Dear *Transport Select Committee Chair*

Please find attached the submission from 51m to the Transport Select Committee in response to the questions posed.

51m represents the following 13 Local Authorities who are aligned in their response to the HS2 consultation:

- Buckinghamshire County Council
- Aylesbury Vale District Council
- Chiltern District Council
- South Bucks District Council
- Wycombe District Council
- London Borough of Hillingdon
- Cherwell District Council
- Lichfield District Council
- South Northants District Council
- Warwick District Council
- North Warwickshire Borough Council
- Warwickshire County Council
- Stratford-on-Avon District Council

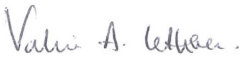
The 51m name represents the equivalent of how much HS2 will cost each and every Parliamentary Constituency…£51million. The group wants to emphasise the impact this proposed scheme will have on every taxpayer in the country for years to come.

51m are opposed to the current High Speed rail proposals as they are presently outlined and do not believe that they are in the best interests of the UK as a whole in terms of the benefits claimed in the business case.

51m are not opposed to higher speed rail per se and fully acknowledge the need for strategic improvement to the national rail infrastructure. However, we do not believe that all the other alternatives to achieve the transport capacity, regeneration and environmental benefits have been fully explored by the Government and with in excess of £30billion proposed to be invested, we owe it to the nation to ensure these are fully explored. Due to the reasons outlined above and in the enclosed report, we cannot support the current proposals suggested by Government and are actively working on a plan to strongly object to them.

This submission has been formatted as a single strategic response to Question 1 (What are the benefits and drawbacks of HSR) together with amplification of the issues raised in the subsequent chapters.

Yours faithfully



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51m RESPONSE TO

TRANSPORT SELECT COMMITTEE

ON HS2

May 2011

MAIN ARGUMENTS AGAINST HS2 – QUESTION 1

Introduction

1. 51m is a consortium of Local Authorities between London and Birmingham on the HS2 route. The Group is called 51m because £51m is the cost to each Parliamentary constituency in the UK of the HS2 project.

2. This document is 51m's response to Question One, and will set out the overall arguments against HS2. It will cross refer to the supporting evidence, which form the chapters of this report and which in turn cross-refer to the TSC's questions, although not in the same order, so that the Committee can see where we have dealt with the relevant issues.

3. HS2 is an enormously expensive (£30bn Net Present Value) and environmentally damaging piece of infrastructure, which requires £17bn (NPV) of public subsidy. Even on the DfT's own case, the Y has a benefit cost ratio ("BCR") of only 2.2 (excluding Wider Economic Impacts – WEI) and 2.6 (including WEI) and this reduces to 1.6 and 2.0 respectively for Phase 1 , and these are based on some over optimistic assumptions. HS2 should only be given the go ahead if there is a clear case in the national interest, which has been robustly and independently scrutinised. The DfT case is fundamentally flawed in a large number of respects and has not been adequately scrutinised and tested.

4. 51m is not against high speed rail per se, but it must be the right project and properly justified. The Government should not spend £billions, simply because HSR is a modern and glamorous form of infrastructure, particularly where smaller and less expensive transport schemes would give far greater benefits in environmental, social and transport terms. As Sir Rod Eddington said in his 2007 Transport Study;

   "because the UK is already well connected, the key economic challenge is therefore to improve the performance of the existing network… There are very high returns from making best use of existing networks [with…]large

projects with speculative benefits and relying on untested technology, are unlikely to generate attractive returns."

5. The evidence shows that HS2 would largely be used by those in the highest income brackets (and many of those for leisure purposes). In essence HS2 is a massive public subsidy to the well off, with at best some doubtful economic benefits.

6. There is a long history of over optimistic forecasting by the rail industry, both in terms of passenger forecasts and costs. The Committee should bear in mind that schemes such as this are developed by those who have a strong interest in them, as is recognised by international studies.

7. The issues which arise on the DfT's case are:

   a) There are much cheaper incremental alternatives, which can meet the forecast demand, but in a quicker and more responsive manner.

   b) Demand forecasts are optimistic.

   c) The rail industry has a poor record on passenger forecasting.

   d) HS2 service provision of 18tph is undeliverable.

   e) It wont reduce overall air travel and will have no climate change benefits

   f) The benefits assumed are too high, particularly as assumptions about time spent on trains being wasted are out of date.

   g) The scheme will have little impact in rebalancing the regional economy, in contrast to local and regional schemes that offer practical benefits.

   h) It creates large disbenefits to many existing rail users.

   i) Major construction impacts at Euston.

   j) No justification for Heathrow and HS1 links.

   k) HS2 is critically different from the European examples DfT rely upon.

Unrealistic Comparators/Better Alternatives – Chapters 1 &10

8. Probably the most fundamental problem with the DfT's economic analysis is that they have not used the best alternative as their comparator with which

to test the business case, instead using a wholly unrealistic "do-minimum" comparator with almost no changes over 30 years. The DfT's principal alternative, Rail Package 2 "RP2", fails to optimise the opportunity for extending and reconfiguring trains; includes unnecessary and costly infrastructure; and fails to apply a consistent approach to the infrastructure which is needed between it and HS2. This is contrary to basic principles on carrying out a business case such as this, and has led to a wholly distorted picture as to the need for, and benefits of, HS2.

9. DfT have used different do minimum cases for their evaluation of HS2 and their alternative RP2 which results in the overestimation of the benefits of HS2.

10. Issues about the level of passenger growth, how time is spent and the value of time saved are inevitably open to subjective judgement, and ultimately guesswork. But it is a simple fact that huge increases in capacity can be produced on the relevant parts of the rail network, with relatively simple and far cheaper steps than HS2, and which address crowding issues earlier.

11. There are a series of incremental improvements to the existing network which can deliver more than sufficient to meet the forecast demand. These steps have 4 major advantages over HS2. Firstly, they can be introduced incrementally so that if the massive demand increases forecast by HS2 do not materialise there is no wasted investment. Secondly, they are far cheaper than HS2. Thirdly, they can be introduced much more quickly than HS2, so can deal with existing overcrowding issues, rather than having to wait until 2026 (at the earliest). Fourthly, they are very low risk.

12. In summary the incremental ways to increase capacity over the DfT base case are:

    a) Take account of Evergreen 3 (line speed increase from London Marylebone- Birmingham), which will be completed this year and provides journey speeds to Birmingham only a few minutes longer than those on Virgin trains, thereby reducing demand from Euston and

increasing capacity including at peak times. This scheme was deliberately ignored in the DfT business case.

b) Change the train configuration on Pendolinos to change at least one carriage from first to standard. The overcrowding issues only arise in standard class;

c) Lengthen existing Pendolinos, all to 11 car and then most to 12 car. The combination of (b) and (c) produces 9 standard cars per train, in contrast with 5 at the moment;

d) Introduce “smart” ticketing and demand management, to reduce peak demand, for example eliminating the artificial peak on Friday after 7pm at Euston;

e) Carry out a series of relatively “minor” infrastructure capacity improvements at pinchpoints, including a grade separated junction south of Milton Keynes, to allow improved separation between fast and slow lines.

13. The cumulative capacity increases of these measures over the 2008 base case demand would be in the order of trebling (211%), see table below, at a total capital cost in the region of £2bn. Of course these steps would not provide the journey time improvements of HS2. But once it is understood that the majority of the benefits from the journey time reductions are dependent on the assumption that business people do not work on trains, it can be seen that spending £30bn (NPV) for this gain is a very poor use of public money.

Interventions	Daily trains	Daily standard class seats	% increase above 2008 base	Comments
Train investment with no/little infrastructure investment				
HS2 2008 Base		59,298		Base used by DfT for evaluation of HS2. Predates full WCML upgrade timetable
Current timetable	286	81,924	38%	Includes Voyager services (30 daily)
Evergreen 3	[68]	[28,900][1]	[55%]	Committed scheme – complete in 2011
Committed lengthening project	286	105,924	79%	Committed scheme – implemented from 2012
December 2013 additional services	306	113,769	92%	Additional hourly off-peak train each way
First class reconfiguration	306	134,379	127%	One car converted from first to standard
12 car sets (except Liverpool)	306	166,908	181%	Major physical constraints at Liverpool
Infrastructure Investment				
Additional services	336	184,326	211%	30 additional daily trains following investment to relieve pinchpoints

14. These improvements would cause no disruption at Euston, as opposed to HS2's disruption which will be massive for 7-8 years. It is also important to stress that the alternative would cause minimal disruption to the WCML and is in no way comparable with the WCML upgrade which took place a few years ago.

Demand Growth[2] - Chapter 2

15. DfT forecast is for 102% "background" demand growth to 2043, and 209% including the additional growth generated by HS2. The DfT describe this as "conservative", but that is misleading. They justify this by reference to high

[1] Illustrative Evergreen 3 figures assume Chiltern trains currently 4 car class 168 units (275 seats), lengthened to 6 car class 168 (425 seats) and this capacity increase is not included in 211%

levels of growth on long distance rail travel in the last 15 years and a very strong relationship between increased wealth and increased long distance rail trips. But this must be seen in the context of overall long distance trips on all modes per person remaining constant since 1995; no rail growth in the period 1952-1995; and rail travel being strongly influenced by investment (including public subsidy) post privatisation. It is wholly unsound to assume that the factors which led to rapid growth post 1995 will continue to 2043.

16. The DfT have used assumptions on growth derived from the rail forecasting manual (PDFH) for the period up to 2043, even though this is contrary to their own normal forecasting practice; to Sir Rod Eddington's recommendations and to Network Rail's position. To take a period of exceptionally high growth, based on very particular factors, extrapolate it forward for 35 years, and then to suggest that this is a conservative approach is not justified.

17. Forecasting is inherently uncertain, and in recognition of this DfT's own Guidance imposes a cap of demand growth in 2026. DfT in its original evaluation extended this to 2033, because of the long lead in time for HS2. However, they have now extended the forecast period to 2043 and then capped the forecast at double the current levels. The DfT has therefore applied its high growth figures for 35 (2008-2043) years. This leads to a highly uncertain forecast. The failure to carry out any proper sensitivity testing exacerbates the inadequacies of the forecast.

18. Even if one were to take a half way point between the growth forecast by the DfT and the work carried out on behalf of 51m, the Benefit Cost Ratio would fall to below 1.5 (excl. WEI), and therefore fails any normal test for Government supported projects.

Rail Industry history of poor forecasting – Chapter 3

19. 51m's concern that the passenger forecasts are seriously over optimistic, is strongly supported by the rail industry's very poor record on forecasting

demand for major rail projects. CTRL (now HS1) predicted demand in 2006 of 25 million passengers, whereas the actual traffic is around 9 million. The Public Accounts Committee in 2006 reported that the DfT had told them that they had learnt from their mistakes and next time would factor in more severe downside assumptions, but they have notably failed to do so, on HS2.

20. Comparisons with HSR internationally are often cited, implying that we are a long way behind other countries, however there are fundamental differences between virtually all HSR networks and the UK: elsewhere their rail journey times were much slower pre-HSR than in the UK, where WCML is a modern 125mph railway; post-HSR their journey times are all more than halved; and with the exception of Frankfurt - Cologne the distances are much longer. The table below sets out the impact of HSR routes on journey times for a number of international networks.

	Distance	**Pre – HSR**	**Post – HSR**
Tokyo – Osaka	515km	6hrs 30mins	3hrs 10mins (now 2hrs 30mins)
Madrid – Seville	472km	6hrs 30mins	2hrs 45 mins (now 2hrs 30 mins)
Paris – Lyon	431km	4hrs	1hrs 55 mins
Frankfurt – Cologne	180km	2hrs 20 mins	1hr 2 mins
London – Manchester	296km	2hr 08mins	1hr 13 mins proposed (from 2032)
London – Birmingham	182km	1hr 24 mins	49 mins proposed

21. On the face of it, the Cologne – Frankfurt route appears to be equivalent to London – Birmingham, at essentially the same distance. However, Cologne – Frankfurt is part of a much wider network, with almost all trains going to or coming from somewhere else, as part of longer distance routes such as Amsterdam – Basel and Dortmund – Munich. The HSR route also gives proportionately much greater time savings than HS2 to Birmingham, with Cologne – Frankfurt times of 62 minutes, compared with timings on the tortuous classic route of 140 minutes. But London – Birmingham is only 84

minutes today, and Virgin Trains say that they could deliver 70 minutes on the existing track.

22. The DfT has placed great reliance on international examples to support its case, however the evidence does not support this conclusion. The Dutch HSR has financial problems, the President of SNCF has stated that the network is decaying as investment is focused on TGV lines, distances between stations on TGV lines are much greater than in the UK, and in Germany the classic network is slow and not comparable with the UK mainlines.

HS2 Service Provision – Chapter 4

23. The DfT passenger forecasts are reliant upon their assumptions about the number of trains that can be provided, their speed and reliability. However, their entire case rests on assuming 18tph for the full network, which is a figure that has never been achieved anywhere in the world for high speed infrastructure. High speed rail worldwide only has 12 -15 tph maximum. Industry experts place no reliance on being able to achieve 18tph in the foreseeable future.

24. In terms of reliability, the DfT assume a very high level of reliability, although even on the full "Y" scheme many of the high speed trains will be coming from the classic network and will be using train paths shared with other users. This raises major doubts over the robustness of the assumptions about reliability.

25. The entire forecasting exercise is therefore based on untried (indeed un-invented) technology and unjustified assumptions about other train operators.

Modal Shift from Air – Chapter 11

26. The DfT forecast only 6% of HS2 passengers are switching from air. Domestic demand to all London airports has fallen by 26% since 2004 and it is therefore very difficult to reconcile this with DfT predictions of 128%

growth to 2043. Journey times from Glasgow/Edinburgh to Paris/Brussels will remain over 6 hours and therefore no modal shift can be assumed.

27. It is interesting to note that even on Madrid-Barcelona, where the high speed rail link reduced journey times from around 6 hours to 2 hrs 40mins hours, there remain 25 flights per day, each way, on the route.

Benefits - Chapter 2

28. The key benefit of HS2 in its economic case is the value of shorter journey times, which accounts for £18bn of the £44bn benefits. £14bn of this depends on the assumption that time savings translate into greater productivity for business travellers. This is because in the economic case the DfT have assumed that time spent on trains is wasted, and have taken no account of modern technology which allows business travellers to use train time productively. This is considered in detail in *"51m Economic Case".*

29. The DfT seek to rebut this by saying that if one does assume that time on trains is used productively then that is simply recovered by the benefits of reducing overcrowding. But this is flawed. The much cheaper alternative proposals reduce overcrowding more than HS2 (HS2 predicts load factor of 58% in 2043, whereas the Optimised Alternative has about 52% and even the DfT alternative RP2 has 51%) , and can provide additional capacity sooner.

30. Given the above concerns, if you undertake a 50% downside sensitivity test on the benefits in the business case (between DfT's and work done for 51m) the BCR falls to less than 1.0 (excl. WEI) for Phase 1 and about 1.2 (excl. WEI) for the Y.

31. Importantly the DfT in the business case has ignored price competition from the classic network which post HS2 will have much spare capacity. It is difficult to see why those who are getting the benefit from high speed rail should not be paying premium fares for those benefits, or to believe that this will not happen in practice. But the DfT business case rests on there being no premium fares, and the shortfall being made up by public subsidy.

Without this assumption the business case would fall much further because the passenger forecasts would reduce significantly.

Economic Rebalancing and Regeneration – Chapters 3 & 5

32. The DfT now places great emphasis on the desirability of "rebalancing the economy", and "reshaping the economic geography" of the UK. It is well established in the academic literature that the benefits of high speed rail between regional centres and a dominant capital city are likely to accrue significantly more to the capital than to the regions. Essentially the argument is that if you provide very good transport links from the hub to spokes, there is some benefit to spokes but most benefit to the hub. So regional centres will gain something but most of the gain will fall to London and SE, as by far and away the strongest areas of the national economy. Even on the DfT's case 7 out of 10 jobs are created in the South East and twice as many new trips are generated to, compared with from London.

33. If Government wishes to prioritise rebalancing the economy, and regenerating the Northern cities, then the way to achieve this is through significant investment in transport between the northern cities, and within their travel to work areas. This has been the clear aspiration of those regions as set out in the Northern Way strategy and transport priorities.

Impacts Carbon – Chapter 6

34. In terms of carbon emissions the DfT's own case is that HS2 will only be carbon neutral. Given the massive public investment in the scheme, and the overall contribution of transport to carbon emissions it seems odd that the Government should support a scheme with so little carbon benefit. HS2 also generates a very large number of new trips, i.e. people who are not currently choosing to travel, and only achieves 7% of HS2 passenger shifting from car use. Emerging Government policy is to encourage people to travel less, and to prioritise schemes which achieve a reduction in carbon emissions. HS2 does neither.

35. But in any event the forecast of HS2 being carbon neutral is itself extremely optimistic. This forecast rests entirely on high assumptions about modal shift from air see above, and most critically on making the assumption that airport slots which are freed up by the reduction in domestic flights would not be re-used. In reality it is quite clear that those slots, particularly at Heathrow will be filled with long haul flights, which are both more profitable for the airlines and much more carbon emitting. Aviation growth is constrained by the number of runways in the SE of England. If HS2 frees up slots at those airports then the inevitable consequence will be a growth in carbon emissions.

Impact on Freight – Chapter 7

36. The current Network Rail freight strategy does envisage freight tonnage growing in the next 30 years with the highest growth in containerised traffic from the ports of Felixstowe, Southampton and Thames Gateway. The current Felixstowe – Nuneaton freight upgrade project will take some 20 trains per day off the southern part of the WCML releasing capacity for freight growth. Other investments are being made in the freight network including Southampton – West Midlands gauge enhancement.

37. Freight almost exclusively uses the slow lines on WCML, so has little impact on fast lines services and capacity except when it has to cross the fast lines on a flat junction or there are short 2 or 3 track sections. This happens at certain pinch points: south of Nuneaton, Colwich and Stafford Infrastructure works currently being delivered or proposed in alternatives would in any event address the pinchpoints for freight.

Impacts on the Classic Network – Chapters 8, 9 &10

38. The HS2 case is based on no investment beyond those already committed by 2015 on the WCML, MML or ECML, until the completion of HS2, even though they are predicting major growth on these routes in the intervening years. This will lead to major overcrowding issues and is an unsustainable position. Overcrowding currently exists on the commuter route between

Northampton/Milton Keynes and London and will not be addressed until 2026 at the earliest when Phase 1 of HS2 is proposed to open.

a) HS2 results in the WCML only having an average load factor of 31%. £9bn has recently been invested in this route to make it the most modern in the UK.

b) There will be capacity and/or frequency reduction to some cities, for example Coventry, Wolverhampton, Stoke-on-Trent, Leicester, Chesterfield, Peterborough and Doncaster. These reductions are included in the business case, because there is an assumed saving of around £5bn (NPV) in operating costs. Any promises to maintain existing service levels to these cities would have serious impact on the business case.

c) As Heathrow Express(HEX) trains to stop at Old Oak Common, all GWML services will also have to stop otherwise capacity on the route will be reduced. This would add approximately 5mins to all journey times to/from the West and Wales.

39. There will be massive disruption throughout the construction period at Euston station, for about 8 years. The scheme involves the reconstruction and lowering of all the existing platforms and major changes to the approach tracks. It is inconceivable that this can be achieved without extensive track closures.

40. The creation of a station at Old Oak Common will have significant impacts on the operation of the GWML, HEX and Crossrail services. The paucity of detail on the Old Oak Common proposals make it impossible to predict what will happen there, but both the Crossrail services and its depot are likely to suffer major disruption.

Links to Heathrow and HS1 – Chapters 11 & 12

41. The DfT proposal involves linking HS2 to Heathrow and HS1. It is beyond any possible doubt there is no economic case for providing such links, a view

held by the rail industry as well – the passenger forecasts are far too low. Further, there are no train paths available for these services in any event.

42. This merely provides an example of how poorly thought out HS2 is, and how proposals for expenditure of £billions of public funds have not been properly appraised.

Environmental Impacts – Chapter 13

43. HS2 have provided little detail on the environmental costs, benefits and mitigation (apart from saying there will be some and allocating funding) for London to Birmingham (Phase 1). No details have been provided for the Y (Phase 2) and the route has not even been identified, although HS2 have indicated that this will be divulged at the end of this year after the consultation has been completed. This is the only opportunity for the benefits and drawbacks to be understood and considered, before the principle is fixed. The lack of information makes any valid consultation or assessment impossible.

44. Any project of this magnitude will inevitably have significant environmental impacts and HS2 will be no different, indeed its Appraisal of Sustainability scores all aspects negatively. Due to the lack of information and the fact that HS2 has not offered any mitigation measure, two authorities south of Birmingham have undertaken their own initial investigations to reach an initial understanding of the impacts. Buckinghamshire have major concerns about impacts upon the AONB, local hydrology, habitats, heritage assets and the wider landscape. Similarly Hillingdon and South Bucks have significant concerns with regard to the Colne Valley Park, a vital local resource.

45. Given that the route goes through four other rural counties, as well as densely populated urban areas, it would not be unreasonable to assume that the number of adverse impacts on environmental assets would be very substantial.

46. It is also important to remember the impact on people's lives, both in terms of noise and disruption, but also the 100s of dwellings to be demolished.

47. HSR has specific noise characteristics compared with classic rail and although HS2 have focused a lot on noise in their road shows with the noise booth, it is clear that this does not provide a true reflection of the impacts. They have provided little detail on the real impacts in the areas either side of the route. Fundamental to understanding the impact of noise on dwellings, business, schools, AONB etc is the production of noise contours.

48. For these reasons it is not possible to understand the real environmental costs and benefits of HS2 as little or no information has been provided.

Government Transport and Environmental Policy – Chapter 14 & 15

49. In the most fundamental aspects this proposal appears to be contrary to key parts of Government policy

a) It involves a major subsidy into rail transport at a point in time when the Government is seeking to reduce subsidy to the rail industry.

b) It encourages people to travel more, indeed relies upon them doing so, when Government policy is moving towards encouraging less trips and more use of alternative technology.

c) It involves a relatively small modal shift, when Government transport policy is supposed to be focused on sustainable development.

d) It has neutral or negative carbon impact.

e) It produces highly speculative regeneration benefits and will be far less effective in achieving the policy objective of rebalancing the economy, than would far less expensive regional investments. This is contrary to the policy priorities of the Northern Regions Development Agencies.

f) Although the capital costs of HS2 will fall outside this spending review, £750m is to be spent in this parliament simply on achieving the Hybrid Bill.

Conclusions

50. For all these reasons 51m is of the view that the case for the HS2 scheme does not begin to be made. Not only are there serious doubts over the validity of the HS2 case but there is a real practical and low risk alternative, which can meet the need as it arises and relatively cheaply. This is not as exciting or high profile as HS2 but far better value for money. The Committee is asked to request the DfT to undertake a fundamental reappraisal.

51. *"the risk is that transport policy can become the pursuit of icons. Almost invariably such projects – 'grand projects' – develop real momentum, driven by strong lobbying. The momentum can make such projects difficult – and unpopular – to stop, even when the benefit:cost equation does not stack up, or the environmental and landscape impacts are unacceptable".* Sir Rod Eddington – The Transport Study.

CONTENTS

KEY EXPERT ADVISORS TO 51m

Pen Portraits

11.1 Pen Portraits for key expert advisors to 51m are provided below.

Christopher Stokes

11.2 Christopher Stokes has held a number of senior posts in the rail industry, Government and management consultancy. His experience includes delivery of the winning bid for the high profile InterCity East Coast franchise, and competitive, high quality bids for the East Midlands and Cross Country franchises. He worked for the Strategic Rail Authority as an Executive Director, Railway Development and led the SRA's work on network development and railway operating and technical issues, including the development and delivery of major infrastructure enhancement proposals.

11.3 Other positions included the Non-executive Chairman, Agility Trains October 2008 – September 2009 a consortium of Hitachi, John Laing plc and Barclays Private Equity. Agility Trains was the preferred bidder for DfT's InterCity Express Project.

11.4 He was a Non-executive Board Member, the Office of Rail Regulation (ORR) from July 2004 to July 2006 (did not seek reappointment because of potential conflicts of interest).

Hilary Wharf

11.5 Hilary Wharf is a partner at Wharf Weston, which began in 1990 and has had a continuous close association working for key UK rail organisations (Network Rail/Railtrack, RSSB, SRA, ATOC, franchise operators and British Rail) for more than 20 years.

11.6 She has skills in business economics, cost benefit analysis, forecasting, statistical analysis and human resources/labour relations. She has extensive experience in applying and developing quantitative techniques to determine and test effectiveness of policy initiatives. For the last 6 years she has worked almost exclusively as part of core teams on railway franchise bids.

11.7 Since March 2010 (with the Government initially suspending rail franchise competitions), she has worked full time on High Speed 2. She has produced detailed analyses of the HS2 business case (with findings confirmed by leading consultancy, FTI Consulting); alternatives to HS2; the Wider

Economic Impacts; property bight arrangements; and made submissions to the preceding Transport Select Committee on Transport and the Economy.

Christopher Castles

11.8 Christopher Castles is an economist and former partner of PricewaterhouseCoopers, where he led the Transport Economics and Policy group for 15 years. He has carried out a wide range of cost benefit evaluations of major rail, road and port development schemes throughout the world. His fields of expertise cover transport policy analysis, market analysis and demand forecasting, economic appraisal, pricing policy, regulation, privatisation and industry restructuring, business planning and financial analysis.

Professor John Tomaney

11.9 Professor John Tomaney is Henry Daysh Professor of Regional Development and Director of the Centre for Urban and Regional Development Studies (CURDS), Newcastle University; Adjunct Professor in Regional Studies in the Department of Geography and Environmental Sciences at Monash University, Melbourne; Associate Director of the UK Spatial Economics Research Centre (SERC) and is an Academician of the Academy of Social Science (UK). He is also a Research Fellow of the Smith Institute, London. He was educated at the London School of Economics, University of Sussex and University of Newcastle upon Tyne.

11.10 He has published over 100 books and articles on questions of local and regional development including *Local and Regional Development* (Routledge, 2006) and *Handbook of Local and Regional Development* (Routledge 2011) co-authored with Andy Pike and Andrés Rodríguez-Pose. He has undertaken numerous research projects in the UK and elsewhere. Among the organisations for which he has conducted research are: UK Research Councils, government departments in the UK and elsewhere, the European Commission, the OECD and local and regional development agencies and private sector and voluntary organisations and think tanks in the UK and abroad. He has given evidence to Royal Commissions and Parliamentary Committees in the UK. In addition, he is a regular commentator in the UK media on matters of local and regional development.

Ian Thynne

11.11 Ian Thynne is the London Borough of Hillingdon's Principal Sustainability Officer. He leads on carbon reduction projects and coordinates actions over the broad range of council operations. Ian provides the primary point of contact on carbon matters and provided the Borough's consultation responses to the Mayor of London's Climate Change Strategy. Ian is a qualified planner with 15 years experience within the environmental sector, 10 of which served at the Environment Agency. He spent most of this time developing and implementing environmental policies with the latter time at the Environment Agency spent promoting the need for Climate Change Action.

11.12 Since joining Hillingdon, Ian has represented London Boroughs alongside London Councils at the Examination in Public for the Replacement London Plan. He has carried out reviews of the Borough's own carbon reduction actions and developed a network of key personnel through the Council to help meet the Climate Change challenges.

JMP

11.13 JMP is an established transport planning consultancy with over 200 professional and technical staff in the UK. We have significant resources available to undertake this research within the formal consultation period and, in partnership with Professor John Barrett (University of Leeds and CenSA), the wide variety of skills needed to deliver this project.

11.14 The expertise of Professor Barrett, who provides the UK Government with the methodology to calculate the embedded carbon in all goods and services, and of Dr. Debbie Walker, whose work has been instrumental in informing government guidance on the quantification of carbon emissions from travel behaviour, provides nationally recognised expertise in leading and supporting this research. Professor Barrett's methodology is now used by the NHS and most government departments. Additionally, the approach is used by rail providers such as Northern Rail as a methodology to assess the carbon footprint of their operations. The approach ensures that the full lifecycle of every good and service is taken into account. John worked with JMP in its work in Yorkshire and Humber to provide, examine and evaluate what measures would be needed to achieve a reduction in carbon dioxide emissions from transport to meet regional targets in 2008.

11.15 The JMP team is led by Martin Revill who have been responsible for delivering and assessing complicated projects such as the prioritisation and agreement of transport investment programmes through the Regional Funding Allocations process in three English regions; the development of city region transport programmes to feed into DaSTS reporting to DfT; and working on LTPs to meet statutory and democratic requirements.

Marcus Rogers

11.16 Marcus Rogers is Head of Service for Planning, Environment and Development at Buckinghamshire County Council. He is responsible for Economy and Enterprise, Rights of Way, Archaeology, Country Parks and Green Spaces, Definitive Maps, Natural Environment, Planning, Waste and Sustainability. Previously he was the Operations Lead Service Manager for Planning and Environment functions and was also a senior manager in Transport Policy and Planning at the County Council.

Tim Bellamy MSc, BA (Hons), MIHT, MILT

11.17 Tim Bellamy is currently the Transport and Regeneration Manager for Transport for Buckinghamshire (TfB). Through this role, he is able to shape and develop transport's role and strategic direction in order to deliver the corporate aims and objectives of the County Council. He oversees services delivered by Policy & Sustainability and Network Management which includes the Alliance's professional strategic transport functions such as transportation policy and strategy development, network management, casualty reduction, the establishment of appropriate contract and performance indicators, development of the Local Transport Plan 3, transport project development, compilation of capital programme and its implementation (including major schemes), sustainable travel, transport development control, highway records and land charges, across the whole service area to deliver the goals and vision of TfB and the Strategic Client.

- Whilst employed by TfB, Tim has been leading on a number of significant projects, including High Speed 2; the High Wycombe and Aylesbury Town Centre Regeneration; the third Local Transport Plan; the development of the Big Society concept in Buckinghamshire; the Local Sustainable Transport Fund submission; the delivery of the Growth Area Funding; responses to major developments such as Pinewood and Silverstone; and the 2012 Olympic and Paralympic Games.

- Previously Tim worked at the East of England Regional Assembly as a Regional Transport Planning Manager, where amongst other projects; he led work on the Regional Funding Allocation prioritisations; the assessment of Community Infrastructure Fund and Growth Area Funding applications; the formation and running of the Regional Transport Forum; East-West Rail development; and oversaw a number of submissions for a variety of national and European funding sources.
- Tim spent five years at Essex County Council as a Senior and Principal Transport Officer. Whilst there he managed transportation work on the nationally recognised Thames Gateway: South Essex regeneration area, along with producing the second Local Transport Plan, various Annual Progress Reports and assessing the Government's application for London Stansted Airport. In addition, Tim helped to formulate the Haven Gateway and Stansted-Harlow Transportation Boards and progressed Major Scheme Business Cases for the South Essex Rapid Transit, the Fryerns/Carylands Masterplan and the A13/A130 Sadlers Farm Junction schemes.
- Tim has been shortlisted for Young Transport Planning Manager of the Year 2011.

Chapter 1

Optimised Alternative to HS2 - The Scope for Growth on the Existing Network

Prepared by Christopher Stokes

1 OPTIMISED ALTERNATIVE TO HS2 – THE SCOPE FOR GROWTH ON THE EXISTING NETWORK

Prepared by Christopher Stokes

1.1 This submission relates to the following questions listed by the Committee:

- 2.1 – alternative investment in the "classic" network.
- 3.1 – the methodology used in evaluating HS2 against alternatives.
- 3.2 – evaluation of upgrading the West Coast Main Line.
- 3.3 – consideration of alternative means of managing demand.

Introduction

1.2 Rigorous evaluation of proposals to construct a £32 billion rail project should properly include consideration of all alternative options, with the project itself evaluated against the best alternative, rather than an artificial "do minimum" case, as has been the case with HS2.

1.3 Taking the present position as a start point, there is currently limited crowding on the West Coast Main Line in standard class. This is concentrated on Friday evenings, particularly on departures immediately after 7 pm when cheaper "saver" are available. In contrast, first class load factors are low, at about 20%.

1.4 Provision of additional capacity is already planned through the committed project for lengthening 31 out of the existing 52 Pendolino units from 9 to 11 cars by adding two standard class cars, together with the procurement of four new 11 car trains. However, there is likely to be significant further demand growth, and it is certainly appropriate to identify options to meet this.

1.5 Options should be considered incrementally, starting with proposals which prime facie offer the best value for money. The options would include:

- Effective use of the capacity provided by Chiltern Railways as a result of the Evergreen 3 project, which will provide 90 minute journey times between London and Birmingham from later this year.
- Rolling stock reconfiguration, particularly conversion of some first class vehicles to standard class.
- More effective demand management, including use when appropriate of obligatory reservations.

- Operation of longer trains, to the extent that this is possible without major infrastructure expenditure.
- Targeted infrastructure investment to clear selected bottlenecks to enable frequencies to be increased.
- Construction of new infrastructure (HS2).

1.6 It should be noted that the Department for Transport (DfT) and HS2 Ltd have given **no** consideration to rolling stock reconfiguration and improved demand management, and have not optimised their evaluation either of train lengthening, or of incremental infrastructure investment.

1.7 This submission considers these options, focussing on the West Coast Main Line, and also includes brief summaries in relation to the East Coast and Midland Main Lines. The options for the West Coast Main Line have been evaluated to produce an "Optimised Alternative", a low risk, incremental approach, with much lower costs than for HS2 and the ability to trigger incremental expenditure as and when it is required, rather than the "all or nothing" approach which is unavoidable with construction of a new route.

1.8 The Optimised Alternative is based on the incremental interventions in Table 1.1.

1.9 The Optimised Alternative therefore delivers a 211% increase in standard class seating over DfT's 2008 "base", the derivation of which is detailed in Annex 1, without taking into account the potential capacity upgrade on the Chiltern route, or assuming any benefits from more effective demand management. This increase is over twice the high "background growth" figure of 102% forecast by DfT.

1.10 The proposed incremental changes are considered in more detail in this chapter.

Evergreen 3

1.11 DfT's evaluation takes no account of the committed Evergreen 3 project on the Chiltern route. This will be completed later this year, and will give journey times on the Chiltern route only a few minutes longer than on Virgin to Euston. The standard timing from Birmingham New Street to Euston is 84 minutes; Chiltern will offer 90 minute journey times when Evergreen 3 is completed, and Chiltern serves the affluent Solihull area more conveniently than the West Coast railhead at Birmingham International. Given that fares on Chiltern are generally significantly cheaper than on Virgin, it is likely that the Chiltern route will abstract significant traffic from Euston.

1.12 At present, Chiltern generally operate short (3 or 4 car) trains, and capacity could be readily increased by operating longer trains without any additional infrastructure expenditure.

TABLE 1.1 INCREMENTAL INTERVENTIONS FOR OPTIMISED ALTERNATIVE

Interventions	Daily Trains	Daily Standard Class Seats	% Increase above 2008 Base	Comments
Train Investment with no/little Infrastructure Investment				
HS2 2008 Base		59,298		Base used by DfT for evaluation of HS2. Predates full WCML upgrade timetable.
Current timetable	286	81,924	38%	Includes Voyager services (30 daily)
Evergreen 3	[68]	[28,900][1]	[55%]	Committed scheme – complete in 2011 Illustrative numbers – excluded from totals
Committed lengthening project	286	10,5924	79%	Committed scheme – implemented from 2012
December 2013 additional services	306	113,769	92%	Additional hourly off-peak train each way
First class reconfiguration	306	134,379	127%	One car converted from first to standard
12 car sets (except Liverpool)	306	166,908	181%	Major physical constraints at Liverpool
Infrastructure Investment				
Additional services	336	184,326	211%	30 additional daily trains following investment to relieve pinchpoints

[1] Illustrative Evergreen 3 figures assume Chiltern trains currently 4 car class 168 units (275 seats), lengthened to 6 car class 168 (425 seats)

1.13 A combination of extra seats on the West Coast Main Line and Chiltern routes is fully able to meet high growth scenarios for the London – West Midlands corridor.

Rolling Stock Configuration

1.14 First class load factors are much lower than standard class currently (c20% only, compared with c50% in standard class) and first class volumes have recently dropped, reflecting reductions in corporate and public sector expenses paid first class business travel as a result of the recession and public expenditure cuts. First class yields per passenger have also declined substantially, reflecting the shift to much cheaper, train specific advance purchase tickets.

1.15 If, conservatively, one out of the current four first class car in each unit is reconfigured as standard class, this would increase overall seating. For an 11 car unit, the new capacity would be 99 first/519 standard, compared with 145/444 at present. The reduction in crowding would be significantly greater, reflecting the much higher load factors in standard class; the units would have 75 additional standard class seats, giving an overall increase in standard class of 19%. It may be that detailed analysis would show that overall capacity would be optimised by reconfiguring two first class cars to standard class in each train. It is also possible that bidders for the new West Coast franchise will propose reconfiguration themselves.

1.16 This change could almost certainly be carried out without any reduction in revenue, as the limited number of trains on which a reduction of one first class vehicle would cause a shortage of first class capacity could be managed through yield management techniques.

Improved Demand Management

1.17 The majority of the existing overcrowding is on departures from Euston after 1900 on a Friday evening, as these trains are the first for which the regulated, non-train specific "saver" fares are available. Given the increases in open ticket prices since privatisation, the regulated "Saver" fares represent very good value, and are cheaper than advanced purchase prices in the evening peak period. But this is an artificial peak, directly caused by the fares structure, and could be reduced by changes to the structure for fares regulation.

1.18 In the medium term, the development of smarter IT will certainly enable better demand management, with flexible, fully reservable trains, enabling passengers to arrive at the last minute, and book a seat "on the run", using mobile devices,

provided space is available. Given the pace of IT development, it is inconceivable that such systems will not be in place by 2026 when HS2 Phase 1 is due to open.

1.19 Effective demand management would enable load factors to rise on a sustainable way without increased overcrowding; both Eurostar and French TGV services already operate at load factors of about 70%. This would also significantly improve the poor financial performance of the rail industry, as set out in the National Audit Office's report "Increasing Rail Capacity"[2], which recommended:

"The Department should…[evaluate] further the costs and benefits of demand management as well as capacity enhancement approaches to tackling peak time overcrowding.."

Operation of Longer Trains

1.20 The current InterCity fleet comprises 52x9 car Pendolinos, each with 145 first class and 294 standard class seats, together with 21x5 car diesel "Voyager" units which are used on Euston – Chester/North Wales and Birmingham – Glasgow/Edinburgh services. The analysis of options for increasing train capacity only considers the Pendolino fleet, but it is equally possible to lengthen or reconfigure the Voyager fleet to deliver equivalent proportional capacity increases.

1.21 The existing project to lengthen 31 of the Pendolino units to 11 cars and build 4 new 11 car units will increase total standard class capacity by 42%. Full use of the four new trains will be delivered through use of the extra path identified by DfT in the West Coast franchise consultation document[3].

1.22 A further increase in train lengths to 12 cars is deliverable cost effectively except on the Euston – Liverpool route. Conservatively, it would be necessary to retain 10x11 car sets to ensure that sufficient units were reliably available for the Liverpool services, which, as a self contained service, currently require 8 units each day. It should be noted that DfT considered operation of 14 and 17 car trains in its review of alternatives, but both were rejected because of the major infrastructure work required – but there was no serious evaluation of full 11 or12 car operations.

[2] Executive Summary:NAO rept (HC 33 2010-2011): Increasing passenger rail capacity [Exec summary] (pdf - 65KB - opens in new window)

[3] InterCity West Coast Consultation Document – January 2011 page 52 http://www.dft.gov.uk/consultations/closed/2011-01/

1.23 Work carried out by Atkins for DfT did however indicate that only modest infrastructure expenditure would be required to enable 12 car operation on all routes except Liverpool, where lengthening platforms would be prohibitively expensive.[4]

Targeted Infrastructure Investment

1.24 **Short term**. The most urgent action required is work to enable the peak fast commuter frequency to Milton Keynes/Northampton to be increased. This requires two actions:

- Construction of a grade separated Junction at Ledburn, south of Leighton Buzzard, to enable commuter trains to transfer from the fast to the slow lines without conflicting with trains in the other direction. This work was identified in "Rail Package 2" ("RP2"), the best alternative evaluated by DfT, at an estimated cost of £243 million. The site of the junction is remote from housing and is unlikely to present insuperable difficulties in terms of obtaining Transport and Works Act consent.
- Procurement of new, high performance trains for operation of the fast commuter services to minimise the impact of capacity on the route south of Ledburn junction. DfT has already considered introducing new "IEP" trains for these services, and indeed has included equivalent units for the fast Kings Cross – Cambridge trains on the East Coast Main Line in its recently announced commitment to the IEP project. As would be the case on the West Coast Main Line, the new trains will run to the same timings as the long distance InterCity services on the route, hence maximising route capacity.

1.25 **Medium term.** As and when it becomes clear that the increased train capacity set out above will not meet realistic forecasts of demand, further work should be undertaken to mitigate pinchpoints north of Rugby:

1.26 **Construction of a fourth line between Attleborough and Brinklow.** This work would shorten the section of route north of Rugby which currently has only one northbound track which has to accommodate InterCity services together with up to three freight trains an hour. Completion of the current Felixstowe – Nuneaton route upgrade will potentially allow a significant reduction in the number of freight trains on the route south of Nuneaton, but this capacity may be taken up

[4] "Rail Interventions Report of the High Speed 2 Strategic Alternatives" Appendix E http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/railintervention.pdf

by new flows, for example from new port developments such as London Gateway.

1.27 Both the RP2 work and independent work for this evaluation validate that this section of the route will provide sufficient capacity to allow operation of an upgraded InterCity service. The estimated cost of this work is £187 million.

1.28 The **"Stafford bypass"**. There are significant capacity constraints south of Stafford and at Stafford itself:

- Colwich junction, where the route to Manchester via Stoke-on-Trent leaves the main line, is not grade separated.
- The main line from Colwich junction towards Stafford is only two track for c3 miles, with a flat junction where the four track section resumes.
- There is a flat junction with the Birmingham – Stafford route just south of Stafford.

1.29 Network Rail has been evaluating possible options for mitigating these constraints, including construction of a "Stafford bypass" which would also allow some reduction in journey times. Firm proposals have not yet been developed, but it is assumed in RP2 that these pinchpoints can be resolved at an estimated cost of £1.23 billion.

1.30 It should be noted that HS2's own analysis assumes that

"some infrastructure/ signalling works have taken place in the Stafford area to alleviate this known capacity constraint"[5]*,*

so HS2 makes no allowance for the costs of this work. RP2 is therefore inconsistent with this, resulting in a significant bias towards HS2 in DfT's evaluation.

1.31 Other works proposed by DfT in its review of strategic alternatives[6] are not necessary, either because other schemes will provide the necessary capacity (for example the Manchester "Hub" scheme will free up capacity for additional InterCity trains at Manchester Piccadilly and its approaches, and is assumed to

[5] Technical Appendices, Appendix 2, para 2.20 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/technicalappendix/pdf/report.pdf

[6] HS2 Strategic Alternatives Study – Rail Interventions Report (March 2010) http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/railintervention.pdf

have been completed in DfT's evaluation of HS2 itself) or because the additional capacity is not required, as between Coventry and Birmingham.

1.32 The capital costs of the Optimised Alternative (£2.06 billion) are detailed in Table 1.2, which also gives a comparison with DfT's estimate of capital expenditure for RP2.

West Coast Main Line - Summary

InterCity Services

- Overall, InterCity standard class capacity can be increased by 181% by rolling stock reconfiguration and train lengthening.
- A further incremental capacity uplift (giving a total increase of 211%) can be achieved by carrying out a number of specific infrastructure improvements at an estimated cost of £2.06 billion, to allow an increase in all day frequency to 11 trains per hour. An illustrative pattern for this level of service is provided in Figure 1.1. This service pattern provides faster journey times for a number of key flows, increased overall capacity, and improved journey opportunities for key intermediate stations.

1.33 As discussed earlier, the key issue in relation to crowding is standard class capacity. However, we have also analysed the Optimised Alternative against HS2 and RP2 (see annex 2). This shows that the Optimised Alternative delivers a lower overall load factor than HS2 (52% compared with 58% for HS2), and provides broadly the same capacity as RP2 at little more than half the capital cost.

1.34 There is therefore no case for construction of HS2 to meet any need for increased capacity for the foreseeable future.

1.35 **Fast commuter services.** There is an immediate and more serious overcrowding problem on peak trains between Northampton, Milton Keynes and Euston. Capacity constraints on the route only currently allow operation of a half hourly service from London in the evening peak. All peak trains are already overcrowded, with passengers standing for at least 30 minutes.

1.36 Urgent action is needed to provide additional capacity on this route, and capacity could be doubled in five years by construction of the proposed grade separated junction at Ledburn at an estimated cost of £243million, and procurement of new, higher performance rolling stock. But construction of HS2 will delay this until 2026 at the earliest.

FIGURE 1.1 SERVICE SCHEMATIC FOR ILLUSTRATIVE SERVICE

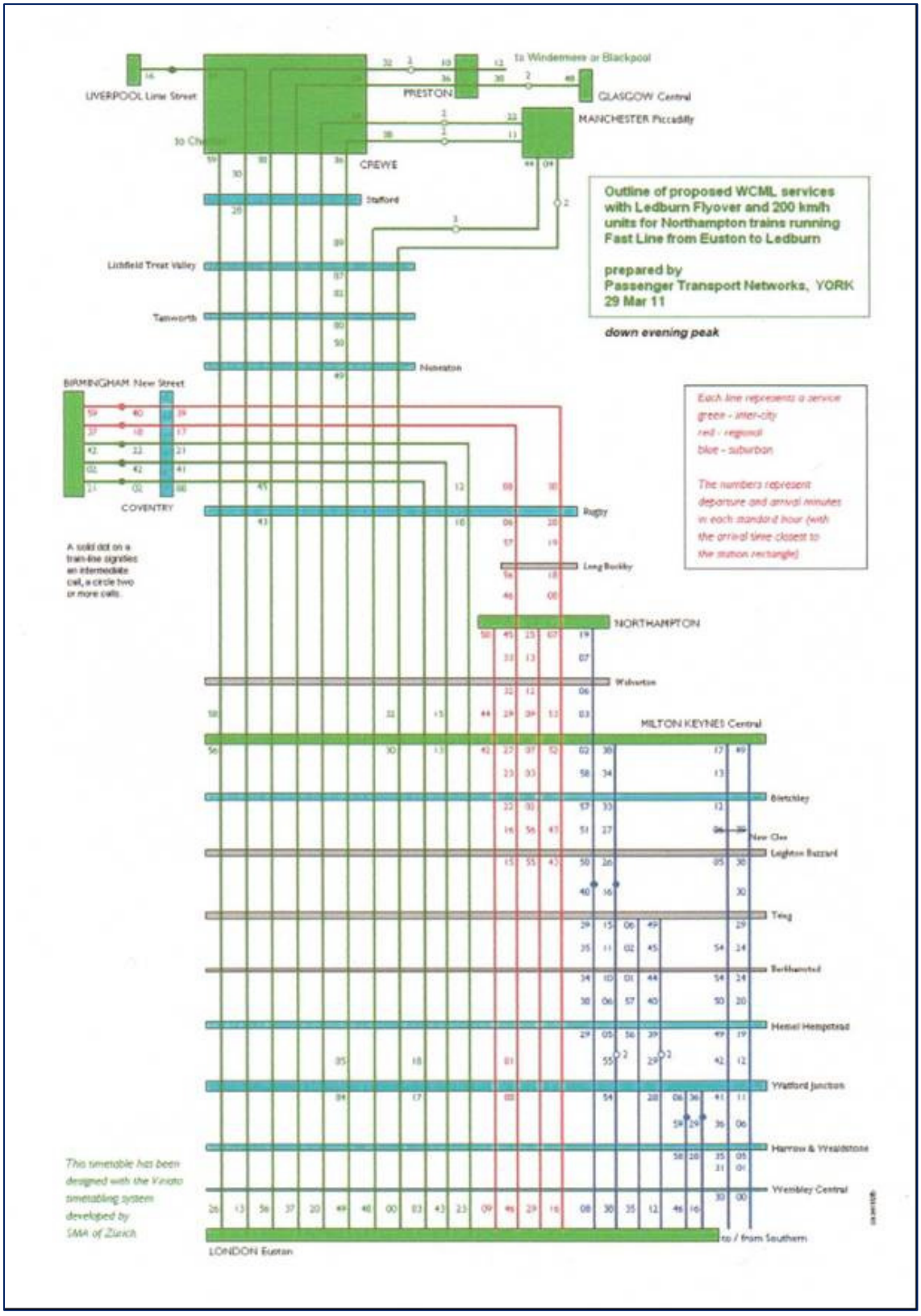


TABLE 1.2 CAPITAL EXPENDITURE: RP2 COMPARED WITH OPTIMISED ALTERNATIVE

Scheme	Scenario B (£bn)	Optimised Alternative (£bn)
Stafford area bypass	1.230	1.230
Ledburn grade separated junction	0.243	0.243
Euston station – 3 extra platforms	0.062	N/A
Manchester Piccadilly – 3 extra platforms	0.395	N/A
Attleborough to Brinklow – 4 tracking	0.187	0.187
Northampton Loop speed improvements	0.003	0.003
Beechwood/Stechford 4 tracking	0.903	N/A
Power supply + disruption + other items (+24%)	0.737	0.390
Total	**3.759**	**2.062**

Scenario B schemes are identical to those for RP2, and are shown in "Strategic Alternatives to the Proposed "Y" Network, page 41 (http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf)

1.37 **Freight.** Freight traffic uses the "slow" lines during the daytime, and would only be affected by increased InterCity services at pinchpoints which would be eased (chapter 6). In addition, the current upgrade of the Felixstowe – Nuneaton route will allow diversion of over half the existing freight trains south of Rugby, creating significant capacity for future growth.

1.38 Freight capacity issues are discussed in more detail in Chapter 7.

East Coast Main Line

1.39 Overall seating capacity can be increased by 87% by the committed frequency increase from May 2011, the introduction of planned higher capacity trains ("IEP"), the use of higher capacity trains on open access services, and a further timetable revision to allow an extra train per hour on the route, as envisaged in Network Rail's East Coast Main Line 2016 Capacity Review (December 2010).

1.40 In the longer term, further capacity increases can be delivered with infrastructure enhancements costed at £1.159 – 1.615 billion. With improved demand management, the 115% background growth forecast for 2043 in DfT's HS2 documentation can be readily absorbed without further major infrastructure

enhancements. There is therefore no case for construction of HS2 to meet any need for increased capacity on the East Coast Main Line for the foreseeable future.

Midland Main Line

1.41 Almost half the trains arriving at St. Pancras during the morning peak period have standing passengers, but this is entirely due to relatively short distance commuting from Bedford, Luton and Luton Airport Parkway - the current average all day load factor south of Leicester is only 39%.

1.42 The Thameslink project, now under construction, will deliver a major increase in capacity south of Bedford, with train lengths extended from 8 to 12 cars. When this additional capacity is delivered, the Thameslink service will be a good alternative for passengers who currently use Midland Main Line trains. It is certainly not value for money to provide additional long distance capacity solely to provide short distance commuting capacity between Bedford and London.

1.43 DfT's future forecast demand growth of c100% can therefore be met without any significant further infrastructure investment. This can be delivered through a combination of lengthening InterCity trains and transfer of some short distance London commuter traffic to Thameslink services, once additional capacity is available as an output of the Thameslink project.

1.44 There is therefore no justification for the service levels or scope of infrastructure work proposed by DfT in the Alternatives Study[7].

Conclusions

1.45 The above analysis shows that there is no case for construction of HS2 on capacity grounds. Future foreseeable growth can be met by incremental cost effective measures, delivering earlier benefits when needed and avoiding the "all or nothing" approach which is inevitable with HS2.

[7] High Speed Rail Strategic Alternatives Study, February 2011 http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf

Chapter 2

Economic and Business Case

Prepared by Wharf Weston

2 ECONOMIC AND BUSINESS CASE

Prepared by Wharf Weston

2.1 This chapter relates to the following questions listed by the Committee:

- 2.1 – implications for domestic aviation
- 3.1 – how robust are the assumptions and methodology and the impact of lost revenue on the "classic network"
- 3.2 – Alternatives – upgrading the WCML
- 5.4 – Major beneficiaries of HSR make an appropriate financial contribution

2.2 The case DfT make for HS2 is not a commercial one, but a social cost benefit assessment made in line with the NATA approach. The £17bn required subsidy is justified by £44bn of economic and social benefits. However there are serious issues with the HS2 assessment:

- *Subsidy*: long distance rail travel is an odd priority for government subsidy, given the recipients are generally affluent and it encourages more travel.
- *Forecasts*: evidence suggests demand is substantially overestimated – the doubling by 2043 should be less than half that increase, and the trebling with HS2 less than doubling.
- *Benefits*: the principle benefits depend on an outdated view of how people use their time on trains, causing both productivity and benefits to be significantly overstated.
- *Comparator*: HS2 is assessed against an unrealistic comparator (and not the best alternative, or even alternatives developed by DfT) which makes HS2 appear to have benefits much greater than it should e.g. crowding benefits.

2.3 Revising DfT's demand and benefits assessment reduces the £44bn for the 'Y' to about £14bn, and the benefit cost ratio (BCR) from 2.6 (including Wider Economic Impacts) to about 0.5. If our key concerns have a lesser impact, the BCR would still only reach about 1.0.

Justification for Subsidy

2.4 While HS2 is justified in terms of its social benefits, even on DfT's assessment, the BCR is not sufficiently high in itself (2.2 to 2.6), and less for Phase 1 (1.6 to 2.0), that it justifies priority over many other transport projects. There are two concerns with the subsidy:

- *Encouraging more travel:* The subsidy, in providing a new railway at less than its cost, encourages additional travel – particularly business travellers[1]. The first stage of HS2 will induce 10.5 million extra journeys per annum – journeys that would not otherwise be made. This sits unhappily with Government's initiative to encourage alternatives to business travel[2].
- *Subsidising the affluent:* The subsidy also has the regressive property that it supports the mainly affluent users of long distance rail. As Figure 2.1 shows, the top quintile of households by income do 47% of the long distance train travel currently. It is unexpected to seek to subsidise those who can best afford to pay the full cost.

DEMAND FORECASTS ARE OVERESTIMATED

DfT Forecasts[3]

2.5 The forecasts of demand for HS2 are crucial to its economic case, as passenger numbers directly relate to the level of additional fares income and the scale of economic and welfare benefits. DfT's 2011 forecasts for the London–West Midlands (phase 1) are in Table 2.1, with the breakdown of HS2 journeys in Table 2.2, together with a revised indicative forecast.

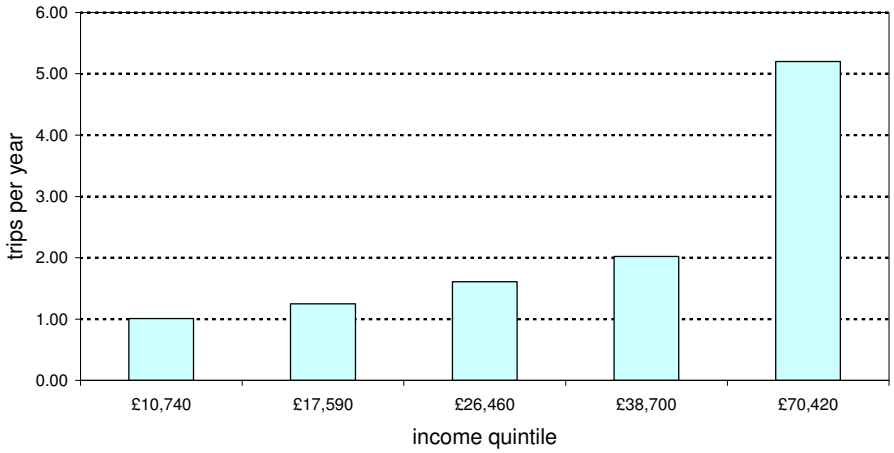
2.6 DfT have not provided sufficient information to do a similar analysis for the full "Y" network.

[1] HS2 Ltd estimate 37% of the new journeys on HS2 would be business travellers ('Demand for Long Distance Travel' April 2011,section 6.18 page 15, compared to an all HS2 traveller average of 30%

[2] Norman Baker (Parliamentary Under-Secretary of State for Transport) holds this portfolio responsibility

[3] HS2 Ltd actually do the forecasts, but they are done to Department for Transport (DfT) rules

FIGURE 2.1 LONG DISTANCE RAIL TRIPS BY HOUSEHOLD INCOME



Source: 'Modelling Long-Distance Travel in the UK', Charlene Rohr, James Fox, Andrew Daly, Bhanu Patruni, Sunil Patil, Flavia Tsang. RAND Europe, NTS 2002/5, income data 2005/6 ONS

TABLE 2.1 TOTAL LONG DISTANCE DOMESTIC TRIPS

	Increase 2008 to 2043	Average Annual Rate
Total Long Distance Rail (Over 100 Miles)	60%	1.4%
WCML (South Of Milton Keynes) without HS2	102%	2.0%
WCML (North Of Milton Keynes) without HS2	127%	2.4%
HS2/WCML with HS2 Phase 1	209%	
Domestic Air	128%	2.4%
Car	54%	1.2%
Total Long Distance Without HS2 (All Modes)	66%	1.5%

TABLE 2.2 COMPONENTS OF DEMAND

Phase 1	DfT Feb 2011 forecasts for 2043				WW revised forecast
	%[4]	Journeys per Day	Journeys per Year (m)	Increase over 2008 Base (50,085[5])	Increase over 2008 Base (50,085)
WCML (without HS2)		100,961	35.3	102%	38%
Switch from Rail	65	88,467	31.0		
New Trips	22	29,943	10.5		
From Air	6	8,166	2.9		
From Car	7	9,527	3.3		
Total on HS2	100	136,103[6]	47.6		
HS2 to HS1		5,926[7]			
Remain on WCML		12,494[8]			
Total WCML + HS2		154,523		209%	81%[9]

2.7 DfT's forecasts show a doubling in WCML rail demand (102%) without HS2 (i.e. 'background growth'), and a trebling (209%) with HS2 (phase 1). Using more justifiable assumptions, discussed below, Wharf Weston (WW) estimate an indicative revised forecast of 38% (i.e. less than half the doubling), and 81% respectively i.e. to not quite double, with HS2.

2.8 The DfT describe their forecasts as 'conservative', but put in context this is difficult to justify.

Context

2.9 *Domestic travel and income:* DfT's forecast depends on long distance domestic travel growing with increases in real income[10]. However evidence demonstrates that this link is breaking down:

[4] 'Economic case for HS2', Feb 2011, Table 3

[5] The historical 2008 base was changed (from about 45k to 50k between 2010 and 2011 forecasts)

[6] 'Economic Case for HS2' Feb 2011, Figure 3, page 20

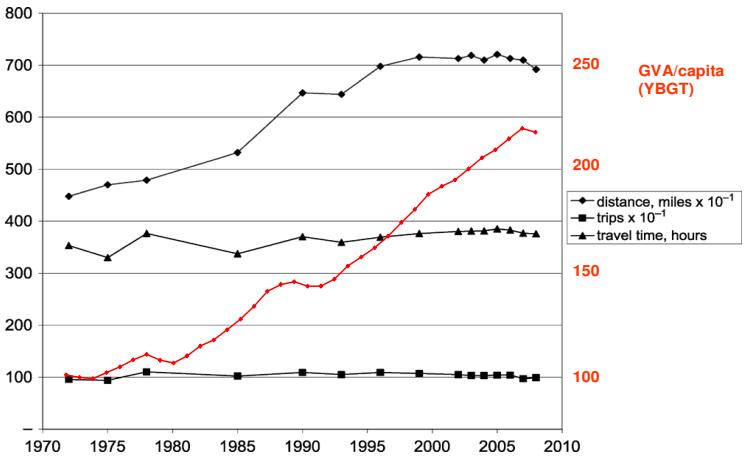
[7] Economic Case for HS2' Feb 2011, section 3.3.22 page 24, gives 4,850 using HS2 to go onto HS1 in 2033, escalating this at the rate of background growth (2%/annum) to give a 2043 figure

[8] Assuming all transfers from classic rail are from WCML. This is inconsistent with the 14,000 given at 'Demand for Long Distance Travel' April 2011, Section 6.3. The number remaining on WCML will be higher, and some transfers are from Chiltern Railway, but there is no basis to estimate this accurately. The information has been requested from DfT.

[9] Excludes HS1 passengers

- Since the mid 1990s domestic travel per person has not been growing despite real incomes (GVA/capita) increasing by about a third (34%). Prior to this, journey length did seem to be increasing with income. See Figure 2.2.
- This decoupling of domestic transport from economic growth is not specific to the UK, but applies to the European developed economies.[11] And Crozet in an OECD discussion paper observes: *"…In Germany, the UK, Italy and France, domestic passenger traffic has been more or less flat since the early 2000s."* [12] Economic growth however continued.
- Long distance trips per person have been constant since 1995. See Figure 2.3. People are not making more trips as average real incomes increase (although higher income groups make more trips than lower income groups). DfT however forecast the over 100 mile trips (all modes) will increase by 36% from 7 to 9.5 per person by 2043.

FIGURE 2.2 TRAVELLING TIME, TRIPS AND DISTANCES PER PERSON (COMPARED WITH REAL GVA/CAPITA[13]



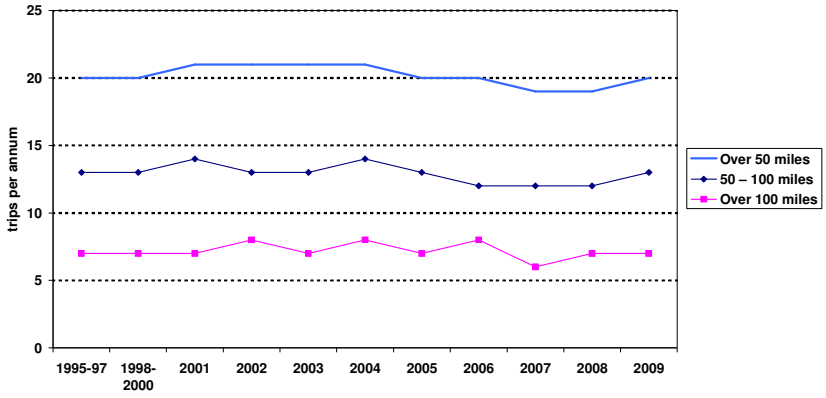
[10] DfT state in 'HSR Consultation: Future Demand for Long Distance Travel' 'as people become more prosperous they make more long distance journeys'

[11] see Transport at the Crossroads' EEA Report 3/2009, for decoupling in Europe using Eurostat data

[12] 'The Prospects for Inter-Urban Travel Demand', Y. Crozet — *Discussion Paper 2009-14* — OECD/ITF, 2009, section 2.2

[13] Based on analysis by Dr Metz based on NTS 2008 Table 2.1 with GVA/capita trend added

FIGURE 2.3 LONG DISTANCE TRAVEL PER PERSON (NTS037)[14]



2.10 *Population growth*: DfT say population growth boosts demand for travel, but population grows slowly. Over the last 15 years demand grew with population but only by about 5%. Population is forecast to grow by 22% to 2043, explaining about a fifth of DfT's 102% rail forecast.

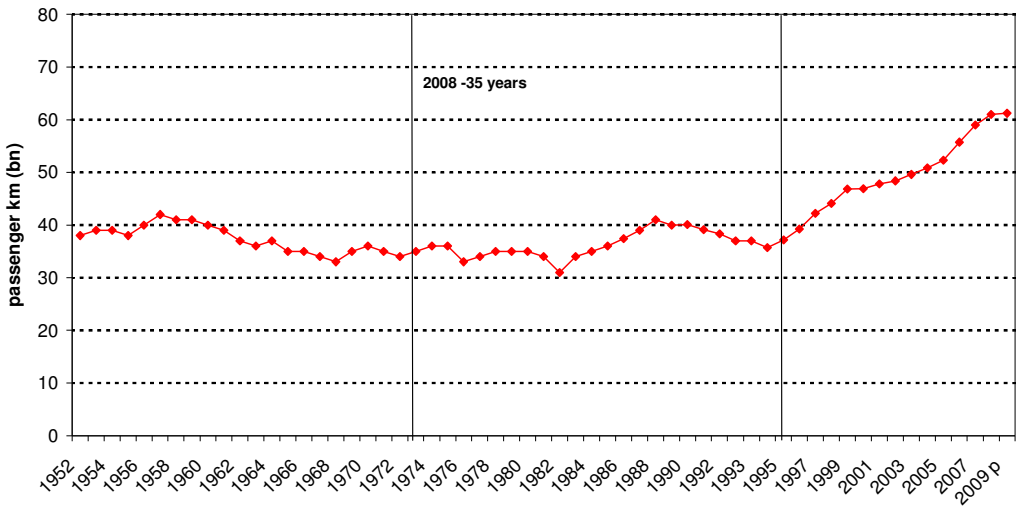
2.11 *Past rail growth*: within an overall lack of growth in domestic travel/person, rail has grown strongly (3.9%/a) over the last 15 years, mainly by modal shift (from coach and car). But it did not grow at all over the previous 40 years (see Figure 2.4), not even with population. If the past 15 years are relevant to future rail growth, the drivers of that growth need to be understood:

- Privatisation and the accompanying increased investment and improved services.
- Airline-style pricing, and price increases limited with the extra cost met by extra subsidy).
- Mobile technologies (phones, laptops, wifi, broadband) making trains a more productive and enjoyable environment in a way that has not favoured other transport modes.

2.12 Some of these have run their course, others have more potential (e.g. improved services and mobile technology), but rail's modal share cannot be expected to expand indefinitely.

[14] Based on analysis by Dr Metz based on NTS 2008 Table 2.1 with GVA/capita trend added

FIGURE 2.4 LONG TERM RAIL GROWTH



Source: Transport Statistics of GB, 2010 release, Table TSGB0101

2.13 The context is one of a saturating market for travel within which rail has increased its share.

Use of Rail Model (PDFH) for a 35 Year Forecast is Unsound

2.14 The forecasting model that DfT uses relies on relationships extracted from the past for factors such as population, economic growth, fares, journey times, etc, to derive a rail demand forecast. This type of model is inherently best suited to short to medium term forecasts, where shifts in these key relationships are less likely to happen.

2.15 It is generally accepted that to take account of market saturation it is necessary to stop, or cap, the projections at some point. This is particularly important given it is a fixed elasticity model i.e. it assumes people spend ever increasing proportions of income on travel. Different views are taken as to when growth should be capped:

- DfT recommend a normal horizon for projecting increases to 2026[15] i.e. 18 yrs (2008-2026).
- Sir Rod Eddington thought that a 10 year period was long enough[16].

[15] Webtag unit 3.13.1 Section 3.3. DfT August 2007. It says central case should cap growth at 2026

[16] 'Inter Urban Rail Forecasts' section 3.17. Whilst the trends may be a consistent basis for forecasting forward through time, they do not account for saturation of demand in the rail market, and as such, confidence in such an uncapped forecasting procedure must reduce considerably for forecasts beyond 2016.' Eddington, 2006

- Network Rail see a cap as essential[17], but express concerns about using PDFH for long term forecasts at all. They observe that PDFH was calibrated during a period of rapid rail growth, and has already been amended three[18] times to reflect behavioural changes.
- DfT used a 25 year period (to 2033) for their March 2010 forecast, justified on the HS2 completion date, rather than the capabilities of the model[19]. Given the cap concerns the 'background growth' (not induced demand for HS2 itself) this is difficult to understand.
- DfT in their new February 2011 forecast extend this to 35 years (to 2043) i.e. to twice their own 18 year norm. This looks unsound in the context of the past 35 years (i.e. from 1974, see Figure 2.4), as only for the last 15 years has there been any growth in rail travel at all.

2.16 DfT, on their own admission[20], say they are not forecasting demand, but are estimating how long a doubling takes, which they have independently decided (without evidence) will happen.

2.17 *Indicative revised forecast*: capping demand after 25 years (as in DfT's 2010 forecast), but at 2011 growth rates[21], reduces the rail 'background growth' increase from 102% to 65%.

Version of Rail Model Used Assumes too much Growth for Longer Journeys

2.18 DfT continue to use an outdated version of the rail model (PDFHv4.1) in which the 'income elasticity' factors forecast longer journeys to grow more quickly than shorter ones. For 1% more income, people in Birmingham are expected to spend 2.5% more on travel to London, whereas in Glasgow it is 2.8% more. This feature is recognised to be a problem:

- DfT issued Draft Guidance (which has yet to be adopted) which imposes a cap (at 2.5%).

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[17] 'Network Route Utilisation Strategy: Scenarios and Long Distance Forecasts' Network Rail, June 2009, Section 5.2 page 34

[18] Now five times, with the issue of PDFH4.1 and PDFH5.0

[19] 'HS2 Demand Model Analysis', HS2 Ltd, February 2010, section 3.2.6 page 31

[20] ' *For our earlier work we capped growth of rail demand in 2033, at a level of demand in the WCML corridor that is slightly more than double current levels. With the lower current GDP forecasts, this cap would now be hit later, in 2043.*'
'Economic Case for HS2', DfT, February 2011, section 3.2.9 page 15

[21] average 2%/a (not 3.3%/a in 2010 forecast) includes the economic downturn and price increases

- The current model (v5.0) removes the problem e.g. 1.9% would apply to both journeys, but despite research (for DfT and others) confirming the feature incorrect[22] v4.1 is still used.

2.19 *Indicative revised forecast*: if the demand forecast for HS2 were redone with v5.0 'income elasticities', it would reduce the increase in 'background growth' from 102% to about 68%.

Rail Model Assumptions Overestimate Uplift in Demand due to HS2

2.20 DfT also expect HS2 itself to induce demand because of its shorter journey times – taking demand from doubling due to 'background growth', to more than tripling with HS2. The uplift for HS2 (Phase 1) represents a further 47,000 passengers/day (i.e. a 54% increase over those transferring from classic rail). There are concerns that the uplift is overestimated:

- PDFHv4.1 is based on journey time relationships that pre-date the development and market penetration of the technologies that have made time on trains more productive.
- Evidence from the last WCML upgrade (that DfT cite) shows a 36% increase in demand for an average 34 minute reduction in journey time[23]. In fact WCML improvements were larger with major increases in service frequency too, and the HS2 journey time saving will be on average smaller for the first phase of HS2. WCML could only partly reflect the reducing value of journey time savings. The 36% is therefore a high estimate of uplift.

2.21 *Indicative revised forecast*: assume HS2 demand uplift uses last WCML upgrade figures.

Summary of Adjustments to Rail Forecast

2.22 Combining the above three factors would result in a 'background growth' of only 38% to 2033 and staying at this level (compared to DfT's 102% to 2043), and increasing to 81% with phase 1 HS2 uplift to 2033 and remaining at this level (compared with DfT's 209% to 2043).

[22] The findings of research by Oxera and Arup were publicly presented at Transport Economists Group in February 2011 (by Oxera, Arup and DfT)

[23] 'Demand for Long Distance Travel' April 2011,section 6.19 page 16 (the 36% relates to 2006 to 2009)

2.23 The adjustments we have made are intended as indicative of the overestimate. They do not attempt to remodel demand, but have been based on specific identifiable factors.

2.24 We also apply a 50% sensitivity to the adjustments. Demand with HS2 uplift then increases from 81% to 139% to 2033 and stays at this level (compared to DfT's 209% to 2043).

2.25 The demand forecast has a major impact on the schemes value for money (the BCR):

- If the WW indicative forecast is used the BCR for the full "Y" network reduces to 0.8 (without WEI) and 1.1 (with WEI). This compares with 2.2 and 2.6 for HS2.
- Applying the 50% sensitivity to our adjustment, the 'Y' BCR still reduces to 1.3 and 1.6.

2.26 *Premium fares:* DfT presume no premium fares for HS2, and they assume classic services will not compete on fares (despite the freed up capacity). If premium fares were to apply (as many believe will happen) then the demand uplift for HS2 would reduce, as would those transferring to classic services (eroding the £5.4bn saving that the business case currently assumes). No adjustments are made for these affects

2.27 These outcomes suggest that the case for HS2 is not robust to plausible adjustments to demand forecasts, even putting aside other issues.

Sensitivities not Done on Key Income Related Assumptions

2.28 It is common ground that there is uncertainty with long term demand forecasts. We would expect DfT to show that HS2 is robust to plausible different views of key parameters:

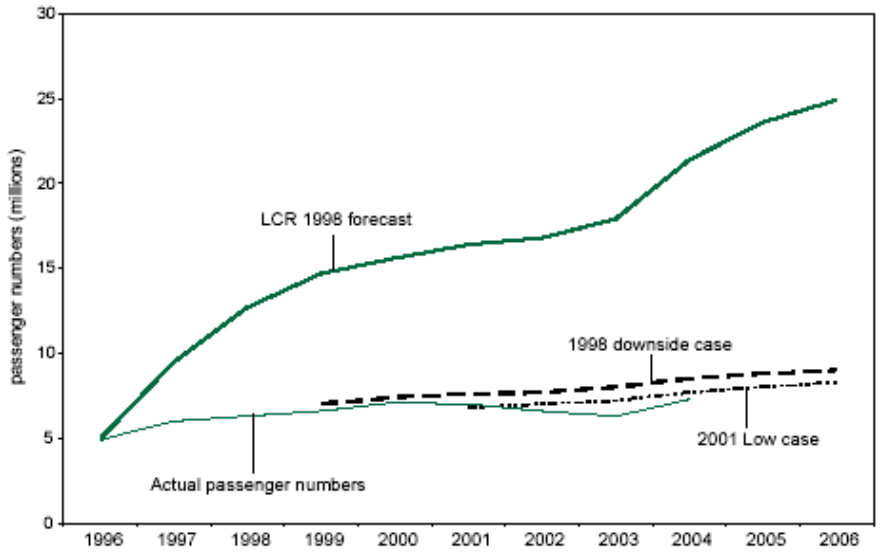
- DfT's own guidance[24] requires sensitivity analyses; but the stated tests in webtag were not done, nor PDFHv5.0 factors used (as discussed with Analytical Challenge Group).
- Developing different scenarios e.g. downside case (as Challenge Group discussed).
- Applying lessons from previous experiences e.g. HS1, given DfT's track record.

[24] Webtag unit 3.15.4 (section 6.1.1 page 7), states the alternative elasticities to be used for sensitivities

2.29 In the 2010 case HS2 Ltd showed that a 20% shortfall in their forecast reduced their BCR from 2.4 to below 1.5. Even this simple sensitivity has not been repeated.

2.30 The Public Accounts Select Committee[25], criticised the HS1 forecasts for being optimistic and DfT undertook "to factor more severe downside assumptions" in future assessments. As Figure 2.5 shows demand fell short of even the low scenario. By 2009 demand was still only just 37% of the original LCR forecast.

FIGURE 2.5 HS1 PASSENGER NUMBERS



2.31 The explanation that caused the forecast to be optimistic, that competition was not foreseen, is a concern given that competition has been sidelined for HS2.

2.32 Excessive demand forecasts are frequently produced in support of rail projects. More than 9 out of 10 rail projects have demand overestimated, on average by a factor of two[26].

2.33 Given the history of demand overestimation in similar projects, it is surprising to find that DfT are not heeding there own advice, as stated in 'Delivering a Sustainable Railway' in 2007 :

[25] Select Committee on Public Accounts, Thirty-Eighth Report, and C&AG's Reports, HC 77 of Session 2005/6, Fig. 8

[26] 'Inaccuracies in Traffic Forecasting' B Flyvbjerg, M Skamris Holm and S Buhl. Transport reviews, Jan 2006

"Forecasts have been wrong before, and any strategy that tried to build a rigid investment programme based on fixed long-term forecasts would inevitably be wrong again."

Air Forecast

2.34 A detailed review of aviation impacts are given in Chapters 11 & 12 and below is an overview of the DfT assumptions for air transfers to HS2.

2.35 DfT estimate 6% of HS2 passengers (about 8,000 journeys/day or 2.9m/a) switch from air. This figure increases to 6m/a for the Y (but with no supporting detail). Both look optimistic:

- To generate even 6%, DfT must assume that the domestic air market grows – they forecast by 128% to 2043 (last year they said 178% by 2033) – and their forecast is no longer constrained by supply[27], i.e. it is not all real air journeys that switch to HS2. That much real growth could not occur without extra runway capacity for London (and hence some of the 6% is new journeys rather than modal transfer).
- The forecast 2.9m/a is about 95% of current passenger levels on the relevant air market (London - NW/Scottish lowlands) and half if all London airports included (yellow bar).
- The actual trend in domestic air demand, particularly in the relevant routes, is declining, and scope for modal shift looks limited.

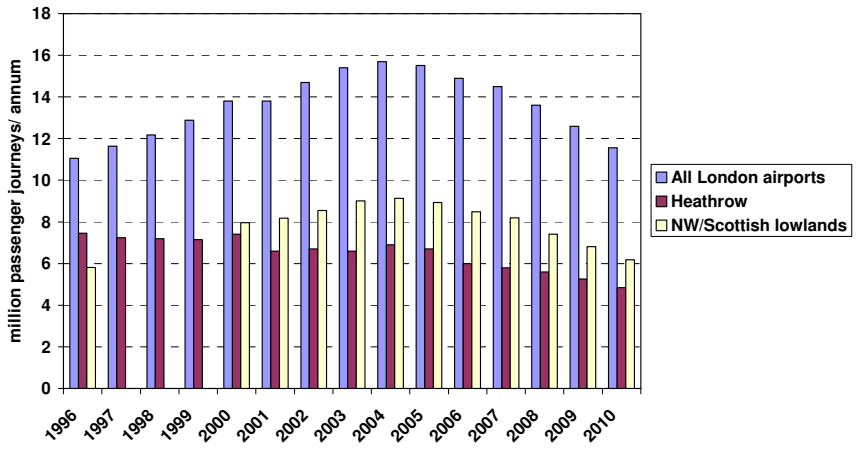
2.36 Figure 2.6 shows what has been happening to London domestic air demand (CAA figures[28]). Domestic air services for London have actually been declining since the mid 2000's (from before the recession). This will reflect the time penalties imposed by tight security, and the improved intercity train services winning on key routes.

[27] 'Economic Case for HS2'. section1.1.8 page 7

[28] CAA UK airport statistics, Table 10 2 Domestic terminal passenger traffic, Table 12 2 Domestic air PAX route analysis

FIGURE 2.6 LONDON DOMESTIC AIR PASSENGER NUMBERS

Figure 6: London domestic air passenger numbers



2.37 It is generally agreed that rail may replace air where rail journeys are under about 3 hours[29]), with rails percentage falling off sharply above 2.5hrs[30]. These times may have lengthened due to security issues, but if this is still relevant in 2026, it may apply to HS2. Given that the HS2 journey times to Glasgow and Edinburgh with the "Y" are 3 hr 30 -40 minutes, and the fastest Edinburgh-London train is already only 4 hours, the modal transfer looks optimistic.

Benefits are Overstated

2.38 The key benefit of HS2 in its economic case is the value of the shorter journey times. It accounts for £18bn of the £44bn benefits, £14bn of which depends on the assumption that time savings translate into greater productivity for business travellers.

2.39 Business time is valued at the cost to employers of the time; leisure (and commuter) time at willingness to pay values. The former are around 8.5 times that of the latter. These values relate to research conducted on data over a decade old. The business time values are increased in line with real per capita incomes, and those for leisure passengers at 80% of this increase, so unlike costs that erode during the 60 year assessment period (lasting to

[29] 'High Speed Rail Investment: An overview of the literature', Network Rail, 2009, Chris Nash

[30] Michael Mann op cit

2092 for the second phase of HS2), these benefits are very influential on the assessment.

2.40 There are two serious problems that both concern use of outdated assumptions:

- *Productivity*: no account has been taken of the impact of modern technology in making on-board time useful and enjoyable – it is assumed at zero (wholly wasted), and so every minute of journey time saving is assumed to translate into a minute extra productivity.
- *Unit costs*: the cost of business time DfT use relates to when there were relatively few business travellers and they were typically the high earners (£70k/pa in 2009 money).

Productivity

2.41 DfT now accept that at least some time on board trains is already productive[31] i.e. businessmen do work on trains. This is unsurprising as it is common knowledge. The surprise is that it has not been reflected in DfT's assessment framework. The issues are:

- *Technical feasibility:* There are some limitations at present e.g. patchy mobile phone and broadband coverage, but these are unlikely to be issues by 2026 when HS2 commences.
- *Time at seat:* Not all time on board a long distance train can be productive e.g. finding a seat, getting out papers, computer, packing up is not productive. However this happens irrespective of the journey length. Any reductions in journey time e.g. 30 minutes, directly correspond to less time available in the seat i.e. 30 minutes. What matters is how time is used in the seat compared to where else one would have worked e.g. home, office. If working on the train is as productive as elsewhere, then productivity benefits should not flow from having a shorter journey.
- *Period of working:* Business travellers are unlikely to spend all their time working, but this is similar to the normal workplace or when they work from home. Travellers may have a cup of coffee or a meal, but shortening the journey and preventing this does not generate more productive time – unless the coffee or meal would be foregone.

[31] Economic Case for HS2: The Y Network and London – West Midlands', February 2011 para 7.3.2 and 7.3.3 page 51

- *Impediments:* There are impediments for some people and occupations - if you get travel sick it precludes work, if you need privacy or cannot do your specific work on a train (because you are a service engineer), but for 'briefcase travellers' (main business group) this will not generally be a problem. Crowding is an impediment and discussed below.

2.42 Similar issues apply to the value of on board leisure time.

2.43 DfT observe in the consultation that such a change to the assessment framework cannot be made in isolation[32]. However, they are wrong to conclude as they do that HS2 can recover the lost benefits through a reduction in crowding being more valuable. As discussed below, compared to realistic alternatives HS2 actually has greater crowding (58%) compared with even the DfT alternative RP2 (51%). Neither are they recovered by productive gains from modal shift from air or car. Air will shortly support the same technologies that make trains productive, and any benefit to the 7% of travellers from car would be swamped by the 87% of HS2 travellers with much reduced benefits.

2.44 The implications are, notwithstanding, substantial:

- *Overcrowding:* this is not just an issue of minor inconvenience but a productivity issue. It bears on HS2, as the alternative of uprating the existing rail network can be done more quickly and so prevent crowding developing.
- *Full 'costs'*. The 'full costs' of train journeys for business and (to a lesser extent) leisure travellers has therefore been reducing, which will have been a material factor in the recent increases in long distance rail demand, but will not continue indefinitely.
- *Very high speed:* the basis for determining how fast high speed rail should go has been undermined, as this inherently involves trade-offs between journey time savings against capital, operating, climatic and environmental costs. With a materially reduced value of time savings, the previous view of the best balance needs to be reconsidered. The same problem affects the route selection process, as it has presumed the straighter faster route has substantial benefits due to its journey time savings. This may not in fact be the case.

[32] op cit

2.45 DfT's failure to take account of changes in the usefulness of time on-board trains not only invalidates their assessment, but calls into question the choices made about speed and route.

Unit Costs (for Valuing Time Savings)

2.46 The unit costs are an issue because, with increasing rail business travel, the higher numbers of trips require a broader base of travellers to make them. A further near quadrupling in business travel forecast for HS2 between 2008 and 2043 (against a population increase of just 22%) must be expected to have an effect. It becomes unreasonable to assume that such travellers could be composed predominantly from the earnings elite, as DfT's figure does (their figures translate into £70k/a salary in 2009 money).

2.47 A reduction of earnings to the average for 'Managers and Senior Officials'[33] (at £47k) would still put earnings into the top decile, but reduce the level by a third. This overstatement would by itself remove about £7bn from the £44bn benefits, as it affects time savings and reliability.

Unrealistic Comparator

2.48 For most small and medium sized projects that are appraised using Green Book and webtag a 'do minimum' provides a suitable base for assessment purposes. However for major schemes such as HS2 it is no more realistic than a 'do nothing', especially over time scales as long as HS2.

'Do Minimum'

2.49 The assessment of HS2 is done against a 'do minimum' case. This means no improvement to capacity or services beyond those already committed[34]. This is unrealistic as:

- The infrastructure clearly requires renewing over the next 30 years: use of a 'do minimum' implies ignoring all the opportunities for improvements that renewals offer.
- It is questionable whether this approach is consistent with DfT's guidance[35] that envisages addressing anticipatable problems within the 'do minimum' case.

[33] ASHE 2009 (ONS survey) mean gross annual average earnings for occupation code 1 ((£47k)

[34] On WCML this involves extending part of fleet to 11 car, 4 new sets and IEP. It however excludes Evergreen 3, that reduces the Birmingham London journey time on Chiltern Railways, that will win business from WCML, delaying the requirement for any additional WCML capacity.

- Demand/capacity is not managed to prevent for example overcrowding[36]. It is inconceivable that if Government were faced with further substantial increases in demand that it would fail to enable further capacity and permit very high levels of overcrowding.
- High benefits from crowding relief and service frequency improvements are artificially created by the improbable assumption that the crowding would be left unaddressed.
- The appropriate test should be whether HS2 is better than the 'best' alternative.

Best Alternatives

2.50 Development of the *best alternatives* is entirely in line with NATA, and is in fact a requirement[37]. We assume a best alternative to be one that satisfies forecast demand either commercially or with the highest BCR (with evidence for other objectives being poor). However, no 'best alternatives' were developed, as discussed below.

Other Developed Alternatives

2.51 DfT did however have alternatives developed, e.g. Rail Package 2 for WCML, but even then they were not compared with HS2 in the business case. If they had been it would have been clear that there were cheaper, more cost effective alternatives that could be implemented earlier and in stages against developing demand.

2.52 However, DfT go to considerable lengths to present HS2 as having no viable alternatives, by developing transparently sub-optimal options, conducting assessments on dissimilar bases and misrepresenting results. Examples are:

- *Sub-optimal options*: In the analysis of rail alternatives for the consultation[38] there is no attempt to cost effectively provide for the forecast demand, with many of the Y options producing very high levels of capacity that would be seriously underutilised.

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[35] Webtag unit 2.5

[36] '…….Do Minimum matrices for rail (and road) are estimated by uplifting constrained (i.e. ex-post / observed) 2007/8 demand for exogenous influences only, with no attempt to estimate levels of underlying unconstrained demand, or the effects of changes in supply/congestion occurring after 2007.'

[37] WebTag Unit 3.13.1 Guidance on Rail Appraisal, section 3.2.2

[38] 'High Speed Rail Strategic Alternatives to the Y Network', DfT (Atkins), February 2011

An important benefit of improving the existing network is that this can be done quickly and incrementally, preventing economically costly crowding from developing and avoiding the risk inherent in relying on long term forecasts. Incremental implementation is ignored for the assessment. All elements of the options are implemented when HS2 is e.g. 2026.

- *Capacity they produce*: The Secretary of State and Theresa Villiers[39] repeatedly claim that the alternatives e.g. Rail Package 2 (the most favourable alternative DfT had developed to HS2's Phase 1) are not credible[40] or practical[41] It is claimed they cannot provide sufficient capacity to meet demand. But RP2 in fact delivers 151% more capacity (not 50%) when assessed on the same basis as DfT forecast demand (at 102%)[42].

- *Disruption they produce*: Government have repeatedly said that uprating existing lines would cause unacceptable levels of disruption – similar to the previous WCML upgrade despite the completely different scale of change[43]; that the Euston rebuild work on three new platforms for RP2 would be greater than the 8 year rebuild for HS2 (described as 'like open heart surgery on a conscious patient[44]'); there would be greater demolition of houses involved with alternatives (a subsequent FOI[45] confirmed DfT had no such evidence). Work has been done (see Chapter 1 on Optimised Alternative) that shows that forecast demand can be met through rolling stock changes, with little or no interference with railway operations (and the three new Euston platforms are not required). Even with RP2, the disruption would be minor compared to that from HS2

- *Costs*: DfT had RP2 reviewed in 2010/11 to bring it in line with 2011 HS2 assessment. A 41% increase to operating costs for optimism bias was introduced[46], despite not being included in 2010 and extensive practical experience of such costs for WCML (by contrast to HS2 that has

[39] 31 March 2011,(Westminster Hall debate on HS2);

[40] Philip Hammond at 'High Speed Rail Transport Times Conference, 4 November 2010

[41] Response by Philip Hammond to oral question raised by Tony Baldry, MP (28 October 2010)

[42] see 'Briefing note on Demand, Capacity and RP2', April 2011, HS2AA.

[43] 'More capacity on WCML: an Alternative to HS2' Section 5, March 2011,HS2AA

[44] HSR Summit by New Civil Engineer and Infrastructure Journal (reported April 2011 Modern Railways)

[45] Response to FOI request ref: P0007057, 10 December 2010 to B Weston

[46] High Speed 2 Strategic Alternatives Study, London to West Midlands rail alternatives – update of economic appraisal, Atkins, Feb 2011 (9 March, released to DfT website not library late March 2011

consistently attracted the same 41% bias). Rolling stock costs for WCML are also inflated by optimism bias and re-assessment, despite costs being clearly understood from the current Pendolino procurement.

- *'Do minimum' comparator'*: The 2010/11 re-assessment of RP2 changed the basis of the do-minimum comparator (extending all trains to 11 car) from that used for the 'do minimum' comparator for HS2, and hence removing some of the benefit attributed to RP2.
- *Value for money:* In the March 2010 business case, although RP2 had a significantly better BCR (3.63)[47] than HS2 (at 2.4). The 2010 White Paper concealed this by showing figures for 'medium scale rail upgrade package'[48] with rolling stock costs assessed on a different and more expensive basis than HS2. In the 2011 business case the same happened again with RP2 that relates to Phase 1 bundled with the Y alternatives that appear poor value for money reflecting the inappropriateness of options developed.
- DfT take no account of the effect of risk on the expected outcomes, which would favour the short lead time and incremental character of enhancements to the existing network.

2.53 The result of the failure to develop proper alternatives, and to compare HS2 against them, invalidates the economic assessment DfT presents.

Adjusting the Assessment

2.54 It is not practicable to put the assessment of HS2 onto a sound footing, it is only possible to make a number of simple adjustments to illustrate the extent to which the economic case for HS2 may change were more appropriate assumptions made.

2.55 There are also serious doubts about its technical deliverability of the service pattern proposed for the "Y" network is that. This involves 18 trains/hr in the peak, with no services specified to Heathrow or onto HS1. Existing technology cannot deliver 18 trains/hr on HS2, with 15 trains/hr a likely maximum[49]. This is not even discussed in the business case materials. A review of the technical deliverability is given in Chapter 4. However we are not able to adjust the assessment to reflect this.

[47] 'High Speed 2 Strategic Alternatives Study – Strategic Outline Business Case'

[48] Table 2.4 page 51, 'Mid-scale rail upgrade package'

[49] Greengauge21 July 2010 HS2 Interfaces Report

2.56 We assume that the best alternative against which HS2 is assessed is made up of a set of low cost capacity improvements on the existing network, and these improvements will either be commercially viable or have a high BCR. Such an optimised alternative has been developed (see Chapter 1). It is better than the highly sub-optimal alternatives developed by Atkins for DfT e.g. RP2 and others.

2.57 On this basis, the assessment of HS2 should be of the *incremental* benefits that it would be delivered for the *incremental* costs. The incremental costs would be the full costs, and the incremental benefits would be those over the benefits of the alternative.

2.58 The table illustrates what this might look like for the Y (and the BCR effect only for phase 1 at foot of the table), with the basis of the benefits adjustments in Table 2.5. It shows:

- Adjusting the benefits only, the BCR falls from 2.2/2.6 to 0.9/1.1, and together with the indicative demand forecast, it becomes just 0.3/0.5 i.e. a 'poor' value for money project.

TABLE 2.3 FEBRUARY 2011 DFT FIGURES ADJUSTED FOR REVISIONS TO BENEFITS AND DEMAND

All £Bn NPV at 2009 Prices	DfT Feb 2011 Figures (Full Y)			Revisions to Benefits (Full Y)			Including Revisions to Demand
	Business	Leisure/ Commuting	Total	Business	Leisure/ Commuting	Total	+81% (not 209%)
Rail: Journey Time Saving	14.1	4.3	18.4	0.9	2.2	3.1	1.9
Improved Reliability	4.4	1.3	5.7	3.0#	1.3#	4.2	2.6
Reduced Crowding	1.5	3.6	5.1	0	0	0	0
Waiting Time*	2.0	2.0	4.0	1.3	2.0	3.3	2.0
Other Impacts e.g. Access	0.5	0.6	1.2	0.4	0.6	1.0	0.6
Released Capacity Benefits			1.3			1.3	1.3
Road Decongestion	2.7	1.3	4.0	2.7	1.3	4.0	2.4
HS1 Link			0.4			0.4	0.2
Total Transport User	**25.2**	**13.1**	**39.9**	**8.3**	**7.3**	**17.2**	**11.0**
Reduced Tax			-2.7			-2.7	-1.6
Net Transport Benefits			**37.3**			**14.6**	**9.4**
WEI - Agglomeration			4.1			4.1	4.1
WEI – Imperfect Competition			2.4			0.8	0.5
Total WEI			6.5			4.9	4.6
Total Net Benefits incl WEI			**43.8**			**19.5**	**14.0**
Additional Revenue			**27.2**			**27.2**	**16.6**
Capital and Operating Cost			**44.3**			**44.3**	**44.3**
Net Subsidy			**17.1**			**17.1**	**27.7**
Benefit Cost Ratio (excl WEI)			**2.2**			**0.9**	**0.3**
Benefit Cost Ratio (incl WEI)			**2.6**			**1.1**	**0.5**
	DfT Feb 2011 Figures Phase1			**Revisions to Benefits (Phase1)**			**Including Demand**
Benefit Cost Ratio (excl WEI)			**1.6**			**0.7**	**0.3**
Benefit Cost Ratio (incl WEI)			**2.0**			**1.0**	**0.5**

 # Issues about achievability of 18 trains/hr are likely to eliminate reliability benefits, although no reduction made to reflect this. Adjustment made in sensitivity

** Waiting time has not been reduced to reflect that the realistic comparator may have a higher train frequency than the 'do minimum', as Rail Package 2 does. Purely rolling stock based improvements would not reduce waiting time benefits*

2.59 Table 2.4 considers a 50% sensitivity test on both benefits and demand (by adjusting journey time savings and crowding benefits by a half, assuming a worse reliability, and adjusting the indicative demand forecast). The basis is shown in Table 2.5.

TABLE 2.4 FULL "Y" NETWORK FIGURES ADJUSTED FOR REVISIONS TO BENEFITS AND DEMAND - SENSITIVITIES

All £Bn NPV at 2009 Prices	**Revisions to Benefits (Full Y) (50% Sensitivity)**			**Including Demand (50% Sensitivity)**
	Business	**Leisure/ Commuting**	**Total**	**+139% (Not 209%)**
Rail: Journey Time Saving	4.7	3.2	7.9	6.4
Improved Reliability	1.5	0.6	2.1	1.7
Reduced Crowding	0.7	1.8	2.5	2.0
Waiting Time*	1.3	2.0	3.3	2.7
Other Impacts E.G. Access	0.4	0.6	0.9	0.8
Released Capacity Benefits			1.3	1.3
Road Decongestion	2.7	1.3	4.0	2.4
HS1 Link			0.4	0.3
Total Transport User	11.3	9.6	22.5	20.4
Reduced Tax			-2.7	-2.1
Net Transport Benefits			**19.8**	**18.3**
WEI - Agglomeration			4.1	4.1
WEI – Imperfect Competition			1.0	0.8
Total WEI			5.2	5.0
Total Net Benefits incl WEI			**25.0**	**23.2**
Additional Revenue			**27.2**	**21.9**
Capital and Operating Cost			**44.3**	**44.3**
Net Subsidy			**17.1**	**22.4**
Benefit Cost Ratio (excl WEI)			**1.2**	**0.8**
Benefit Cost Ratio (incl WEI)			**1.5**	**1.0**
	Revisions To Benefits (Phase1 Only)			**Including Demand**
Benefit Cost Ratio (excl WEI)			**0.9**	**0.6**
Benefit Cost Ratio (incl WEI)			**1.2**	**0.8**

2.60 The table shows that for the full "Y" even with the 50% sensitivity, the BCR on benefit changes is 1.2/1.5 and together with demand, only just reaches 1.0 (compared to DfT's Feb 2011 result of 2.6 including WEI).

TABLE 2.5 SUMMARY OF BENEFITS ADJUSTMENTS

	WW Benefits Adjustments	**50% Sensitivity**	**Demand Effect**
1. Business On-Board Journey Time Saving	Zero Productivity Value – Reduced To Half DfT's Leisure Value	Half DfT Productivity Value	Pro Rata to Demand
2. Other On-Board Journey Time Saving	Half DfT Value	¾ DfT Value	Pro Rata to Demand
3. Reliability	DfT Percentage	Half DfT Value	Pro Rata to Demand
4. Crowding	Zero	Half DfT Value	Pro Rata to Demand
5. Waiting Time	DfT Value	DfT Value	Pro Rata to Demand
6. Other Rail User Impacts	DfT Value	DfT Value	Pro Rata to Demand
7. Released Capacity Benefits	DfT Value	DfT Value	Unaffected
8. HS1 Benefit	DfT Value	DfT Value	Pro Rata to Demand
9. WEI Agglomeration	DfT Value	DfT Value	Unaffected
10. WEI Imperfect Competition	DfT Percentage value	DfT Percentage value	Pro Rata to Demand
11. Revenue	DfT Value	DfT Value	Pro Rata to Demand
12. Costs	DfT Value	DfT Value	Unaffected
13. Business Time Unit Value (Affects Items 1,3, 5, 6, 10)	2/3 of DfT Value	2/3 of DfT Value	Unaffected

Chapter 3

Lessons from other Major Transport Projects

Prepared by Christopher Castles & Christopher Stokes

3 LESSONS FROM OTHER MAJOR TRANSPORT PROJECTS

Prepared by Christopher Castles

3.1 This chapter relates to the following questions listed by the Committee:

- 3.4 – What lessons should the Government learn from other major transport projects to ensure that any new high speed lines are built on time and to budget?

3.2 Large infrastructure projects have a poor record of achievement in meeting their expected outcomes in terms of costs and demand. These projects are inherently risky as a result of the long lead times before they are delivered and because most such projects have high technology and construction risks. Long lead times add to the inherent uncertainties of forecasting demand, while technology risks often result in delays in implementation and cost overruns. The HS2 project will have a very long lead time to implementation, the technology will be new in the UK and HS2 is relying on a higher specification (18 trains per hour) than is the case with any existing High Speed Railway in the world or where the industry view is that 12tph – 15tph is the maximum that can be achieved. So it is right to consider carefully the experience of other similar projects.

3.3 There has recently been some quite extensive international research into the post implementation performance of major infrastructure projects, notably by Bent Flyvberg[1] and colleagues. They have found that major infrastructure projects have a very poor record in meeting their forecast expectations, both in terms of the accuracy of the forecasts of demand and in outcomes for costs. It is also common to experience long delays in construction implementation and also teething problems before these projects are operating effectively. There has been no improvement in performance over the past thirty years. Hence the financial performance of many large scale infrastructure projects has been very poor and the costs to governments and to private investors have consequently been high.

[1] Policy and planning for large-infrastructure projects: problems, causes, cures Bent Flyvbjerg
Aalborg University, Department of Development and Planning, Fibigerstraede 13, 9220 Aalborg,

3.4 However, once built, major infrastructure projects are permanent and cannot be removed, even after bankruptcy of the project financiers. Hence, with the passage of time, they become established as demand builds up and initial problems fade from public memory. This may partly account for the apparent inertia in learning from past experience. The private sector has, however, been learning the lessons from the past and increasingly it is reluctant to take on risks that it is has found difficult to manage. Consequently these risks tend to return to the public sector. Major infrastructure projects also usually attract a strong lobby of interest groups to support them. These lobby groups have an interest in promoting projects with optimistic forecasts. Another factor that has limited the ability to learn from the past is that some types of projects attract public and political support on the basis of the apparent strategic benefits that success would bring, without proper consideration of risks or the reality of these benefits.

3.5 Transport infrastructure projects often exhibit these features. Railway projects are particularly prone to optimistic forecasting bias and have a poor record of implementation. Research by Flyvbjerg examined 25 major international rail projects and found that the average error in the traffic forecasts was an overestimate of 51.4%. This was considerably worse than the sample of road projects examined in the same paper, which generally had a much better record in forecasting both demand and costs. On average rail schemes experienced a 45% cost overrun which has meant that rail schemes have generally failed to meet expectations. The very poor performance of railway projects is partly because they often involve solving unique technical and engineering challenges. The market for rail travel is more complex to forecast because it is influenced by a mixture of commercial and public interest influences and it competes between air and road transport. There is some evidence that positive public and political sentiment supporting rail projects can exacerbate the tendency to overestimate the benefits and underestimate their risks.

3.6 Flyvberg and colleagues consider various explanations for the scale and consistency of this optimism bias that systematically overestimates the chances of success for major transport projects. Some of it can be explained by the inherent uncertainty in forecasting, including technical weaknesses in data and modelling. There are also psychological factors leading to delusional optimism and herd mentality. The activities of the vested interests and lobby groups representing those who expect to gain from major projects also have a significant influence. Incentives on politicians

may tend to favour optimistic expectations of success. Political and economic pressures are often perceived by project planners which influences their work. The extent and impact of these various influences are hard to disentangle. But there is sufficient evidence in the systematic nature of the bias that occurs, as well as case study evidence from the experience of specific projects, to recognise the relevance of these factors. Flyvberg and colleagues made recommendations about how to handle optimism bias in project appraisal and the principle of their work has been taken into account in calculating cost estimates for HS2, but not in the estimation of demand forecasts.

Railway Case Studies in the UK

3.7 There are two recent case studies of major railway projects in the UK that are particularly relevant to the demand forecasting for HS2. These are the Channel Tunnel and the Channel Tunnel Rail Link (HS1).

The Channel Tunnel – Eurotunnel

3.8 The UK government made a firm policy commitment that the Channel Tunnel should be built and financed by the private sector and there would be no government backing for its financing. A large international consortium of lending banks was formed who appointed traffic and revenue consultants (TRC) and also an independent reviewer of the demand forecasts. The TRC produced annual updates of their forecasts over the more than 10 year project preparation and construction period and these were independently reviewed. The annual independent review never deviated by more than 5% from the TRC's forecasts in its assessment of their validity. The main focus of the review tended to be on macro economic factors rather than factors related to competition that proved to be the most decisive. The reviewer had a particular expertise in macroeconomic but this was not particularly relevant to the outcome of the forecasts.

3.9 The traffic and revenue forecasters used well established transport planning techniques and models for forecasting demand and revenue, although arguably these were poorly suited for preparing reliable forecasts for a commercial rail shuttle link in the competitive cross channel market. A similar comment could apply to the forecasts that have been prepared for HS2. The Channel Tunnel forecasts failed to anticipate the competitive response of the ferries to the opening of the Channel Tunnel and Eurotunnel quickly fell into financial difficulties.

3.10 The UK government wisely refused to offer assistance, although many of the international banks in the lending consortium had believed that there was an implicit government guarantee behind the financing. The lending banks appointed a business adviser, rather than a transport planning adviser, to review the forecasts and produce a revised view of future prospects for the business. The business adviser analysed the competitive dynamics of the cross channel market and produced new scenarios for the business forecasts on which the financial restructuring of the business was based.

3.11 Eurotunnel now operates under a relatively secure financial structure. But about half its capital has effectively been lost by the private investors who funded it. The opening of Eurotunnel services resulted in the breaking of an oligopolistic market and has lowered the costs to consumers of cross channel travel. Private sector financiers learned a lot from their experience with the project and have been much more cautious about the risks they are willing to take on as a result.

Channel Tunnel Rail Link – Eurostar – HS1

3.12 The need for a rail link to strengthen the Channel Tunnel was debated for many years during the planning stage, but was delayed by uncertainty over its funding and viability. The Government was keen not to be seen to provide public funds for the rail link which could be regarded as undermining its pledge not to provide support to Eurotunnel. This delayed the process of delivering the rail link. It eventually went through a competitive bidding process as a privately funded project using the revenue stream from the Eurostar trains that had already been purchased by British Railways and SNCF.

3.13 The bid was won by the London and Continental Railway consortium. They relied on demand forecasts produced using transport planning methodologies that are very similar to those that have been used for HS2. These rely on estimates of consumer responses to new service levels on the railway and to future changes in income and price that are expressed as elasticity of demand assumptions. These forecasts anticipated that demand would now have reached about 25 million passengers, whereas actual traffic has grown only slowly and has now reached around 9 million nearly 15 years after the original forecasts. At the time the forecasts were prepared the size of the relevant market for travel between London/Paris/Brussels was about 4 million passengers per year. LCR appeared to believe that the speed and service improvements created by

Eurostar operating on HS1 would generate a great deal more traffic than actually materialised.

3.14 Other forecasts of demand were being produced at the same time for other bidders. At least two of these bidders produced forecasts that were in a more realistic range. These forecasts were prepared by business advisers using different forecasting techniques, models and assumptions. When reviewing the bids, the government chose to accept the LCR forecasts, despite their being unrelated to the size of the existing market, or to the expectations of other bidders.

3.15 Presumably the government assumed that the risk of the outcome of these forecasts would remain with the private sector. In view of the failure of the LCR consortium soon after the opening of HS1 and the subsequent consequences for the public finances, it appears that this assumption was not entirely carried through in the negotiations over the financial structure and risk transfer arrangements [2]for the funding of HS1. The private sector had by then learned to limit its risks with major rail schemes, but it seems the government had not taken on board the same lessons.

3.16 When LCR failed the government appointed advisers to review the forecasts in 2001. By then there was a political predilection to provide a government funded rescue of LCR rather than to leave the risks with the private sector as had been done with Eurotunnel. HS1 has recently been sold for £2.1 billion, well below its construction cost of £5 billion. A large proportion of the loss has been borne by the taxpayer on the basis of unrealistic demand forecasts.

3.17 The Transport Select Committee investigated the failure of the Channel Tunnel Rail Link in 2006. These were primarily the failure to evaluate the impact of low cost air carriers and the unrealistic elacticities of demand used to forecast passenger responses to Eurostar's services. The Committee's reported that '*The Department told us that it has now learned from all this experience, and that the next time it considered undertaking a major transport project, it would factor more severe downside assumptions into its business case analysis'*. It is difficult to reconcile this statement with the work that has been done by HS2 Ltd.

3.18 It appears that the government has been slower than the private sector to learn the lessons implicit in the inherent unreliability of the forecasting

techniques applied for railway projects. The HS1 experience demonstrates all the factors outlined above leading to optimism bias. The Department has not followed its own advice while the planning of HS2. It has relied on the same forecasting methods and assumptions and has not taken account of the risk in these forecasts in evaluating a full range of options for providing the capacity needed on the West Coast Mainline. Instead, it has focussed on one solution, high speed rail, and has then adopted an approach which is likely to bias the evaluation in favour of that solution. In view of the costly experience of Eurotunnel and HS1, that seems a highly questionable approach.

Railway Case Studies - International

Financial Results

3.19 Most HSR routes have been funded by governments and operated by state railways, so the financial results are in the majority of cases obscure, particularly given the degree of political support for the projects. The general view is that only two projects have produced a conventional financial return, the Tokaido Shinkansen between Tokyo and Osaka and the original TGV Sud-Est route between Paris and Lyon

3.20 Academic research suggests that over-forecasting is endemic for major rail projects both in Britain and elsewhere in the world. Research on this by Danish academics in 2006[3], states:

"for nine out of ten rail projects, passenger forecasts are overestimated; average overestimation is 106%"

3.21 A number of completed HSR projects are known to have serious financial problems, particularly the new Dutch high speed line between Amsterdam and Brussels (106miles) as stated in February 2011 by Schultz van Haegen (Dutch Infrastructure Minister) *"operational profits at HSA are substantially lower that those envisaged due to fewer domestic passengers than originally projected",* and the Taiwan route. The proposed Tampa – Orlando HSR in the United States has recently been cancelled, at a very late stage in its development. Despite Federal capital funding for its construction costs, the new Florida State Governor was unwilling to commit to the indefinite operating subsidies likely to be required.

[3] Inaccuracy in Traffic Forecasts. Bent Flyvbjerg, Mette K. Skamris Holm and Søren L. Buhl, Department of Development of Planning, Aalborg University

Markets

3.22 HSR projects have addressed a wide range of markets. Taking the two most successful routes as examples:

Tokaido Shinkansen

3.23 The Tokaido Shinkansen serves probably the most densely populated corridors in the world between Tokyo and Osaka, including a number of other major cities such as Yokohama, Nagoya and Kyoto, as well as many large towns. There are 15 intermediate stations on the route. The route serves an enormous market and carries very large passenger volumes, both end to end and to intermediate stations, and is almost certainly the most profitable rail operation in the world.

TGV Sud-Est

3.24 In contrast the TGV Sud-Est route serves no significant centres of population between Paris and Lyon, and is largely built though open country. There are only two intermediate stations, both of which have a very limited train service.

3.25 In addition to serving the Paris – Lyon flow, the HSR route extends to Marseille and Montpellier, and train services operate to a wide range of destinations on the classic network, providing fast long distance surface travel to the whole of south east France.

HS2 Markets

3.26 The markets potentially served by HS2 have some similarities to those served by the Tokaido Shinkansen, albeit on a smaller scale.

3.27 The existing London – West Midlands route links not just London and Birmingham but a number of cities and towns between them (Watford, Milton Keynes, Rugby, Coventry and Birmingham International) and continues beyond Birmingham to Sandwell and Dudley and Wolverhampton.

3.28 The current classic service links these points very effectively, albeit not at HSR speeds. In contrast, HS2 will not serve a major part of these markets, only directly replicating Birmingham New Street and Birmingham International, and services to stations such as Coventry and Wolverhampton will be degraded through a combination of reduced frequency and extended

journey times as a result of additional stops. There are similar issues for the other corridors to be served by HS2.

Journey Length

3.29 HSR operations generally cover significantly longer distances than those served by HS2; Britain is a relatively small country, with most of its major population centres quite close together.

3.30 HS2 would therefore be markedly different from the TGV Sud-Est operation, where all passengers have a very fast long distance trunk haul. The ***minimum*** journey distance on TGV Sud-Est is 265 miles (Paris – Lyon), and a significant part of the market is for much longer journeys, for example to Marseille (466 miles). In contrast, the great majority of HS2 journeys would be much shorter than this: Manchester is 184 miles from London, Birmingham 113 miles.

3.31 The few shorter routes, for example the Dutch HSR route, offer relatively small overall journey time savings, as the proportion of time taken up by accessing the HSR station at either end represents a much higher proportion of the door to door journey time. For HS2, even the additional access time from the local public transport network including Birmingham New Street to the new Curzon Street station will dilute the promised journey time savings.

3.32 On the face of it, the Cologne – Frankfurt route appears to be equivalent to London – Birmingham, at essentially the same distance. However, Cologne – Frankfurt is part of a much wider network, with almost all trains going to or coming from somewhere else, as part of longer distance routes such as Amsterdam – Basel and Dortmund – Munich. The HSR route also gives proportionately much greater time savings than HS2 to Birmingham, with Cologne – Frankfurt times of 62 minutes, compared with timings on the tortuous classic route of 140 minutes – but London – Birmingham is only 84 minutes today.

3.33 On the face of it, the Cologne – Frankfurt route appears to be equivalent to London – Birmingham, at essentially the same distance. However, Cologne – Frankfurt is part of a much wider network, with almost all trains going to or coming from somewhere else, as part of longer distance routes such as Amsterdam – Basel and Dortmund – Munich. The HSR route also gives proportionately much greater time savings than HS2 to Birmingham, with Cologne – Frankfurt times of 62 minutes, compared with timings on the tortuous classic route of 140 minutes. But London – Birmingham is only 84

minutes today, and Virgin Trains say that they could deliver 70 minutes on the existing track. The table below sets out the impact of HSR routes on journey times.

TABLE 3.1 IMPACT OF HSR ROUTES ON JOURNEY TIMES

	Distance	Pre – HSR	Post – HSR
Tokyo – Osaka	515km	6hrs 30mins	3hrs 10mins (now 2hrs 30mins)
Madrid – Seville	472km	6hrs 30mins	2hrs 45 mins (now 2hrs 30 mins)
Paris – Lyon	431km	4hrs	1hrs 55 mins
Frankfurt – Cologne	180km	2hrs 20 mins	1hr 2 mins
London – Manchester	296km	2hr 08mins	1hr 13 mins proposed (from 2032)
London – Birmingham	182km	1hr 24 mins	49 mins proposed

3.34 What is striking is that: elsewhere in the world their journey times were much slower pre-HSR than in the UK, where WCML already operates at 125mph; post-HSR their journey times are all more than halved; with the exception of one case the distances are much longer.

Impact on Classic Networks

3.35 It is inevitable and logical that classic services are reduced when a parallel HSR route is built. There are no through trains from Tokyo to Osaka or Paris to Lyon on the classic routes, and smaller intermediate stations in Japan can only be reached by using the Shinkansen and interchanging.

3.36 The HS2 business case reflects this, with a Net Present Value saving of £5.4 billion for reduced services on the classic network, and it is difficult to see, for example, how the current 20 minute frequency from Coventry to London could be sustained if all Birmingham – London passengers are assumed to have transferred to HS2. However, this inevitably leads to degradation of the quality of service to many towns not directly served by HS2, as set out in Chapter 8.

3.37 Additionally, there are also potential opportunity costs for the wider rail network. This is shown by France, where the non-TGV network has suffered because investment has been channelled into TGV routes. The Independent (9th April) reported Guillame Pépy, the President of SNCF as describing the system as *"decaying…facing a financial impasse… heading for the wall"* and that France was in danger of going too fast in the construction of fast lines:

"we risk having longer and longer high speed lines which are used less and less."

Conclusions

- Financial results for HSR projects are generally poor, with endemic over-forecasting of demand.
- Capital costs are very high in Britain, reflecting both higher unit costs and system design.
- Most journey lengths in Britain are too short for HSR to be an appropriate transport solution, particularly given existing fast and frequent rail services to and from London.
- Existing services will inevitably be reduced on parallel "classic" routes.

Chapter 4

HS2 Route Capacity and Reliability

Prepared by Christopher Stokes

4 HS2 ROUTE CAPACITY AND RELIABILITY

Prepared by Christopher Stokes

4.1 This chapter relates to the following questions listed by the Committee:

- 2.2 – The effectiveness of investment in HS2 in terms of capacity and reliability.
- 3.1 – DfT's evaluation of capacity and reliability for the HS2 project.
- 4.4 – Lessons from other HSR projects.

Introduction

4.2 This submission considers the planned utilisation of HS2, its technical capacity and its potential reliability.

Planned Utilisation

4.3 The business case for HS2 is based on a very high level of utilisation of the route, at 18 trains per hour in peak periods and 14 trains per hour off-peak on the Birmingham – London section. The proposed service pattern is set out in the "Economic case for HS2"[1]. This is shown in Figure 4.1.

4.4 Of the eighteen trains per hour in peak periods, six operate to and from destinations on the existing network[2], with inevitably a serious risk of importing any delays incurred on the existing network on to HS2. There are no intermediate stations between Old Oak Common and Birmingham Interchange, so capacity can be optimised on this section of the route.

4.5 North of Birmingham there are between six and nine trains on the Manchester branch, depending on whether Liverpool and Glasgow services leave the route at Lichfield or at a junction south of Manchester; no information is available on this at present. The Leeds branch has nine trains per hour, of which five are shown to stop at the East Midlands and South Yorkshire stations. This operating pattern represents a major constraint on timetable planning, and may in practice be difficult to achieve, given the need to ensure that southbound trains join the core section south of Birmingham at precise intervals.

[1] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf Page 61

[2] Assuming that dedicated high speed infrastructure is provided throughout to Manchester and Leeds

FIGURE 4.1 PROPOSED SERVICE PATTERN FOR HS1

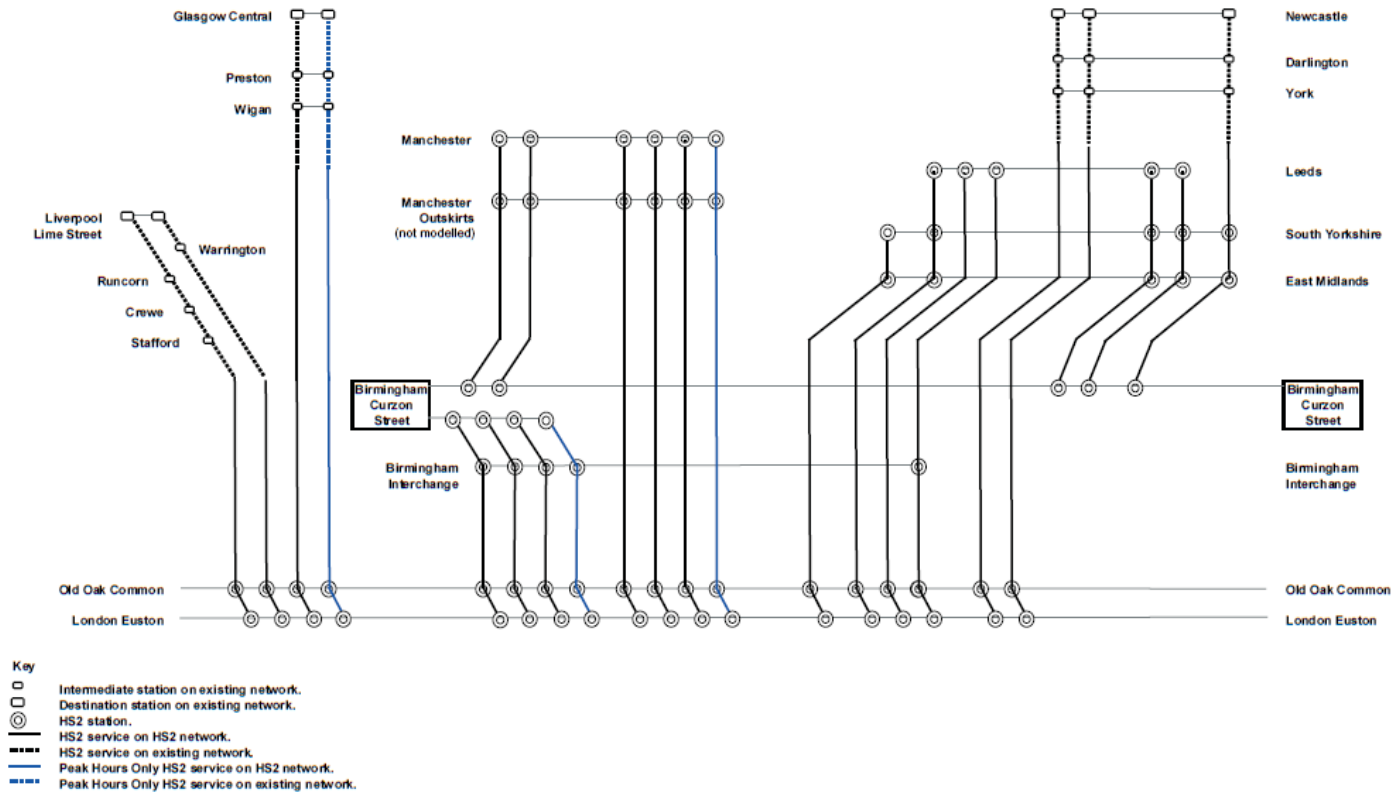

Figure A2 – **Service specification assumptions for the Y network**

N.B. Further work is being done to determine which of the above services might serve Heathrow and which might serve Heathrow, and which might run on to mainland Europe.

4.6 The specification does not include any trains to Heathrow or mainland Europe via the HS1 connection. The document states:

"further work is being done to determine which of the above services might serve Heathrow….and which might run to mainland Europe"

4.7 No information is available on the proposed frequency of Heathrow and HS1 services, other than it is stated that Heathrow trains may join and split on-route, presumably at Birmingham Interchange. Again, this operating pattern represents a major constraint on timetable planning, and may in practice not be possible.

Experience on other High Speed Lines

4.8 The planned utilisation of the route is higher than that achieved on any other high speed line in the world.

4.9 The Tokaido Shinkansen operates at the highest capacity, with up to fourteen trains per hour at peak periods, despite the constraints of varied stopping patterns – slow trains are overtaken several times on-route. However, the Japanese high speed network is self contained, and does not connect with or import delays from the "classic" network, which is built to a different track gauge.

4.10 French high speed lines operate at up to 12 trains per hour at peak times at present. German, and Spanish routes operate at lower levels of capacity, in the case of Spain typically at no more than four or five trains per hour.

4.11 In a "Why we need HS2" supplement (April 2011, page 56), Modern Railways reports that Jacques Robouël of Systra stated at a recent HS2 conference that

"the present signalling on high speed lines allows a dozen trains an hour in each direction – the European Rail Traffic Management System is probably not going to increase this number."

4.12 Systra is SNCF's consultancy arm, so the company has an enormous knowledge of high speed rail and a clear interest in promoting it. Yet its staff believes that twelve trains per hour, not eighteen, is the practical maximum for a high speed line.

Technical Capacity

4.13 Greengauge21, the pro-HS2 lobby group, published a useful and comprehensive technical note on its website, as Appendix B to its report "*Fast Forward: a high-speed rail strategy for Britain*" [3]. This gives considerable detail on the technical capacity of high speed lines, as shown by the following extract.

FIGURE 4.2 HEADWAY BETWEEN TWO 300 KM/HOUR TRAINS[4]

2.4.2 Speed and headways

Maximum commercial speed and braking sequences will define the minimum headway distance and time between two trains. Figure 1 shows the 7 block sections that are required to meet the braking sequence and consequently to follow the previous train.

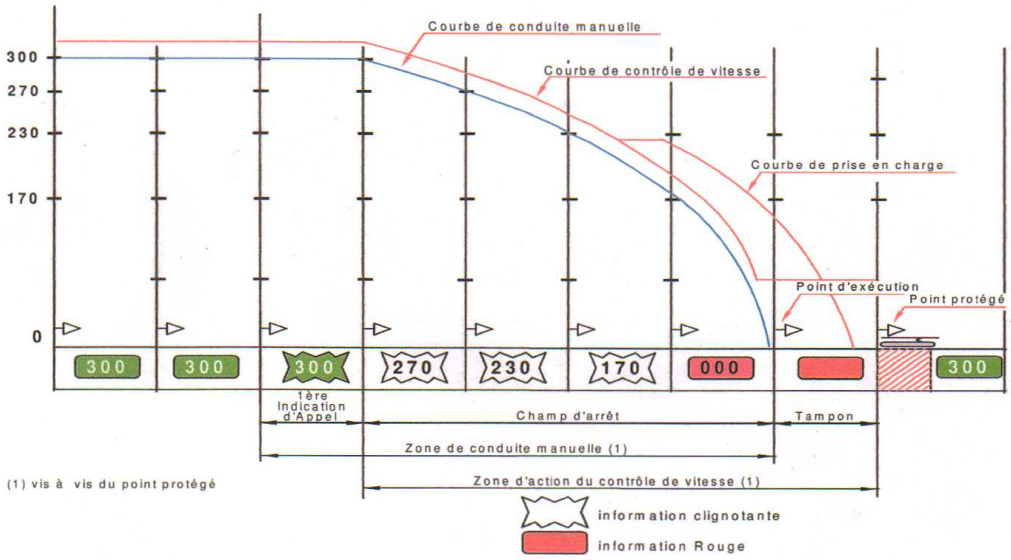

Figure 1 : Headway between two 300 km/h trains

A major threshold shall be considered as seven blocks are needed when running at 300 km/h (sequence is 300, (300), (270), (230), (170), (000), 000) including the buffer block) but eight blocks are required when running at 320 km/h.

4.14 The report also includes a table setting out the "technical headway", the absolute minimum time between two trains at various maximum speeds. This is shown in the following figure.

[3] Greengauge 21 (2009). . www.greengauge21.net/publications/fast-forward-a-high-speed-rail-strategy-for-britain, Appendix B, §2.4-2.6.

[4] Based on the signalling system used on HS1. Use of ETCS level 2 will not significantly change the constraints.

FIGURE 4.3 TECHNICAL HEADWAY

Maximum speed limit (km/h)	Speed with 5% punctuality margin (km/h)	Number of blocks	Block lengths (m)	Headway (m)	Speed (m/minute)	Technical headway (min)	Trains/hr, design capacity	Trains/hr 75% of design capacity
300	285	7	1600	11600	4750	2.78	21.6	16.2
300	285	7	2000	14400	4750	3.36	17.8	13.4
320	304	8	1600	13200	5067	2.94	20.4	15.3
320	304	8	2000	16400	5067	3.57	16.8	12.6
350	332.5	8	1600	13200	5542	2.72	22.1	16.6
350	332.5	8	2000	16400	5542	3.29	18.2	13.7

4.15 The best technical headway quoted in the Greengauge21 report is 2.27 minutes, at 350 km/hr, close to the 360 km/hr claimed by HS2 Ltd for their operation. However, no European high speed line in fact operates at this speed at present (320 km/hr is the current maximum), and the only country to have done so is China, which has recently reduced speeds to 300 km/h, to reduce unsustainable maintenance and energy costs.

4.16 The table indicates that the design capacity varies between 16.8 trains per hour and 22.1 trains per hour. However, this is a purely theoretical capacity, as it makes no allowance for any delay whatsoever, even of a few seconds. The more realistic figure is the "trains per hour at 75% of design capacity" column, which represents the maximum realistic level of operation, ranging from 12.6 to 16.6 trains per hour. This itself significantly exceeds European Rail Agency/International Union of Railways recommendations for timetable planning.

4.17 Network Rail's assessment is similar. Its "Strategic Business Case for New Lines"[5] states:

"In options that have through running to the classic line network a maximum capability of 14 tph in each direction is assumed. This reduced capability is to reflect the significant additional performance risk and the difficulty of integrating the respective route timetables."

4.18 In addition, Greengauge21 held three workshops in May and June 2010, which concluded that 18 trains per hour was not realistic, and acknowledged that there were major capacity problems on the West Coast Main Line north of Lichfield in Phase 1. The options identified for the longer term were (a) to plan for four tracks over the trunk route between London and Birmingham, (b) to plan for lower service frequencies, or (c) to plan a second north-south high speed line.

5 http://www.networkrail.co.uk/documents/About%20us/New%20Lines%20Programme/5883_Strategic%20Business%20Case.pdf page 17 para 3.20

4.19 It is therefore clear that the claimed 18 trains per hour for HS2 is not achievable. The key constraint is not signalling technology but the braking distance for trains from full speed to a stop, which increases in relation to the square of the speed – if a train comes to a sudden halt for any reason, it is essential that the following train can stop safely without running into the train in front. HS2 Ltd have stated that:

"over the longer term, we assumed an hourly capacity of 18 train paths. This relies on the realisation of certain anticipated improvements in train control and braking systems…"[6]

4.20 However, informal discussion with major European train manufacturers indicate that a quantum increase in braking capability beyond present performance is not achievable.

HS2 Route Constraints

4.21 As with any high speed line, there are constraints caused by the specific characteristics of HS2:

- The approaches to Euston, with conflicting moves in and out of the terminal platforms. This is mitigated, but not eliminated, by grade separation.
- The approach to Old Oak Common station. All trains will stop there, and there are parallel platforms in each direction, but with trains running at the minimum technical headway, deceleration of the first train causes progressively greater delay to subsequent trains – equivalent to the effect of delays propagating on a congested motorway.
- The approaches to other intermediate stations (Birmingham Interchange, East Midlands and South Yorkshire). Stopping trains can be "looped", and overtaken by non-stop trains, but this consumes capacity on the route, as the train which stops takes up twp paths, one in advance and one behind the fast train.
- Integration of service from Heathrow with trains from Euston.
- Integration of services from HS1 at Old Oak Common, and trains from the existing network south of Leeds, south of Manchester and at Lichfield.

[6] High Speed Rail – a report to Government by HS2 Ltd, March 2010 page 225, para 6.1.25 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/hs2report/

4.22 It is clear that no detailed timetabling exercise has been carried out to demonstrate that capacity for the claimed service pattern is available, even on a theoretical basis.

HS2 Reliability

4.23 There are a number of factors which will impact on HS2's reliability

- The requirement for absolute precision in all aspects of operation. Operation at the claimed level of eighteen trains per hour requires trains to operate at an average interval of 200 seconds, little more than the absolute technical minimum.
- Presentation of trains from the existing network. Southbound, six out of the proposed eighteen trains per hour will have started their journeys on the existing network, in most cases having travelled significant distances over busy two track main lines, with a mix of fast and semi-fast passenger trains and significant freight flows. These routes present greater operating challenges than the south end of the West Coast Main Line, on which one pair of tracks is effectively only used by InterCity trains, all operating at the same speed. It is therefore not realistic to expect that these trains will always be precisely on time – but if they miss their "path", there will inevitably be significant consequential delays, as there is no resilience or spare capacity with eighteen trains per hour operation.
- Presentation of through services from mainland Europe. These trains will inevitably be subject to risk of delay, having travelled on TGV Nord, through the Channel Tunnel, HS1, the busy North London Line and the single track tunnel between Camden and Old Oak Common – again, if they miss their "path" from Old Oak Common, there is a real risk of consequential delays to other HS2 services
- The pattern of operation proposed for Heathrow trains, with joining and splitting on-route, adds significant complexity and risk to the planned operation. Joining trains will require slower approach speeds approaching Birmingham Interchange, further reducing route capacity. Without a detailed timetabling exercise, which it is clear has not yet been carried out, the ability even to plan the proposed Heathrow services is unproven and indeed may well be impracticable.

4.24 As with timetable planning, it is clear that no work has been done to simulate the reliability of the planned use of HS2.

Reliability of Alternatives

4.25 As discussed earlier, the relationship between maximum speed and headway is crucial. The technical headway on the existing West Coast route, with a maximum speed of 200 km/h, is only about 1.67 minutes, giving an equivalent design capacity of over 30 trains per hour. However, as with HS2, the actual capacity of the route is dictated by constraints at stations and junctions, and the varied characteristics of the trains using it.

4.26 The alternatives evaluated by DfT in 2010 involved investment in specific pinchpoints, increasing overall route capacity, but still well below the design capacity of most sections of the route. DfT have claimed that this approach would reduce reliability, but this directly contradicts their consultant's conclusions in the "High Speed 2 Strategic Alternatives Study, which states:

"Even with higher levels of train frequency, the packages may enhance train performance at a network level…..these locations may more than compensate for other area where there will be an enhanced train frequency but no infrastructure enhancements" [7]

Conclusions

- Operation of the planned 18 trains per hour is almost certainly impractical. Based on experience in other countries, the maximum realistic capacity is 12 – 15 trains per hour.
- A reduction in planned use to 12 – 15 trains per hour, together with the use of some paths for Heathrow and HS1 trains, will significantly reduce the available range and frequency of HS2 services to London, with a major adverse impact on the business case for the project.
- Government's claims that HS2 will operate more reliably than the existing West Coast Main Line are neither substantiated nor justified.

7 http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/alternativestudy/pdf/railintervention.pdf Appendix B Section 1.1.1 page 16

Chapter 5

Local and Regional Impacts of High Speed Rail in the UK

Prepared by Professor Tomaney

5 THE LOCAL AND REGIONAL IMPACTS OF HIGH SPEED RAIL IN THE UK: A REVIEW OF THE EVIDENCE

Prepared by Professor Tomaney

5.1 This chapter relates to the following questions listed by the Committee:

- 5.1 What evidence is there that HSR will promote economic regeneration and help bridge the north-south economic divide?

Introduction

5.2 This chapter is concerned with an aspect of the debate surrounding the proposed HS2 high speed railway. The arguments made in support of (and against) HS2 are complex and, at times, contradictory. Our aim in this paper is to focus on one of the more recent, but increasingly prominent propositions in the debate; namely that HS2 will accelerate the regeneration of slow-growing regions in the UK and assist the new policy objective of "rebalancing the economy" spatially. There are several other arguments which are deployed in support of HS2 – such as its potential impacts on capacity constraints, congestion and carbon emissions – but we touch on these aspects of the debate only insofar as they bear on our core question of the likely contribution of high speed rail (HSR) to regional rebalancing.

5.3 Claims about the transformative potential of HS2 for regional economies have gained recent prominence in the arguments of proponents. For instance, the Secretary of State for Transport, Phillip Hammond, has asserted recently that HS2 represents:

A once-in-a-generation chance to reshape our economic geography; bring our key cities closer together; regenerate our urban centres; and tackle the North-South divide that has held this country back for far too long (2011, no page. http://www.dft.gov.uk/press/speechesstatements/speeches/hammond20110228*).*[1]

[1] In his Foreword to the Department for Transport's High Speed Rail: Investing in Britain's Future Consultation (February 2011) Hammond reiterates: "By slashing journey times and linking to our major international gateways, it has the potential to help bridge the North-South divide that has for too long limited growth outside London and the South East (Hammond, "Foreword" in DFT 2011: 5).

5.4 A former Secretary of State Lord Adonis has complained recently:

"There is a big debate about the economic benefits of high-speed rail. Bizarrely it has been suggested that HS2 might disadvantage the regions by sucking more economic activity into the south-east than it generates in the regions – a view which has even been expressed in the West Midlands, a telling commentary on the lack of confidence there is in the regional economy. In fact, the evidence is of a fairly clear and positive relationship, among cities and large towns, between journey time to London and productivity. The shorter the journey time to London, the higher tends to be productivity. By bringing Birmingham closer to London, its productivity should rise, which is good for jobs, good for business and potentially transformational for Birmingham's future" (2011: http://www.opendemocracy.net/ourkingdom/andrew-adonis/birmingham-unleashed-elected-mayor-high-speed-rail-and-academies#*.)*

5.5 It is noticeable that little evidence is deployed in support of these arguments. The aim of this chapter is to examine the basis for these claims by assembling the available evidence. We scrutinise the international and national academic literature and other evidence to assess how well-founded the claims are. The chapter is structured as follows:

- We outline the case made by the proponents.
- We examine the international evidence – theoretical and empirical – about the local and regional impacts of HSR.
- We look at the little available UK evidence about the local and regional impacts of HS2 and outline the regional rebalancing challenge `and the potential role of transport in this, paying attention to alternative transport proposals.

5.6 Finally, we draw some conclusions. We conclude that it's difficult to find robust evidence that HS2 will have a transformative impact on the economic geography of the UK, although we cannot definitively preclude the possibility that it might have some impacts. For this reason we offer the Scottish verdict of "not proven".

HS2 and Regional Development: The Nature of the Claims

5.7 Claims that HS2 can lead to "strategic change in the economic geography of Britain, supporting sustainable long-term growth and reducing regional disparities" (DFT, 2011: 12) have become increasingly central to the HSR proposition. These claims are related to the Government's commitment to

the objective of "rebalancing" the UK economy. In their Foreword to the Coalition Programme David Cameron and Nick Clegg stated:

"…we both want to build a new economy from the rubble of the old. We will support sustainable growth and enterprise, balanced across all regions and all industries" (Cabinet Office, 2010: 7).

The term rebalancing has become central to government rhetoric although it is used in multiple and, at times, contradictory ways. Amidst this confusion, however, it has tended to refer fairly consistently to the notion of an economy less reliant on the contribution of financial services and less concentrated in London and the South East. The Coalition Programme for Government states:

"We want to create a fairer and more balanced economy, where we are not so dependent on a narrow range of economic sectors, and where new businesses and economic opportunities are more evenly shared between regions and industries" (HMG, 2010a: 9).

This perspective underpins the "Local Growth" agenda, which has been outlined by the Government (HMG, 2010b).

5.8 Recent commentary has emphasised the scale of the rebalancing challenge (e.g. BIS, 2010; Ward, 2011; PwC, 2010; SQW Ltd., Cambridge Econometrics Ltd., Centre for Urban and Regional Development Studies and Institute of Employment Research, 2011). Regional inequalities in the UK are longstanding, comparatively wide and entrenched. Moreover, the nature of the Government's deficit reduction plan focused on historically unprecedented and rapid reductions in public expenditure, according to most analyses, will impact heavily on employment, output and income in the northern regions, which have tended to rely disproportionately on public sector jobs.

5.9 The Department for Transport's consultation document High Speed Rail: Investing in Britain's Future places heavy emphasis on the contribution that HSR can make to the objective of rebalancing – although it does not use this term directly (see DFT, 2011, especially Chapter 2). Among other things, it argues:

"By bringing the major cities of the Midlands and the North closer to the capital, and by ensuring that capacity is available to handle high levels of demand growth, high speed rail could benefit thousands of businesses by improving access to the huge and internationally-competitive markets of London and the South East – just as service sector firms in Lyon have

benefited from enhanced access to Paris. And by bringing the major regional conurbations closer together, boosting productivity and enabling greater economic specialisation, high speed rail could put them in a strong position to compete effectively in those markets. High speed rail would also act as a catalyst for regeneration, as has been seen in cities across Europe, such as Lille, where the arrival of high speed rail drove the development of the major Euralille complex. A British high speed rail network could contribute strongly to regeneration in our major cities, for example at Old Oak Common in West London and in the Eastside district of Birmingham. A London–West Midlands line alone could support the creation of around 40,000 jobs (DFT, 2011)".

5.10 In total, the DfT analysis predicts that HS2 would generate benefits worth £43.7 at present value. Since capital and operating costs are expected to be £44.3 over the next 60 years (partially offset by forecasted £27.2 billion in fares revenue) the result, according to the government's calculations is a benefit:cost ratio of 2.6. In a supporting study prepared by KPMG (2010) it is claimed that HS2 would create a single market for services and knowledge based activities, through a better connection between core cities in the UK. As a result, GVA would receive by 2040 a boost between £17 billion and £29 billion. Due to increased economic activity, HS2 would also generate additional tax receipts valued between £6 billion and £10 billion. This impact, according to KPMG (2010) would be felt more strongly in the North of the country, thereby effectively contributing to the spatial rebalancing of the UK economy.

5.11 The DfT provides European examples to support its argument, although it is unclear what the sources of its evidence are:

"International experience supports this view. In Lyon, the high speed rail link to Paris has enabled firms from the city to benefit from improved access to the French capital. The area around Lyon's Part Dieu high speed rail station now hosts 5.3 million square feet of office space and around 20,000 jobs. Similar patterns have been observed in Japan, where high speed rail has seen a dispersal of investment and economic activity from the main 'developed region' towards the periphery. And in Spain, a number of towns and cities have benefited from improved links to the capital – for example, Lleida, whose high speed rail links have helped to attract investment from Microsoft and other high-tech companies."

5.12 The Government's main statement on its approach to rebalancing the economy spatially is its White Paper Local Growth (HMG, 2010b). This document refers to rail only once as a means of encouraging local growth

and this reference is to Crossrail, although there are some generic references to the importance of transport investments. Similarly the accompanying technical paper makes no reference at all to the role of rail (and only two references to transport) as a source of local growth, and here the focus is on the importance of intra-urban transport systems in underpinning agglomeration economies rather than addressing inter-regional imbalances(BIS, 2010).

5.13 In summary, the current government is presenting high speed rail as a crucial policy instrument that will help address regional inequalities and boost the UK economy. The government also claims that total economic benefits and fares revenue will be significantly higher than capital and operational costs, which will guarantee a positive rate of return to investment. However as we will discuss next, based on theoretical and empirical arguments, these predictions are founded on assumptions that are difficult to sustain.

High Speed Rail and Regional Development

Theory and Evidence

5.14 The "new economic geography" (NEG) (Krugman, 1991) seeks to explain the persistence of regional disparities assigning a critical role to the productivity advantages accruing from the agglomeration of economic activity in major cities which are able to attract firms and workers. NEG is a globally influential theoretical framework for understanding the economic processes that produce regional inequalities. It is worth paying particular attention to, because this theoretical framework figured prominently in the technical paper which accompanied the current UK Government's white paper on *Local Growth*, which set out its approach to rebalancing the UK economy spatially (HMG, 2010b, BIS, 2010). According to NEG the location of each individual business is the result of a trade-off between transportation costs and increasing returns to scale. The latter suggests that the marginal cost of production decreases as total production increases. In other words, once a firm invests in the necessary physical and human infrastructure the more it produces the cheaper the cost of each individual good or service. Therefore the firm has an incentive to locate its activities in the same place, even if that implies transporting some of its output. Naturally the benefits of increasing returns to scale disappear once transportation costs exceed its benefits.

5.15 This is an important principle but it still does not explain why firms tend to locate in cities, where land and labour are more expensive, instead of locating in isolated or rural areas. The emergence of cities is the product of localisation and/or agglomeration economies. Both are based on the same three principles, but the former explains the concentration of firms in specialised clusters, whereas the latter explains their presence in cities with a diversified economy. The three principles are: scale economies in intermediate outputs, labour market pooling, and knowledge spillovers. These principles are mutually reinforcing and therefore they lead to exponential gains in productivity and competitiveness. The combination between the benefits of agglomeration and the principles underlining the location of businesses explains the pull effect exerted by core cities. This pull effect has remained strong (and according to some authors has even increased) despite the proliferation of information and communication technologies and an overall decrease in transportation costs. It explains why cities such as London and the South East region of England continue to prosper and diverge from the rest of the country, despite higher land and property prices (plus other costs, such as increasing commuting times or pollution).

5.16 Much of the NEG literature surveyed does not focus specifically on high speed rail but its conclusions are nonetheless relevant. A recent paper by Lafourcade and Thisse (2008) for example develops the theoretical elements in NEG theory concerning the mobility of capital and labour, increasing returns to scale and transport costs to understand the potential impact of infrastructure investment. The authors argue that lower transport costs are likely to benefit core regions to the detriment of poorer ones. The positive externalities generated by agglomeration economies are mutually reinforcing and therefore the more productive cities or regions are likely to provide a more competitive business environment. As a result, when firms located in the core city compete with those located in peripheral ones the former have a comparative advantage. This is particularly the case for isolated areas, which are the most likely to suffer from transport improvements, even if this assumption is counterintuitive[2].

[2] According to De Rus: "New economic geography models not only point out this potential ambiguity in the impact of lower transport costs on less developed regions, they also tell us that the overall effect depends on certain aspects of the economic environment (such as mobility and wage rigidities) and on the characteristics of the projects. On this respect, the Trans-European Transport Network will give much of the EU better access to the main activity centres. However, the gap in relative accessibility between core and peripheral areas is likely to increase as a result of the new

5.17 There is nevertheless an assumption that the impact of transport costs on the regional economies follows a bell curve i.e. after a first period, when a fall in transportation costs leads to concentration of economic activity in the major agglomerations, lower transportation costs are likely to facilitate a redistribution of economic activity towards the periphery, particularly of manufacturing activities. This would however imply that transportation costs became almost negligible.

5.18 A similar argument is developed by Puga who has drawn on these insights to examine the trends in regional inequalities and regional disparities in the EU who notes that:

"A better connection between two regions with different development levels not only gives a less developed region better access to the inputs and markets of more developed regions. It also makes it easier for firms in richer regions to supply poorer regions at a distance, and can thus harm the industrialisation prospects of less developed areas. New economic geography models not only point out this potential ambiguity of lower transport costs on less developed regions, they also tells us that the overall effects depends not just on the characteristics of the projects, but also on certain aspects of the economic environment. For instance, if there is little interregional migration, and if wages do not vary much between regions – even when regions differ widely in their attractiveness to firms – then investment in infrastructure can do little to help poorer regions catch up, and may even widen their lag with respect to richer regions. (2002)"

5.19 Puga (2002) suggests that the main (potential) impact of high speed rail is on the location of business services and headquarters suggesting that an increased ability of business service providers and headquarters' operation to serve remote locations leads to a further concentration of these activities in fewer, larger cities. One effect of this can be to raise costs in those cities which make them less attractive to manufacturing firms. This accelerates the shift in economic geography from a specialisation by sector to a specialisation by function. Puga provides evidence of this shift in US and of the emergence of this trend in France, where the construction of the Lyon-Paris TGV led to the relocation of headquarters activities from Lyon to Paris

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infrastructure, which reinforces the position of core regions as transport hubs. The emphasis on high speed rail links is also likely to favour the main nodes of the network, and is unlikely to promote the development of new activity centres in minor nodes or in locations in between nodes" (2008: 14).

in contradiction to the claims made in the DfT consultation document (DfT 2011; see section 2 above). DfT claims that the development of a new office complex adjacent to the Part-Dieu station in Lyon points to the positive effects of HSR, but this statement does not address the net impacts on growth and employment. The balance of evidence assessed here and below in section 3.2 points to a negative net impacts for Lyon.

5.20 Puga distinguishes between different types of rail investment, for instance between those that facilitate trade between regions and those that facilitate trade within regions (see also Martin and Rogers, 1995). He concludes that while improvements in the former may harm rather than help peripheral regions, improvements in local infrastructure appear to have no negative impacts. Similarly hub-and-spoke type high speed rail systems appear to produce particular effects. Multiple spokes connected to a single hub tend "to promote agglomeration in the hub of the network, as firms located there face lower transport costs to spoke locations than firms in one spoke to another. Furthermore, they also tend to trigger disparities between spoke regions" (Puga, 2002: 397; see also Puga and Venables, 1997; Fujita and Mori, 1996).

5.21 This phenomenon is demonstrated clearly in the work of Vickerman *et al* (1999) which shows that the development of the European high speed rail network has tended to increase the accessibility of core cities within Europe whereas peripheral regions gain some improved accessibility but markedly less than core cities. Nodal cities gain the most from improvements to the high speed network while places between nodes or on the edge of the network do not make gains as might be predicted by the new economic geography (see also Lafourcade and Thisse 2008).

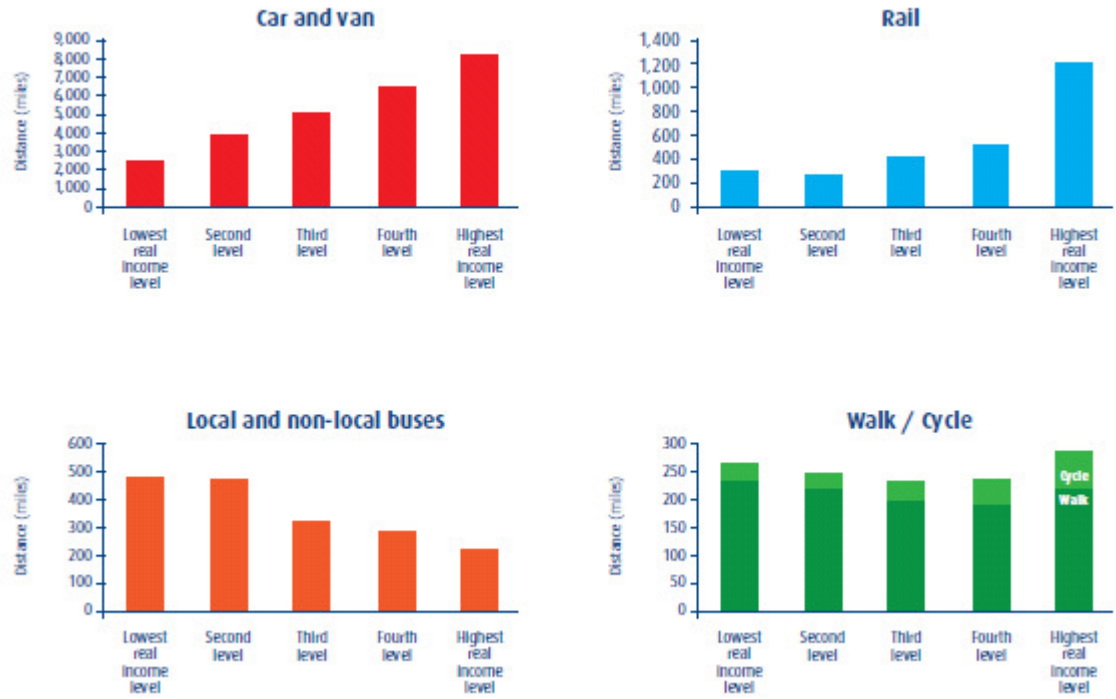
5.22 In a highly cited and influential study, which used cross-sectional and panel data to assess the impact of European Structural Funds expenditure on Objective 1 regions, Fratesi and Rodríguez-Pose (2004) show that despite the concentration of EU investments in new infrastructure (notably roads, high speed rail, etc.) there was no noticeable impact on regional convergence. Only in the case of investments in education and human capital – which represented about one eighth of the total commitments in the period under review – was it possible to identify positive and significant return. Fratesi and Rodríguez-Pose consider a number of reasons for this disappointing performance but conclude that the main reason is that the relationship between infrastructure investments and regional convergence is inherently weak. They suggest:

"Since … roads, railways, and telecommunication networks run in two directions, a strategy strongly skewed towards specific regional characteristics that are at the root of the development of infrastructure in regions with relatively vulnerable local production structures, weak entrepreneurship levels and technological base, and an often weaker human capital endowment, may solve an important development bottleneck and reduce the infrastructural gap with the rest of the EU, but may leave these regions more exposed to competition from stronger and more technologically advanced firms in core areas. Spain provides an example of where this mechanism may already be at work. The strong recent investment on transport infrastructure in Objective 1 regions devoted to the construction of road and high-speed rail links between the periphery of the country and Madrid – has probably helped to boost the phenomenal growth rates that Madrid has experienced in the second half of the 1990s, but has left many of the Objective 1 regions, whose economic prospects rail-links were supposed to increase, struggling to catch-up" (2004: 109).

5.23 One of the factors contributing to these outcomes is that rail in general – and high speed rail in particular – is generally patronised by higher income groups., as demonstrated by the Sustainable Development Commission, using UK data (see Table 1). These groups are overrepresented in London and the South East and underrepresented in the Midlands and North. Regional income inequalities and the relatively high costs of using high speed rail are therefore likely to shape the net regional benefits of HSR:

"There are potential fairness benefits for regional economies. It is argued that a high speed rail network would help to rebalance the UK economy and could allow existing rail lines to be dedicated to improved local rail services. However, others have suggested that rather than bolstering the economies of the Midlands and the North it will further imbalance the national economy towards London. High speed rail could also divert funds away from investment in local rail services … those in the highest income quintile are the greatest users of rail. Despite commitments to ensure that new high speed services would not be offered at premium prices it could therefore be argued that higher income groups would stand to benefit most from large scale investment in a high speed rail network. Ultimately, the fairness impacts of a high speed rail network will depend on the detail of implementation plans, how it is integrated into the existing transport network and what complementary transport policies are included" (SDC, 2011: 59).

FIGURE 5.1 DISTANCE TRAVELLED BY MODE BY INCOME QUINTILE (NATIONAL TRAVEL SURVEY)



Source: cited in SDC (2011)

International Examples

5.24 There are six countries worldwide (other than the UK) where high speed rail lines have received a significant amount of investment: Japan, France, Germany, Spain and, more recently Italy and China. Italy completed its first high speed line 2006 and rail's share there remains well below the EU average so it is difficult to evaluate its impact for the purposes of this study. China is currently investing heavily in this mode of transportation (the first line opened in 2008) and is en route to have the most extensive HSR network in the entire world by 2012. Despite the size of its network and of its investments, the fact that is a rather recent development also makes it difficult to assess its impacts on the economic geography of this country3. Therefore we will focus on the remaining five aforementioned examples.

3 Recent commentary has suggested that the main driver behind the growth of the Chinese high speed rail has been the pursuit of prestige and the desire to develop a railway export industry. Moreover there are signs that the rate of investment in high-speed new lines is likely to slow ("China: Off the rails? High-speed trains might be forced to go a little more slowly", The Economist, 31st March 2010.)

5.25 Japan was the first country to build a HSR line between Tokyo and Osaka in 1964. Since then three more lines have been built and the system currently serves over 300 million passengers per year, a value above demand forecasts. The time savings generated by the existence of HSR are estimated to be 400 million hours a year. Nevertheless, original expectations about economic benefits from these lines led to political pressure for the creation of more stations, which in turn endangered the economic viability of Japanese HSR system. By 1987 debt was so high ($US 200 billion) that the Japanese government decided to privatise the system. At the same time evidence from 1997 indicated that HSR had not necessarily contributed to long-term regional dispersion of economic activities (Sasaki et al. 1997). It is true that the cities served by it grew at a faster pace than those excluded, but the HSR routes had been designed taking into consideration expected growth, independently of its impacts. Therefore faster growth happened where it was already expected, even before the line was built.

5.26 The French high speed rail system is one of the most successful in financial terms and in the impact it has had on the cities served. It was built under strong governmental intervention and had from the beginning a strong focus on cost containment and commercial viability. For that reason it is mostly a mixed system: the construction of new separate rails was restricted to congested areas, while in the rest of the service conventional lines were upgraded to accommodate higher speeds. HSR lines account for only 37% of the total network. Regarding its impact on regional development, there is some evidence that cities such as Lyon and Lille have benefited from the creation of a HSR line. The former for instance was capable of attracting several regional offices of firms headquartered in Paris. Nevertheless, the French capital has gained the most from the creation of a network that has Paris as its central node. For instance, according to Albalate and Bell (2010) in the Paris-Rhone-Alps route, flight and train journeys to Paris increased 144%; those in the opposite direction have increased 54%. Intra-organisational trips that have Paris as their destination increased 156%, while tips originating in Paris are up 21%. Survey based analysis also indicated that the impact of HSR on business location was negligible, according to the same authors (Albalate and Bell 2010). Therefore, despite some business creation, there is no evidence that HSR led to overall economic decentralisation from Paris (Marti Hennenberg 2000 cited in Albalate and Bell 2010). Furthermore, as in other countries, there is evidence that HSR reduces the number of overnight stays from business

travellers. This has a negative impact on one of the industries that is usually most likely to benefit from HSR: tourism4.

5.27 In Germany the construction of HSR had two objectives: 1) to improve the North South connections, that had been neglected in the period before WWII, when the priority were west-east links; 2) to combine freight and passenger service in order to serve the industrial centres. According to Heinisch (1992) the main concern in Germany was not faster passenger traffic but better connections between the North Sea ports and the industrial and consumer markets in South Germany. The end result is that the German HSR network is mostly based on the upgrade of previously existing lines, with commercial speeds remaining lower than in other countries. Also, due to high costs resulting from a difficult terrain, the country's urban structure, political and legal obstacles and low ridership, there have been questions about the financial and environmental justification for investing in high speed rail (Albalate and Bell 2010). There have been no significant impacts on the economic geography of Germany resulting from HSR, partly because there is not a central city dominating the urban system, but also because it transports less people than HSR systems in France or Japan, making it a less relevant factor in influencing regional development.

5.28 In Spain the first HSR line between Seville and Madrid was finished in 1992. It was built mostly as a tool to achieve territorial cohesion since this was not a heavily congested route. Later the country inaugurated the Madrid-Barcelona line that links the two major cities in this country, plus lines linking Cordoba to Malaga, and Madrid to Valladolid. Due to the small size of Spain's urban agglomerations, ridership has remained low in comparison with France and Japan. These lines have therefore been deemed to deliver negative economic results. Moreover, there is some evidence that Madrid has benefited the most from the connection to Seville (Gourvish 2010), contributing to a greater centralisation of businesses and population in the

[4] DfT (2008) offers the development of the EURALILLLE business district as further evidence of the development impact of the TGV. EURALILLE certainly represents a major property development and Lille benefitted from its strategic location in northern Europe and as potential node between Paris and London close to the Channel Tunnel. However, even in these apparently favourable conditions, Moulaert *et al* (2001) highlight the ambiguous local impact of these developments suggesting they have accelerated intra-regional inequalities as neighbouring towns such as Roubaix, Tourcoing and Villeneuve d'Ascq experienced few development gains and may have lost economic activities to EURALILLE. It should be noted, Moulaert et al observe, that to produce the observable effects, the construction of EURALILLE was supported by very large public investments. This is also true of Part-Dieu in Lyon.

Spanish capital. According to Gourvish (2010), there are concerns that a similar process might happen between Madrid and Barcelona, with the latter losing out to the former. Nevertheless Spanish governments have repeatedly vowed to continue expanding the HSR network, mostly because it has a very positive image with the country's population, as a sign of progress and modernity (Albalate and Bel 2010).

5.29 In general, evidence from these countries suggests that HSR is likely to generate or reinforce territorial polarisation (Albalate and Bel 2010). This fact is acknowledged in at least two of the documents requested by HS2 Ltd as part of its project development (Gourvish 2010; Urban and Regional Policy 2009). Both admit the paucity of evidence to support that high speed rail infrastructure tends to contribute to the rebalancing of regional economies. The prediction that HSR will generate growth in peripheral cities (supported by data from KPMG 2010) is mostly based on assumptions which are difficult to sustain after close scrutiny. The report prepared by KPMG in 2010 indicated that rail makes places more productive and on this basis the construction of HS2 would lead to economic growth in London and the other UK cities. But on the one hand this impact is difficult to prove, because it is almost impossible to isolate the impact that rail has in a city's productivity, from the impact exerted by other means of transportation, or even by the other elements that sustain agglomeration economies (such as active labour markets, positive knowledge externalities, increasing returns to scale). On the other hand this line of causality itself is problematic: when KPMG suggests that rail makes cities more productive, it may only be capturing the fact that the more productive places have better transport connections, including rail.

Implications for the UK

5.30 Turning directly to the situation in the UK, the most authoritative recent review of transport policy, the Eddington Review, questions whether so-called "step change measures", such as HS2, would have a major transformation economic impacts:

"Step-change measures intended to transform the economy are not, in a world of constrained resources, likely to be a priority. The available evidence for step-change projects in the UK, such as a new high-speed North-South rail line, shows wider BCRs [benefit-cost ratios] at the lower end of the distribution before accounting for landscape and carbon effects. Furthermore, BCRs of alternative options to solve these problems are not available. However, it is often argued that such measures miss

transformational economic impacts, such as a radical shift in the economic geography of the UK brought about by new levels of connectivity. The evidence for transformational benefits is at best unproven, and … the UK's urban areas and regions are already well connected. Another potential benefit (which should be included in the wider BCR) is that of freeing up capacity on existing rail lines. Whilst this is true, it is not at all clear that creating new networks is the most appropriate or cost-effective method to achieve increased capacity: high speed options should be assessed coldly alongside other polices for achieving the same objective. Other transport investments are very likely to offer superior returns compared to where projects rely on new and largely untested technologies" (Eddington, 2006a: Vol. 3: 133).

5.31 Eddington maintained instead that a greater priority should be attached to investments in urban transport systems where it is possible to demonstrate clearer returns:

"Given that agglomerations in a service-based economy tend to be found in major urban areas; that urban networks are particularly heavily used and shared by a wide range of users; and that economic growth and congestion are disproportionately represented in urban areas, projects in urban areas might have been expected to offer very high returns. It is not unreasonable, at the strategic level, to consider that the costs of congestion and unreliability are likely to have a far greater direct impact on the economic success of the UK than might be the case for some other parts of the transport system" (Eddington, 2006a: Vol. 3: Fig 1.9) [5].

5.32 The UK already has a high speed rail system based on upgrades to the West Coast Main Line and the East Coast Main Line. The objective of the current government is to invest in a new purposely built high speed line called HS2. There are therefore two elements that need to be discussed: the first is the impact of the current high speed lines on the UK's economic geography, and the second is the expected impact of the new HS2.

5.33 According to research by Chen and Hall (2009) high speed rail in Britain had the positive effect of integrating the economy of London with some cities

[5] Eddington also argues: "… the UK's economic geography means that the principal task of the UK transport system is not, in comparison to the needs of France or Spain, to put in place very high-speed networks to bring distant cities and regions closer together, in order to enable trading and facilitate economies of scale. Instead, because the UK's economic activity is in fact densely located in and around urban areas, domestic freight routes and international gateways, the greater task is to deal with the resulting density of transport demand" (2006b: 22) .

located within a two hour range. This was particularly the case for Bristol, Leeds, Cardiff and York, that witnessed an improvement in their relative GVA. As a result the authors question if allowing more cities to be within a two hour distance of London would allow them to achieve similar results. Some questions, however, remain unresolved: did places such as Leeds and York grow at the expense of places like Newcastle or Middlesbrough? If they did what opportunities are there for the former to benefit from a similar process if their travel times to London were reduced? Another question is whether these cities benefited from better rail connections due to their specific economic structure (e.g. financial services in Leeds, tourism in York, centralisation of public services in Cardiff)? If this was the case then a similar process might not happen in other urban centres without the same characteristics. Finally, despite the results presented by Chen and Hall (2009) regional data for the UK shows a consistent divergence between London and the South East in relation to the rest of the country. This would indicate that whatever positive benefits have been gained from high speed train, they have not been sufficient to reverse the long term trend of increasing regional inequalities.

5.34 Regarding the future impacts of HS2 in the UK, the expected benefits announced by the UK government are mostly based on economic growth resulting from a more integrated economy. However as argued above, these are calculated on the basis that cities with good rail links are more productive, which as we have demonstrated is difficult to prove. Based on previous experiences from other countries, the most likely outcome is that economic growth at the national level would result from an increasing concentration of population and economic activity in London and the South East. The overall objective of higher growth would still be attained, but not the one of reconfiguring the UK's regional economic disparities. The only possible solution to guarantee a more equal distribution of resources, as argued by Urban and Regional Policy (2009), would be to put in place effective governance mechanisms that would complement the existence of a better infrastructure. This is however unlikely to happen as a result of current constraints on the public budget. Even then it remains not proven that such governance mechanisms would be capable of reversing 'natural' economic trends. Following Puga (2002), the proposed UK model is a clearly a hub and spoke one centred on London which, therefore, according to this analysis, has a high probability of accruing the majority of the benefits of the investment.

5.35 We have noted those analyses, which suggest that intra-regional or intra-urban transport systems have tended to have positive impacts than faster inter-regional connections, especially as far as lagging regions are concerned. Drawing on work by the London School of Economics, the Manchester Independent Economic Review endorsed this perspective:

"Turning to national links, in particular high-speed train links, the LSE study contains strong evidence that the greatest economic benefits are to be gained from focus on improving transport within the travel-to-work areas of cities themselves, rather than between them – and this is the case for Manchester. Thus, transport within MCR is the first and much more important priority.

Proposals for expensive enhancements to external links should undergo a thorough benefit-cost analysis (including environmental costs). For additional investments within the North of England as a whole, including Leeds-Manchester, the case is stronger than for additional investments on the route to London. However, there still needs to be clarity about the benefits and costs" (2009: 26).

5.36 Steer Davis Gleave (2009) for the Northern Way identified that to improve the productivity gap between the North and the rest of the UK northern cities needed to work together more effectively, and highlighted investment in transport infrastructure as a priority. The Northern Way work suggests that improved cross-Pennine rail links would be necessary to derive benefits from improved North-South links. Moreover, removing bottlenecks, providing increased capacity and reducing journey times would all deliver benefits to large and small cities across the North. Mann (2006) concludes that improvements to commuter services also have the potential to deliver significant economic benefits, highlighting the advantages of wider labour market catchment and agglomeration benefits. For the Northern Way, improving the Leeds – Manchester rail corridor is a priority and it could be argued that it is packages of schemes such as this which form the real alternative to HSR[6].

[6] In transport terms, HS2 will deliver the Government's objectives for the London – West Midlands corridor. However, investment on the scale required to deliver HS2 could be utilised to deliver a wide range of interventions which would provide significant improvements to the UK's transport infrastructure, improving reliability, capacity and safety. Arguably, these have the potential to deliver equivalent or higher benefits for outlying regions at lower cost, and an in-depth study of a much wider range of alternatives would have been justified.

Conclusions

"… the improvement of means of transport is dangerous for costly goods: these lose the most effective protection of all tariff protections, namely that provided by bad roads" (Wilhelm Launhardt, 1885/1993: 150).

"Road and rail tracks can be used to travel both ways. A better connection between two regions with different development levels not only gives firms in a less developed region better access to the inputs and markets of more developed regions, it also makes it easier for firms in richer regions to supply poorer regions at a distance, and can thus harm the industrialisation prospects of less developed areas" (Puga, 2002: 401).

5.37 Our aim in this chapter has been to assess the claims concerning the local and regional impacts of high speed rail in general and HS2 in particular. We noted that claims about the "transformational impact" of HS2 on the UK's economic geography have become increasingly central to the proponents' case. However, we observed contradictions in the government's argument and its use of theory and evidence, with barely any weight given to the role of inter-regional rail investments in contributing to local growth in the analyses of BIS, while they appear central in the arguments of DfT. We reviewed the theoretical and empirical literature on the local and regional impact of high speed rail around the world. The clear balance of this literature suggests that these impacts are ambiguous at best and negative at worst. It is very difficult to find unambiguous evidence in support of the contentions that are being made about the potential impacts of HS2 on the cities and regions of the UK. We noted the theoretical and empirical evidence that suggests investments in intra-urban and intra-regional transport systems may provide more local benefits than high-speed North-South links.

5.38 Following our review of the international peer-reviewed and other literature, far from it being "bizarre", as suggested, by Lord Adonis, there are compelling reasons to doubt whether HSR will contribute to "rebalancing regional economies". In fact as we noted above, the two substantive treatments of this issue in HS2's documentation raise broadly similar questions (Gourvish, 2010; Urban and Regional Policy, 2009).

5.39 This chapter has restricted itself to a review of the evidence on the urban and regional impacts of high speed rail. We have not presented a general critique of HS2, but have raised serious questions about the evidence upon which the case is being made about the HS2's transformational impact of

the economic geography of the UK. As things stand, we find that the case is "not proven".

Chapter 6

Carbon Impacts of HS2

Prepared by Ian Thynne & JMP

6 CARBON IMPACTS OF HS2

Prepared by Ian Thynne & JMP

6.1 This chapter relates to the following questions listed by the Committee:

- 6.1 What will be the overall impact of HSR on UK carbon emissions? How much modal shift from aviation and roads would be needed for HSR to reduce carbon?

Overview

High speed rail is also an important part of our plans for a low carbon economy, helping us meet our climate change targets by encouraging millions out of their cars and off the planes onto the train. (Philip Hammond, Foreword to High Speed Rail: Investing in Britain's Future.)

6.2 DfT claims that HS2 will be broadly carbon neutral. The vagueness of the statement is commensurate with the standard of the Green House Gas report presented by DfT. Unfortunately this broad assessment fails to properly consider a number of factors that affect carbon emissions.

6.3 The DfT's own business plan for 2011 – 2015 states it will:

Simplify transport funding and decision making, driving smarter investment to encourage low carbon transport and green growth.

6.4 HS2 will have a number of impacts on different factors which are considered in this chapter which will demonstrate that HS2 is not part of a low carbon future:

- Consumption of electricity.
- Change from domestic slots to medium and long haul flights.
- Assessment of construction carbon.
- Modal shift from domestic air to rail.
- Impacts on road transportation.

Consumption of Electricity

6.5 HS2 will have quite high CO2 emissions related to the consumption of electricity. The amount of emissions will be dependent on the carbon intensity of grid electricity and whether or not the UK moves to cleaner greener fuels in line with targets that have been set. The assumptions made about electricity consumption in the carbon report are broadly adequate and provide a range of results which are fair given the amount of information provided. It is therefore accepted that HS2 will have relatively high carbon emissions from its operations.

Change from Domestic Slots to Medium and Long Haul Flights

6.6 The Green House Gas report (Chapter 6) sets out the impacts on carbon emissions as a result of a switch in domestic flights to HS2. The first methodology provides a theoretical best case reduction of 23.2 MtCO2, although this relies on a complete switch of domestic flights to HS2 and no reuse of these slots. A much more realistic best case scenario suggests no change in emissions based on the assumption of no change in domestic flights. Both of these are highly unlikely, the second more so, since HS2 is being promoted as an alternative to domestic flights.

6.7 The second methodology sets out the worst case scenario (as well as those mentioned above) but cannot quantify what it is. The uncertainty relates to the subsequent impacts of freed up domestic flights slots being switched to international flights e.g. HS2 Ltd do not know if a domestic slot will then be taken up by a medium haul flight to Europe or a long haul flight to America. The report therefore does not try to quantify and instead opts to base its broad conclusion on emissions on a scenario that does not see the re-use of domestic flight slots.

6.8 International flights are more commercially viable for airport operators and Heathrow's domestic flights have continued to reduce in recent years (see chapter 11). Furthermore, DFT has publicly claimed that the HS2 Heathrow spur is about enhancing international connectivity. DFT claim the Heathrow Link will:

Bring Manchester and Leeds city centres within 70 and 75 minutes respectively of the country's main hub airport and transforming its accessibility from the Midlands and the North release runway capacity so that Heathrow could enhance its operational resilience and potentially develop its route network (DFT Exhibition Banner, The case for high speed rail)

6.9 However, in order to enhance international connectivity more use has to be made of the constrained capacity at Heathrow. Colin Matthews, BAA's Chief Executive is quoted as saying:

…BAA would like more passengers to arrive [at Heathrow] by train. High Speed rail would attract people who currently arrive by short-haul flights, freeing slots for more long-haul flights

6.10 And Nigel Milton, Director of Policy and Political Relations at Heathrow told the ENDS Report (an environmental website):

No sensible, well-informed person still seriously pretends HS2 is a green alternative to a third runway. The question now is given no third runway, how we can maximise the effectiveness of our limited capacity at Heathrow. ***That means more long-haul flights****…every time BMI or British Airways have cancelled a domestic route in the past, they've replaced it with a more profitable medium- or long- haul route. That's exactly what will happen when HS2 comes and more domestic routes get cut.*

6.11 DfT is relying solely on the EU Emissions Trading Scheme (EU ETS) to control the likelihood of domestic slots going international, and therefore reduce HS2 impacts on carbon. No assessment of this has been carried out and HS2 Ltd would appear to be 'hoping' this has the desired effect. However, the aviation industry led by BAA would suggest that this control is highly unlikely to be effective. This assumption is supported by an academic study by Dr Elena Ares for the House of Commons Library, Science and Environment section which concludes:

*"According to the EU Commission's estimates the theoretical impact of inclusion is that emissions reductions of 183 millions tonnes of CO2, a 46% reduction compared to business as usual will be achieved by aviation as they will be capped at 2004-06 levels. However as the Commission points out the option of purchasing credits from within the EU ETS and the Kyoto schemes mean that other options are available to the aviation industry and actual cuts are not likely to be anything as significant." (*Dr Elena Ares, 27 April 2011, House of Commons Library, Science and Environment Section).

6.12 HS2 Ltd has not done the work to enable a proper assessment of what effect the EU ETS would have on the freed up domestic slots switching to international. There is no inclination within the aviation industry, particularly at BAA to freeze domestic slots for the good of the environment and the EU ETS is untried, untested and is currently considered to be relatively ineffective. Therefore, the HS2 claim that it will be "broadly

carbon neutral" is based on the hope that freed up domestic slots will not be used for international purposes and HS2 Ltd's own report acknowledges that the impacts could be negative if this were not to happen. The case presented by the aviation industry reduces this hope to a highly unlikely scenario.

Lack of Consideration of Construction Impacts

6.13 There is also a serious concern that the carbon emissions related to the construction impacts is flawed. HS2 Ltd has used a methodology that fails to consider Government endorsed approaches set in the Greenhouse Gas Guidelines for Business (2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting). JMP (Sustainable Transport Consultants) has used this approved methodology to assess the impacts of emissions associated with the construction impacts of HS2. The findings are considerably different from HS2 Ltd whose assessment is based on a more simple CO2 / £ equation. Using the approved methodology above, JMP has assessed the likely emissions for construction as being in the region of 13.6 million tonnes of CO2 compared with HS2 Ltd's assessment of 1.2 million tonnes.

6.14 More importantly, there is confusion within the report as to what is being assessed. There is a suggestion at the start of the report that the 'Y' network is being considered, yet the assessment in section 6.2 is clearly based on the proposed route, London to Birmingham. If the report is meant to consider the whole 'Y' network then the total embedded emissions is even further from the JMP assessment. A proper assessment should be completed that allows a direct comparison of carbon emissions related to the construction of the whole 'Y' network and links to Scotland against the modal shift from road and air to rail. The current assessment is far from adequate.

Modal Shift from Domestic Flights to HS2

6.15 HS2 acknowledges that the major competitor with High Speed Rail is air travel. This is also the area where any significant carbon savings are likely to exist as in theory the operational carbon generated by HSR (per passenger km) should be less than that for the equivalent journey by air.

6.16 The first issue to note from the report is that there is no data on modal shift is used and there are no details on how the related carbon emissions have been calculated. The carbon benefits rely primarily on the 'Y' network, but more so the benefits to Scotland. Therefore any CO2 benefits would

happen after 2033 and the completion of the 'Y'. This means that HS2 would be in considerable carbon debt until the full benefits can be explored. With no supporting data, it is difficult to assess the information provided, and more importantly it's difficult for HS2 to be able to justify their conclusions.

6.17 However, using the information provided in all the reports and basing the carbon impacts on the demand forecasting, over 100% modal shift is required from Leeds and Manchester flights to compensate for the construction and operational impacts of the London to Birmingham route. Obviously this cannot be achieved, and is further undermined by the need to build the whole 'Y' network in order to achieve the modal shift from Leeds and Manchester flights to HS2.

6.18 In 2007 Booz Allen Hamilton's produced a report for DfT which assessed the carbon impacts of a possible new North-South rail line. The analysis included CO2 emissions from construction and operations over a period of 60 years. The 2007 report showed that carbon emissions parity could not be achieved for the London-Manchester route. The rail mode share required to offset additional emissions would exceed 100%, i.e. the entire carbon emissions generated by domestic flights is less than the increase in emissions from high speed rail.

6.19 JMP's analysis of HS2 for 51M uses assumptions on the rail services beyond the 'Y' network for the Scotland links because no information has been provided by HS2. The broad analysis shows that alongside the 100+% shift from Leeds and Manchester flights to HS2, 88% of all flights from Glasgow would also need to switch to HS2. It must be acknowledged that this is only to make up for the impacts of the London to Birmingham route. The impacts of the whole 'Y' network are not yet known.

6.20 In simple terms, the modal shift needed to achieve even 'carbon neutrality' is impossible. For the London to Birmingham route to achieve parity, the whole 'Y' network has to be in operation, and more than 100% of flights need to be removed from the skies. Even in the unlikely situation ofHS2 being the preferred mode for travel from Glasgow to London, there would still be a considerable amount of domestic flights with the intended purpose of interlining; this point is underlined by examples in Europe whereby airlines still fly regular services between cities connected by HSR (Madrid – Barcelona still has over 20 flights per day and Paris – Lyon up to 9 flights a day).

Impacts on Road Transportation

6.21 Rail is normally considered to be a cleaner more efficient alternative to road transportation. However, HS2 acknowledge that this multi billion pound rail scheme will have minimal impact on road. Only 6% of HS2 passengers will have left their cars at home or the Birmingham Interchange (HS2 Demand for Long Distance Travel April 2011). This has an almost negligible impact on road emissions as set out in HS2 Ltd's report.

6.22 Table 4 of the HS2 Ltd report states the scheme will achieve a reduction of between 0.8MtCO2 and 2.2 MtCO2 as a result of removing cars from the road. The report uses a reasonable best case estimate of 1MtCO2 reduction in road emissions over 60years as a result of HS2. In 2009 the DfT reported that the UK's road transport emissions were 113MtCO2.

6.23 There is no reason to doubt the figures presented by HS2 Ltd, but there is a more important issue to be considered. The single largest public transport intervention for the foreseeable future will have no noticeable impact on the UK's transport emissions. This is highly concerning given that road transportation provides a quarter of the UK's emissions which should make this a prime area for helping to meet the overall 2050 reduction goal of 80%.

6.24 There is a further omission within the carbon report related to the impacts on road transportation. The report fails to acknowledge any effect the opening of a new station near the Birmingham NEC would have on road trips.

6.25 Paragraph 3.10.1 of the Appraisal of Sustainability (Main Report 1) states:

"A new HS2 station would be constructed adjacent to the NEC and just to the east of the M42. And It is likely that some 7,000 car parking spaces also would be required and that this would be provided in multi-storey accommodation."

6.26 The size of this car park would suggest considerable new road journeys. It may be possible that some of these spaces are a result of reduced car journeys to London which would reduce carbon emissions; however, it is more likely that these spaces will be used by those would otherwise have travelled to satellite stations closer to home or those not choosing to journey into the Curzon St station in Birmingham. This has not been obviously factored into the report and there is no mention of any additional road trips as a result of the new interchange at Birmingham.

Conclusions

6.27 The first thing to notice about the HS2 Ltd report is the amount of assumptions and incompleteness of the supporting data. The report acknowledges that:

"During the later stages of preparing the AoS it became apparent that a full set of results from the HS2 Demand Model would not be available. Subsequently, the approach agreed with HS2 Ltd was to adapt the detailed methodology to reflect current availability of the HS2 Demand Model results." (para 5.1.1 of Greenhouse Gas Report)

6.28 This lack of a robust report makes it very difficult to fully determine the impacts on carbon. It also means that the conclusions are just as vague, which results in the claim that HS2 is 'broadly carbon neutral'. This claim deliberately ignores some significant impacts which would otherwise overturn the statement to read 'highly carbon negative'. The information provided on the modal shift from air to rail is not clearly presented in the report. Further studies suggest the modal shift from to rail on the proposed route would not be enough to outweigh the operational and construction emissions. The most damaging omission for the report is a failure to acknowledge that any freed up domestic slots would be used for international slots. When a proper assessment of the carbon impacts is undertaken that factors in a shift of domestic slots to international, it is impossible to conclude that HS2 would be 'broadly carbon neutral'. Given that HS2 has little or no impact on road emissions this multi billion pound 'green' transport scheme fails comprehensively to meet the green rhetoric of Phillip Hammond and the only part it plays in reducing UK's ambitious emissions targets is a highly negative one.

6.29 In reality HS2 will increase the UK's carbon emissions and will have a damaging affect on the UK's attempts to meet an 80% reduction in CO2 emissions by 2050.

Chapter 7

Freight Capacity Issues

Prepared by Christopher Stokes

7 FREIGHT CAPACITY ISSUES

Prepared by Christopher Stokes

7.1 This chapter relates to the following questions listed by the Committee:

- 6.3 – What would be the impact on freight services on the classic network.

General background

7.2 Government supports increased freight traffic on the rail network, as this potentially delivers environmental benefits and some decongestion of the trunk road network. However, the British market remains a challenging environment for rail freight, with most movements being relatively short distance; there has also been decline in traditional heavy industry, where rail's competitive position is relatively strong.

7.3 Nevertheless, there was significant growth immediately after privatisation. This reflected two factors: (1) the new privatised operators sought to increase volumes, and (2) coal supplies to power stations continued to switch from home produced coal (either deep mined or opencast) to imports, much of which came through Hunterston, near Ayr in south west Scotland, hence had to travel much further to reach the power stations concentrated in the Midlands and South Yorkshire. This trend is now complete, and coal movements are likely to decline in the long term as coal fired power stations become life expired and close. Electricity generation using coal is also very poor in carbon terms so there is little likelihood of new coal fired stations being built.

7.4 There has also been strong growth in intermodal traffic (containers) mostly to and from the big ports (e.g. Felixstowe and Southampton), but also for Anglo-Scottish flows, principally from Daventry. This is very relevant to the West Coast Main Line, which is the key trunk route for intermodal freight.

7.5 The actual freight volumes are set out in the Office of Rail Regulation's National Rail Trends Year Book[1] (pages 44 and 46):

[1] http://www.rail-reg.gov.uk/upload/pdf/nrt-yearbook-2009-10.pdf

FIGURE 7.1 FREIGHT VOLUMES FROM ORR'S NATIONAL RAIL TRENDS YEARBOOK

7.6 The tonnages moved by rail are at or close to a historical low, but performance has been better on the tonne-kilometres measure, as movements are getting longer.

Freight on the West Coast Main Line

7.7 Freight movements on the West Coast Main line are predominantly intermodal. This sector has shown strong growth, as discussed above, and it is reasonable to assume this will continue, with rail gaining market share from road. Part of this growth can be absorbed by operation of longer trains, delivering improved productivity for the operators, which is of course vital for them in competition with road haulage - this is a highly competitive business, with very thin margins. But there will be a need for additional freight trains, at least on parts of the route.

7.8 The majority of the route between London and Crewe is four track, with the two "fast" lines essentially only used by fast passenger trains in the daytime. So any increase in InterCity services has little direct impact on freight capacity except at a limited number of pinchpoints, for example between Rugby and Nuneaton, where there is only one northbound track for part of the distance, and at junctions at Colwich (where the route to Manchester via Stoke splits from the main line) and Stafford. The £2.06 billion investment proposed in Chapter 1 would directly ease these pinchpoints, so freight capacity would not be reduced as a result of an incremental increase in InterCity frequencies.

7.9 Current freight capacity on the route is 2-3 trains per hour in the day, except during the commuter peak (although even then, some freight trains do run). Capacity is much higher at night, probably up to 8-10 trains per hour. If all the available capacity is taken, the route could theoretically take up to 120 freight trains each way daily, although in practice this would not be achievable because of the need both for flexibility and to absorb delays. The practical limit is, say, 80 trains. At present the route takes c36 trains south of Rugby, c44 north of Rugby, so it is busy, but by no means full. However, Network Rail is currently doing work to upgrade the Felixstowe - Nuneaton cross country route, which will provide a more direct route from Felixstowe, Ipswich and Harwich. This will potentially take up to 20 trains each way off the West Coast Main Line south of Nuneaton, freeing up capacity south of there for any conceivable future growth. North of Nuneaton, there is still capacity except at the pinchpoints mentioned in Chapter 1, which would need to be tackled both to allow additional InterCity services and/or freight growth.

Summary

7.10 While rail freight is unlikely to grow strongly overall, there is likely to be growth in intermodal traffic. However, completion of the Felixstowe - Nuneaton upgrade will potentially allow a significant transfer of freight movements away from the south end of the West Coast Main Line, creating capacity for any foreseeable level of future growth. Capacity north of Nuneaton can also be maintained/increased by infrastructure investment to relieve specific pinchpoints.

Chapter 8

Capacity and Service Disbenefits

Prepared by Christopher Stokes

8 CAPACITY AND SERVICE DISBENEFITS

Prepared by Christopher Stokes

8.1 This chapter relates to the following questions listed by the Committee:

- 2.2 – Implications on HSR on the funding of the classic network - impact of delays to investment in the existing network.
- 3.1 – Robustness of assumptions methodology - relationship between planned capacity and existing capacity, and forecast growth.
- 4.2 – Which cities should be served by the Y - identification of cities which are adversely affected by HS2.
- 5.1 – Economic regeneration and bridging the North-South divide - identification of cities which are likely to be adversely affected by HS2.

Introduction

8.2 This submission considers the following major issues:

- Inadequate planned capacity on HS2 for key flows.
- Delays to increases in capacity as a result of the project.
- The impact of reduced classic services.

Inadequate Planned Capacity

8.3 One of the key arguments put forward by the government in support of High Speed 2 ("HS2") is that it is the only effective way of increasing capacity on the rail network.

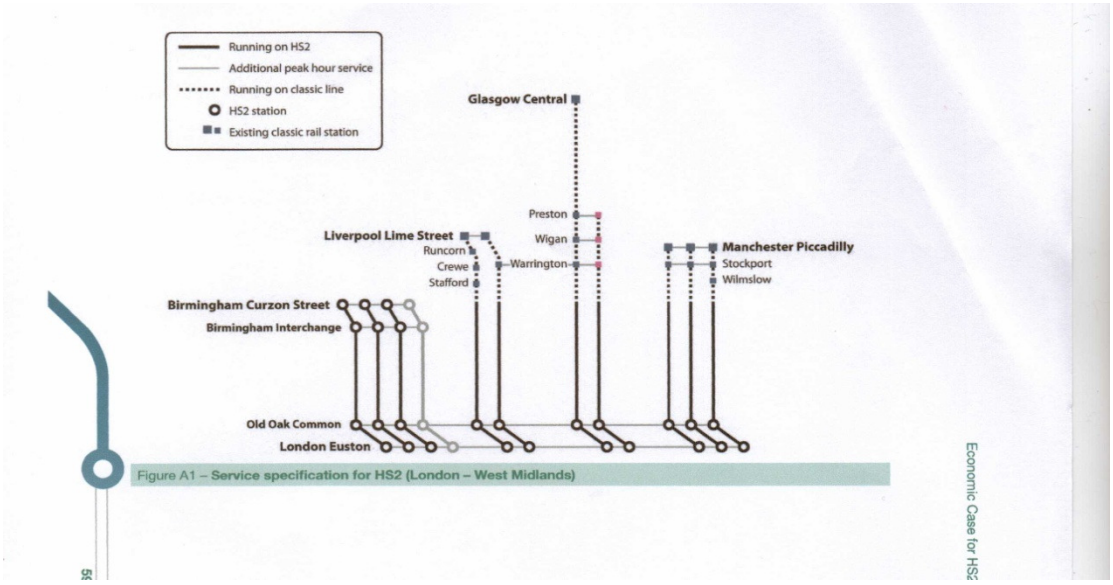
8.4 **However, detailed analysis of the service patterns published in the consultation documentation shows that for a number of key flows HS2 provides less capacity than now.**

Phase 1 Plans (2026)

8.5 The biggest passenger flow on the West Coast Main Line is between London and Manchester. There are three trains an hour today. The Government has already committed to lengthen 31 out of 52 Pendolino trains from 9 to 11 cars from 2012, also to buy 4 new 11 car trains. Each 11 car train will then have 589 seats, giving up to 1,767 seats per hour.

8.6 When HS2 Phase 1 is scheduled to be complete in 2026, the published plans still only show three trains per hour, as set in the supporting document "*The Economic case for HS2*",[1] and shown in the following figure.

FIGURE 8.1 SERVICE SPECIFICATION FOR HS2



source: The Economic Case for HS2

8.7 The proposed high speed trains to Manchester run on HS2 as far as its junction with the existing route north of Lichfield, then on the existing network between Lichfield and Manchester. HS2 Ltd's documentation states that the trains will be in units which each have 550 seats[2]. On services which operate throughout on the new route (only London – Birmingham in Phase 1), these can be operated in pairs, giving 1,100 seats per train. But services which operate partly over existing routes will be formed of one unit only, as two unit trains would be much too long for all the stations, and could only be accommodated with massive expenditure and disruption. This is confirmed in HS2's own documentation:

[1] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf, pg. 59

[2] http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/technicalappendix/pdf/report.pdf HS2 Technical Appendix December 2009, Appendix 2: Day 1 Train Service assumptions for demand Modelling para 3.2

"Under the provisional service specification … classic-compatible high speed services would operate on HS2 and the classic network between London and destinations further north. All would be formed of 200m units, capable of carrying 550 passengers"[3]

8.8 So for Phase 1, from 2026 until at least 2032/3 (assuming Phase 2 is built), HS2 plan to provide 3 x 550 seats to Manchester, a total of 1,650 seats an hour**, a reduction of 6.6 per cent on the total from 2012** compared with the capacity provided by 11 car Pendolino sets. However, HS2 forecast passenger growth of 209% by 2043, which gives pro-rata growth of 107% by 2026, more than double the "base" number of passengers, whilst at the same time claiming HS2 reduces overcrowding. This is not credible.

8.9 The Department of Transport (DfT) may seek to argue that the service assumptions are only illustrative, and more trains could be operated to Manchester. In addition to the three trains routed via HS2, the documentation published in March 2010 indicated that there would be one train remaining on the existing route, to serve intermediate flows such as Milton Keynes to Manchester and Stoke-on-Trent to London. So there would be four London trains an hour to Manchester, but one will be much slower and is assumed only to carry intermediate traffic.

8.10 This part of the network is already heavily congested, and in its evaluation of alternatives for upgrading the existing network, DfT argue that it would be necessary to spend £1.6 billion on work to increase capacity north of Lichfield[4] to enable operation of four trains an hour to Manchester, although HS2 explicitly state this isn't needed for their four trains an hour, as no costs for this work are included in their estimates:

"[Stafford] It is assumed that some infrastructure/signalling works have taken place in the Stafford area to alleviate this known capacity constraint…[Manchester Hub] It is assumed that works have taken place in Manchester to alleviate the congestion of the rail routes into/through

[3] High Speed Rail for Britain – a Report by High Speed 2 Ltd, Page 147, Para 3.10.17 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/hs2report/

[4] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-strategic-alternative.pdf Page 41, WCML scenario B items B1 and B4

Manchester, including the provision of additional capacity at Manchester Piccadilly.[5]*"*

8.11 It is simply not credible for DfT to claim that the HS2 service to Manchester could be increased to the six or more trains an hour which would be needed to carry their forecast passenger numbers without major expenditure on the existing network.

8.12 HS2 Ltd's own documentation also makes clear that the proposed high speed service pattern for Preston and Glasgow does no provide sufficient capacity to meet their demand forecasts:

"*In modelling these services we identified high levels of demand resulting in some severe crowding during the peak. In reality there would be a number of ways in which to deal with this, which could include a reconfiguration of the timetable or minor upgrades to the route. These options would require further detailed analysis and planning but for simplicity we have modelled 400m-long trains on this route*[6]**"**

8.13 While the capacity shortfall to Manchester should be resolved when Phase 2 is completed, Glasgow services would continue to be operated by single unit trains.

Phase 2 Plans (2032/3)

8.14 While completion of Phase 2 would enable operation of two unit trains to Manchester, the Phase 2 plans are also fundamentally flawed. The *"Service specification assumptions for the Y network"* are set out in *The Economic case for HS2*[7], as shown in Figure 8.2.

8.15 The specification shows a total of 18 trains an hour, which is above the realistic maximum capacity of the route, as set out in Chapter 4 "HS2 Route Capacity and Reliability".

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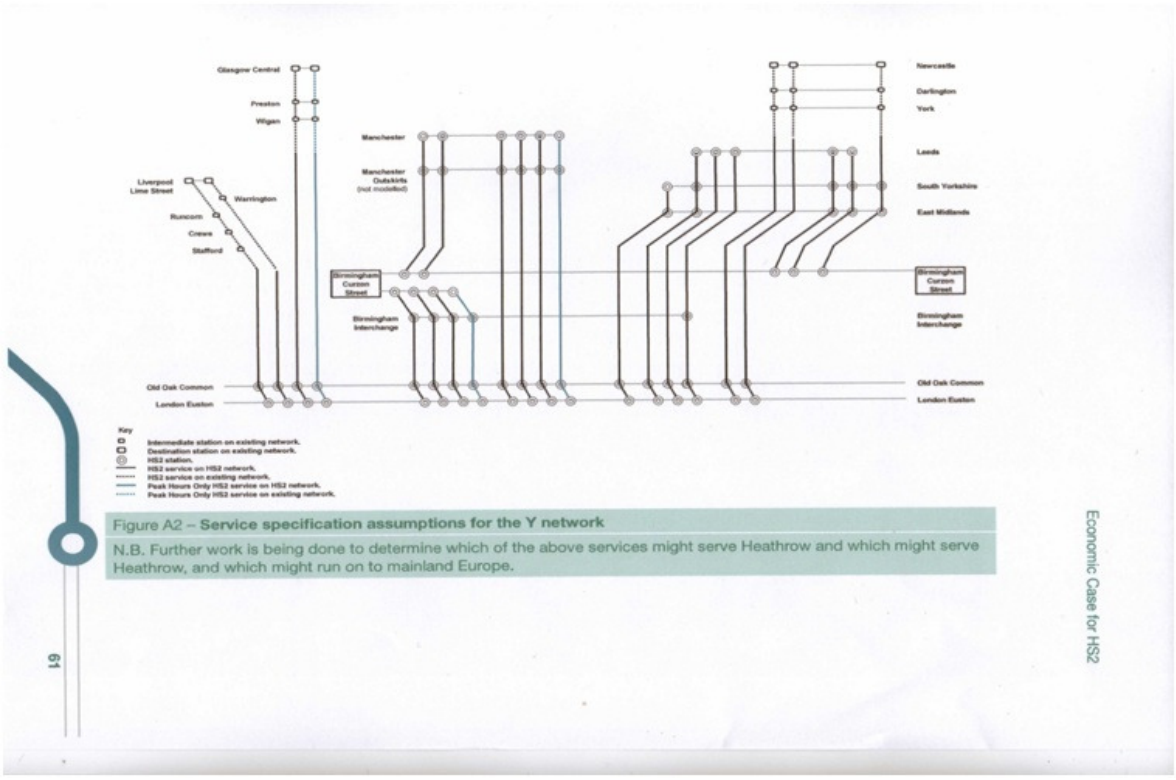
[5] Technical Appendices, Appendix 2, para 2.20, 2.21 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/technicalappendix/pdf/report.pdf

[6] High Speed Rail for Britain – a Report by High Speed 2 Ltd, Page 147, Para 3.10.17 c http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/hs2report/

[7] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf, pg. 61

FIGURE 8.2 ECONOMIC CASE FOR HS2 (FEBRUARY 2011, PAGE 61)



- The main consultation document shows journey times from London to Edinburgh reduced to 3 hours 30 minutes (on page 20), but the service pattern shows no services to Edinburgh.
- The pattern only shows two trains an hour to York, Darlington and Newcastle. But there are two trains an hour today, and these are typically the busiest services on the East Coast Main line. When the new IEP trains recently announced by Philip Hammond are introduced, seating capacity per train will be 649 seats, giving 1,298 seats per hour, yet in 2033 DfT propose to have only 2 x 550 seat trains per hour, giving 1,100 seats, which is a **reduction of 15 per cent** on the IEP capacity, despite forecast growth of over 200 per cent.
- The actual number of London services overall will also ultimately be significantly less than set out in the service specification, as this doesn't take into account the proposed links to HS1 and Heathrow. This is clear from the note on the bottom of the annex*:*

"Further work is being done to determine which of the above services might serve Heathrow……and which might run on to mainland Europe".

8.16 Services to HS1 and Heathrow cannot, of course, serve Euston as well.

Delays to Increased Capacity

8.17 DfT's consultation documents make clear that the case for HS2 is based on an assumption that no further investment is made to enhance capacity on any of the routes ultimately affected beyond schemes which are already committed.

8.18 This approach condemns existing passengers to progressively increasing overcrowding on specific parts of the network where this is already a problem. A prime example is the commuter service between Northampton, Milton Keynes and Euston, where there is high growth and already significant overcrowding – in the evening peak period, it is necessary to join fast services up to fifteen minutes before departure to be certain of getting a seat, with passengers standing for a minimum of thirty minutes, often longer. Yet there is potential to implement improvements on an incremental basis, for example by construction of a grade separated junction south of Milton Keynes which, together with higher performance new rolling stock, would allow commuter capacity to Milton Keynes and Northampton to be doubled.

8.19 Action is urgently needed on these flows. DfT's own documentation ("Rail Package 2") demonstrates that this approach is realistic and deliverable, and improvements could be delivered in about five year's time if the decision to do so was taken now. But with HS2, there will be no capacity increase until 2026.

8.20 The position on the Midland and East Coast Main Line Routes is much worse: no capacity increase until 2032/3 at best. For the Midland Main Line, Network Rail's "Network RUS – Electrification"[8], published in October 2009, claims that there is a financial case for electrification, the only route evaluated for which this was claimed. But the Secretary of State has already indicated his approach in answer to questions in the House of Commons from Members with constituencies served by the Midland Main Line following his statement on electrification of the Great Western Main Line:

8

http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/network/working%20group%204%20-%20electrification%20strategy/networkrus_electrification.pdf

"The announcement today does not include provision for the Midland Main Line. The hon. Gentleman mentioned bi-mode trains, and I am sure that he has also been lobbying for the electrification of the line, as have many other midlands Members. The debate about the line's future also has to take account of the implications of High Speed 2, however. Once the High Speed 2 consultation, which began yesterday, has been completed and the Government have announced their definitive plans later this year, it will be much easier to plan for the long-term future of the midland main line."

8.21 It is important to recognise that if promises are made to address this lack of investment in capacity in the classic network, the cost, benefits and implications should included within the HS2 base case, which will have a detrimental effect on the overall business case.

Reductions to Classic Services

8.22 It is not possible to be definitive on the impact of HS2 on the train services on individual towns and cities at this stage, but it is clear from experience in other countries such as Japan, France and Spain that train services on the "classic" main lines affected will be reduced (see chapter 3). Given that the HS2 business case assumes that all long distance travel between the cities served by HS2 transfers to the high speed line, this is inevitable: it would clearly not be sustainable to continue to operate a twenty minute frequency service between Manchester and London on the existing route when the trains no longer carry end to end traffic.

8.23 This is confirmed in the HS2 consultation documentation:

"we have also assumed an adjusted service pattern on the WCML, with the withdrawal and adjustment of some long distance services…"[9]

and

"In addition we can reasonably assume that there would be a reduction in long distance services on the Midland and East Coast Main Lines as the new high speed services were introduced"[10]

and significant savings in operating costs as a result of these service reductions are included in the overall business case for the Y network, at a total Net Present Value of £5.4 billion[11].

[9] Economic Case for HS2 February 2011 Page 27 para 4.2.4

[10] Economic Case for HS2 February 2011 Page 11 para 2.2.7

8.24 The current consultation document is silent on the detail of the services to be operated on the classic routes after HS2 is opened. However, this information was provided for Phase 1 in documents published by the previous government in March 2010[12] (Figure 9.2). It is unlikely that there has been any change to the assumptions used in the business Case for Phase 1 since then.

8.25 Nevertheless, the broad direction of changes is clear:

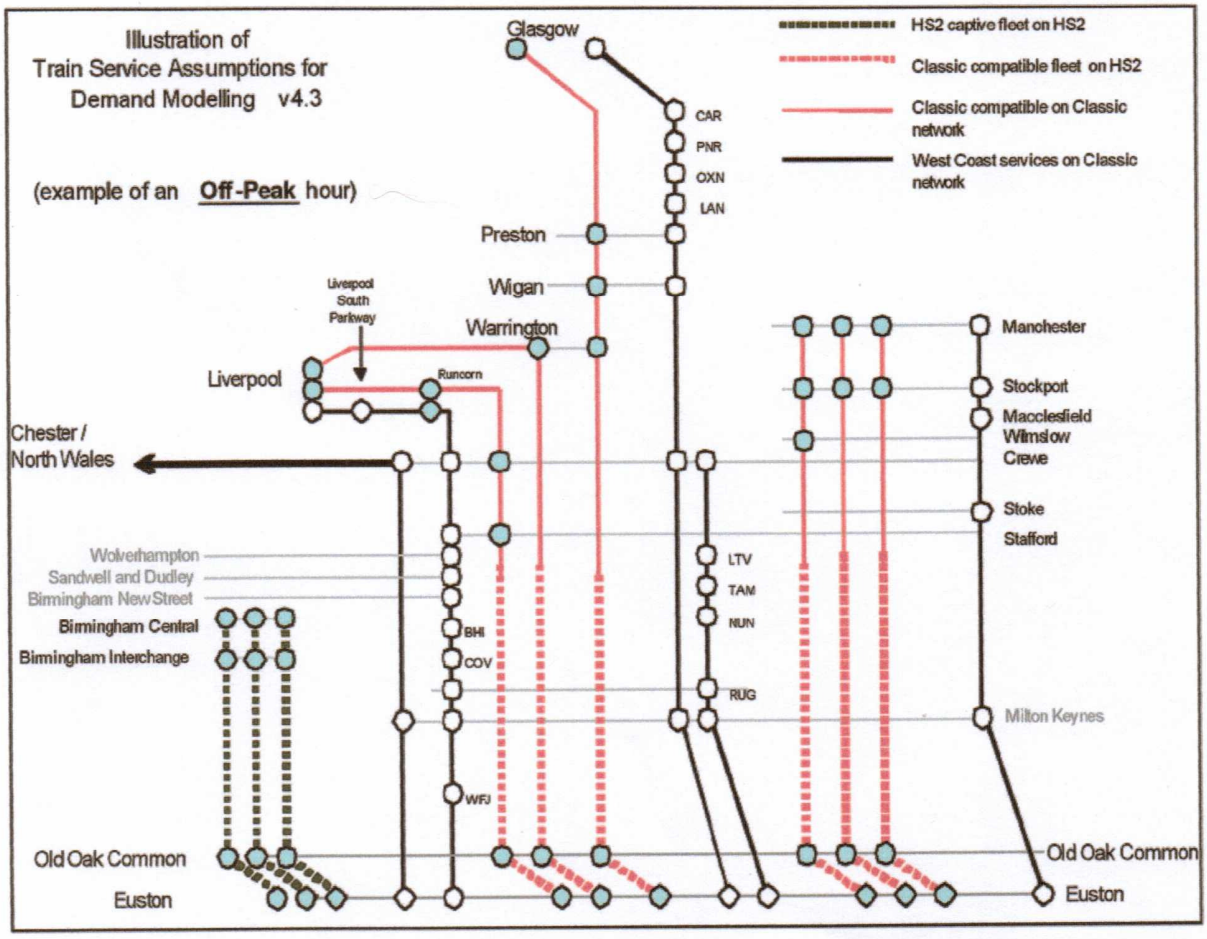
- The cities directly served by HS2 (Birmingham, Manchester and Leeds) will benefit from faster journey times. Similarly, passengers able to access HS2's Parkway stations will also benefit.
- Some major stations on existing routes are certain to see a reduction in frequency in their services to and from London, and also in many cases slower journey times as a result of additional intermediate stops. Examples are Coventry, Wolverhampton and Stoke-on-Trent (Phase 1) and Leicester, Chesterfield, Peterborough and Doncaster (Phase 2)
- Whilst London, Birmingham, Manchester and Leeds are planned or expected to have city HS2 stations close to the city centre, Sheffield and Nottingham/Derby will only have "Parkway" stations. For many passengers, the additional access time to reach these stations will dilute the time savings as a result of HS2. In addition, the Parkway stations will inevitably be less well integrated with the cities' local public transport networks (bus, tram and rail).
- Towns which are served by interchange at key city centre stations will in many cases have a disbenefit, either as a result of less frequent and slower connecting services to London, or the need to transfer between stations to access the HS2 network. For example, passengers on the West Midlands suburban network will have the choice of either using the remaining London services on the existing route or making a transfer between Birmingham New Street and the new HS2 Curzon Street terminus, a walk of about ten minutes.

11 Confirmed by email from HS2 Ltd to HS2 Action Alliance 12th April 2011

12 Day 1 train service assumptions for demand modelling, High Speed " technical appendices 11th March 2010

FIGURE 8.3 DAY 1 TRAIN SERVICE ASSUMPTIONS FOR DEMAND MODELLING

Appendix A: Illustration of off-peak hour services



source: High Speed 2 " Technical Appendices" 11th March 2010

Potential Impact on Great Western Main Line Services

8.26 It is likely that all GWML trains will have to call at Old Oak Common as a consequence of the proposed stops in Heathrow Express services. This would increase **all** journey times to and from Paddington by 4/5 minutes, but would have limited value for interchange for long distance services. For example, after completion of Phase 1, Bristol – Birmingham journeys would still be very much faster by the half hourly direct service (86 minutes against 158 minutes, allowing 20 minutes for interchange at Old Oak Common). Even after completion of Phase 2, the hourly direct Bristol – Manchester service is still faster than interchanging at Old Oak Common (179 minutes against 182 minutes).

8.27 This issue is discussed in more detail in Chapter 9.

Impacts by Station

8.28 The impacts by station for those parts of Britain which are directly affected in one way or another by HS2 are set out in the following tables. For Phase 1, the service patterns are based on the March 2010 documentation (Table 8.1); for phase 2, the indicative HS2 pattern has been taken as a base (Table 8.2), with judgements made on the likely pattern of residual services.

Conclusions

- On the basis of the published documentation, cities such as Manchester (Phase 1), and Newcastle will have the capacity of their London train services reduced when HS2 is completed.
- HS2 also acknowledge that capacity on the Preston/Glasgow route is inadequate to meet forecast demand.
- The documentation shows that some of the services specified to and from London will in fact be diverted to Heathrow or HS1, reducing the actual capacity available to London.
- The assumed route capacity is unrealistically high, as set out in Chapter 4. This will further reduce the available capacity.
- The above capacity reductions will inevitably massively reduce the claimed revenue and transport user benefits for HS2.
- Towns and cities not directly served by HS2 can expect to see a deterioration in their London InterCity services, reflecting the major

savings for classic route service reductions included in the HS2 business case. Any replacement of these services would have a significant impact on the £5.4 billion operating cost saving assumed in the HS2 business case.

TABLE 8.1 ALTERNATIVE HS2 IMPACTS – PHASE 1

All services will be subject to disruption during the reconstruction of Euston station and its approaches; there will be no capacity increases before 2026 other than for already committed schemes. Major "losers" highlighted in yellow.

Station	Impact
Milton Keynes Northampton	1. Potential Doubling of Commuter Capacity from C2016 not Taken Forward in Advance of HS2 2. Significant Capacity Improvement from 2026, Subject to Affordability
Rugby	1. Potential Service Improvements on the Existing Route not Taken Forward in Advance of HS2 2. Possible Capacity and Frequency Improvements from 2026, Subject to Affordability 3. Present Hourly Non-Stop Service Replaced by Two Trains An Hour, but Making 1/2 Stops
Coventry	Frequency Reduced from 3 to 1 Train per Hour from 2026, with Journey Times Extended by 10 Minutes, as Trains Stop At Rugby, Milton Keynes and Watford Junction
Birmingham International	1. "Parkway" Function Effectively Taken Over by Birmingham Interchange from 2026 2. Frequency Reduced from 3 to 1 Train per Hour from 2026, with Journey Times Extended by 10 Minutes, as Trains Shown to Stop At Rugby, Milton Keynes and Watford Junction
Birmingham Curzon Street	1. High Speed Service with 33-35 Minute Journey Time Saving. 2. 3 Trains per Hour
West Midlands Suburban Network Via Birmingham New Street	1. Implications For Connections with the West Midlands Suburban Network - Frequency Reduced from 3 to 1 Train per Hour from 2026, with Journey Times Extended by 10 Minutes, as Trains Stop At Rugby, Milton Keynes and Watford Junction. 2. High Speed Alternatives Available by Transfer to the HS2 Curzon Street Terminus

Station	Impact
Sandwell and Dudley Wolverhampton	Frequency Unchanged. Journey Times Extended by 10 Minutes
Shrewsbury, Wrexham and Mid Wales	1. Journey Time For Connecting Services from Wolverhampton and Birmingham New Street Increased by 10 Minutes, and Frequency from Birmingham New Street Reduced from 3 to 1 Trains an Hour. 2. Transfer from New Street to Curzon Street Available as a Faster Alternative
Nuneaton, Tamworth, Lichfield	1. Potential Service Improvements on the Existing Route not Taken Forward in Advance of HS2 2. Possible Journey Time Improvements from 2026, as Trains Are Shown to Make Fewer Stops En Route
Stafford Crewe	1. Potential Service Improvements on the Existing Route not Taken Forward in Advance of HS2 2. C20 Minute Journey Time Improvement from 2026
Stoke-on Trent	1. No High Speed Service Proposed 2. Frequency Reduced from 2 to 1 Train per Hour 3. Average Journey Time Lengthened Slightly
Macclesfield	Average Journey Time Lengthened Slightly
Wilmslow	1. Frequency Hourly, as Now 2. Journey Time Reduced by C20 Minutes
Manchester Stockport	1. C20 Minute Reduction in Journey Times 2. Three Trains an Hour Via HS2, One Via the Classic Route 3. A ***Reduction*** in Overall Capacity on the Route, from 1767 Seats to 1650 Seats per Hour, Despite Network

Station	Impact
	Rail's Forecasts That This Route Would Have the Highest Growth.13 4. Issues of Access to the Local Transport Network Unclear Until Station Site is Determined
Runcorn	1. Frequency Hourly, as Now 2. Journey Time Reduced by C20 Minutes
Liverpool Lime Street Warrington	1. C15 - 20 Minute Reduction in Journey Times 2. Frequency Increased to Two Trains per Hour
Wigan	1. Frequency Hourly, as Now 2. Journey Time Reduced by C20 Minutes
Preston	1. Hourly HS2 Service, with Journey Time Reduction of C20 Minutes 2. Hourly Classic Service
Lancaster, Oxenholme, Penrith, Carlisle	1. No Through Service Via HS2 2. Hourly Classic Service 3. HS2 Can be Used by Interchange At Preston
Glasgow	1. Hourly HS2 Service, with Journey Time Reduction of C20 Minutes 2. Hourly Classic Service
North Wales Via Crewe	No Significant Change – Existing Through Services Shown to Continue

[13] This assumes 550 seats for HS2 units, as set out in the consultation documentation, and 589 seats for 11 car Pendolino sets

TABLE 8.2 ALTERNATIVE HS2 IMPACTS – PHASE 2

No additional capacity provided on either the Midland main line or the East Coast Main line prior to completion of Phase 2 in 2032/3 at the earliest - major "losers" highlighted in yellow.

	Station	Impact
West Coast Main Line	Milton Keynes, Northampton Rugby Coventry Birmingham International West Midlands Suburban Network Sandwell and Dudley Wolverhampton Shrewsbury, Wrexham and Mid Wales Nunueaton, Tamworth, Lichfield Stafford, Crewe Stoke-on-Trent Macclesfield	No Change to Phase 1 Impacts
	Wilmslow	Parkway Function Effectively Taken Over by "Manchester Outskirts" Station – Impact Dependent on Location of this

	Station	Impact
	Stockport	1. "Manchester Outskirts" Station Potentially Substitutes For Stockport Stops 2. Loss of Local Transport Interchange
	Manchester	1. Three High Speed Trains an Hour (Four In Peak Periods) 2. Potential Major Capacity Increase Using Dedicated High Speed Sets (Can be 1100 Seats Per Train) 3. c55 Minute Journey Time on Present Times (c35 Minute Reduction on Phase 1) 4. Issues of Access to the Local Transport Network Unclear until Station Site is Determined
	Runcorn Liverpool Lime Street	No Change to Phase 1 Impacts (Main Consultation Paper Implies A Further Reduction In Journey Times to Liverpool, but the Service Specification Assumptions Show Liverpool Services Still Leaving HS2 at Lichfield and Calling at Stafford)
	Warrington	1. *Possible Reduction In Frequency – Service Specification Assumptions Show Only One Train an Hour* 2. Journey Times Unchanged From Phase 1
	Wigan	1. Frequency Hourly, as now 2. Journey Time Reduced by c55 Minutes
	Preston	1. Hourly HS2 Service, with Journey Time Reduction of c55 Minutes 2. Assumed Hourly Classic Service, as For Phase 1
	Lancaster, Oxenholme,	1. No Through Service Via HS2

	Station	Impact
	Penrith, Carlisle	2. Assumed Hourly Classic Service, as For Phase 1 3. HS2 Can be Used by Interchange at Preston
	Glasgow	Hourly HS2 Service, with Journey Time Reduction of c55 Minutes
	North Wales Via Crewe	No Change to Phase 1 Impacts
Midland Main Line	**Station**	**Impact**
	Luton Luton Airport Parkway Bedford	No Significant Impact – Significant Additional Capacity Provided as a Result of the Thameslink Project
	Wellingborough Kettering Corby	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Potential Capacity Improvements From 2032/3, Reflecting Transfer of Longer Distance Journeys to HS2
	Market Harborough	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Potential Capacity Improvements From 2032/3, Reflecting Transfer of Longer Distance Journeys to HS2
	Leicester	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Service Frequency and Journey Times Likely to Deteriorate on Completion of Phase 2 – Leicester Currently Has Four London Trains an Hour, Two of Which are Non-Stop
	Loughborough	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken

	Station	Impact
		Forward In Advance of HS2 2. Service Frequency and Journey Times Likely to Deteriorate on Completion of Phase 2 – Loughborough Currently has Two London Trains an Hour, One of which only Stops at Leicester 3. HS2 East Midlands Station Potentially Substitutes For Loughborough Stops
	Nottingham Derby	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Significant Journey Time Improvements From HST East Midlands Station 3. Reduced Frequency and Increased Journey Times For Existing City Centre Stations 4. Loss of Local Transport Interchange
	Sheffield	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Significant Journey Time Improvements From HST South Yorkshire Station (C52 Minutes) 3. Reduced Frequency and Increased Journey Times For Existing City Centre Station 4. Loss of Local Transport Interchange
	Chesterfield	1. Electrification, Journey Time Reductions and Increase In Capacity Not Taken Forward In Advance of HS2 2. Service Frequency and Journey Times Likely to Deteriorate on Completion of Phase 2 – Chesterfield Currently has Two Trains an Hour, Non-Stop between Leicester and London
East Coast Main Line **Note: The Journey Time Savings For ECML Claimed In the Consultation Document**	Peterborough	Service Frequency Likely to Deteriorate on Completion of Phase 2 –Peterborough Typically has Three/Four Fast Trains an Hour
	Grantham	Possible Frequency and Capacity Improvements Following Transfer of Longer Distance Passengers to HS2

	Station	Impact
Are Overstated, as These Do Not Reflect the Acceleration to be Implemented In May 2011	Newark	
	Doncaster	1. Service Frequency and Journey Times Likely to Deteriorate on Completion of Phase 2 2. South Yorkshire HS2 Station may be an Attractive Substitute, Depending on Its Location
	Wakefield	Service Frequency and Journey Times on the Existing Route Likely to Deteriorate on Completion of Phase 2
	Leeds	1. Three High Speed Trains an Hour 2. Potential Major Capacity Increase Using Dedicated High Speed Sets (can be 1,100 Seats Per Train) 3. c55 Minute Journey Time Reduction on Present Times 4. Issues of Access to the Local Transport Network Unclear Until Station Site is Determined
	York Darlington Durham Newcastle	1. Two High Speed Trains an Hour –**No Capacity Increase on Present Service** 2. c15 Minute Journey Time Reduction to Newcastle on May 2011 Times
	Berwick on Tweed Edinburgh	1. Service Assumption Does Not Show any Trains North of Newcastle, Despite Journey Time Reductions Claimed In the Main Consultation Paper 2. **No Capacity Increase on Present Service** 3. C50 Minute Journey Time Reduction on Present Times[14]

[14] The basis of the journey time savings claimed to Edinburgh are unclear, and inconsistent with the times to Newcastle. The timings may assume operation by WCML, although DfT's service specification assumptions do not show trains to Edinburgh by either route

Chapter 9

Impacts on Great West Main Line

Prepared by Christopher Stokes

9 IMPACTS ON GREAT WEST MAIN LINE

Prepared by Christopher Stokes

9.1 This chapter relates to the following questions listed by the Committee:

- 3.1 –Business Case robustness of assumptions and methodology - the failure of DfT to analyse the impact of HS2 on GWML passengers.
- 4.1 and 4.2 - Cities served and station locations – criteria for intermediate stations
- 5.2 – the impact on regeneration in South Wales and the West of England of deceleration of GWML InterCity services.
- 5.3- Locations which will benefit from HSR - the disbenefits from HS2 on South Wales and the West of England.

Introduction

9.2 This submission evaluates the impact of the proposed Old Oak Common interchange station on Great Western Main Line (GWML) services

HS2 proposals

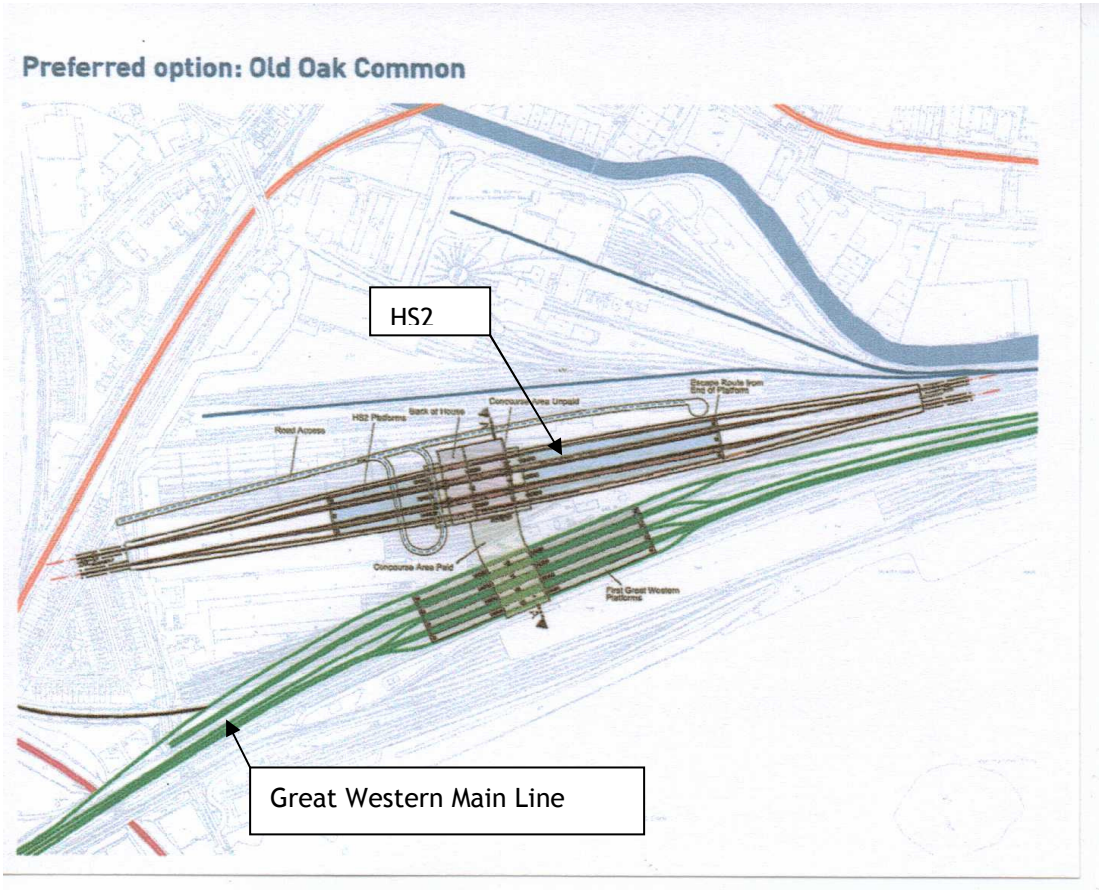
9.3 The Government's plans for HS2 include a major interchange station at Old Oak Common, about 5 kms from Paddington. This station is designed to serve a number of purposes:

- Interchange between HS2 and Crossrail, providing faster distribution to central London for some HS2 passengers, and, crucially, relieving the heavily congested Underground Lines from Euston.
- Providing an interchange between HS2 and Heathrow Express, giving a good connection from HS2 to Heathrow between 2026 and 2032/3 when the direct link from HS2 to Heathrow is planned to open
- Providing connections from Heathrow to the Thames Valley, South Wales and the West of England

9.4 The GWML station is envisaged to have eight platforms, two in each direction on the two "fast lines", primarily used by InterCity trains and Heathrow Express, and two in each direction on the two "slow lines", primarily used by suburban services.

9.5 A plan of the proposed station is shown as Figure 9.1.

FIGURE 9.1 PROPOSED OLD OAK COMMON STATION



Source: High Speed Rail – A report to Government by HS2 Ltd March 2010, page 82

Disadvantages for GWML passengers

9.6 The plans for Old Oak Common initially appear quite attractive, but more detailed examination reveals a number of serious drawbacks:

- All GWML trains stopping at Old Oak Common will have journey times extended, by 3 – 4 minutes for commuter trains, 4 minutes for Heathrow Express and 5 minutes for InterCity trains.
- No useful purpose is served by stopping GWML InterCity trains at Old Oak Common
    - Journey times for the dominant flows to and from central London are extended
    - Interchange with Crossrail will already be easily available at Paddington itself

- Interchange with HS2 is of little or no use for passengers from the West of England and South Wales, as direct services to and via Birmingham are much more convenient and generally faster (as highlighted in journey time comparisons in Annex 1 at the end of this chapter).

- Once Heathrow Express trains stop at Old Oak Common all GWML trains on the fast lines have to stop at Old Oak Common because of impacts on train paths. A detailed analysis of the capacity implications carried out by the consultancy Passenger Transport Networks concludes that "one is then led inexorably to the circumstances more familiar on urban metros, where if one train stops, everything must stop". The Passenger Transport Networks report is appended at the end of this chapter as Annex 2.

- Quality of service for Heathrow Express will be downgraded, with an extended journey time. It is also likely that the present arrangement, with a train always waiting at Paddington, will no longer be deliverable, as result of the slower journeys.

- Construction of the Old Oak Common GWML platforms will inevitably involve significant disruption to the route over several years; unlike Stratford International, the GWML platforms will not be built on a clear site.

9.7 Passengers from suburban stations between Old Oak Common and Reading will potentially gain some benefit from the connection with HS2, so there may be a case for stopping trains on the "slow lines"; the Crossrail services would continue to provide a good connection to Heathrow.

Conclusion

9.8 The requirement to stop all trains at the proposed Old Oak Common station will lengthen journey times for all passengers to and from Paddington (29.1 million journeys in 2010).

9.9 There is no interchange benefit as a result of calling GWML InterCity trains at Old Oak Common – journey times are almost always faster on existing direct services.

9.10 The quality of service on Heathrow Express will also be degraded, with extended journey times to and from central London and the likelihood that there will no longer always be a train waiting at Paddington.

9.11 If a direct spur to Heathrow is constructed in 2032/3, the potential benefit of fast connections from HS2 to Heathrow is only relevant between 2026 and 2032/3.

Annex 1 – Journey Time Comparisons

Bristol - Birmingham

- Existing service - half hourly direct trains, typical journey time 86 minutes.
- Via Old Oak Common and HS2 - half hourly with interchange[1]; estimated journey time 158 minutes.

Bristol – Manchester

- Existing service - Hourly direct trains, typical journey time 179 minutes.
- Via Old Oak Common and HS2 - half hourly with interchange; estimated journey time 182 minutes.

Cardiff – Manchester

- Existing service - Hourly direct trains, typical journey time 205 minutes.
- Via Old Oak Common and HS2 - half hourly with interchange; estimated journey time 208 minutes.

Cardiff - Birmingham

- Existing service - Hourly direct trains, typical journey time 120 minutes.
- Via Old Oak Common and HS2 - half hourly with interchange; estimated journey time 184 minutes.

Reading – Birmingham

- Existing service - Half hourly direct trains, typical journey time 97 minutes.
- Via Old Oak Common and HS2 - three trains an hour[2] with interchange; estimated journey time 87 minutes.

[1] The estimated timings allow 20 minutes for interchange at Old Oak Common; the actual time required will depend on the time needed to walk from GWML to HS2 platforms, and the detail of the timetable in operation at the time

[2] This is the planned all day frequency from Old Oak Common to Birmingham

Plymouth - Birmingham

- Existing service - Hourly direct trains, typical journey time 211 minutes.
- Via Old Oak Common and HS2.
- Hourly with interchange; estimated journey time 242 minutes.

Annex 2 – Passenger Transport Networks Report

source: Jonathan Tyler, Passenger Transport Networks, York, 25 April 2011

High Speed 2 – Old Oak Common Interchange:

Implications for the Great Western Main Line

The route for the London … Birmingham High Speed Railway recommended by HS2 Ltd to the Government, and as such adopted for the present consultation, includes a large interchange at Old Oak Common, approximately 14.9 km from London Euston. It would be built on railway land alongside the Great Western Main Line [GWML]. There would be six platform faces (three islands) on the HS2 tracks and eight on GWML (one island for each of four tracks). The arguments for the scheme are broadly that:

- It would provide for easy connections with Crossrail, the fast east … west line being built across London, thereby saving journey-time for many locations compared with interchanging at Euston.
- By diverting passengers away from Euston it would ease pressure on the London Underground lines there.
- In the other direction it would secure simple interchange with trains serving Heathrow Airport, pending the building of a direct high-speed link.
- It would act as an interchange with through European trains via a tunnelled link with HS1.
- By stopping GWML trains it would broaden the reach of HS2 into the Thames Valley[3].
- The Interchange would be the catalyst for the regeneration of a deprived area.

HS2 Ltd has assumed that all its services would stop at Old Oak Common Interchange. This is partly because its various functions are best fulfilled if every connection is offered at a good frequency and partly because, even in

[3] In the 2010 White Paper [Cm 7827, ¶6.21] it is suggested that the Interchange could also attract travellers from further west onto HS2, but this seems implausible given the more direct and probably improved routes between South Wales and the West of England and Birmingham. The point is not mentioned in more recent documents.

a well-engineered station, as this will be, a train being overtaken by a not-stopping service would be subject to unacceptable delay.

None of the public documents appear to mention any evaluation of the implications of Old Oak Common Interchange for GWML services4. This note therefore reports a timetabling exercise. We have focussed on the Main Lines (the GW terminology for Fast Lines) since they present the greater operational challenge: it is easier to insert an extra stop into slower services on the Relief Lines – although we are not aware of any statement by Crossrail on the impact of the station on its proposed pattern of services.

The GWML platforms at Old Oak would be located approximately 5.0 km from Paddington. In the Down (westbound) direction the speed limit becomes 160 km/h at 3.3 km from the terminus and rises to 200 km/h only 2.2 km west of the planned site. Inserting a stop just as trains are accelerating to line-speed, or where it would cause earlier braking than is otherwise necessary, is not ideal and would need substantial justification. Moreover there would be problematic consequences for timetable planning.

The 2011 timetable for the Down Main in an evening peak hour is shown in Figure A. Trains worked by High Speed Trains [HSTs] are shown in green, Heathrow Express services in blue and suburban services worked by 145 km/h (90 miles/h) diesel units in red. It can be seen that the sequence of 16 trains requires disciplined working and has a limited margin for minor perturbations. Sixteen trains/hour is in fact the maximum conventionally recommended for a line with 3-minute headways, although Network Rail specifies that a planning margin of 2.5 minutes can be used between Paddington and Airport Junction.

Figure B shows how the GWML service might look in 2026. It is assumed that electrification will have been completed. The units that will replace HSTs will have slightly faster acceleration out of Paddington, while the outer-suburban electric units are assumed to be brisker and have a top speed of 160 km/h, like the existing Heathrow Express units. There might

[4] The rationale for and proposed layout of the station is described in http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/hs2report/pdf/chapter3a.pdf and summarised in a Factsheet produced for the consultation, http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/old-oak-common-station_0.pdf.

be 12 long-distance and regional service worked at 200 km/h, all stopping at Reading and four of which would stop at either Maidenhead or Twyford. Two fast outer-suburban services would run non-stop to Slough, and Heathrow Express would continue to operate quarter-hourly.

This gives 18 trains/h, which ought to be achievable on an electrified and modernised railway for the duration of a peak period. Note, however, that two buffers against disruption are maintained (allowing for the 2.5-minute headway the theoretical utilisation of capacity is 75%). It should be noted that the Great Western Route Utilisation Strategy shows a plan for only 17 trains/h [Figure 9.1], but the difference would not make any material difference to the analysis.

In Figure C we introduce stops in the Heathrow Express service, as envisaged by HS2 Ltd. This has three consequences. First, it breaks up the performance gap and renders it less useful. Second, it removes the half-hourly outer-suburban path. And third, it reduces the headway: to clear Airport Junction at the minimum of 2.5 minutes ahead of the next fast in the quarter-hourly cycle the first Heathrow train must leave Paddington at xx.07.8, which means three 2.6-minute headways ahead of it that must be deemed tight. Moreover, these calculations are based on 0.8 minutes for braking, a 2-minute dwell at Old Oak and 1.0 minute for acceleration: if any of those figures are optimistic, as they may be, then stopping just the Heathrows becomes impossible.

One is then led inexorably to the circumstances more familiar on urban metros where, if one train stops, everything must stop, as shown in Figure D. Here the neat pattern of Figure B, including the recovery gap, is retained, but every train has 3.8 minutes inserted in its schedule for the Old Oak stop. It should also be noted that this scheme presupposes the arrangement of an island platform and two tracks used alternately. Capacity would be greatly, and unacceptably, reduced without that layout, but it must add considerably to the cost of the new station.

It must be extremely doubtful whether stopping every medium- and long-distance GWML train or the Heathrow Express could be justified. HS2 <> Heathrow passengers will have the only-slightly-slower Crossrail Heathrow service, while the other Crossrail arm covers the stations west of Old Oak as far as Maidenhead. The trade-off would then essentially be between, on the one hand, some benefit to a modest number of travellers between Twyford, Reading and points west and places on the HS2 network, and, on the other, the delay to very large numbers of Paddington travellers on the

principal GWML services. The case would become weaker still if Crossrail is extended to Reading, as many believe it logically should be and for which powers exist.

Conclusion

Interchange with the Great Western Main Line at Old Oak Common should be limited to services on the Relief and Crossrail Lines. Building twin-track platforms on the Main Line is most unlikely to be justified, and not doing so would yield considerable savings in the cost of the proposed station.

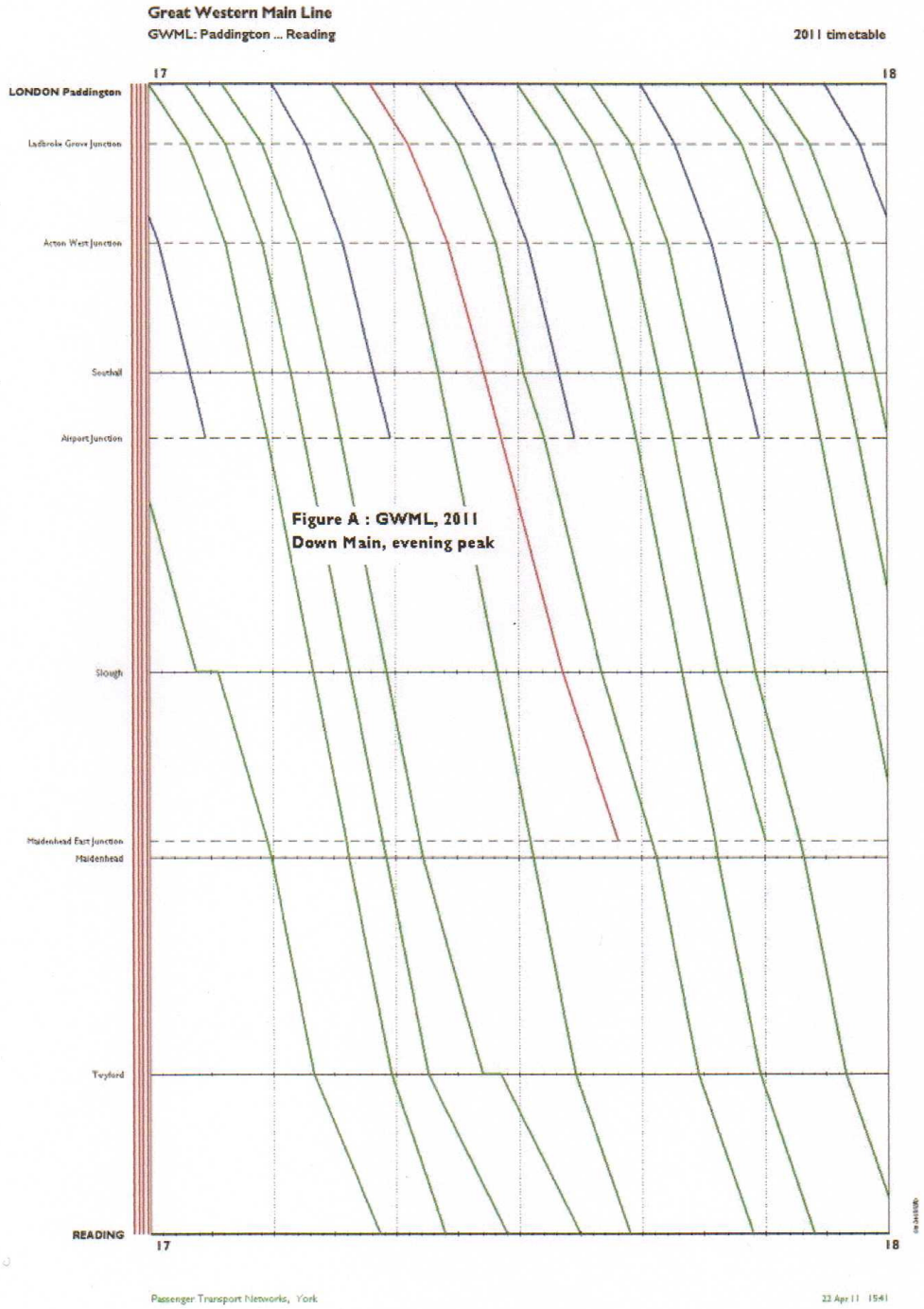


Figure A : GWML, 2011 Down Main, evening peak

25/04/2011

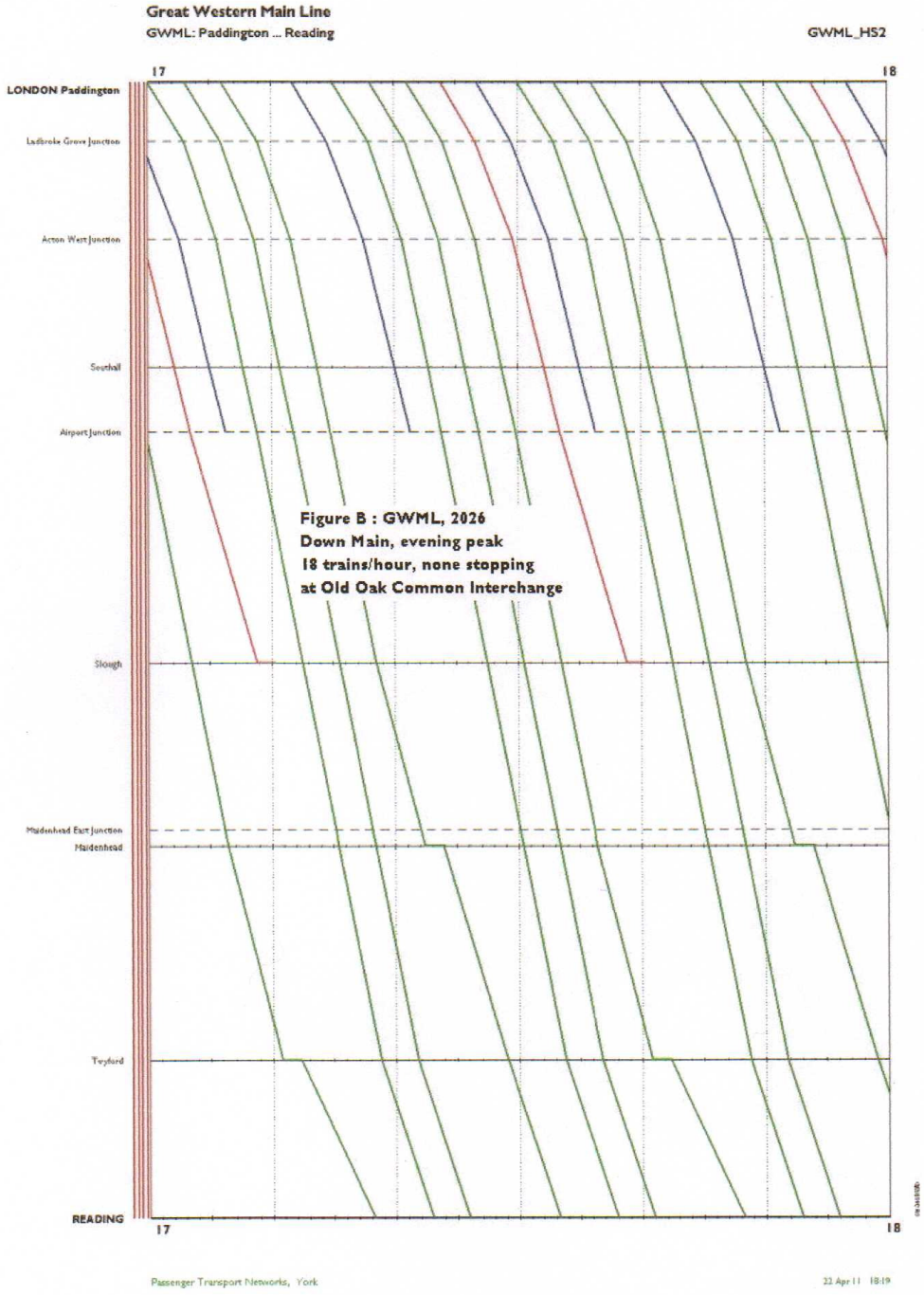


Figure B : GWML, 2026
Down Main, evening peak
18 trains/hour, none stopping
at Old Oak Common Interchange

25/04/2011

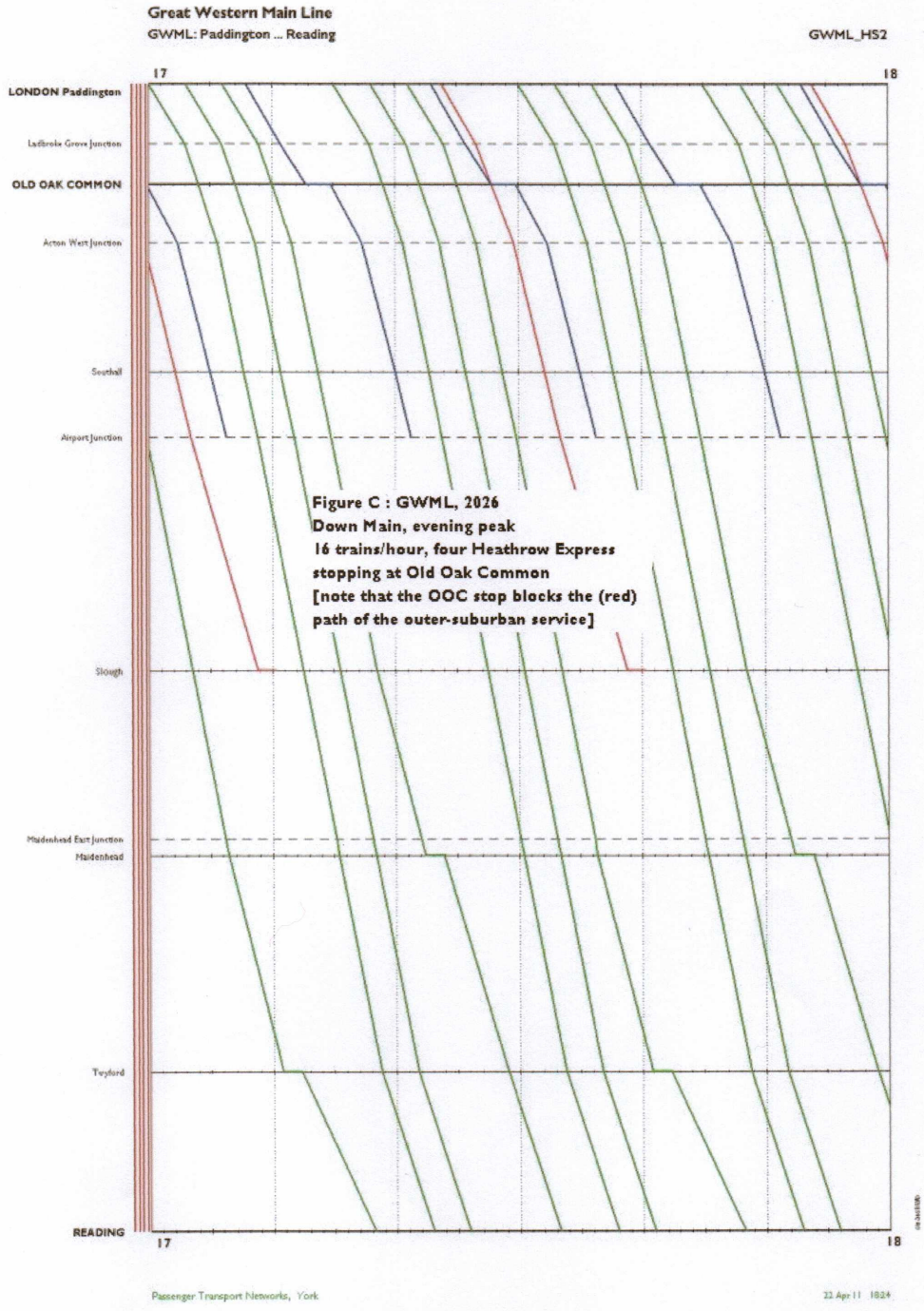


Figure C : GWML, 2026
Down Main, evening peak
16 trains/hour, four Heathrow Express stopping at Old Oak Common
[note that the OOC stop blocks the (red) path of the outer-suburban service]

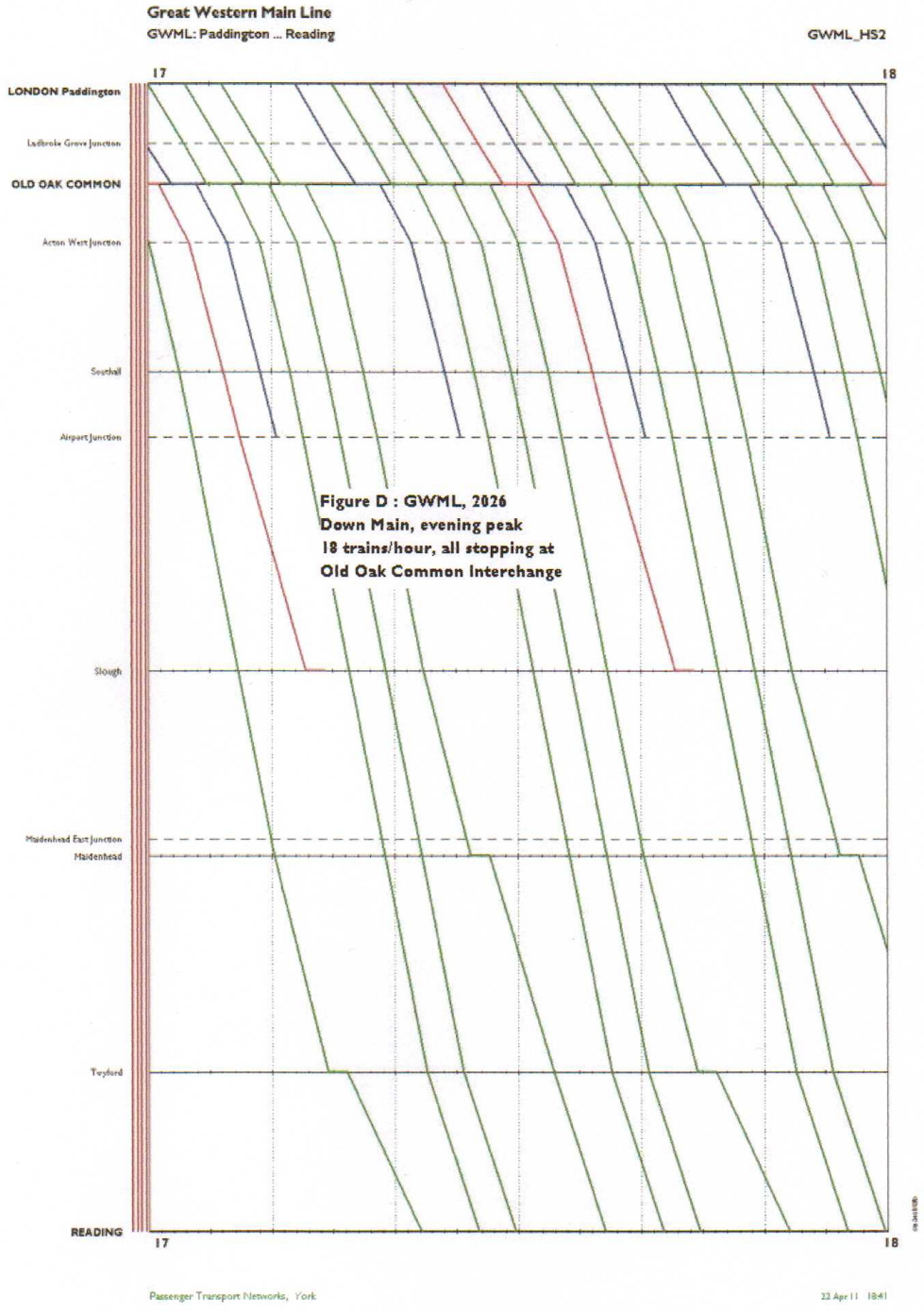


Figure D : GWML, 2026
Down Main, evening peak
18 trains/hour, all stopping at
Old Oak Common Interchange

25/04/2011

Chapter 10

Disruption to Existing Services During Construction

Prepared by Christopher Stokes

10 DISRUPTION TO EXISTING SERVICES DURING CONSTRUCTION

Prepared by Christopher Stokes

10.1 This chapter relates to the following questions listed by the Committee:

- 3.1 – Business case robustness of assumptions - the failure to evaluate the financial and economic impacts of HS2 construction on the existing operation, particularly at Euston and Old Oak Common.
- 4.1 – Station location - the implications for existing services of the choice of Euston as the London terminus for HS2.
- 6.4 – The disruption to the "classic" network during construction, particularly during the rebuilding of Euston.

Introduction

10.2 Ministers have throughout argued that the construction of HS2 will cause minimal disruption to existing train services, and also claimed that any upgrade to the existing route will cause major disruption over a long period, citing the impact caused by the West Coast Main Line (WCML) upgrade before its completion in 2008.

10.3 It is true that, for most of the length of the route, construction of HS2 will have minimal impact on the existing network. However, there will be massive impact over 7/8 years at Euston, which is of course the key station on the route; there will also be a significant impact on the Great Western Main Line and Crossrail as a result of construction of the proposed Old Oak Common station, with lesser impacts elsewhere.

Euston Reconstruction

10.4 There will be major disruption at Euston over a 7/8 year period, as it is proposed to rebuild the tracks and the station completely. All the existing platforms will be realigned and rebuilt, with the level of the approach tracks dropped by approximately 1.5 metres north of Hampstead Road, increasing to 3 metres down the length of the station.[1] Construction of the HS2

[1] High Speed 2 Route Engineering report Para 3.5
http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-route-engineering.pdf

approach tracks to Euston is also likely to cause disruption to the route into the terminal during this period.

10.5 It is likely that train services into Euston will have to be reduced for considerable periods during this work, both as a result of reductions in the number of platforms available during construction and a reduced number of approach tracks, reducing the capacity of the route. This is likely to affect both Inter-City and commuter services. The High Speed 2 Route Engineering Report states that *"During construction, planning would ensure that there is minimum impact on existing classic services."*[2] But there is no indication of how the work would be phased and for how much of the eight year construction programme services will have to be reduced. In addition, work of this scale will certainly require a number of complete closures, typically over holiday periods such as Easter and Christmas.

10.6 In addition to the direct impact on train services, passenger circulation will be seriously affected during the construction programme: Euston will become a building site for seven years.

10.7 Despite the scale of the planned work, Minister's statements on this have been at best naive and at worst seriously misleading. Theresa Villiers MP stated in the Westminster Hall debate on 31st March that:

"… the works required at Euston for RP2 would be considerably more disruptive than those required there for HS2, because they would have to be carried out within Euston's current footprint, making it much more difficult to keep current services going"

10.8 Given the scale of reconstruction set out in HS2's own documentation, including lowering the tracks both on the approaches to Euston and in the station itself, it is inconceivable that the work for HS2 would cause less disruption than the addition of three platforms on the west side of the station proposed by DfT in its RP2 alternative, which our analysis ("Chapter 1 Optimised Alternative – the scope for growth on the exiting network") shows is not required in any case.

10.9 The potential disruption is obliquely acknowledged in the consultation documents:

"…the major redevelopment project necessary at Euston station, lasting between seven and eight years…"[3]

[2] High Speed 2 Route Engineering report Para 3.1

[3] High Speed Rail: Investing in Britain's Future February 2011. page 54, para. 2.68

10.10 And also in the consultation document for the next West Coast franchise:

"…it is likely that major construction work will be needed at Euston station to enable the new high speed rail lines to be incorporated into the revamped station building. The phasing of any such works will only be decided after the consultation, but the new franchisee would need to be prepared for the possibility of some disruption to both services and the station concourse interchange during the next franchise"[4]

10.11 The reality is that the disruption will be massive. This is a project which was described by a participant at a High Speed rail conference in February as *"open heart surgery on a conscious patient"*[5]

10.12 The High Speed 2 Route Engineering Report also makes clear that the capacity of the station and its approach tracks will be reduced for the existing WCML route after reconstruction. At present there are effectively three pair of tracks from Camden to Euston itself, which has eighteen platforms; this minimises potential conflicts between arriving and departing trains immediately outside the station, hence reduces delay. After reconstruction, there will only be twelve platforms for the existing WCML route (plus two "hybrid" platforms for use by HS2 or "classic" trains), and four associated approach tracks. This will constrain the total capacity of the route

Great Western Main Line

10.13 The major and complex work required to build Old Oak Common station may require reductions to commuter and Inter-City services to and from Paddington for a significant period, in addition to the impact on services during construction of the committed Crossrail project, including the construction of the Crossrail train maintenance depot at Old Oak Common.

10.14 The work at Old Oak Common involves major construction on an intensively used main line route, and there will inevitably be serious disruption to train services during the construction period. The scale of this disruption is totally unclear because of the lack of detail provided by DfT; for example, it is not clear whether access to the Crossrail depot can be maintained throughout the construction period.

[4] InterCity West Coast Consultation Document January 2011. Page 39

[5] Modern Railways April 2011 page 55

Other Disruption

Chiltern Line

10.15 Construction of HS2 parallel to the existing Chiltern line route between Northolt and West Ruislip may require significant disruption to Chiltern Line services.

Other Locations

10.16 There will be limited disruption at other locations, for example for the construction of the junction at Lichfield at the North end of the Phase 1 route, and at locations where the route of HS2 crosses sections of the existing network.

Disruption as a Result of Upgrading the Existing Route

10.17 Detailed work carried out for the "51m" group shows that any foreseeable level of demand growth can be cost effectively met by a range of incremental measures, including some specific infrastructure investment if this proves to be necessary, without construction of HS2 ("Chapter 1 Optimised Alternative – the scope for growth on the exiting network").

10.18 The hierarchy of actions to increase capacity is built up as follows:

- Rolling stock reconfiguration, particularly conversion of some first class vehicles to standard class
- More effective demand management, including use when appropriate of obligatory reservations
- Operation of longer trains, to the extent that this is possible without major infrastructure expenditure
- Targeted infrastructure investment to clear selected bottlenecks to enable frequencies to be increased

10.19 It should be noted that the Department for Transport (DfT) and HS2 Ltd have given **no** consideration to rolling stock reconfiguration and improved demand management, and have not optimised their evaluation either of train lengthening, or of incremental infrastructure investment.

Impact of Possible Upgrades to the Existing Route

10.20 The upgrades proposed for the existing route are set out in the 51m "Optimised Alternatives" Chapter 1. These do not involve wholesale modernisation and upgrade of the existing route (as was the case with the

recently completed WCML route modernisation) but investment to increase capacity at a small number of specific "pinchpoints":

- **Ledburn Junction** - The scope of the work involved in grade separating Ledburn Junction is broadly equivalent to that required for the HS2 junction at Lichfield.
- **Construction of a fourth line between Attleborough and Brinklow** - Some disruption would be necessary, probably with diversions at weekends via the West Midlands for a limited period
- **The "Stafford Bypass"** – The detailed HS2 documentation assumes that equivalent work has taken place for Phase 1 of HS2[6], to enable frequency increases north of Lichfield. The impact on West Coast Main Line services is therefore identical for HS2 and any upgrade of the existing infrastructure.

Conclusion

10.21 Construction of HS2 is certain to cause greater disruption to existing WCML InterCity services than targeted, incremental upgrades to the existing route, as a result of the planned complete reconstruction of Euston over an eight year period. HS2 will also significantly impact on Great Western Main Line services and, to a lesser extent, the Chiltern route. The disruption caused by HS2 to the existing network will be significantly greater than the Optimised Alternative.

[6] Technical Appendices, Appendix 2, para 2.20 http://webarchive.nationalarchives.gov.uk/20110131042819/http://www.dft.gov.uk/pgr/rail/pi/highspeedrail/hs2ltd/technicalappendix/pdf/report.pdf

Chapter 11

Links to Heathrow

Prepared by Christopher Stokes

11 LINKS TO HEATHROW

Prepared by Christopher Stokes

11.1 This submission relates to the following questions listed by the Committee:

- 2.3 – Implications for domestic aviation.
- 3.1 – Business case robustness of assumptions and methodology - evaluation of passenger forecasts and modal shifts.
- 4.4 – Proposed direct link to Heathrow.
- 6.1 – Impact on carbon emissions.

Introduction

11.2 This submission scopes the potential market for a direct link to Heathrow, considers the impact on carbon emissions, and examines potential service patterns for serving Heathrow, together with the impact of such an operation on reliability and the opportunity cost in terms of the capacity lost for services to central London.

The HS2 Business Case

11.3 The Consultation documents published in February 2011 include very little useful information on the business case for the Heathrow spur.

11.4 The main consultation paper High Speed Rail: Investing in Britain's Future"[1] asserts that there is a *"compelling strategic case for being able to link the high speed network to Heathrow*" (page 24) and that this link should be in the form of a spur, costing between £2.5 – 3.9 billion. However, it is acknowledged that operating to Heathrow would have an opportunity cost in terms of capacity to central London, as a spur would mean that a train path to central London would be lost for every train to Heathrow (Page 66). To minimise this capacity impact, it is suggested that Heathrow trains would split/join on-route (presumably at Birmingham Interchange) although operation on this basis would inevitably extend journey times and impact on reliability.

[1] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-consultation.pdf

11.5 The Economic Case for HS2[2] provides no more detail. It is claimed that the assessment of the full "Y" network includes Heathrow (Page 7), but no Heathrow services are shown in the *"Service specification assumptions for the Y network"* (page 61), and there is no published incremental case for the spur. It is not clear whether this is because the work has not been done, or that the evaluation which has been done shows that there is no case for building the spur on any basis of conventional transport economic evaluation.

11.6 It is however clear from the report prepared by HS2 Ltd for the Labour government, published in March 2010 that their conclusion at that time was that there was no business case for a direct link to Heathrow, even though it was then Government policy to increase Heathrow's capacity by building a third runway:

*"...the total market for accessing Heathrow from the West Midlands, North West, North and Scotland is currently around 3.7 million trips. Our modelling suggests relatively little of this would shift to HS2, with the rail share increasing by less than 1 percentage point (about 2000 passengers per day, or **just over one train load each way**)" (Para 3.3.10).*

Potential Markets

Air Passengers Accessing Heathrow by Surface Transport

11.7 Heathrow is an immensely important airport, in a premier league compared with other British airports. It has the overwhelming majority of the UK's long haul flights, and a much higher proportion of business travel than elsewhere. It is the key international gateway to London, a pre-eminent "World City" and one of the handful of international business centres. There are only limited long haul flights from other British airports. However, even though Heathrow is in a real sense Britain's national airport, long haul business travel and inwards tourist travel is primarily centred on London.

11.8 In contrast, for European destinations, and in many cases for holiday travel beyond Europe, Heathrow is in fact a regional airport, albeit serving the wealthiest and most densely populated region in the country.

11.9 CAA data provides detailed information on the origins and destination of Heathrow passengers. The data shows that passengers overwhelmingly

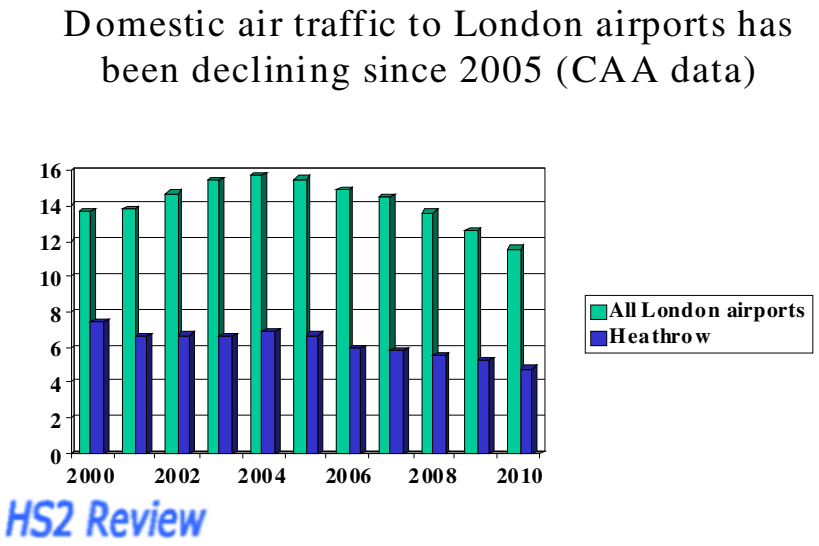
[2] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf

start or finish relatively close to the airport itself. Over 90% of Heathrow's passengers originate or terminate in regions which would not be served by HS2 at all.

Domestic Flights

11.10 Domestic air passenger volumes to and from London have declined by 26% since 2004, with an 8% reduction in 2010 alone; this is in marked contrast to the forecast of 128% growth by 2043 for domestic air travel used by DfT.

FIGURE 11.1 DOMESTIC AIR TRAVEL



11.11 There are now only five mainland domestic routes to Heathrow: Manchester, Newcastle, Glasgow, Edinburgh and Aberdeen. On any realistic basis, it would take years to complete high speed routes to Edinburgh and Glasgow, let alone Aberdeen, so for the foreseeable future there will continue to be significant numbers of air passengers from these cities to London, even though rail is now taking a greater share of the leisure market as services improve and air travel becomes less pleasant, principally as a result of security requirements.

11.12 The Manchester air market has already substantially reduced as a result of the improved rail service following completion of the West Coast Main Line upgrade. Rail is now estimated to take c80% of the combined rail/air

market[3], as would be expected when there is a twenty minute frequency train service taking just over two hours to central London. The majority of remaining Heathrow passengers are almost certainly interlining. A direct high speed link to the airport would of course be attractive for interlining passengers, but the volumes are insufficient to justify the construction costs, or to sustain a dedicated service: 2010 air passengers between Heathrow and Manchester totalled 799,000, 1095 a day each way. This isn't enough to justify £2.5 – 3.9 billion for a link to Heathrow, nor the trains to serve it at a competitive frequency. Even if all the interlining passengers transferred to rail at Heathrow, a minority still want to go to central London, so would transfer to HS2 direct London services, not to Heathrow trains.

Heathrow as a Surface Transport Hub

11.13 The Department for Transport (DfT) claim that that a direct link *"would contribute to Heathrow's future development as a multi-modal transport hub"*[4] for passengers travelling to a wide range of destinations in the greater south-east. This is not credible; Heathrow provides much poorer access to the Underground network than central London rail termini; the bus network is only useful for local distribution; and coach services are in competition with, not complementary to InterCity rail. The "Airtrack" project would potentially have provided a useful link, providing a rail connection to South Western suburbs, but BAA have recently abandoned this scheme, withdrawing their Transport and Works Act application.

Heathrow as an Alternative to European Hubs

11.14 Greengauge21, a leading pro-HS2 lobby group, suggest that a direct HS2 link would result in passengers who currently fly from regional airports and interline at other European hubs such as Charles de Gaulle and Schipol choosing to travel via Heathrow instead. Given the congestion at Heathrow, hence the frequent flight delays, both queuing for take off and stacking waiting to land, it does not appear likely that construction of an HS2 spur will trigger a significant transfer away from other hubs.

11.15 Such an operation would require through ticketing and baggage check at all stations served by the proposed Heathrow trains. While through ticketing is

[3] ATOC press release 5th April 2011 http://www.atoc.org/media-centre/latest-press-releases/shift-from-air-to-rail-heralds-turning-point-in-how-people-travel-between-uks-main-cities-100571

[4] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-consultation.pdf Page 17

unlikely to create any problems, baggage check raises significant practical difficulties, including the need to allow time to load/unload baggage at intermediate stations. Given the intensity of planned use of the HS2 route, this would almost certainly reduce both route capacity and reliability. Also, previous remote baggage check in facilities such as at Paddington for Heathrow Express were unsuccessful and quickly withdrawn.

Assessment of Potential Demand

Transfer from Domestic Flights

11.16 Domestic passenger volumes for Heathrow for 2010 are shown in the table below.

TABLE 11.1 2010 HEATHROW MAINLAND DOMESTIC ROUTE VOLUMES (BOTH WAYS)

Route	Passengers	% Change on 2009
Manchester	799,264	-12
Newcastle	424,251	-11
Edinburgh	1,244,793	-5
Glasgow	1,003,344	-7
Aberdeen	617,693	-4

11.17 Experience from elsewhere in the world indicates that the introduction of high speed rail services does not typically result in the withdrawal of parallel air services – there are still frequent flights from Tokyo to Osaka, Paris to Lyon and Madrid to Barcelona. However, Manchester - Heathrow flights could be withdrawn following completion of HS2, and we assume that 67% transfer to HS2 Heathrow services, with other passengers transferring to HS2 Euston services.

11.18 Although HS2 journey time savings are limited for Newcastle, Edinburgh and Glasgow, it is assumed that HS2 would capture 10% of current air volumes, a major increase in rail traffic for these routes. However, this would overwhelmingly be travel to central London, for which rail is much more competitive. Transfer of passengers for Heathrow itself (primarily interlining) is likely to be much less, perhaps 2% of total air volumes. No

transfer is assumed from Aberdeen, as rail times will remain uncompetitive with HS2.

11.19 Domestic air volumes are assumed to remain at 2010 levels, which is a "high" estimate given the substantial, progressive decline since 2004.On this basis, total rail volumes transferred from mainland domestic flights are estimated at 1,067,000 a year, of whom 589,000, or 807 daily each way, would use direct HS2 Heathrow services, the balance travelling to Euston. This is dramatically lower than DfT's forecast of a total switch from air of 2.9 million passengers a year, primarily reflecting DfT's extraordinary forecast of 128% growth in domestic air volumes by 2043.

Transfer for Surface Access from Other Modes

11.20 CAA has published detailed survey data for the origin and destination passengers for Heathrow for 2009[5]. This shows the percentage of total Heathrow passengers to and from areas for which HS2 would provide potentially attractive surface access as follows:

- East Midlands (Nottingham, Derby and surrounding area) 1.6%
- West Midlands 2.1%
- Other parts of England c1.5%[6]

11.21 This analysis indicates a total potential for mode shift to HS2 of 5.2%. Taking a "high" estimate of 50% of this potential would give a total of 1.06 million passengers, or 1,452 daily each way, provided a high all day frequency is offered.

Transfer from European Hubs

11.22 No significant transfer is expected.

Total potential

11.23 This analysis suggests a total potential daily volume of 2259 passengers each way a day. It should be noted that this total is based on "high" estimates of transfer to rail, and is over double the number estimated by HS2 Ltd in its March 2010 report.

[5] http://www.caa.co.uk/docs/81/2009CAAPaxSurveyReport.pdf

[6] "Rest of England" covers the North of England, as more detail is available for other regions. The total for "Rest of England" is 3.8%

Carbon Impacts

11.24 Capacity at Heathrow is highly constrained, and BAA Executives are on record as saying that they would welcome replacement of short haul flights by rail as this would free up slots for additional long haul flights. Colin Matthews, BAA's Chief Executive is quoted as saying[7]:

"…BAA would like more passengers to arrive [at Heathrow] by train. High Speed rail would attract people who currently arrive by short-haul flights, freeing slots for more long-haul flights"

and Nigel Milton, Director of Policy and Political Relations at Heathrow told the ENDS Report (an environmental website):

"No sensible, well-informed person still seriously pretends HS2 is a green alternative to a third runway. The question now is given no third runway, how we can maximise the effectiveness of our limited capacity at Heathrow. That means more long-haul flights…every time BMI or British Airways have cancelled a domestic route in the past, they've replaced it with a more profitable medium- or long- haul route. That's exactly what will happen when HS2 comes and more domestic routes get cut."[8]

11.25 There is no ability for Government to lock in any carbon savings as a result of withdrawal of domestic routes. BMI's recent withdrawal from the Glasgow – Heathrow route has demonstrated this very clearly. BMI has not surrendered the slots previously used for Glasgow flights, but is instead using these for longer European routes, resulting in a net increase in carbon emissions. Further analysis of carbon impacts is given in Chapter 6.

Potential HS2 Service Patterns for Heathrow

11.26 The consultation documentation does not give any information on the proposed pattern of service to Heathrow to be operated on HS2. It appears likely that **no** serious work has been done in connection with this – an extraordinary position in relation to a proposed investment of between £2.5 billion - £3.9 billion for this link. The Economic Case for HS2 does include a "service specifications for the Y network"[9], but this does not show any trains

[7] Transport Times November 2010, reporting on a High Speed Rail conference

[8] ENDS Report 434, March 2011, pp. 34-36

[9] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf Page 61

to Heathrow or to HS1; there is a footnote which states *"Further work is being done to determine which of the above services might serve Heathrow…".*

11.27 A frequent, regular service would be essential in order to achieve the scale of modal shift discussed above. The ***minimum*** pattern is an hourly service from Birmingham, joining at Birmingham Interchange with trains from Manchester and Leeds on alternate hours, giving a two hourly frequency for each branch of the "Y". This pattern would give a total of 17,600 seats each way over a sixteen hour day, resulting in an unsustainably low average load factor of c13% seats occupied. It is clear that an operation of this nature would not cover the direct operating costs of the trains themselves, and would not therefore contribute towards the cost of maintaining the infrastructure. There is no possibility of any return on capital for either the rolling stock used for Heathrow services or the investment in the spur itself.

Reliability Impacts

11.28 The proposed utilisation of HS2 for the full "Y" scheme is 18 trains an hour, significantly in excess of that for any other high speed route in the world, and only achievable with assumptions on improved signalling and braking technology. There is no resilience in this level of route utilisation, and reliability is therefore at best problematic, as discussed in Chapter 4 "HS2 Route Capacity and Reliability". The pattern of operation proposed by DfT, with Heathrow trains joining and splitting on-route, adds significant complexity and risk to the planned operation. Without a detailed timetabling exercise, which it is clear has not yet been carried out, the ability even to plan the proposed Heathrow services, with trains splitting and joining at Birmingham Interchange, is unproven and indeed may well be impracticable.

11.29 In any event, it is certain that this pattern of operation will inevitably lead to serious reliability issues.

Opportunity Cost

11.30 Operation of poorly used trains to Heathrow will reduce the capacity available for trains to Euston. However, it is clear from DfT's forecasts for HS2 that capacity will be at a premium, with the capacity projected for the Preston – Glasgow and York – Newcastle corridors wholly inadequate for the projected demand (discussed in Chapter 8 "HS2 – Capacity and Service Disbenefits").

11.31 It is also clear from The Economic Case for HS2 that operating services to HS1 would have an opportunity cost in terms of capacity to central London, as a train path to central London would be lost for every train to HS1.[10]

11.32 Given this, it is clear that the Heathrow spur will ***reduce*** the already poor benefit cost ratio for the overall project, and potentially make it impossible for HS2 to offer the full geographic range of London services.

Conclusions

- The government has provided no quantitative evidence to support its claim that there is a case for the link to Heathrow.
- Analysis of the potential market for direct services to Heathrow shows that these will be heavily loss making before any account is taken of infrastructure costs.
- Operation of services to Heathrow would make the fragile reliability of HS2 significantly worse.
- The link will have no benefit in terms of carbon emissions, as it will free up slots for more long haul flights, with higher emissions.
- Operation of Heathrow services will have a major opportunity cost for the project as a result of reduced capacity into Euston.

[10] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf Footnote on page 61

Chapter 12

HS2/HS1 Connection

Prepared by Christopher Stokes

12 HS2/HS1 CONNECTION

Prepared by Christopher Stokes

12.1 This chapter relates to the following questions listed by the Committee:

- 3.1 – Business case - robustness of passenger forecasts and modal shifts
- 4.4 – The proposed link to HS1
- 6 – Potential impacts on London Overground services on the North London Line

Introduction

12.2 This chapter examines the business case for through services to HS1, including the potential market, the competitive position with air, and possible service patterns.

12.3 The impact of through services on the reliability of HS2, security and immigration requirements, and the opportunity cost in terms of the capacity lost for services to central London are also considered.

The HS2 Business Case

12.4 The Consultation documents published in February 2011 include very little useful information on the business case for direct services to HS1.

12.5 The main consultation paper High Speed Rail: Investing in Britain's Future"[1] states:

"the Government's view is that the strategic case for a direct link between the proposed high speed rail network and the HS1 line to the Channel Tunnel is strong" (Page 68)

and that this link should be in the form of a single track tunnel from Old Oak Common to the North London Line, then using existing rail infrastructure to a junction with the HS1 route just north of St.Pancras. The estimated capital cost of the link is £0.9 billion. A plan of the east end of the proposed link is attached (Annex 1), showing the inter-action with the North London Line and the connection with HS1.

[1] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hsr-consultation.pdf

12.6 The "Economic Case for HS2[2]" provides little more detail. It is claimed that the assessment of the full "Y" network includes the costs and benefits of the link to HS1 (Page 7), but no through services are shown in the "Service specification assumptions for the Y network" (page 61), and there is no published incremental case for the link. The only figures quoted are that the daily use of the link to and from the West Midlands would be around 4,850 passengers in 2033, and that the benefits of the HS1 link are £0.4 billion (page 30) – the latter figure is significantly less than the £0.9 billion capital cost of the link.

12.7 It is not clear whether a full evaluation of the business case for the link has been done, or if the evaluation showed that there is no conventional transport economic case for building the link. However, it is clear from the report prepared by HS2 Ltd for the Labour government, published in March 2010, that their conclusion at that time was that there was no business case for a direct link to HS1:

"Running direct services to Paris or Brussels…would bring Birmingham within three hours and attract a significant market share, but the market would not be big enough to fill a 400 metre train a day in 2033. Direct services to destinations North of Birmingham would attract a smaller market share but are competing in a bigger market and might fill another train a day" (Para 3.8.12)

It is also clear from The Economic Case for HS2 that

"operating services to HS1 would have an opportunity cost in terms of capacity to central London, as a train path to central London would be lost for every train to HS1."[3]

Analysis of the Market

Current Position

12.8 Rail is potentially competitive with air for journey times up to four hours. This essentially means that HS1 through services could be competitive for journeys such as Manchester – Paris and Leeds – Brussels, but are unlikely to win significant market share for journeys which start or end either north of Manchester and Leeds or beyond Paris and Brussels

[2] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf

[3] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf

12.9 Existing travel between the English regions and the near continent (Paris and Brussels) is overwhelmingly by air at present, so CAA data gives a basis for assessing the existing market. Comparing air volumes in 2000 and 2010, air traffic on the key potential flows has generally declined, in some cases dramatically as shown in the following tables.

TABLE 12.1 AIR TRAFFIC BETWEEN PARIS AND ENGLISH REGIONS

Paris	2010 air passengers	% change on 2009	2000 air passengers	% change 2010 on 2000
Birmingham	314,227	-1	377,837	-17
Manchester	441,341	-1	529,410	-17
East Midlands	91,572	-11	101,646	-10
Leeds/Bradford	73,359	-18	55,197	+32

TABLE 12.2 AIR TRAFFIC BETWEEN BRUSSELS AND ENGLISH REGIONS

Brussels	2010 air passengers	% change on 2009	2000 air passengers	% change 2010 on 2000
Birmingham	100,093	+2	243,125	-59
Manchester	148,788	+18	338,816	-56
East Midlands	23,197	0	44,329	-47
Leeds/Bradford	20,419	-9	103,471	-80

12.10 This reflects the much wider range of destinations now available from UK airports following the dramatic changes in the market place as a result of low cost airlines – in particular, there is a much greater choice of destinations for leisure travel, so traditional destinations such as Paris are much less dominant.

12.11 The airlines have reacted to this very effectively, maintaining or increasing frequencies by using smaller planes with low operating costs, and adopting the low cost model. There are typically six daily flights each way between key city pairs such as Birmingham and Brussels, and Manchester and Paris. Fares are also cheap, £50-70 for Birmingham to Paris if booked three/four

weeks in advance. These routes meet market demand, and are not subsidised.

Potential for Rail

12.12 Assuming that rail is able to offer equivalent frequencies to air, in a "high" scenario it would be reasonable to assume that airlines would cease to operate from Birmingham to Paris and Brussels, and that rail would capture 50% of the rail/air market from Manchester, East Midlands and Leeds/Bradford, with journey times, for example, of 3 hours 40 minutes from Manchester to Paris. On this basis the potential rail volumes are as shown in the tables below.

TABLE 12.3 POTENTIAL RAIL VOLUMES BETWEEN PARIS AND ENGLISH REGIONS

Paris	2010 air passengers	Rail potential	Daily one way rail flow
Birmingham	314,227	314,227	430
Manchester	441,341	220,671	302
East Midlands	91,572	45,786	63
Leeds/Bradford	73,359	36,679	50

TABLE 12.4 POTENTIAL RAIL VOLUMES BETWEEN BRUSSELS AND ENGLISH REGIONS

Brussels	2010 air passengers	Rail potential	Daily one way rail flow
Birmingham	100,093	100,093	137
Manchester	148,788	74,394	102
East Midlands	23,197	11,599	16
Leeds/Bradford	20,419	10,209	14

12.13 This analysis suggests the rail potential is very low, in no case equating to a 550 seat capacity single unit train. In contrast the planes used on these routes are small, typically less than 100 seats, and are a much better match for the needs of these markets than high capacity high speed trains.

12.14 It is clear that there is very little case for any trains from the Leeds branch of the "Y", and little possibility of sustaining a competitive frequency for business travel on any route – it is therefore unlikely that through operation

would in reality result in the withdrawal of flights from Birmingham to Paris and Brussels, or deliver the modal shift assumed as the basis for this analysis.

12.15 The analysis confirms HS2 Ltd's March 2010 conclusion. However, it is not consistent with the 4850 daily passenger figure for 2033 to and from the West Midlands quoted in the consultation document. The basis of the latter figure is not explained in the documentation, but it presumably assumes both high future growth – a heroic assumption given the changes to air volumes over the last ten years – and that flights from Birmingham to Paris and Brussels are withdrawn.

Possible Service Pattern

12.16 The consultation documentation does not give any information on the proposed pattern of through services to HS1. It appears likely that **no** serious work has been done in connection with this – an extraordinary position in relation to a proposed investment of £0.9 billion for this link. The Economic Case for HS2 does include a *"service specifications for the Y network"*[4], but this does not show any trains to Heathrow or to HS1; there is a footnote which states *"Further work is being done to determine which might…run on to mainland Europe".*

12.17 A frequent, regular service would be essential in order to achieve the scale of modal shift discussed above. However the analysis set out above indicates that, at the most, it might be possible to operate two trains daily from Manchester to Paris, calling at Birmingham Interchange, Old Oak Common and Lille (to maximise connections to the wider European high speed network). Given the potential passenger numbers, separate services from Birmingham Curzon Street would not be justified; the West Midlands would be served through the Birmingham Interchange railhead.

12.18 This pattern of service would be unattractive to high yield business travel, given its low frequency. Even for leisure traffic, prices would effectively be set by low cost airlines which as discussed above offer low prices and require no subsidy.

12.19 It is therefore clear that an operation of this nature would not cover the direct operating costs of the trains themselves, and would not therefore contribute towards the cost of maintaining the infrastructure. There is no

[4] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-economic-case.pdf Page 61

possibility of any return on capital for either the rolling stock used for through HS1 services or the investment in the spur itself.

Reliability Impacts

12.20 The proposed utilisation of HS2 for the full "Y" scheme is 18 trains an hour, significantly in excess of that for any other high speed route in the world, and only achievable with assumptions on improved signalling and braking technology. There is no resilience in this level of route utilisation, and reliability is therefore at best problematic; this is discussed in more detail in Chapter 4 "HS2 Route Capacity and Reliability".

12.21 In addition to the unprecedented high levels of utilisation of HS2 itself, there are significant issues on other sections of the overall transit to Paris.

- The single line tunnel between Old Oak Common and the North London Line represents a clear risk to performance – in the event of late running of a through train in either direction, there are potential consequential delays for trains in the other direction, which would either have to wait at Old Oak Common or, even more disruptively, be held on the North London Line.
- The North London Line itself is intensively used both for London Overground services, which are planned to increase to eight trains an hour in each direction, and for freight. There is a real risk of the through trains impacting on other services on the North London Line and vice-versa. We understand TfL have similar concerns.
- Whilst HS1 is nothing like as busy as the plans for HS2, it does carry both Eurostar services and domestic services with varied stopping patterns, and the route has limited spare capacity in peak periods. There may be significant issues in linking "train paths" across HS2, the North London Line and HS1.
- There are similar issues through the Channel Tunnel, where Eurostar has significantly faster timings than Eurotunnel's own shuttle trains, which limits capacity, and on TGV-Nord in France, particularly between Lille and Paris, which has a mix of international services (both Eurostar and Thalys, and French domestic services).

12.22 Without a detailed timetabling exercise, which it is clear has not yet been carried out, the ability even to plan the proposed through HS1 services is unproven and indeed may well be impracticable. It is also unclear whether

through HS1 trains can be operated without a reducing the frequency of the London Overground service on the North London Line below the planned eight trains an hour in each direction.

12.23 In any event, it is certain that this pattern of operation will inevitably lead to serious reliability issues, with a small delay on any part of the route potentially causing the through trains to lose their slot, causing both delays to the through train itself and consequential delays to other services.

Security and Immigration Issues

12.24 The HS2 documentation indicates that it is expected that the security and immigration procedures which currently apply to Eurostar will also apply to through trains to HS1. This is likely to require effective separation of the through trains from services to Euston at all HS2 stations at which the HS2 trains will call. This is spelt out for Old Oak Common in the "Route Engineering Report"[5] which indeed refers to an option, not covered in the main consultation document, that HS1 services all terminate at Old Oak Common:

"The international aspects of the HS1 to HS2 connection have implications on platform design and access control arrangements…There would be options for platform usage:

- *The central platform could be a terminal "Europe" platform. Passengers would alight from the HS2 train from the North, and would pass through immigration/security controls as they moved to the "Europe" platform…[or]*
- *A through-running platform to the HS2-HS1 link… security and immigration issues would have to be addressed, either at the passengers' originating stations, or on the train during the journey."*

12.25 It is clear that fundamental issues about the operation of HS1 trains have yet to be resolved, casting further doubts on the claimed benefits. It is also clear that security and immigration concerns will prevent the through trains from carrying domestic passengers within Britain. This is equivalent to a Basel – Amsterdam train only carrying passengers for the Netherlands, which would completely destroy the business case for such an operation.

[5] http://highspeedrail.dft.gov.uk/sites/highspeedrail.dft.gov.uk/files/hs2-route-engineering.pdf Page 40

Opportunity Cost

12.26 Operation of poorly used trains through to HS1 will reduce the capacity available for trains to Euston. However, it is clear from DfT's forecasts for HS2 that capacity will be at a premium, with the capacity projected for the Preston – Glasgow and York – Newcastle corridors wholly inadequate for the projected demand, as discussed in Chapter 4 "HS2 – Capacity and Service Disbenefits".

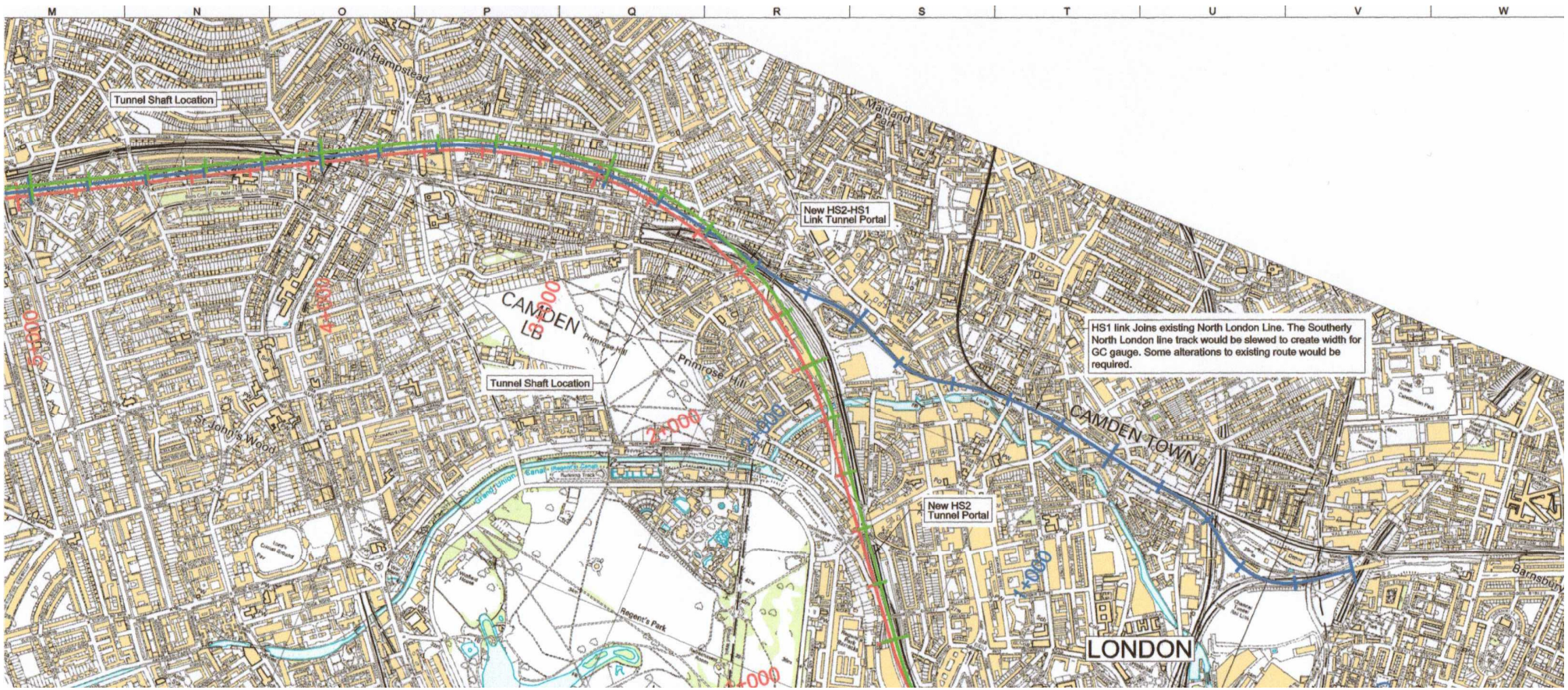
12.27 Given this, it is clear that the HS1 services will reduce the already poor benefit cost ratio for the overall project, and potentially make it impossible for HS2 to offer the full geographic range of London services.

Conclusions

12.28 There is no business case for operation of through services to HS1. The potential markets are relatively small, and are well catered for by airlines offering frequent services with small planes, without subsidy.

12.29 Operation of through services would require significant, unjustifiable subsidies and reduce the Benefit Cost Ratio for HS2 as a whole. Furthermore, the link would increase HS2's capital costs, reduce its capacity into Euston, and reduce overall reliability.

ANNEX 1 - THE INTERACTION WITH THE NORTH LONDON LINE AND THE CONNECTION WITH HS1



Chapter 13

Environmental Impacts

Prepared by Marcus Rogers

13 ENVIRONMENTAL IMPACTS

Prepared by Marcus Rogers

13.1 This chapter relates to the following questions listed by the Committee:

- 6.2 - Are environmental costs and benefits (including in relation to noise) correctly accounted for in the business case?

13.2 The High Speed 2 (HS2) proposals will cause considerable environmental damage both during construction and throughout its life. The Appraisal of Sustainability (AoS) prepared by HS2 includes a series of objectives against which the proposals are measured, ranging from highly unsupportive through to highly supportive.

13.3 No aspect of HS2 scores positively in the AoS for its environmental impacts, and whilst this is not uncommon at an early stage for any major development project since it indicates where mitigation is most required, HS2 Ltd has not suggested any mitigation measures, but rather allocated an amount of funding for future investigations.

13.4 Further consideration and review of the AoS has highlighted that determining the total environmental costs and impact of the HS2 proposals is not currently possible, since not all the relevant information, surveys or supporting data has been either published or in many cases undertaken.

13.5 Since so little has been done to consider mitigation or sufficient evidence provided to demonstrate that it has, every individual and group is being asked to respond to a consultation with insufficient information or data to make an informed and balanced judgement.

APPRAISAL OF SUSTAINABILITY (AoS)

13.6 51m believes that not only does the AoS lack necessary detail but it is also an unsatisfactory compromise that tries and fails to meet the needs of SEA, NATA, WebTag and other guidance. The Government argues that HS2 proposals linking London and Birmingham should be considered a 'project', subject to EIA. But proposals for Phase 2, linking to Heathrow, Manchester and Leeds, suggest it is a series of projects, or possibly a programme and therefore subject to SEA.

13.7 The consultation documents including AoS provide no detail whatsoever about the route of the line north of Birmingham and therefore no assessment of environmental consequences is possible. Given that the line will have to go

through very environmentally sensitive areas such as across the Pennines, this is a very serious omission.

ENVIRONMENTAL COSTS

Water

13.8 The AoS acknowledges that HS2 will impact on groundwater and therefore does not meet DfT sustainability objectives. Any damage to groundwater could have effects on water supply that cannot necessarily be fixed, even with expensive solutions which are yet to be determined.

13.9 The AoS acknowledges this significant risk but fails to reassure and evidence that it can be managed. Rather the AoS assumes that money earmarked for mitigation will cover all eventualities even though the Catchment Abstraction Management Strategies (CAMS, 2007) concluded that the Colne catchment, including the Misbourne, Chess, Gade, and Bulbourne chalk streams (internationally scarce and protected habitats) was already 'over-abstracted'.

Noise

13.10 HSR has specific noise characteristics compared with classic rail and although HS2 have focused a lot on noise in their road shows with the noise booth, it is clear that this does not a true reflection of the impacts and they have provided little detail on the real impacts in the areas either side of the route. Fundamental to understanding the impact of noise on dwellings, business, schools, AONB etc is the production of noise contours. The only way that the noise impacts can be understood is for contours to be produced.

Planning requirements

13.11 Designated Areas of Outstanding Natural Beauty (AONB) are protected by national legislation, there is a presumption to refuse inappropriate development and proposals must identify exceptional circumstances for approval. 51m does not believe HS2 has yet been proven to be in the national interest and therefore there are no demonstrable exceptional circumstances.

13.12 Planning Policy Statement 9 (PPS9) sets out a sensible and defensible decision making process to ensure ecological impacts are properly assessed. It sets the principle that all information is collected and assessed and impacts mitigated or compensated. HS2 Ltd have proposed a single route, without assessing data, assuming that all ecological issues can be overcome, inconsistent with PPS9.

Historic environment and heritage impacts

13.13 A number of historic environment and heritage assets will be impacted along the route and the anticipated effects may be direct physical damage, loss of historic character, visual and noise intrusion.

13.14 To suggest that: 'Where practicable, the vertical alignment could be adjusted to avoid any identified deposits of archaeological significance' fails to take account of likely engineering constraints, meaning that most archaeological sites along the line would be destroyed.

Biodiversity and habitat impacts

13.15 The Government's Lawton Report (2010) stressed the importance of wildlife corridors, stating that one of the actions to rebuild an ecological network was enhanced connections between, or joining sites, through physical corridors, or stepping stones. As a result the Government announced its intention to take action to protect wildlife, halving the loss of habitats.

13.16 It also identifies that if required ecological compensation and /or mitigation cannot be delivered within the existing footprint, some form of compensatory offsetting should be provided, at minimum on a 1:1 ratio.

13.17 The AoS provides insufficient information about biodiversity and habitat impacts, and does not adequately consider protected species. It fails to determine how cumulative impacts may be mitigated and key species protected. 51m believes this is a significant omission.

Chapter 14

Government Policy and HS2

Prepared by Christopher Castles

14 GOVERNMENT POLICY AND HS2

Prepared by Christopher Castles

14.1 This chapter relates to the following questions listed by the Committee:

- 2.1 – HSR is designed to improve inter-urban connectivity. How does that objective compare in importance to other transport policy objectives and spending programmes, including those for the strategic road network.
- 5.1 – Evidence that HSR will promote economic regeneration and help bridge the north-south economic divide.

National Transport Strategy and Policy

14.2 The Government's transport policy objectives have emerged progressively over the past year. The Coalition Agreement summarised policy as: "*the Government believes that a modern transport infrastructure is essential for a dynamic and entrepreneurial economy, as well as to improve well-being and quality of life. We need to make the transport sector greener and more sustainable, with tougher emission standards and support for new transport technologies*".

14.3 The agreement also contained a number of points about transport that focused on particular projects and initiatives, including High Speed Rail where it was stated that "*we will establish a high speed rail network as part of our programme of measures to fulfil our joint ambitions for creating a low carbon economy. Our vision is of a truly national high speed rail network for the whole of Britain. Given financial constraints, we will have to achieve this in phases*".

14.4 Other points in the Agreement included support for Crossrail, reforming decision making to give greater weight to low carbon projects, proving a national recharging network for electric vehicles, granting longer rail franchises, supporting sustainable travel, turning the rail regulator into a consumer champion and making Network Rail more accountable.

14.5 Over the past year there have been a number of policy statements that have amplified this initial package of policies that have all been examined within this paper. In addition the Department for Transport launched the consultation on High Speed Rail in February, at which time it published

various additional documents on the project and its alternatives. There are also various statements and submissions by ministers such as evidence and responses to the Transport Select Committee. These documents taken together demonstrate a growing disconnection between the Department for Transport's stated policies and its continued support for HS2.

The Coalition Agreement

14.6 The Coalition Agreement's focus on projects and initiatives rather than policies was understandable in view of the tight timeframes against the agreement was developed and the need to have some agreed understanding as the basis for policy. But it is unrealistic to treat projects as policies. Rather, the projects must be subject to further scrutiny and review as policies are developed and further information becomes available. In the case of HS2 it is clear that the agreement was based on a flawed prospectus. The initial business case for HS2 was published in March 2010 and showed expected demand growth for Stage 1 from London to Birmingham of 3.3% per annum and a net benefit to cost ratio of 2.4. By February 2011 the forecast demand growth was 2% per annum and the net benefit to cost ratio was considerably lower at 1.6. Moreover the statement in the Coalition Agreement that High Speed Rail was part of "*our joint ambitions for creating a low carbon economy*" was incorrect as the project was shown to be carbon neutral.

The Spending Review

14.7 The Spending Review led to substantial reductions in the Department for Transport's budget compared to earlier expectations. Revenue budgets are being reduced far more substantially than capital budgets. Over the period 2010/11 to 2014/15 the resource budget of the Highways Agency is reduced by 23%, local government funding by 28%, London Transport grants by 28% and departmental administration by 33%.

14.8 Within the capital budget, rail expenditure takes a growing share of total expenditure with the nominal capital budget for rail rising from £3.8 billion to £4.5 billion between 2010/11 and 2014/15 while the nominal capital budget of the Highways Agency drops from £1.6 billion to £1.0 billion over the same period. Major rail projects such as HS2 and Crossrail have been retained in the capital programme but a number of proposed major road schemes have been dropped completely.

14.9 The major spending impact of HS2 will be felt after this public expenditure round. The capital cost of stage 1 is estimated at between £16.0 and £17.7 billion. This may be compared with the plans for the next five year spending review period during which the Department for Transport's nominal capital budget for rail is £22.0bn and for national roads is £5.7bn. HS2 accounts for only £750 million of these figures. Capital budgets for future spending rounds will be heavily influenced by the impacts of high speed rail, particularly if further stages are approved. This is bound to constrain the availability of funds for other capital projects on both rail and road.

14.10 Focusing expenditure on rail and away from roads has investment risks. The recent National Infrastructure Plan noted that

"*congestion is predicted to rise by around 30 percent in the period to 2025. If left unchecked, the rising cost of this congestion could waste an extra £22 billion worth of time every year in England by 2025 and increase costs to business by over £10 billion a year".*

The various highway schemes which were approved by the spending review were described by the Secretary of State as making a major contribution to the development of Britain's economy since:

"for every pound invested, there will be over six pounds worth of public benefits. On some schemes, this figure will be higher than ten".

14.11 The Spending Review expressed the hope that

"by prioritising spending on sustainable rail projects such as High Speed Rail and Crossrail we will be providing commuters and intercity travellers with attractive new options instead of the car".

However, the business case shows that very little of the traffic on HS2 is diverted from other transport modes. Out of an expected 136,000 passengers per day expected to use HS2 in 2043, only about 6% (around 8,200 passengers) are expected to divert from air and only about 7% (around 9,500 passengers) from car.

National Infrastructure Plan

14.12 The National Infrastructure Plan which was published in October 2010. The Plan sets out the Government's vision for major infrastructure investment in the UK that includes eight overarching aims and objectives. Four of which are closely aligned to the HS2 debate, namely:

- Maximising the potential of <u>existing</u> road and rail networks.

- Transforming energy and transport systems to deliver a low carbon economy.
- Transforming the UK's strategic rail infrastructure; and
- Providing the best superfast broadband in Europe.

14.13 Within the Plan, the Government outlined a number of key future challenges. These include:

- Obsolescence – all infrastructure has a limited lifespan and parts of the UK's infrastructure are ageing and need updating.
- Globalisation – the UK is facing strong competition from other countries who are investing heavily in improving their infrastructure.
- Growing demand – levels and intensity of usage of existing networks are increasing as the population grows, people use more resources, travel more and want to move goods and ideas faster and in a more reliable way.
- Climate change – it is essential to mitigate climate change and to adapt to its effects.
- Interdependence – interdependencies between systems are growing, with increasing reliance on technology and digital networks.

14.14 In addition, the Government has identified a new hierarchy for infrastructure investment that builds on the approach to capital investment in the Spending Review to inform decisions:

- Maintenance and smarter use of assets
- Targeted action to tackle network stress points and develop networks
- Transformational large scale projects

14.15 Within the Plan, the Government states that it will

"invest in a high-speed rail network that would make rail increasingly the mode of choice for inter-city journeys within the UK, and for many beyond". However this contradicts with a previous statement in the Plan in relation to the transformational large scale projects, where the Government outline that "significant investment in new or replacement infrastructure should only be considered where it is part of a clear long term strategy, is affordable and where maintenance or small scale investment will not meet future need". As outlined within this paper there is currently no adopted

national transport strategy and therefore it is impossible to gauge whether the HS2 proposal is part of a clear long term strategy. In addition, at £17.7bn it is highly questionable whether the project is affordable, especially within the current fiscal climate, especially when there is a cheaper viable alternative available to the Government, RP2.

Department for Transport Business Plan

14.16 The Department for Transport's business plan sets out *"a vision for a transport system which is an engine for economic growth but one that is also greener and safer and improves the quality of life in our communities."* It establishes five structural reform priorities which are to deliver the coalition's commitments on High Speed Rail, to secure our railways for the future, to encourage sustainable travel, to tackle carbon and congestion on our roads and to promote sustainable aviation.

14.17 The policy of securing the future of the railways arises from the parlous financial condition of the industry and the high costs of the UK railway compared to other railways and industries. A value for money review, chaired by Sir Roy McNulty is in progress and has produced an interim report. The objective is to obtain better value for money from the railways. This plan appears clearly at odds with proposals to develop HS2, which will require further subsidy for the rail industry. The discounted net costs to the Government of HS2 are estimated at £10.3 billion.

Creating Growth, Cutting Carbon

14.18 In January 2011, the Government published the Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen White Paper. With the absence of an up-to-date national transport strategy this document is therefore all we currently have that outlines the present Government's thoughts on transportation strategy and policy. As highlighted by Norman Baker MP in the Foreword of the document, the focus of the White Paper was on the delivery of local transport improvements as these provide

"gains at national level [and…] it delivers results quickly. […] So this White Paper is about providing that short term boost to growth, and the early reductions in carbon, that action locally is best placed to deliver".

14.19 The White Paper is only peripherally related to HS2. However, it introduces a new element of thinking in transport policy in considering alternatives to travel. It states that

"as well as considering packages of sustainable transport measures, consideration should be given to not travelling at all. Information and communications technology now provides the means to reduce or remove the need to travel in a number of situations, and can have a number of benefits, to the economy and to the environment".

14.20 Subsequently the Department for Transport has begun a consultation exercise on alternatives to travel, stating that

"for the first time [...] not travelling is an element within the Ministerial portfolio".

The consultation references options:

"*ranging from teleconferencing, videoconferencing and web-conferencing, to working flexible hours, and working remotely*".

These options are alternatives to long distance travel as well as local travel. Indeed, the marketing of business videoconferencing equipment is generally targeted at companies with extensive long distance travel costs. If the consultation leads to new and successful policies to reduce travel then it will inevitably lead to lower traffic levels on HS2. Train passengers are just as likely to adopt alternatives as road and air users.

14.21 In addition, there is a particular focus within the document on addressing carbon emissions. However the focus of the White Paper is on the electrification of the car fleet (rather than supporting HS2) as outlined by the statement that the

"*Government is convinced that in the longer term, progressive electrification of the passenger car fleet will play an important role in decarbonising transport, supported by policies to increase generation capacity and decarbonise the grid*".

The Transport Business Case

14.22 The Transport Business Case was published in April 2011 and sets out the basis on which projects are appraised by Department for Transport. It states in the introduction that

"this approach ensures decisions are made by taking account of all the relevant information set out in five cases, consistent with the Treasury Green Book".

14.23 The new guidance, the transport business case, was published outlining that project promoters will have to provide on five separate cases:

- A strategic case, showing how the measure fits with wider public policy objectives. This should spell out a clear need and rationale for making the investment and how the investment will further the aims and objectives of the project promoter.
- An economic case, demonstrating the project's value for money. The core of this is the project's benefit:cost ratio, which implies a value for money band (poor, low, medium, high or very high). The Department for Transport adjusts the band to reflect non-monetised impacts of a project.
- A commercial case, showing the commercial viability of the proposal, including the procurement strategy, plans for risk allocation and transfer, implementation timescales, and the capability and skills of the team delivering the project.
- A financial case, showing funding arrangements and the impact of the proposal on the Department for Transport's budget and accounts.
- A management case, showing that the project is achievable. This covers matters such as project planning, risk management, communications and stakeholder management, and evidence that the benefits are realisable.

14.24 A key element of this approach is that all feasible options should be considered in seeking to address identified transport problems. For example, all alternative options should be explored before concluding that specific major transport scheme is the appropriate solution.

14.25 The Department for Transport have made two significant alterations – higher monetary values for carbon dioxide and changes to the treatment of fuel duty in benefit:cost ratio calculations – will lend weight to projects that cut CO_2 emissions (and weaken the case for schemes that increase them). Therefore the case for HS2 is neutral at best, due to the Department for Transport itself outlining that the project is carbon neutral.

14.26 In addition, there are several other ways in which the appraisal of HS2 fails to meet the standards set out in the Treasury Green Book. In particular it has evaluated HS2 by comparing it with an unrealistic alternative, failed to compare HS2 with alternatives on a consistent basis and not considered

demand management and pricing as alternatives to predict and provide investment. The appraisal does not provide a robust case for change as many aspects of the case run contrary to other aspects of transport policy. The scheme is poor value for money compared to others in the Department for Transport portfolio. There is no commercial case for HS2, which is why it has to be developed with public subsidy.

Developing a Sustainable Framework for UK Aviation: Scoping Document

14.27 In March 2011, the Government published Developing a sustainable framework for UK aviation that aimed to define the debate of the long-term policy for UK aviation. This document sets out a number of key strategic questions that have been compiled around three themes: aviation and the economy; aviation and climate change; and aviation and the local environment – all of which are of some relevance to the HS2 debate.

14.28 The Government state within this document that

"air transport plays a vital role in providing connectivity for the UK, both internationally and regionally. As an island trading nation, it is self-evident that the UK needs to be well connected. It is also clear that some parts of the country, such as Northern Ireland, will always be heavily dependant on air links. Regional connectivity throughout the UK is a very important issue for overall transport strategy to address".

14.29 In addition, the Government outlined that

"aviation will continue to have an important role to play in our transport system, but that role will change. The Government's investment of £530 million to provide Britain with the best superfast broadband network in Europe will support the development of options such as videoconferencing, telepresence and web conferencing, which have the potential to reduce some elements of the demand for flying [and overall travel]".

Delivering a Sustainable Railway

14.30 The most recent strategy and/or policy statement was published in July 2007, Delivering a Sustainable Railway. This document sets the previous Government's long-term strategy for the next thirty years and outlines that

"it is [a] challenging [task] because it is impossible to forecast accurately demand that far into the future. Some cities and regions will grow faster than others. People and firms are likely to respond to the challenge of global warming by changing travel patterns and ways of working. The pace

of technological change is unpredictable. […] Just as future growth rates are uncertain, so is the way in which people use rail. Land-use, housing and education policies will all have impacts on where people live and work".

14.31 The Government believed that the investments proposed within the Delivering a Sustainable Railway document, would enable the railway by 2030 to deliver twice the passengers of today (2007) in more comfort than today. However the document did outline that

"if demand requires it, the better solution is likely to be a new conventional line, preferably exploiting an existing unused railway alignment, such as the Grand Central route". This illustrates the commitment of Government to pursue the need to offer improvement on existing routes rather than the pursuit of new alignments, such as those proposed by HS2.

14.32 The document concluded by stating that

"sustainability demands a broader look at priorities for the railway alongside other modes, to find the best balance between the needs of the economy, society and the environment".

The Eddington Transport Study

14.33 The Eddington Transport Study was an examination, by Sir Rod Eddington, of the impact of transport decisions on the economy and the environment of the United Kingdom, with recommendations on how the transport network should be modernised. The study was commissioned by the UK Government, and a report of the study was published in December 2006 to support the 2006 Pre-Budget Report.

14.34 Sir Rod Eddington was commissioned by both the Chancellor of the Exchequer and the Secretary of State for Transport, in line with the Government's stated commitment to sustainable development, to study the long-term reliance of and the UK's economic productivity, growth and stability on transport.

14.35 The study still forms the basis of the national transport policy. This study demonstrates that the performance of the UK's transport networks will be a crucial enabler of sustained productivity and competitiveness. For example, transport networks support the productivity and success of urban areas and their catchments, by getting people to work, supporting deep and productive labour markets and allowing businesses within the area to reap the benefits of agglomeration. He demonstrated this by outlining the 69%

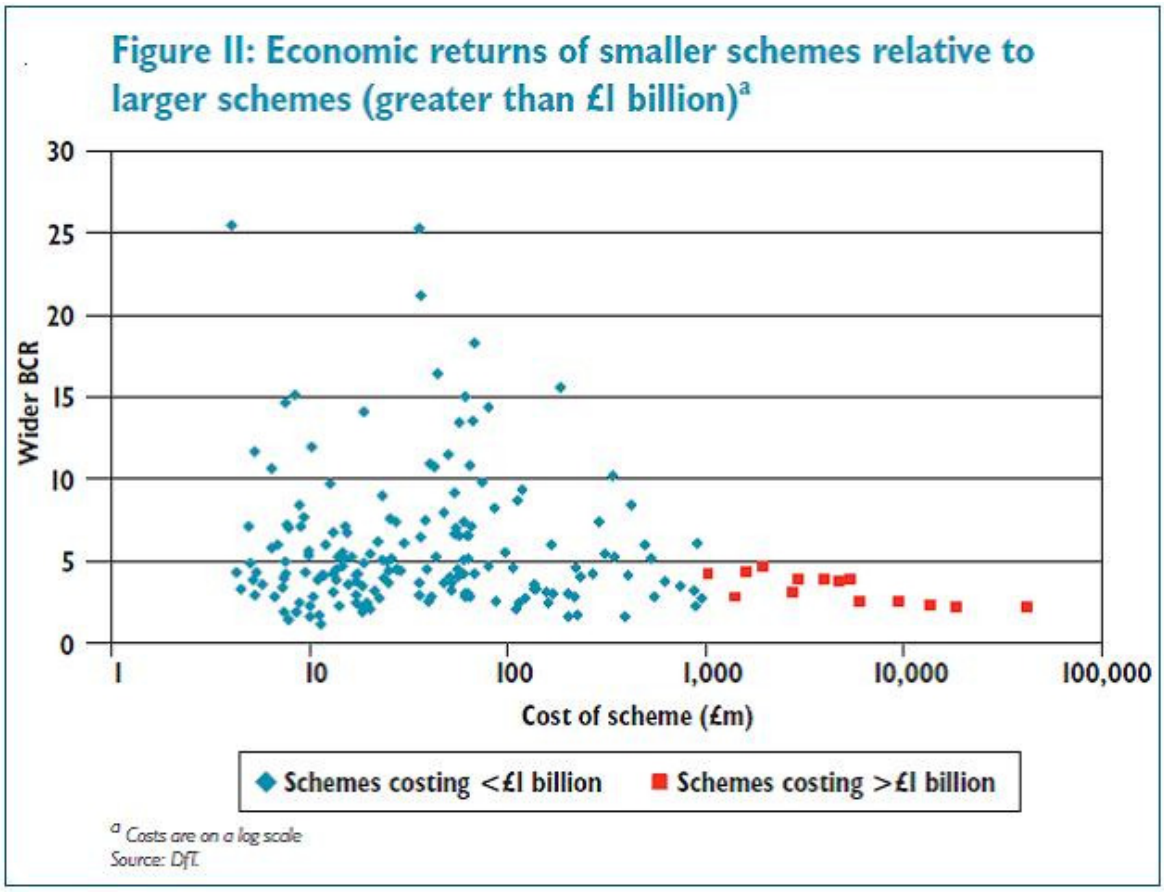
of business trips are less than 15 miles in length; 89% of the delay caused by congestion is in urban areas, and agglomeration effects can add up to 50% to the benefits of some transport schemes.

14.36 Eddington suggests that the Government should focus policy and sustained investment on improving the performance of existing transport networks, in those places that are important for the UK's economic success. He outlined that

"because the UK is already well connected, the key economic challenge is therefore to improve the performance of the existing network. […] There are very high returns from making best use of existing networks [with…] large projects with speculative benefits and relying on untested technology, are unlikely to generate attractive returns".

14.37 The study included the graph below which highlights that, typically, smaller projects offer the high returns, since they can be targeted at specific bottlenecks on the transport system at relatively low cost. Furthermore, such projects often have lower noise and landscape impacts, so their environmental impact can be considerably less than a new piece of infrastructure.

FIGURE 14.1 INCREMENTAL INTERVENTIONS FOR OPTIMISED ALTERNATIVE



14.38 The study outlined

"the risk is that transport policy can become the pursuit of icons. Almost invariably such projects – 'grand projects' – develop real momentum, driven by strong lobbying. The momentum can make such projects difficult – and unpopular – to stop, even when the benefit:cost equation does not stack up, or the environmental and landscape impacts are unacceptable".

14.39 He continued that

"the resources absorbed by such projects could often be much better used elsewhere. The suggested benefit:cost ratios of such projects, although only estimates, are often lower than many other less-exciting transport projects. International evidence collated for this study suggests that the claimed transformational impacts of such projects are rarely observed, and any speculative assessment of 'macro-economic' benefits would involve considerable risk, particularly in view of the large sunk cost investment that would be required. Furthermore, the projects are rarely assessed against

other interventions that would achieve the same goals – it can often seem that, unless Government can somehow demonstrate that the project's costs outweigh the benefits, the projects should go ahead. In fact, the question should really be are there better ways to achieve the same goals, or are there better uses of the funds to achieve different, but more valuable goals, for the same cost?".

14.40 Eddington concluded that

"in short, step change measures, such as a new nation-wide very high-speed train network, are not, in a world of constrained resources, likely to be a priority. That is why, it is critical that the government enforces a strong, strategic approach to option generation, so that it can avoid momentum building up behind particular solutions and the UK can avoid costly mistakes which will not be the most effective way of delivering on its strategic priorities".

14.41 The following figure is taken from the Eddington Transport Study, directly in relation to the case for new very High Speed Lines (HSLs).

FIGURE 14.2 INCREMENTAL INTERVENTIONS FOR OPTIMISED ALTERNATIVE

Figure 15: The case for new very High Speed Lines (HSLs)

Significant momentum has built behind the case for a new network of very high-speed rail lines in the UK. This is often associated with new technologies, such as magnetic levitation devices, currently in very limited use in China. The business case is often argued to rest on the transformational impact of such a network on the UK's economic geography.

However, new high-speed rail networks in the UK would not significantly change the level of economic connectivity between most parts of the UK, given existing aviation and rail links. Even if a transformation in connectivity could be achieved, the evidence is very quiet on the scale of resulting economic benefit, and in France business use of the high speed train network is low.

Faced with such arguments, supporters of HSLs point to the capacity increases such new lines would deliver in London and selected urban areas by removing some or all interurban trains from commuter and freight lines.

Such benefits are likely to be both real and substantial. Crucially though, these goals could be achieved by other solutions, and perhaps at much lower cost. The range of policy measures would include fares pricing policy, signal-based methods of achieving more capacity on the existing network, and conventional solutions to capacity problems e.g. longer trains. Indeed, in keeping with a non-modal approach, the measures assessed should include improvements to other modes that support these journeys (e.g. motorway, bus, and urban access improvements).

New lines – including new very high-speed lines – should take their place within this range of policy measures, and each should be assessed on their merits before selecting the option that offers the greatest returns on investment.

An alternative argument is sometimes made on environmental grounds because a very high speed line from London to Scotland could attract modal shift from air. Such arguments must be made with care given that total domestic aviation emissions, including flight between other cities, account for 1.2 per cent of the UK's annual carbon emissions (CO_2 equivalent), including allowance for the the climate change impacts of non-carbon emissions from aviation. Furthermore, rail's energy consumption and carbon emissions increase with speed and this would erode rail's environmental advantage and so it is important to consider the costs involved in reducing carbon emissions in this way.

The Stern Review

14.42 In July 2005 the Government asked Sir Nicholas Stern to lead a major review of the economics of climate change, to understand more comprehensively the nature of the economic challenges and how they can be met, in the UK and globally. The *Stern Review on the Economics of Climate Change* was published by the Government in October 2006. The report discusses the effect of global warming on the world economy.

14.43 The Review states that climate change is the greatest and widest-ranging market failure ever seen, presenting a unique challenge for economics. The Stern Review's main conclusion is that the benefits of strong, early action on climate change far outweigh the costs of not acting. According to the Review, without action, the overall costs of climate change will be equivalent to losing at least 5% of global gross domestic product (GDP) each year, now and in the future.

14.44 As can be seen from chapter 13 environmental impacts, it is highly improbable that the proposed HS2 scheme will help to reduce the UK's carbon emissions in the short, medium or long term, as recommended by the Stern Review.

Transport Conclusion

14.45 The Treasury Green Book advises "*where lead options involve irreversibility, a full assessment of costs should include the possibility of delay, allowing more time for investigation of alternative ways to achieve the objectives*". That is surely the case for HS2. This project which was included in the Coalition Agreement on the basis of a business case that has now been superseded by a new version which significantly downgrades the expected benefits admits the project is only carbon neutral and is probably still too optimistic. The costs of £750 million over the current spending round mean that other transport projects have to be deferred or cancelled even though they have superior benefit to cost ratios. The project needs to be reviewed against the new National Infrastructure Plan. At present, there does not appear to be a clear definitive links with the Department for Transport's policy of improving the sustainability of the railways. In addition, it does not take into account policies that are aimed at reducing travel.

14.46 To conclude, it does not adhere to the Treasury Green Book and on the basis of Department for Transport's own decision making methodology it is a poor project.

National Economic Strategy and Policy

Plan for Growth

14.47 The Government published the Plan for Growth document in March 2011. The policy statement does not support large investments in infrastructure, such as HS2; however it does encourage investment and private sector employment support outside of London and the South-East. However as Professor Tomaney outlines in chapter 5, it is unlikely the investment in HS2 will rebalance the north-south divide to any significant extent.

14.48 The Plan for Growth focused on five key objectives, namely:

- To create the most competitive tax system in the G20.
- To encourage investment and exports as a route to a more balanced economy.
- An increase in private sector employment, especially in regions outside London and the South East.
- Increased investment in low carbon technologies.
- To create a more educated workforce that is the most flexible in Europe.

Regeneration to enable growth

14.49 In January 2011, the Government published Regeneration to enable growth the set out their ambition for locally-driven growth, encouraging business investment and promoting economic development. The emphasis of this document is on localism and providing regeneration at the local level. The aim is to replace the large, remote regional (or national) bodies with smaller, more focused, local enterprise partnerships, drawing local civic and business leaders together. The Government aims to continue to focus and continue "to help rebalance growth across the country, but regeneration activity should be led by local communities, not by Whitehall [through such schemes as High Speed 2]".

Local growth: realising every place's potential

14.50 The Government's current initiative and ethos surrounding localism and Big Society is further reinforced in the November 2010 publication of Local growth: realising every place's potential. This document further emphasises the Government's "new approach to local growth, shifting power away from central Government to local communities, citizens and independent providers. This means recognising that where drivers of growth are local, decisions should be made locally". Fundamentally, this document (along with the Localism Bill) outlines that present Government considers that growth and regeneration should and could be successfully delivered through a "*small state, Big Society*" model that is at odds with large scheme infrastructure schemes, such as HS2.

14.51 The alignment of HS2 with some of the policy objectives outlined within the 2011 Budget are questionable, at best. One of the key policy objectives outlined by the Chancellor was to create lasting prosperity that requires the economy to change and to rebalance from unsustainable public spending towards net trade and private-sector investment. How the Government believe that the proposed HS2 will help to achieve this particular policy objective is an interesting conundrum.

National Environmental Strategy and Policy

Climate Change Act 2008

14.52 The *Climate Change Act 2008* received Royal Assent in November 2008. The Act makes it the duty of the Secretary of State to ensure that the net UK carbon account for all six Kyoto greenhouse gases for the year 2050 is at least 80% lower than the 1990 baseline. The Act aims to enable the UK to become a low-carbon economy and gives ministers powers to introduce the measures necessary to achieve a range of greenhouse gas reduction targets. However, as stated previously, it is unlikely that the proposed HS2 scheme will significantly reduce the country's carbon emissions.

Department for Environment, Food and Rural Affairs Business Plan

14.53 In November 2010, the Department for Environment, Food and Rural Affairs (DEFRA) published its business plan for the period 2011-2015. This document is meant to be refreshed annually, however to date there to no revised document on the DEFRA website. Within this document the Government outline a number of its key priorities (five in total), one of

which is directly related to HS2 debate. The Government aim to support a strong and sustainable green economy, resilient to climate change. In order to achieve this policy objective the Government will "*help to create the conditions in which businesses can innovate, invest and grow; encourage businesses, people and communities to manage and use natural resources sustainably and to reduce waste; work to ensure that the UK economy is resilient to climate change; and enhance rural communities*".

14.54 This business plan reinforces the Government's structural reform plan whereby a programme of reform will be driven forward that will turn Government "*on its head. We want to bring about a power shift, taking power away from Whitehall and putting it into the hands of people and communities, and a horizon shift, making the decisions that will equip Britain for long term success*".

Department of Energy and Climate Change Business Plan

14.55 In November 2010, the Department of Energy and Climate Change (DECC) published its business plan for the period 2011-2015. This document is meant to be refreshed annually, however to date there to no revised document on the DECC website. This business plan outlines the Government's four principle objectives associated with DECC, namely:

- Save energy with the Green Deal and support vulnerable consumers.
- Deliver secure energy on the way to a low carbon energy future.
- Drive ambitious action on climate change at home and abroad.
- Manage our energy legacy responsibly and cost-effectively.

14.56 The DECC overall vision is to achieve a long term transition to a secure, affordable, low carbon energy on the way to a 80% cut in green house gas emissions by 2050. It aims to reduce energy use by households, businesses and the public sector; however HS2 will only serve to increase the UK's energy use.

Conclusion

14.57 The Treasury Green Book advises

"Where lead options involve irreversibility, a full assessment of costs should include the possibility of delay, allowing more time for investigation of alternative ways to achieve the objectives". This surely applies to HS2. As demonstrated in other reports, this project was included in the Coalition

Agreement on the basis of an outdated business case. This has now been superseded by a new version which significantly downgrades the expected benefits, admits the project is only carbon neutral, is still overly optimistic and offers much poorer value for money than alternatives. The costs of £750 million over the current spending round mean that other transport projects have to be deferred or cancelled even though they have superior benefit to cost ratios.

14.58 The project needs to be reviewed against the new National Infrastructure Plan and the assumptions and application of the methodology underpinning the evaluation revised. It fits badly with the DfT's overall transport policy thinking, especially when considering how best to improve the sustainability of the railways. HS2 takes no account of DfT's policies to reduce the need to travel. In addition, it does not adhere to the Treasury Green Book and on the basis of DfT's own decision making methodology it is a poor project.

14.59 National transport policy has taken a lead from the Eddington Transport Study that strongly recommended that "step change measures, such as a new nation-wide very high-speed train network, are not, in a world of constrained resources, likely to be a priority. That is why, it is critical that the government enforces a strong, strategic approach to option generation, so that it can avoid momentum building up behind particular solutions [such as HS2] and the UK can avoid costly mistakes which will not be the most effective way of delivering on its strategic priorities".

14.60 In addition, it is difficult to align the HS2 project with the over-arching policies' aims and objectives across Government. As demonstrated previously, it appears that the HS2 scheme contradicts the Department for Energy and Climate Change and the Department for Environment, Food and Rural Affair's business plans and a number of strategic documents published recently by the Communities and Local Government department.

Chapter 15

Alternative Transport Priorities in the North

Prepared by Tim Bellamy

15 ALTERNATIVE TRANSPORT PRIORITIES TO HS2 IN THE NORTH

Prepared by Tim Bellamy

15.1 This chapter relates to the following questions listed by the Committee:

- 2.1 – HSR is designed to improve inter-urban connectivity. How does that objective compare in importance to other transport policy objectives and spending programmes, including those for the strategic road network
- 5.1 – Evidence that HSR will promote economic regeneration and help bridge the north – south economic divide

NORTHERN WAY

Introduction

15.2 Led by the three Northern Regional Development Agencies, the Northern Way aimed at bridging the £30bn annual productivity gap between the North's economy and the English regional average. Working with stakeholders from across the North, the Northern Way's focus was firmly on adding value over and above what can be achieved by the North's City Regions and Regions working in isolation. To deliver productivity growth, the Northern Way has identified the North's transport connectivity as one of three key priorities, the other two being private sector investment and business innovation.

15.3 The role of transport in growing the North's economy was first highlighted in the *Northern Way Growth Strategy Moving Forward: The Northern Way*. This set out the importance of improving the links within and between the North's City Regions, and improving access to the North's sea ports and airport international gateways. To support the achievement of these overarching goals, the *Strategic Direction for Transport* was developed. Evidence-based and full-square with the conclusions of Sir Rod Eddington's Transport Study, the *Strategic Direction* sets out the interventions needed to maximise productivity growth, while at the same time seeking to minimise the impact of transport on our environment. The *Strategic Direction* was developed by the Northern Transport Compact to sit below

the broad transport goals established by the Growth Strategy and to inform the development of short, medium and long term priorities.

15.4 Developing an evidence-based approach to pan-northern issues was central to the role of the Northern Way, especially for the top priority issue of transport, where work was undertaken to understand what the barriers are to productivity growth and the most effective ways of overcoming them.

The Northern Way Growth Strategy

15.5 Published in 2004, the *Northern Way Growth Strategy Moving Forward: The Northern Way* set out how the Northern Way sought to improve the economic performance of the North. The Growth Strategy highlighted transport as a priority area for transformational change. The Growth Strategy identified three transport investment priorities for the North:

- To improve surface access to the North's airports.
- To improve access to the North's sea ports.
- To improve links within and between the North's City Regions.

Strategic Direction for Transport

15.6 To underpin the *Growth Strategy*, the Northern Way Transport Compact developed the *Strategic Direction for Transport*. The *Strategic Direction* assessed the most appropriate transport interventions that will promote productivity gain, while at the same time seeking to protect and enhance the North's natural and built environment and contributing to meeting the nation's commitments regarding climate change. Looking over a 20 to 30 year time horizon, this document sits below the high-level transport goals of the Growth Strategy and above the level of individual schemes and projects. The Strategic Direction set out the types of interventions which will have greatest productivity impact. While pre-dating the Eddington Transport Study, the *Strategic Direction* is fully consistent with the findings of that report.

15.7 The Strategic Direction outlines that "*the proximity of London is a major asset to the North. It provides access to world city functions and acts as a global gateway*". This therefore demonstrates that at the time of writing those associated with the Northern Way felt that the connections to London were appropriate and provided significant economic benefits for the North at the present time, without High Speed 2. In addition, the *Strategic Direction* outlines that the focus of investment within the North should be

focused on links within the Northern Way itself as demonstrated by the document stating that "*the Northern Way's work also shows that improving links between the North's City Regions offers greater potential agglomeration benefits than that offered by improving transport within the City Regions. Improving transport between the City Regions also offers the potential for more balanced growth across the North*".

The Northern Way's Short, Medium and Long Term Transport Priorities

15.8 Building on the Strategic Direction, the Northern Way Transport Compact also established a set of Short, Medium and Long Term Transport Priorities for investment in the North's transport system (see below). The Transport Compact's prioritisation work showed that while the transport proposals being pursued by stakeholders across the North would make worthwhile contributions to productivity growth, taken together they did not allow the Strategic Direction to be met. Consequently, if the North's productivity growth was to be maximised these strategic delivery "gaps" needed to be addressed.

The Northern Way's Transport Work

15.9 The central role of the Northern Way's transport work was to add to what could be achieved by the North's three regions and eight city regions acting alone. This resulted in a clear focus on the connectivity between the North's city regions and between the city regions and key business destinations elsewhere in the country, as well as international connectivity. We also worked with partners to add economies of scale to city-region led initiatives.

15.10 In particular, built on the foundation of the Northern Way Growth Strategy, the Strategic Direction for Transport and the Short, Medium and Long Term Transport Priorities, work focused on:

- Closing the strategic deliver gaps - on roads, keeping the strategic road network moving and north-wide behavioural change measures; on rail, the Northern Hub, rail gauge enhancements, rail rolling stock and Trans Pennine and North-South strategies including high speed rail; and on network integration pan-northern smart ticketing and strategic park and ride.
- Building the evidential base on how transport influences productivity in the North and the size of the Northern economy.

- Influencing the programmes and policies of Government and the national delivery agencies, including through drawing on the Strategic Direction, the Priorities work and the evidential base to inform the policy and programme consultations and to inform the North's parliamentarians about the work of the Northern Way Transport Compact.

Transport Priorities - 2007

15.11 This identified the priorities for investment in the North's transport networks for the short (to 2011), medium (to 2016) and long term (looking 20-30 years ahead) and is part of a wider statement of what the Northern Way sees as the transformational priorities that will contribute to closing the £30bn annual output gap between the North and the English regional average.

15.12 Priorities identified will bring substantial and worthwhile productivity growth to the North, but one of our most important findings is that taken together, current proposals for transport investment from stakeholders will not maximise productivity growth: more must be done. Critically we need to develop a pan-Northern approach for the North's rail network if we are to meet the needs of the North's commuters and the growing demand for business and other travel between the North's resurgent City Regions. A North-wide strategy is also needed to keep our motorway and trunk roads moving. Considered pan-northern transport proposals which sought to benefit:

- Movements between the North's City Regions and between Regions.
- Movements to/from international gateways.