

RESPONSE TO THE STUDY 4 SURFACE ACCESS REPORT**CONTENTS**

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1 SUMMARY

Surface access is the most complex of the issues to be resolved for the hub airport in the Thames Estuary. The solution should be good for the airport and good for London. A simple test of each proposal is to cover the airfield on the map with your hand and consider the benefit that the surface access provides for London, without an airport. From this test it is apparent that Rail Options 1, 2 and 4 of the report serve the airport but provide very little benefit for London. Nobody would build the surface access of Options 1, 2 and 4 if there were

no airport. In contrast Option 3 provides the Crossrail Plus orbital, a Circle Line for the 21st century that serves growth across London and the Thames estuary region, without an airport. Crossrail Plus, most of which is already under construction, also provides a convenient, economical, frequent and high-capacity service to the airport for both passengers and employees. An oversight by the report, in not registering the Metrotidal Tunnel and Thames Reach Airport proposals for running C2C services through the tunnel, compounded by a misconception of Crossrail Plus as northern and southern radials from Central London serving only airport passenger demand, together with a quibble about differential travel times to the airport from Central London, has resulted in Rail Option 3 being peremptorily dismissed. Fortunately the misconceptions and omissions are remedied by the consideration of a minor variation, Rail Option 3A, in which the Grays Shuttle is replaced by a Pitsea Shuttle of similar cost and programme to the Strood Shuttle. The result is a surface access system that is much cheaper yet provides much greater capacity, catchment and resilience for the airport, while also benefiting London. When assessed in accordance with the report's parameters the Rail Option 3A comparative cost including risk and optimism bias is £9.902bn, only some £82m more than Option 1. On this basis Option 3A has greater capacity, catchment and resilience than Options 2, 3 or 4 for just £82m more than Option 1, while also providing better value and lower fares. These benefits help to achieve a higher rail surface access mode share for the Metrotidal Tunnel and Thames Reach Airport proposals. The whole package of Option 3A would be provided for 2030.

The benefits of Rail Option 3A are much greater and the costs to the airport are lower if assessed by parameters other than the narrow ones imposed by the Study 4 report. Up to 40% of capacity created by combining the Crossrail Northern and Southern branches to form the Crossrail Plus orbital will be used by non-airport demand around and across the estuary. Similarly up to 40% of capacity created by combining the Pitsea and Strood Shuttles into a single shuttle service will be used for non-airport demand between South Essex and North Kent. With private investors funding the non-airport capacity the attributable cost to the airport falls from £9.902bn to £7.432bn.

There is the risk of a conflict of interests with Jacobs, the leading consultants for the Study 4 surface access report also being leading consultants for the DfT Lower Thames Crossing, where the latest report (Government Response to Consultation: Options for a New lower Thames Crossing; July 2014 reference the latest report published July 2014) states baldly (clause 4.2) “Government does not propose to re-open the options considered previously or any new options.” while adding in clause 4.5 “Any new airport proposal is currently a matter for the Airports Commission...” However what we find is that the Airports Commission Surface Access Study 4 report, published at the same time as the latest DfT Lower Thames Crossing consultations report, has simply adopted the DfT Options A and C for the airport road access without review or consideration of alternative options including capacity for non-airport passengers and freight or the integration of flood defence and tidal power. As a result there has been no assessment of the powerful multimodal ability of the Metrotidal Convey-Hoo Tunnel to relieve congestion at the Dartford Crossing and provide convenient, high-capacity surface access for an Inner Thames Estuary airport while also providing substantial non-airport capacity around the estuary, all with low environmental impacts.

The claim in the report that “option 3 would appear to have negligible benefits” is matched by another in clause 4.4 of the recent “Options for a New Lower Thames Crossing” that “increased river crossing capacity within London, which tends to serve movements within the capital, was likely to have negligible effect on demand at the Dartford crossing.” This second “negligible” defies the experience that whenever there is trouble at the Blackwall Tunnel it is soon felt at the Dartford Crossing. It also contradicts the recent TfL consultations on options for a new river crossing in east London (<https://consultations.tfl.gov.uk/roads/river-crossings?cid=fs192>) that find a Belvedere Bridge provides even more relief for Dartford than a Gallions Reach Bridge. No one is suggesting an East London Crossing by itself can solve the problem at Dartford. What is proposed is a network that combines an East London Crossing with a multimodal tunnel further downstream allied to the London Gateway Container Port and a new hub airport that together recast the demand pattern for UK-EU freight movements. There will be much less emphasis on the traditional, inefficient Dover-Midlands HGV route and more emphasis on direct container shipments and airfreight to the

Thames Estuary, supported by a radically improved rail freight network via Metrotidal Tunnel. For HGV Dartford Crossing die-hards there will remain the option of a DfT LTX A much later in the century, if ever required.

A complete road and rail version of costs Table 30 on pp 139 should include an additional column for Rail Option 3A and an additional row for the mid-range £13.65bn of the road costs assessed for Option 1 – 4 followed by separate rows for each of the DfT LTX options so that the overall costs of the options for the roads and the rails, including the remediation of environmental impacts, risk and optimism bias, can be compared. On this basis the cost to the airport of the full Rail and Road Option 4 estimated by the report is £47.2bn compared with the full cost to the airport of Rail and Road Option 3A, representing Metrotidal Tunnel, of £15.4bn. So the Metrotidal Tunnel solution is less than a third of the surface access cost estimated by the report, while providing a larger catchment area with greater resilience and additional benefits including rail freight connectivity and regional connectivity.

Clause 6.14 of the “Options for a New Lower Thames Crossing: Consultation Responses Summary December 2013” identifies the following groups in support of a crossing further east than the DfT LTXC:-

Southend-on-Sea Borough Council

Dartford Borough Council

Thurrock Council

The South East Local Enterprise Partnership.

It is understandable that Medway Council and Castle Point Borough Council are not expressing support since they are on the route further east. Though Gravesham Borough Council are not listed it would be surprising if they did not find the opportunity of a crossing further east as beneficial for the borough compared with the direct impacts of DfT LTX A or C. Together these groups are the major representative bodies for the estuary. On the current DfT programme it is apparent that Dartford, Gravesham and Thurrock will experience

widespread disruption to host a web of highway corridors, only to remain the sole location of the Lower Thames Crossing(s) throughout this century. The irony here is that a multimodal tunnel downstream can be accommodated with minimal impact on local residents and with the environmental impacts offset by flood defence and tidal power benefits. Here the multimodal tunnel can serve a new hub airport and still not require new roads through Dartford, Gravesham or Thurrock except for some upgrades to the A13, A127 and A2 east of the M25 that are necessary and beneficial in any event, with or without an airport.

We urge the Airports Commission to consider Road and Rail Option 3A that integrates a multimodal Lower Thames Tunnel with flood defence and tidal power, rather than adopt a DfT LTX road-only Lower Thames Crossing that pursues yesterday's Dover-Midlands HGV freight agenda. Metrotidal Tunnel combined with an East London Crossing provides a network for the 21st century that is much cheaper than the preferred options of the Study 4 report yet provides much greater capacity, catchment and resilience both for the airport and for the growth of London.

2 RAIL OPTION 3A

Rail Option 3A is the same as Rail Option 3 but with the Grays Shuttle replaced by a Pitsea Shuttle. This requires a 2.8km twin track chord from the Crossrail Plus orbital leading to two new platforms on the south side of Pitsea Station. The Pitsea Shuttle provides a connection to the airport from the existing C2C services between Fenchurch Street and Southend Central/Shoeburyness on both branches of the LTS thereby providing shorter, quicker and cheaper rail access to and from the airport for the passengers and employees of South Essex and an alternative route from Central London. There are no deliverability issues with this modest proposal, which is within the range of options submitted for the consultations.

The works to provide the Pitsea Shuttle are similar to if not less than those required for the Strood Shuttle (£100,000,000 prior to risk and optimism bias) resulting in the following column for Rail Option 3A in Table 30 pp139:-

Scheme	Option 3A
	Crossrail Northern Extension
	with the Grays Shuttle replaced by a Pitsea Shuttle
Common Tracks into Airport	920,000,000
Shuttle to Strood	100,000,000
Shuttle to Pitsea	100,000,000
Waterloo Stopper	510,000,000
Southern Crossrail Extension	1,710,000,000
Northern Crossrail Extension	1,030,000,000
HS1 Extension	235,000,000
Additional HS1 platform at St. Pancras	110,000,000
Rail costs total	4,715,000,000
Risk and optimism bias	5,187,000,000
Rail TOTAL (Inc. risk and optimism bias)	9,902,000,000

On this basis Option 3A has much greater capacity and catchment than Option 2 or Option 3 for just £82m more than Option 1, so provides good value and low fares. The additional catchment via Pitsea Station in South Essex also addresses the concern raised on pp4 of the report that there are few stations on the proposed Crossrail line between Shenfield and the airport. These benefits help to achieve the higher rail surface access mode share of the Metrotidal Tunnel and Thames Reach Airport proposals. The whole package would be provided for 2030.

Further savings are discussed in the Section 9; Agglomeration Benefits below.

3 TRAX AND REGIONAL RAIL CONNECTIONS

The £1.5bn cost saving of Rail Option 3A from Rail Option 3 (£3.15bn including risk and optimism bias) can be put towards providing additional Thames Reach Airport Express (TRAX) services from Central London from 2050. This sum should be more than sufficient to 4-track the line from Pitsea through Basildon to Upminster, there being sufficient area along the route to accommodate the four tracking with modest third-party impacts, and to include two new platforms at Basildon for an optional stop on the express service. From Upminster the new TRAX service can run either via Romford, by dualling the existing LTS Upminster-Romford Line and thence to Stratford or Liverpool Street, or continue to Barking and thence to Stratford or Liverpool Street, with the Barking route also opening express services from Fenchurch Street. These provide the following journey distances:-

Route	Distance km
Liverpool Street via Barking and Basildon to TRA	58.7
Liverpool Street via Romford and Basildon to TRA	59.2
Fenchurch Street via Barking and Basildon to TRA	58.4

The lack of available platform space at Liverpool Street should be reviewed. Platforms will be liberated at Liverpool Street following the opening of Crossrail. Subject to a review of priorities it would be surprising that space could not be found for an express service between the City and the new hub airport.

Other TRAX options for spending the £3.15bn saving include:-

- opening a high-speed HS1-HS2 link and enhancing the capacity of HS1

- further improvements to the Waterloo Stopper
- providing an alternating-train 12tph Central London to Airport fast Crossrail Plus service that bypasses some of the less frequently used outer stops to balance the journey times north and south and provide a faster service to the airport, saving ten to fifteen minutes from Central London. This option too was outlined in our submissions for May.

Other regional rail options for spending the £3.15bn include:-

- completing the ECML-HS1 link (ECCL) via the Crossrail Plus orbital and airport including the WAML connection
- providing the chord to the GEML at Shenfield for direct services from Essex, Suffolk and Norfolk to the airport
- providing the proposed GC-gauge freight network

4 CROSSRAIL PLUS ORBITAL

The report's discussion of northern and southern extensions to Crossrail reflects a misconception of the Crossrail Plus orbital as separate radials that principally serve airport passengers from "Central London". In effect the northern and southern extensions are assessed as separate lines that do not connect since their function is seen only in terms of getting to and from the airport. The following problems arise from this misconception:-

1. The benefit of the Crossrail Plus orbital system is seen only in terms of radial passenger movements between the airport and "Central London".
2. Other significant benefits are overlooked:-
 - i. the doubling of Crossrail capacity and frequency serving the airport, from 12tph to 24tph

- ii. the wider spread of rail capacity to the airport for passengers and employees
 - iii. the additional resilience of alternative high-capacity, high frequency services north and south of the Thames, so that services are sustained during maintenance and/or incidents that interrupt one side of the orbital
 - iv. the reduction in rail travel times and fares for airport passengers from Northeast London and for areas served by interchange with the Great Eastern Main Line at Shenfield, extending the one-hour isochrone catchment across Essex and Suffolk to Norfolk.
 - v. the substantial reduction in rail travel distances, times and fares for local airport employees from East London, South Essex and the Southend conurbation
 - vi. the availability of counter-cyclical commuting capacity around the Thames Estuary for airport and non-airport commuters
 - vii. the wider agglomeration benefits around the Thames Estuary for accommodating and generating growth
3. “Central London” remains a mid-19thC conception of the City, the West End, North Kensington and South Kensington embraced by the Circle Line.

With the closure of the Docks, development of Canary Wharf and regeneration following the Olympics, Central London has grown since the Circle Line was completed in 1884. The spread of inward investment from the City west to Kensington through the 19th and 20th centuries is now joined by growth from the City east to the Docks and beyond through the 20th and 21st centuries. This new Central London, growing to the west and to the east, needs a new rail network and new hub airport. Crossrail Plus from Reading in the west to a new hub airport in the east provides the Circle Line for 21st Century London.

The report’s misconception of the Crossrail Plus orbital as a radial system only serving the airport is compounded by a quibble concerning airport passenger travel times from “Central

London". The first bullet point of clause 4.4.2 pp74 notes "Passengers boarding Crossrail services from central London stations were assumed to wait for a southern branch train due to the shorter in-train time in Options 3 and 4 when compared with the northern branch". On the basis of this assumption the report then concludes on pp4, "The introduction of the Crossrail northern extension in Option 3 is predicted to carry almost zero demand as it is a much longer route from central London than the Crossrail southern extension so it was logical to assume that Crossrail passengers boarding in the core section would wait on platforms for southern branch services rather than incur a longer journey time...therefore Option 3 would appear to have negligible benefits." So this is how Option 3, without consideration or assessment of the Crossrail Plus benefits, is dismissed by the report on the basis of a less than two-minute assumption.

The distance from Whitechapel, where the northern and southern branches separate, to the airport are 64.0km and 56.2km respectively i.e. a difference of 7.8km. As there are the same number of stations on each route the difference in journey time to the airport will be spent travelling between the more widely-spaced outer stations of the northern branch. Now assume an airport passenger is waiting on the Liverpool Street Crossrail platform when a northern train pulls in. The choice is to get on that train or wait for the next southern train. Assuming the trains alternate the wait will be 150seconds (24tph) from the time the northern train departs. The northern train will be travelling at around 120kph between outer stations so in 150 seconds it will travel 5km, reducing the difference to 2.8km or 84 seconds of travel time to the airport. Hence the potential advantage of waiting for the southern train is less than two minutes. This assumes the same travel speeds between stations on both lines but with the existing track of the northern route generally straighter it is likely to be slightly faster on average, resulting in a further narrowing of the travel time difference to the point that airport passengers on the core section can comfortably get on the first train passing through and be confident of arriving at the airport at more or less the same time.

For an exactly balanced system from the Crossrail core to the airport the following measures could be implemented though they are not seen to be necessary:-

- Billericay could be omitted as a stop on the northern branch
- northern and southern train speeds and/or platform times could be adjusted to provide the same overall travel times to the airport
- as already noted above, an alternate-train, 12tph Central London to Airport Crossrail Plus service could be provided that bypasses some of the less frequently used outer stops to equate the journey times north or south, resulting in a faster service between the central London core and the airport

There is merit in the last of these options subject to saving say ten to fifteen minutes from the journey times. Train schedules around the orbital back to the core would be synchronised by a fast service on one side of the estuary becoming an all-stopper on the other to complete the orbit with this combination alternating north and south and alternating around the orbit. Such a combination would also serve the wider non-airport agglomeration benefits by reducing orbital times.

In summary Crossrail Plus provides a high-capacity, high-frequency service like a modern tube line with minimal waiting, not a Network Rail 2-4tph type dedicated express-service from a terminus to an airport where you have to plan your journey or expect to wait on a platform for several minutes. For this reason Crossrail Plus will provide convenient, economical journeys to and from the airport for most Londoners in the central districts all the way to the east. The report has confirmed this for the southern branch. With the full orbital services will be considerably better.

Many of us have stood on a tube platform at some time or another judging whether to get on the crowded train that has just arrived, with the prospect of standing through several stops, or wait for the next in the hope of getting a seat. The report identifies crowding on the southern branch of Crossrail owing to Canary Wharf (4.6.3) and crowding on the core Crossrail line as capacity grows at the airport (4.6.14). So from Liverpool Street at peak times there's the prospect of standing through to Canary Wharf and beyond. For the Crossrail Plus service

northern trains alternate with southern trains. According to the Study 4 report airport passengers at Liverpool Street, with the option of getting a seat on a northern train will still wait for a crowded southern train and then stand through the next few stations to save 84 seconds of travel time. In practice, with the difference in travel times likely to be smaller and the prospect of standing on a crowded southern train, passengers will take the northern train and capacities on the northern and southern routes will equilibrate. As noted above the difference in journey times is likely to be less than 84 seconds and the times can be made the same, so passengers will comfortably take the first train that arrives, whether northern or southern, without disadvantage.

The emphasis of the Study 4 has been on access for the airport passengers. As a result the benefits of the Crossrail Plus orbital in providing convenient and cheap access for airport employees is overlooked. The problem of employees in Essex and Kent not benefiting from a premium express service, identified in 4.6.15 pp 85 of the report, is solved as they simply board Crossrail Plus. Similarly the deliverability risks identified in clause 4.7.1 pp86 are reduced as most of the Crossrail Plus system is already under construction.

5 MULTIMODAL IMMERSED TUBE TUNNEL

Report clauses 2.3.13 – 2.3.15 on pp22 summarise the Metrotidal Tunnel and Thames Reach Airport proposals. A key aspect of the proposal not analysed or discussed by the report is the combining of new rail and road orbitals around the estuary in a multimodal immersed tube tunnel to reduce the environmental impacts and the costs. The proposed new road-only East London Crossing linking the A406 to the A2016 mentioned in clause 2.3.14 last bullet point is not a Metrotidal Tunnel and Thames Reach Airport proposal but one advanced by TfL as a solution for London's existing growth to the east without an airport. TfL have recently added the Belvedere Bridge option that provides greater relief for the Dartford Crossing. Accordingly this option should be included in the Extended Baseline of clause 3.1.6 as a non-attributable cost, clause 3.1.7. The proposition to provide the East London Crossing and Metrotidal

Tunnel in lieu of DfT LTXC has not been tested by the report. It is apparent from the peak demand forecasts illustrated by Figures 33 and 34 on pp61 and 62 of the report that the combination of an East London Crossing and multimodal Metrotidal Tunnel has the ability to serve the airport and relieve congestion at the Dartford Crossing. The connections will also substantially reduce the employee journey times and costs from South Essex and the Southend Conurbation to the airport, an area identified by Table 24 pp47 as a key source of airport employment. These areas will be well served by Crossrail Plus and the Pitsea Shuttle, which will help to raise the proportion of rail travel and reduce surcharging of the road network. It is apparent from Figures 44-45 pp 100-101 that much of the VCR road widening work is required by 2050 in any event, without an airport. For example the A13 and A127 east of the M25 and the eastern arc of the M25 will require widening without an airport. Figures 46-49 pp103-105 demonstrate that the DfT LTXC does not help solve this problem on the contrary it requires traffic to drive west on the A127 and A13 from the South Essex conurbation to cross the bridge and then head east on the M2 to the airport, compounding congestion on three of the roads that already have a high VCR without an airport. A clear benefit of the multimodal Metrotidal Tunnel is that the South Essex conurbation, which generates a high percentage of employees, is given relatively short and direct access to the airport without using the A13 and A127 west to the M25 or the A2 east from the M25. While it is assumed that the A127, A13 and A2 east of the M25 will require widening to serve areas further west another advantage of Metrotidal Tunnel is that the airport will not have a significant effect on the Dartford Crossing, again allowing the DfT LTX proposals to be postponed.

Table 30 pp139 provides the “Summary scheme costs for rail packages (£)”. The road costs are assessed separately to be between £10.1 and 17.2bn allowing for risk and optimism bias (8.2.16). Clause 8.2.17 then notes that the airport is likely to require DfT LTX C for which the incremental cost over DfT LTX A is £2bn. The way this information is presented by the report makes it impossible to appreciate the full road and rail costs of the ITE options including the Lower Thames Crossing or understand the very significant savings if the DfT LTX options A or C can be omitted altogether, as proposed by Metrotidal Tunnel.

The following Lower Thames Crossing cost ranges are provided by Table 7.2 pp 26 of the “Options for a new Lower Thames Crossing: Consultation Document May 2013”:-

DfT LTX Option	£bn excluding non-monetised impacts
A	1.2 – 1.6
B	1.8 – 2.2
C	3.1 – 3.2
Cvariant	4.0 – 5.0

Clause 6.4.3 of Study 4 appears to have calculated the incremental cost to the airport for DfT LTX C by deducting the lowest cost of Option A from the highest for Option C. However these figures are for 2010 values. With risk and optimism bias added as for the other Study 4 assessment, the costs still excluding the non-monetised wider impacts, are:-

DfT LTX Option	£bn with risk and optimism bias
A	2.5 – 3.4
B	3.8 – 4.6
C	6.5 – 6.7
Cvariant	8.4 – 10.5

If we accept the Study 4 report proposition that the ITE required DfT LTX C without Cvariant then the mid-range cost including risk and optimism bias is £6.6bn. Consequently a complete road and rail version of costs Table 27 on pp 110 should include an additional column for Rail Option 3A and an additional row for the mid-range £13.65bn of additional road costs (£10.1 – 17.2bn) that have been assessed for options 1-4 followed by separate rows for each of the DfT LTX options so that the overall costs of the options for the roads and the rails, including the remediation of environmental impacts, risk and optimism bias, can be compared.

The full cost of Rail and Road Option 4 on this basis rises from the Rail Option 4 Table 30 cost of £26.97bn to £49.92bn (Rail Option 4, £26.97bn + Mid-range additional roads £13.65bn + Mid-range DfT LTX C £6.6bn = £47.2bn). In contrast the full cost of Rail and Road Option 3A, which does not require a DfT LTX, rises from the Rail Option 3A cost calculated in Section 2 above at £9.902bn to include the additional cost of the multimodal immersed tube tunnel over the presumably twin-bored tunnels of the rail-only Rail Option 3 and the new road connections to Metrotidal Tunnel including upgrades to Junction 30 on the M25 and to the A127, A13 and A2 east of the M25. These costs are not expected to exceed £8bn including risk and optimism bias resulting in an overall road and rail cost of £17.9bn for Option 3A, representing Metrotidal Tunnel. However further savings can be made as described in the Agglomeration Benefits section below.

The Study 4 report appears to favour the DfT LTX C route for road access across the estuary to the airport and a rail bridge for the Grays Shuttle while noting there may be difficulties in aligning the road and rail routes for building a multimodal bridge. We have already looked at this in some detail and note that the route of a Grays Shuttle following the existing tracks through Tilbury Town will encounter the existing slow turn with short radius around the south of Tilbury and must then head northeast away from the airport to rise on chords to merge with the DfT LTXC road bridge, cross the river at a height in excess of 90m and descend to flood datum over Shorne Marshes to turn again and merge with the existing tracks heading east for Hoo Junction. The combination of turning, rising, descending and turning again to cross the bridge will require long and circuitous approaches. We recommend that the simpler, straighter, faster more direct route for the Grays Shuttle would require a descent of only around 30m from Tilbury Town into bored tunnels that pass diagonally under the Thames south of Tilbury Fort and make only a slight turn to rise parallel with the existing tracks east of Gravesend at Denton near the sewage works and thence head directly to Hoo Junction. We have examined this route as an alternative to a second HS1 Thames Tunnel for increasing express capacity into Central London. Given the advantages of this more direct, bored, twin-tunnel route between Grays and Hoo Junction it is unlikely that a Grays Shuttle and its

subsequent extension to form the AEX of Option 4 would be aligned with the DfT LTXC to cross a multimodal bridge or indeed a multimodal immersed tube tunnel on similar alignment to DfT LTXC. Consequently Option 4 will not achieve the economies of the single multimodal immersed tube proposed for the Metrotidal Canvey-Hoo Tunnel.

6 COMPARATIVE PROXIMITY

The report quotes in Table pp 87 the average rail clock times for the various airport surface access options, these being all within 80 – 88 minutes. Clause 4.8.6 then compares this with an average of 73.4 minutes for Heathrow Phase 2, noting that ITE passengers will consequently spend some 12 – 15 minutes longer travelling to the airport. The Metrotidal Tunnel and Thames Reach Airport Transport Connections April (Final) 2014 submission notes on pp3 how the purpose-designed, new-build solution in the Thames Estuary will provide an average of 20 minutes saving in landside travel times between the airport CTA and the gates. Accordingly once this has been taken into account the comparative proximity of Thames Reach Airport is 5 to 8 minutes closer to its passenger catchment than Heathrow Phase 2.

Rail Option 3A, with a Pitsea Shuttle and expresses services from Liverpool Street and Fenchurch Street in lieu of the AEX, together with the Crossrail Plus services will provide lower average travel times for passengers and in particular for employees so that a significant saving will be achieved from the average rail clock times quoted for Option 3 in Table 22 on pp 87 of the Study 4 report ($82.4 + 88 = 85.2$ minutes average journey time). If we assume that Rail Option 3A saves up to 5 minutes from the average clock times the comparative proximity of Thames Reach Airport increases to being some 10-13 minutes closer to the UK passenger catchment than Heathrow Phase 2. If the fast Crossrail Plus services were provided for Thames Reach Airport together with the regional rail connections including the Knights Place connection for improved services for Ashford and the European catchment via HS1 then the average rail clock times for Thames Reach Airport will continue to fall while

those for Heathrow will increase significantly, since it will have relatively poor connectivity to the southeast and to Europe. Accordingly the comparative proximity of Thames Reach Airport could rise to more than 20 minutes closer to the overall hub airport catchment (UK + EU) than Heathrow Phase 2.

In summary the conclusion of clause 4.8.14 that passengers will have a shorter average rail journey time to a hub at Heathrow Phase 2 than for an ITE is flawed and misleading for the following reasons:-

- no account has been taken of the purpose-designed, new-build comparative proximity benefit of Thames Reach Airport
- Rail Option 3A will provide lower average rail clock times to ITE
- Other improvements to Rail Option 3A such as the fast Crossrail Plus services would further reduce the average rail clock times
- the report has lopped-off the regional rail connections and the HS1 Knights Place connection that would again reduce the average rail clock times over a wide catchment area to the East and on the Continent where Heathrow would perform very poorly, with very high rail clock times
- thus by lopping the ITE network that would help reduce its average rail clock times while providing Heathrow with Phase 2 to improve its rail clock times the report has not provided a level playing field

The surprise here is how Heathrow Phase 2 is still not capable of a better performance even with the HS2, Western Rail Access and other rail enhancements thrown in as Core and Extended Baselines. This strongly indicates that the Government should promptly reconsider the proposed rail enhancements for Heathrow and take them out of the Core Baseline assumptions to put them back into the competitive appraisal of Heathrow v the Inner Estuary. This would restore a fair and competitive, level playing-field and reduce Government expenditure.

7 ISOCHRONES AND CATCHMENT

The report assumes that Heathrow is more convenient for the UK passenger catchment than an ITE and hence the number of passengers Heathrow can command will be greater than the number commanded by an ITE. As the existing passenger catchment has evolved around Heathrow since WW2 this assumption may not be surprising but it overlooks the purpose-designed, new-build comparative proximity of Metrotidal Tunnel and Thames Reach Airport. Once this is taken into account, resulting in the airport being some 10 -13 minutes closer on average the potential for the Thames Reach Airport passenger catchment in the UK to exceed substantially anything that Heathrow can achieve becomes apparent. A crude test would input the comparative proximity on the terms of the report to see what catchment population emerges for the ITE. However the full potential of the Thames Reach Airport catchment requires the improved regional rail connections submitted with the proposals, including the ECML and WAML connections to HS1 via the Crossrail Plus orbital. Compared with other current rail proposals the cost will be modest. Unfortunately Study 4 has found these to be outside its remit and on the advice of Network Rail has ignored the potential passenger and freight benefits of the ECML-HS1 link including the links to the WAML. Furthermore other quite minor links such as the short chord at Shenfield to connect the Crossrail Plus orbital to the Great Eastern Main Line have also been ignored. This is a pity as not only are they cheap but they can provide substantial reductions in travel times to the airport and improvements to capacity from Eastern and North Eastern England, the very areas which should benefit from an ITE and all without adding load to HS1. The report's assumption that the benefits of a "Crossrail Northern Extension" are "negligible" compounds this access problem for areas of Eastern England as without the opportunity of a single interchange at Shenfield from the GEML to Crossrail Plus with a short ride to the airport all passengers from the area of Northeast London extending northeast across Essex, Suffolk and Norfolk to the Wash must travel in to Stratford and make an inconvenient interchange to HS1 for the airport. This not only unnecessarily overloads HS1, a point of concern for the report, but results in the important one-hour travel isochrones being unnecessarily close to

the airport, on a line say from Colchester to Harlow. It is extraordinary to test the case for moving the hub to the east and then not provide the simple local connections required to enable the population of Eastern and Northeast England to reach the airport without travelling into Central London (Stratford is now a part of 21st century Central London) and back out again to the airport.

There is no substitute for the mapping of the proposed surface access connections and modelling their isochrones and costs to obtain a better picture of the airport UK catchment and the likely pattern for inward investment and growth. Something of the sort was attempted in 2003 with NAAM, SPASM and SCAB. The work of the report to date, based on Heathrow parameters, is a short cut that makes a number of assumptions that prejudice the case for the ITE and favour Heathrow. For example the report has ignored the HS1 chord from Knights Place to Hoo Junction. As a result the Ashford and European catchment has to spend additional travel time interchanging at Ebbsfleet. This may be a reasonable opening gambit to keep impacts and costs down for 2030 but results in another significant loss of catchment for the ITE from Ashford and an area of the Continent extending across to Paris, Brussels, Amsterdam and the Ruhr. Heathrow cannot compete over these areas.

In summary there has been a tendency for the report to lop off the proposed surface access connections that establish strengths and advantages of Metrotidal Tunnel serving the passengers, employees and freight (see below) of Thames Reach Airport.

8 FREIGHT AND MANUFACTURING LOGISTICS

The Study 4 report has ignored the ability of a multimodal Lower Thames Tunnel east of DfT LTX C to provide a radically new and improved UK–EU rail freight network serving the London Gateway Container Port and the air-freight manufacturing and logistics of an Inner Thames Estuary Airport. This network allows yesterday's Dover-Midlands HGV route to be replaced by container shipments and airfreight direct to the Thames Estuary supported by

new north-south, rail freight connectivity that is beneficial for London, the Greater Southeast, the Midlands and the North. The greatest improvements to capacity, catchment and resilience for this new rail-freight network are achieved through the ECML – HS1 link via the Crossrail Plus orbital including the connections to the West Anglia Main Line and Great Eastern Main Line. While this adds cost to the overall Rail and Road Option 3A package it would still provide the best cost/benefit ratio. Development of the new freight network expansion can be phased to match growth in demand with the full scope completed by 2050.

9 AGGLOMERATION BENEFITS

Rail Option 3A doubles the capacity of Crossrail Plus serving the airport from 12tph to 24tph. With demand on the northern and southern branches brought into balance as discussed above there will be significant capacity on Crossrail Plus to accommodate an increase in rail mode share for access to the airport and for non-airport demand. The outer Crossrail Plus stations are well-placed to provide the park-and-ride facilities as described by our earlier submissions to the Airports Commission, so this too will help to raise rail mode share. More significant is the spare capacity to accommodate an increase in non-aviation journeys including those generated by the agglomeration benefits and the population growth to the east of London around the Thames Estuary region. All the Crossrail Plus orbital stations will become foci for accommodating this growth in London's population.

Agglomeration benefits can also be generated from the Pitsea and Strood Shuttles. The Study 4 report regards the Grays and Pitsea Shuttles as separate services provided solely for the airport. These two shuttles largely cover the same distance across the Hoo to the airport so that for much of their journeys the energy consumption and travel times are duplicated and inefficient. They also add to congestion on the tracks over the Hoo after the AEX expresses service open. A combination of the Pitsea Shuttle with the Strood Shuttle makes more sense. The Pitsea Shuttle conveniently serves the conurbation of Basildon (175,000), Southend (299,000) and Thurrock (157,000) while the Strood Shuttle serves the Medway Towns

(247,000), Maidstone (113,000) and surrounding areas. Together the Pitsea-Strood Shuttle serves in excess of 1m people, providing them with the same one-stop service to the airport while also providing a 4tph shuttle service between Pitsea and Strood.

“So who wants to travel between Southend and the Medway Towns?” is a question that is often asked by those who can only see the rail network in terms of radial arteries serving Central London, and the answer today is “Very few people as the journey is long and inconvenient”. As a result the economies of South Essex and North Kent are independent and less efficient, with services and industries duplicated and generating fewer business opportunities. The Pitsea-Strood Shuttle costs no more to build and operate than the separate Grays and Strood Shuttles, in fact there will be some procurement savings from the single, larger project. The Central London radial network die-hards need not panic as if their predictions were true no one would be worse off and the combined shuttle only used to serve the airport would be wholly funded by the airport. However with a population of one million we predict journeys will be made between Pitsea and Strood and each journey made generates more income for the shuttle service and helps to unite and stimulate the economies of South Essex and North Kent, improving efficiencies and opening new opportunities for the combined population. These agglomeration benefits will be enjoyed by a growing population over the next decade. As a result the capital investment for the shuttle need not fall wholly on the airport but on investors who appreciate the opportunity to generate substantial airport and non-airport fares. Additional rolling stock may be required as the combined airport and non-airport demand takes up capacity but the marginal cost of providing up to 6-8tph is offset by the larger project efficiencies noted above. If for now we assume that non-airport demand of up to 40% of capacity can be generated and funded by private investors the costs attributed to the airport fall by £80m, which with risk and optimism bias becomes a saving of £168m, reducing the cost of Rail Option 3A to the airport from £9.902bn to £9.734bn.

The same agglomeration benefit also applies to the Crossrail Plus orbital, which should not be seen as separate northern and southern radials from Central London that serve only the airport but as an orbital that brings together an even larger population catchment than South

Essex and North Kent, with an even larger opportunity for generating non-airport fares. Again the capital investment would be shared between the airport and private investors who appreciate the opportunity to generate substantial non-airport fares. As for the shuttle service if we assume that non-airport demand of up to 40% of capacity will be generated and funded by private investors the cost including risk and optimism bias of the Crossrail Plus orbital attributed to the airport falls by £2.302bn from £9.902 to £7.6bn. Deduct the £168m saving calculated above for the Pitsea-Strood Shuttle non-airport investment and the overall cost of Rail Option 3A falls to £7.432bn.

This sum with the estimated £8bn for the road connections results in the multimodal Metrotidal Tunnel costs for the airport being £15.4bn compared with £47.2bn for the Rail and Road Option 4 costs. So the Metrotidal Tunnel solution is less than a third of the cost, while providing a larger catchment with greater resilience and additional benefits including rail freight connectivity and regional connectivity.

10 STUDY 4: ERRORS AND OMISSIONS

Set out below is an incomplete list of points in addition to those already raised above:-

Clause/Table	Page	Comment
Mode share table	4	Network Rail percentages for Options 2 and 4 do not add up
Table 1	14	It would appear that the MTTRA Transport Connections April 2014 (Final) submission has not been read as several factors that are provided in Section 5 Surface Access Capacity have not been entered in Table 1

- Transit passengers 40%
- Daily access to and from 50/50
- Peak hour two-way trips 19,300
- Car occupancy factor 1.8

Table 2	15	Similarly for Table 2 the April 2014 (Final) submission, Section 5 Surface Access capacity provides the following:- <ul style="list-style-type: none"> • Total number of employees: 115,000 at the airport • 100% assumed on a given day • Staff car occupancy factor 1.8
3.1.6 and 3.1.7	26	Extended Baseline should include the East London Belvedere Bridge option as a non-attributable cost
3.2.2	27	The use of existing Heathrow parameters to assess the surface access to the ITE is likely to confirm the predictions of a lower rail mode share
3.2.3	27	The assessment should include the wider non-aviation agglomeration and integration benefits
3.2.4	27	The Crossrail Plus orbital enables these car-bound commuters to switch easily to rail commuting, thereby increasing rail mode share
3.2.7	27	Again an assumption that will reinforce a low rail made share
3.3.6 and 3.3.7	35	This is an unnecessary omission by the Study 4 report. The agglomeration benefits are important. Metrotidal Tunnel provides a spacially specific solution where the Crossrail Plus orbital is capable of accommodating this growth at no extra expense.
Figure 24	47	Even with the Heathrow-centric analysis Figure 24 amply demonstrates the need to provide a convenient and short rail commuter service to the airport for employees in South Essex. Crossrail Plus together with the Pitsea Shuttle

		provides the necessary services.
3.4.28	49	This is not a problem. Crossrail Plus and Pitsea Shuttle provide the necessary and convenient local rail services
3.4.31	49	This assumption depends on the cost of providing regional services that bypass London. The costs are marginal once the Crossrail Plus orbital is in place and the services include rail freight as well as passengers.
3.4.32	49	Yes and the additional modelling is quite straightforward given the special arrangements of the Crossrail Plus orbital and associated regional connections, for passengers and for freight
3.4.33	49	The Heathrow-centric review compounded by dismissal of the Crossrail Plus benefits results in an unduly pessimistic assessment of rail mode share and no account is taken of air-rail substitution via HS1 and ITE, something that in which Heathrow cannot effectively participate
Table 10	50	The Study 4 assumptions result in poor access for the East of England, an area that should have much better access to the ITE without placing additional loads on HS1 via Stratford
3.5.2		Yes. For parts of Central London and all areas to the east The Crossrail Plus orbital will provide cheaper, quicker and more convenient access to the airport than a dedicated express service
3.5.4	51	Yes. The one-hour isochrones should be assessed for each option. Direct regional services and/or interchange with the Crossrail Plus services extends the one hour isochrones much further from the airport, and helps to hold down the fares.
Table 11	52	This table is Heathrow-centric in that it omits the areas around the Thames Estuary, Essex, East Anglia and

		Kent that will benefit most from an ITE
3.6	58	The road demand and capacity section simply adopts the DfT LTX A and C options with further consideration of multimodal alternatives further east. The modelling nevertheless demonstrates how Metrotidal Tunnel can usefully serve passengers and employees
4.2.1	65	The Study has overlooked the C2C services that can be Provided through Metrotidal tunnel either directly or via interchange to the Pitsea Shuttle
4.2.3	65/66	The response above describes why the HS1-HS2 link, the ECML-HS1 link with connections to the WAML and GEML, and express services from Liverpool Street and Fenchurch Street should all be reviewed
4.3.1	66	The response above describes the better Rail Option 3A
4.3.2	67/68	The response above describes how the Grays Shuttle is likely to remain a separate twin-bored tunnel via Denton
Table 13	69	This table seriously misrepresents the Metrotidal Tunnel and Thames Reach Airport proposals by not including ticks for:- <ul style="list-style-type: none"> • Network Rail connection to Fenchurch Street • Network Rail connection to the North Kent Line • Reading Link via South Bromley • Milton Keynes (add elsewhere) via Watford • Gatwick via Strood
4.6.6	78	Crossrail Plus services cater for this demand
4.6.10	78	Crossrail Plus will help to achieve a higher rail mode share for both airport passengers and employees
Figures 39 and 40	79	Again because of the reports assumptions rail access from Essex, East Anglia and Kent is underestimated
4.6.11 – 4.6.13	79/80	MTTRA solves these problems
4.6.14	85	the Crossrail Plus orbital prevents congestion in 2050 and

		Thereby also relieves congestion on HS1
4.6.15	85	Again the Crossrail Plus orbital relieves pressure on HS1 and serves the employment clusters
4.7.1	86	The MTTRA proposals reduce the deliverability risks by relieving pressure on HS1
4.8.2 and Table 22	87	Even with the adverse assumptions of the report the MTTRA average clock times are similar. With fairer assumptions they can be the best
4.8.6	88	This is before comparative proximity is taken into account
Table 23	91/92	Average clock times would be improved significantly by the Proposed ECML-HS1 link via the Crossrail Plus orbital