodology employed by the study broadly entails that, if the volume/capacity ratio (VCR) rises above 85% due to airport-related traffic, then the cost of the infrastructure is attributable to the airport; but if the VCR is already over 100%, then no cost is attributable to the airport regardless of the extra demand it generates. This is on the basis that this will need to be dealt with in any case (notwithstanding that, for an existing airport, much of the existing traffic will also be airport related).

3.33. When the methodology is applied in this way it result in favouring an airport – in terms of infrastructure cost – whose location is in close proximity to sections of the highway network already close to or over capacity. This is clearly untenable and undermines the ability to make a fair comparison with the shortlisted airport options.

3.34. The study's approach overestimates the attractiveness of Crossrail; the result is that the model overplays likely crowding on Crossrail.

3.35. By providing a direct service to multiple London destinations, Crossrail will prove very attractive to some passengers, particularly those with young children and/or luggage. However, for many passengers, the longer journey time to central London may limit the attractiveness of the service, with the HS1 or Airport Express services being their preferred route. As such, TfL believes the study has overstated the demand forecast and therefore crowding on Crossrail. However, it is welcomed that the study recognises that reported high levels of demand on Crossrail, mainly on the core section, is primarily due to background demand, and that trains will already be heavily loaded prior to the addition of any airport related passengers.

The study's cost estimates

3.36. A reduction in the Commission's ITE surface access infrastructure capital cost estimates is welcomed. However, the cost estimates presented in the

study are still considered too high.

3.37. The capital cost estimate of the new surface access infrastructure required provided in the study is £37.1- 44.2bn, including risk and optimism bias. This is up to £23bn lower than the £50.4 -67.2bn figure (adding risk and optimism bias onto capital surface access costs) which the Commission published in the Interim Report.

3.38. TfL has costed a very similar network of surface transport infrastructure at £19.1bn (TfL's May 2014 submission) and therefore believes that the study's estimates are still too high, by approximately £18bn. A summary of the development of surface access cost estimates, by both the Commission and the TfL, is presented in Table 3.

Table 3: Summary of ITE Surface Access Cost Estimates

£bn inc. risk and optimism bias	**Commission/ Study 4 Estimates**				**TfL Estimates**	
	Sift 3 Low December 2013	Sift 3 High December 2013	Study 4 Low July 2014	Study 4 High July 2014	Outline submission July 2013 (180mppa)	Refreshed submission May 2014 (150mppa)
Highway	-	-	10.1	17.2	8.2	4
Rail	-	-	27	27	17.7	15.1
TOTAL*	**50.4**	**67.2**	**37.1**	**44.2**	**25.9**	**19.1**

**AC and Study 4 total estimates represent capital costs with 40% risk and 50% optimism bias applied.*

3.39. Notwithstanding the discrepancies in scheme design outlined in Section 3.4, fundamental differences in the build up of costs, as best understood from the information provided in the study, have been identified as below.

3.40. The study's base rates for rail infrastructure and highway widening are significantly high in comparison to TfL's and when benchmarked against similar schemes.

3.41. The cost estimates within the study are presented at a very high level, with limited information provided on how proposed scheme costs have been built up. However, based upon TfL's calculations, founded upon the information provided in the study, the Commission's core base rate costs appear unrealistically high, as outlined below.

3.42. **Rail**: The study's calculated base rates for rail schemes are considered high compared to TfL's and other completed schemes of a similar nature. For example, the study's estimate for the Airport Express (AEX) is calculated to be at an average cost (inc. risk) per km of £351m. This is high compared to TfL's rate of £192m/km and other

schemes such as Crossrail 1 (calculated to be approximately £135m/km[3]), High Speed 1 (calculated to be approximately £56m/km[4]) and the planned HS2 Phase 1 (calculated to be a projected £95m/km[5]).

3.43. **Highways**: The study and TfL drew upon similar examples from which to benchmark the cost per km of highway widening. However, the study has adopted what is thought to be a high rate of £35m/km and £50m/km for single lane widening (for 'low' and 'high' intervention scenarios) compared to TfL's rate of £30m/km.

3.44. TfL considers the study's base rates are too high in comparison with other completed schemes, and are not thought to be reflective of innovation and value engineering that can be achieved by date of construction.

3.45. The study's risk and optimism bias rates are significantly higher than TfL's.

3.46. The study applied a risk contingency of 40% upon the base cost, and a 50% optimism bias also applied to the risk adjusted total. In effect, this more than doubles the base cost. TfL has applied a more conservative rate of 77% risk and optimal bias for rail and 66% for highway widening. This difference accounts for a large proportion of the difference in total cost between the two estimates.

3.47. The study's contingency rates are considered to be overly cautious and TfL questions the use of applying a heavily weighted risk cost at this early stage of the design, as WebTag Unit 5.3 - Table 2, indicates may not be required. The study's rates disproportionately exaggerate the final risk adjusted costs, in comparison with Heathrow and Gatwick.

[3] http://www.crossrail.co.uk/route/crossrail-from-its-early-beginnings (August 2014)

[4] http://www.nao.org.uk/report/the-completion-and-sale-of-high-speed-1/ (August 2014)

[5] http://assets.hs2.org.uk/sites/default/files/inserts/S%26A%208_The%20Economic%20Case%20for%20HS2%20-%20Cost%20and%20risk%20status%20report.pdf (August, 2014)

4. Summary table: Compatibility of the Study with the Mayor's view

Summary of the key observations made:

Issue	Feasibility Study 4	The Mayor's view	Is the Study compatible with Mayor's position?
Surface Access Network Scheme Design			
Design of surface access schemes	Highway widening (up to 230km) and proposed 'Option 4' rail scheme scenario, including AEX and Crossrail extension. HS1-HS2 link excluded.	Highway widening (123 km approx) and proposed rail schemes, including AEX and Crossrail extension. HS1-HS2 link included.	Yes – The surface access proposals are largely comparable. However, TfL considers the study to overestimate highway widening requirements and there are discrepancies between rail schemes proposed i.e. omission of HS1-HS2 link.
Strategic Issues			
Can a new ITE airport provide a high sustainable mode of travel?	Forecast 52% public transport modal share for passengers, higher than currently achieved by Heathrow and Gatwick	Forecast 65% public transport modal share for passengers, higher than currently achieved by Heathrow and Gatwick	Yes – Achieves higher public transport modal share than at Heathrow and Gatwick (41% and 44%) today. However, TfL deems the study's public transport modal share to still be low, and should better reflect world-class levels of sustainable transport.
Can a new ITE airport be made accessible to a large catchment area?	New links could deliver high levels of surface access connectivity, with attractive journey times and level of service, to ITE airport on opening and during future operation, although at higher proposed cost than forecast by TfL.	New links will deliver high levels of surface access connectivity from a large catchment area, with attractive journey times and level of service,	Yes – Although TfL urges the AC to include the HS1-HS2 link proposal to further enhance connectivity.
Can a new ITE accommodate the requirements of other users of the transport network?	Highway improvements can accommodate the needs of ITE demand as well as other users. Issues with overcapacity on some rail networks largely linked to background growth and not the ITE airport.	New rail links and improved highways will bring benefits to both airport and non-airport public transport users, whilst enabling crowding relief on some of the busiest parts of the public transport and highway network.	Yes – Although TfL requests a more comprehensive and robust comparison be made with Heathrow and Gatwick regarding commuters, intercity travellers and freight.

Methodology and Assumptions			
Demand Calculations	Passenger AM peak hour 2-way demand for maximum utilisation 4-runway ITE (study forecast): 20,000	Passenger AM peak hour 2-way demand for maximum utilisation 4-runway ITE (TfL forecast): 20,200	Yes
	Peak direction flow inbound AM Peak: 18,000	Peak direction flow inbound AM Peak: 23,600	TfL adopt a higher rail / public transport mode share benchmarked against other major international airports.
	Inbound peak hour highway demand: 10,000	Inbound peak hour highway demand: 6,750	
	Inbound peak hour rail demand: 8,000	Inbound peak hour rail demand: 16,900	
Cost Estimates			
Total surface access costs	Study estimate costs of between approximately £37bn and £44bn.	The Mayor proposes an overall cost of surface access of £19.1bn (as per TfL's May 2014 submission) accounting for reasonable uplifted rates of construction and including sufficient levels of contingency and risk.	TfL consider the study's cost estimates to be overestimated by around £18bn. The study has not provided a sufficient enough cost breakdown for a robust comparison.
Highway costs	Study estimates total costs of approximately between £10bn and £17bn for highways.	TfL estimates total cost of £4bn for highways.	TfL considers the study's base rates for highway widening, extent of widening, and level of risk and optimism bias as too high.
	Base rate of £35m to £50m per km (not known if inclusive of risk and OB). Proposed widening of 152-230km (low-high). 182-260km approx. if including Lower Thames Crossing (low-high).	Base rate of £30m per km (including risk and OB). Proposed widening of 123km including Lower Thames Crossing.	The Jacobs study adopts higher unit cost rates than TfL and includes additional widening works.
	Lower Thames Crossing - £2bn	Lower Thames Crossing - £1.5bn	There is insufficient data within the study to make detailed cost comparisons.

Rail Costs	Study estimates total cost of approximately £27bn for rail.	TfL estimates total cost of £15.1bn for rail.	TfL considers the study's costs and risk/ optimism bias for similar schemes too high, and highlights questionable additional schemes which add to the total study cost.
	Study's 'Option 4' includes more schemes than TfL, e.g. Strood (£100m exc. risk and OB) and Grays (£1.6bn exc. risk and OB) Shuttles	N/A	Further information is deemed necessary to assess the requirement and benefits of other schemes.
	Study's Crossrail extension estimate, as TfL calculates it to be based on limited information provided: £2bn approx. (exc. risk and OB)	TfL's Crossrail extension estimate: £1.3bn (exc. risk and OB)	The study's cost estimates seem high when compared to other similar schemes.
	HS stations: £0.6bn (assumed to inc. risk and OB)	HS stations: £0.62bn (inc. risk and OB)	Yes
	Study's Airport Express estimate, as TfL calculates it to be based on limited information provided: £9.9bn (£20.7bn if inc. risk and OB)	TfL's Airport Express estimate: £6.7bn (11.8bn if inc. risk and OB)	The study's cost estimates seem high when compared to other similar schemes.
Risk and Optimism Bias	40% risk, plus 50% optimism bias upon risk adjusted total.	10% risk and 66% optimism bias for rail; 66% combined risk and optimism bias for highways.	TfL believes that the study's assumed risk and optimism bias values appear high for this stage.