
HIGH SPEED RAIL

HOW TO GET STARTED

FEBRUARY 2010

I would like to record my thanks to a number of people whose support has been invaluable during the preparation of this short paper.

I am immensely grateful to my co-authors, Sir Andrew Foster, Bridget Rosewell and Professor Rod Smith for their time and wisdom as we have worked together to develop our conclusions. I am likewise indebted to Catherine Griffiths for her unfailing energy and commitment in her tireless research and organisation.

Lastly my thanks go to the many people who were prepared to spend time with us to share their views. The stimulating and interesting debate we enjoyed with all of them made the work we have done significantly more pleasurable than it could otherwise have been. It goes without saying that the views expressed are those of the Research Group, and should not be attributed in any way to those with whom we consulted.

A handwritten signature in black ink that reads "David P J Ross". The signature is written in a cursive, flowing style with a large initial 'D'.

David P J Ross

CONTENTS

EXECUTIVE SUMMARY	3
INTRODUCTION	4
SCALE, COST & MINDSET	5
Scale	5
Cost	5
Mindset & Attitude	6
A MEASURED AMBITION	7
Staging	7
Simplicity	7
FUNDING MODELS & SOURCING FINANCE	9
Funding models	9
International precedent	9
Analysis	10
Recommendation	10
Paying back	11
A WAY FORWARD	12
Glossary	13
Bibliography	14
Appendix 1	16
Biographies	19

EXECUTIVE SUMMARY

The case for High Speed Rail (HSR) has now been made in many quarters. It is concluded that the existing system is overburdened, other countries have already got ahead of us, and higher speeds and additional capacity would provide both economic and social benefits. However, we have yet to establish a practical and effective method of delivery of this investment. This paper addresses this gap.

We need to find a new way of managing these large investments if we are to create an effective, dedicated, national High Speed Rail Network. Our existing methods are designed to create a perfect system but the best is the enemy of the good. Our motorway network was created with an overall vision in mind and then implemented piece by piece and we should learn from this.

Smaller scale, manageable projects to provide dedicated HSR where it is initially most needed can be set up with good financial discipline and learning from international experience. UK costs are high and need to be brought down to international benchmarks. Clear understanding of how different sources of funding can manage risks will also improve deliverability.

We propose that a Special Purpose Vehicle (SPV) should be established to procure a high speed line from Old Oak Common (on the Crossrail route to Heathrow) to Birmingham Airport and Manchester Airport. Funding for this should be raised with government guarantees for the basic infrastructure, but city centre linkages, station development and so on would be funded and justified separately. Train operators would be privately financed. On European standards, this would cost in the region of £6bn.

We view this project as the most effective way of getting high speed rail started – High Speed Light as it were. Further extensions to the route, both to other cities and into the centres of cities, would follow according to the business cases that could be made for them. Some might even be concurrent with the original project so long as the finances could be properly arranged.

INTRODUCTION

During 2009 the case for developing a high speed dedicated rail network (HSR) in Britain was made with growing conviction and in increasing detail¹, and it appears to enjoy the support of all the main political parties².

The existing rail system is already overburdened. The railways are carrying 1.3 billion passengers a year, more than at any time since 1946. Capacity has increased, with a million more trains running now than five years ago, but demand has increased spectacularly, by 40% for passenger services and more than 60% for freight. The trend is projected to continue and the railways will be in crisis by 2020 unless steps are taken³. HSR would add capacity through the new lines themselves and release capacity, including freight capacity, on the 'classic' rail network.

In addition, HSR would drive major economic and social change: transformed connectivity between British business and its customers, improved access for much of the country to European markets, large revenue streams, faster journeys and liberated working time, less road traffic, downward pressure on the extent of domestic air travel, much reduced environmental damage, greater safety and a positive potential impact on regional differentials leading to inclusion and opportunity. The benefits could be very substantial; failure to embrace the HSR challenge could be economically damaging.

In the pursuit of these advantages we lag far behind our neighbours and commercial competitors. Our country's only high speed line is the 69 mile St Pancras to Channel Tunnel link. France by contrast has 4135 miles in place or planned for 2025, Germany 2247, Italy 1138 and Spain 4415⁴.

The case of need requires no further articulation here and the main focus is on delivery, which has not yet received so much attention. What first steps should we take? How can cost be contained? What are the required funding models and sources of finance? These are the issues addressed in this paper.

1. See Bibliography
2. Andrew Adonis, Secretary of State for Transport, speech to Labour Party Conference 2009. Teresa Villiers, Shadow Transport Minister, 6 October 2009. Malcolm Bruce, President of Scottish Liberal Democrats, Annual Report 2009.
3. Network Rail Report: Meeting the capacity challenge: the case for new lines. 2009. www.networkrail.co.uk/newlines
4. *ibid.*

SCALE, COST & MINDSET

SCALE A critical feature of a HSR network is that it needs to be national in its scale and dedicated to high speed trains only. The Greengauge report recommends a network of 1500km (930 miles)⁵. HS2, the company established by Government to bring forward proposals for new lines, has been asked to consider the feasibility of a high speed route between London and the West Midlands⁶, while Network Rail recommended a high speed network linking London to Edinburgh and Glasgow via Birmingham and Manchester with 1500 miles of track⁷.

A recent estimate of overall cost from Network Rail is a daunting £34bn⁸. To put this in perspective, £34bn would finance the 2012 Olympics more than three times over. It is about the same as the entire value of Network Rail's existing assets.

A key requirement in delivering HSR is to create projects that appear to be practicable and fundable and show how this scale can be delivered over time in a manageable way.

COST According to construction companies, the cost of procuring railway infrastructure in Britain is as much as three times higher as comparable projects in continental Europe. The Channel Tunnel Rail Link cost £5.8bn⁹: at more than £56m per kilometre it is the world's most expensive HSR link

There are various reasons for our comparatively higher costs including non-standard technical specifications, different operating standards and safety requirements, tortuous planning requirements and complex budgetary and procurement processes. The cost gap must be reduced.

The UK's railway specifications mean that many products need to be custom built. There would be substantial cost savings if a new high speed network adopted continental European specifications, seeking out universal technical solutions, reducing complexity through standardisation, making use of tried technology and hardware, and building on existing HSR design, engineering and management experience. We must learn from international experience, emulating success wherever we can.

5. Greengauge 21; *Fast Forward: A High-Speed Rail Strategy for Britain, 2009*

6. HS2: <http://www.hs2.org.uk/>

7. Network Rail; *Meeting the Capacity Challenge: A case for new lines, 2009*

8. Network Rail's proposed cost figure

9. Written submission by UK ULtraspeed to Scottish Parliament – 16 October 2008

Safety is an overriding imperative, but specifications and regulations that have grown piecemeal over many years for Britain's classic railway network may not be optimal. Depending on the extent of HSR's integration with existing infrastructure, there is a good case for a review to identify most cost effective practice.

In the UK, major infrastructure and construction projects are subject to ever more onerous requirements and regulations at the planning stage, with analytic processes looking far ahead to long term cost and benefit. In the case of Crossrail there were numerous engineering, economic and policy reviews, and whatever they achieved in terms of refinement came at a significant cost.

Large public sector projects in the UK are notably prone to time and cost overruns and indeed the Treasury Green Book, the bible for project appraisal, specifically requires an 'optimism bias' of 50% to be added to projected cost.

A step forward may be the newly established Infrastructure Planning Commission, but it has not yet turned its attention to rail infrastructure and until a policy statement has been agreed its ability to simplify planning procedures is unclear.

These are areas where costs might be reduced. But the most fertile territory for managing cost is the group of assumptions that are made about the nature of a HSR network and the manner of its development.

MINDSET & ATTITUDE Very large programmes generate an understandable desire to get it perfectly right. It is argued here that cost will be contained and progress made more swiftly and to schedule if the HSR development is staged rather than conceived as a single comprehensive programme. The aim should be to identify initial development which delivers the maximum value for that spend and is safe, but simple and direct in design and execution. An overambitious programme could be the enemy of what is good and achievable.

A MEASURED AMBITION

STAGING Progress towards an overall vision should emulate the development of motorways, conceived as a network but executed little by little over a significant number of years. The HSR programme should be divided into a series of staged and politically, managerially and financially deliverable projects.

A step by step approach, with consideration of options at each stage, would in any event be more likely to provide an up-to-date endpoint infrastructure which reflected the real needs of users at that time.

European experience suggests HSR procurement, project management and construction operates most efficiently and effectively on stretches of 100 to 200 kilometres¹⁰.

SIMPLICITY More than half the cost of the Channel Tunnel Rail Link, and much of the planning effort, arose from the final approach to central London and St Pancras because of the extensive tunnelling and other engineering work involved. Why then, in developing HSR, is it initially essential to build into city centres? Even if traditional appraisal methodologies show that this maximises benefits, a detailed financial analysis will give very different metrics. Best value for money will be achieved by selecting those segments with lower costs per kilometre for early development, probably longer segments outside the cities which represent the potential for the biggest time savings.

The first elements of a new HSR network could provide an effective and efficient link between London, Birmingham and Manchester without venturing into the cities themselves. A possible route runs from a London terminus at Old Oak Common on the new Crossrail route, which links Heathrow to the West and Bond Street and Canary Wharf to the East. Indeed, the Old Oak Common terminus would be only two stops from the West End and seven from the City. The northward HSR route would be to Birmingham Airport and then Manchester Airport where linkages with city centres already exist.

The distance involved in this route is about 300km, suitable for letting as two projects in line with the staging principles outlined above. Major construction companies estimate that a reasonable cost for continental rail projects is €20m per kilometre. On this basis, the cost of a route from London to Manchester is less than £6bn.

Both stations and related facilities should initially be limited in number (at Old Oak Common and Birmingham and Manchester airports) and

designed and built as simply as possible, with essential facilities only. Ancillary development (for example additional parkway stations, improved links to city centres, hotels, restaurants, shopping malls) should not be seen as part of the programme but to be added as investors demand. Some of these may be delivered alongside the core programme, but as separate projects, for example to manage passenger arrivals.

Economic incentives need to be aligned with desired outcomes so that commercial interests and local authorities see opportunities to achieve their own objectives - in the case of LAs, those of their communities - by investing in developments related to the HSR routes. Attention would have to be given to the mechanisms available to LAs to do so in association with other local interests.

Finally, it is not essential to integrate the HSR network with the classic network. A High Speed Network can be developed quite separately, reducing cost and facilitating the adoption of more cost-effective technical specifications.

These four key principles of staging, selection for maximum VFM, simplicity and separation could transform what feels overwhelmingly challenging as a comprehensive, integrated network into something that looks and is achievable. The costs of staged developments would share order of magnitude with several successfully completed or ongoing projects:

- BAA's Heathrow Terminal 5 building cost £4.3 billion
- The Channel Tunnel Rail Link cost £5.8bn
- The West Coast mainline cost in excess of £9bn
- Crossrail will come in at around £16bn
- Total Oil is investing £2bn in the new Laggan and Tormore oil fields.

Moreover the overall costs of a stage would be broken down into separate parcels with distinct stakeholders and funding arrangements, further increasing the sense of achievability:

- Track, signalling and basic stations – core funding
- Additional stops and improved urban links – local authorities
- Enhanced station facilities and other local development – commercial interests
- Rolling stock – core funding, but contracted separately
- Power – contract with energy suppliers
- Operations – franchised to Train Operating Companies (TOCs)
- Maintenance – franchised (perhaps to TOCs, reducing present divisions of responsibility).

The critical point is that a start could be made along the lines proposed, success demonstrated, confidence reinforced and a great platform created for future stages.

FUNDING MODELS & SOURCING FINANCE

FUNDING MODELS The **funders** of a project are those responsible for finding the project costs, while the **finance** is provided by banks and other lenders. Funders also need to find sources of revenue to **pay back** the finance, both debt and equity.

A good deal of information is to hand about approaches adopted around the world in developing HSR. What unites them is the major role played in all cases by the state. But this is manifested in different ways. There are basically three potential funding approaches.

The first and the simplest conceptually, is the *public funding* model. Here the public sector acts as both procurer and deliverer, usually working through a state railway company. Specific works or equipment packages might be contracted out and also train operations on completion. But design is in-house and the financial burden, and risk, are borne directly by the public sector. The taxpayer is both funder and financier. Payback is not considered.

The second is the project *finance/PPP* model. The public sector acts as facilitator, letting a long term concession to a private sector consortium that designs, constructs and maintains the high speed line infrastructure - and bears risk which is reflected in costs. The funding consortium raises debt and equity finance, to be repaid from a periodic availability fee from government once the infrastructure is complete and operating. Passenger operations, and possibly also the supply of trains, may be contracted out to separate private sector entities.

The third is the *rail agency* model under which the public sector usually establishes a dedicated delivery organisation, at arms length and separate from the state owned railway company – ensuring some independence from government control and protection from political change. The agency raises private sector debt finance underwritten by government guarantees and procures design, construction and equipment through contracts. Pay back is similar to the PPP model, but the funding is at least partly in the public sector.

INTERNATIONAL PRECEDENT The most common model has been the public funding model. For example, both Japan and France embarked on their high speed rail developments on that basis. Both supplemented central state funding with contributions from regional and local government, partly to spread the burden and partly to bind in local support. For the most recent additions to its high speed network, France has switched to the PPP model.

The PPP model is being used for the Dutch HSL Zuid project and Portugal's HSR network.

Italy adopted the rail agency model, which is similar in concept to the Network Rail arrangement, and also to the structure to which Channel Tunnel Rail Link migrated when the original approach failed.

ANALYSIS Realistically, given the current complexity of issues surrounding government debt, the public funding model appears unattractive. Even without the recent crisis, the continued centralised approach seems at odds with the expressed wish to open up funding to wider ranges of interests and regional groups. Most importantly, the advantage of working with a strong private sector partnership is that financial discipline and effective cost control are rigorously imposed.

The Project funding/PPP model provides such discipline and transfers the financial risks of construction or maintenance overrun to the private sector, but at a price, and the burden on public finances is mitigated significantly by being spread over time (thirty years or more). The main constraint is the balance sheet capacity of private sector contractors to take on construction risk and the need for detailed ex ante contracts to guarantee returns.

The Rail Agency model, like PPP, spreads the call on public funding over a lengthy period. But because of the government's guarantee and its retention of a share of risk, very large volumes of debt can be raised at competitive rates. Moreover, agency management retains flexibility and control because debt providers look with security to the government for repayment and thus need only a simple covenant framework rather than the complex requirements of PPP agreements, which tend to constrain management. At the same time it provides a financial envelope in which the agency must work to deliver agreed outputs and the consequent financial discipline.

RECOMMENDATION Although the PPP model might be made to work with segmented and phased stages, our view is that the rail agency model probably offers the best chances of delivering a successful programme. Its crucial advantages, arising from risk sharing, are the lower cost of finance and the agency's ability to retain control and flexibility through relatively simple contracting arrangements (with lower transaction costs).

A Special Purpose Vehicle (SPV) should be established to undertake the agency role. The key principles underpinning its existence and success would be that government must assume a major role in view of the scale of the enterprise (and this is broadly supported by international experience),

that risk must be shared and that development must be phased, as already suggested. Such an entity would have independence from political interference, having an agreed brief to deliver and a secure financial package within which to work.

Under this preferred model the development programme would be financed largely by government guaranteed debt, sourced from infrastructure funds, bond investors, banks and multilaterals (eg the European Investment Bank, Export Credit Agencies).

PAYING BACK It is crucial to understand what revenues can support what elements of debt under any model. Recent experience shows that the 'farebox', the revenue from end-users of the completed facility, can cover the running costs of railway operations and their capital equipment and contribute to the repayment of development debt through Train Operating Company franchising. However, the farebox alone cannot cover all infrastructure development cost under current pricing systems.

The owners of property that achieve enhanced value through proximity to HSR links could also be required to contribute. However, some of the benefits may be spread thinly over many consumers, which makes it hard to create a pricing structure to cover these costs. In this case the taxpayer would shoulder some of the burden, whether through grants or subsidies by central, regional or local government or the EU. All of these would benefit from economic growth and its associated tax revenues, as well as the non-monetary benefits of reduced congestion and environmental gains.

It would be for the SPV (and regulators) to align responsibility for paying back debt and interest with the nature and extent of stakeholding and benefit.

Where HSR stations are outside main cities (parkway stations), the local authorities could fund interchange links from the city centre if they thought there was benefit. It would be optional. The local authority could either co-develop the stations with franchise holders or independently to capture the value gain. The main mechanism currently open to councils for generating additional funds for such purposes is through deals related to local development and property investment. More flexible options for local government finance would permit better decision making in this area.

A WAY FORWARD

The economic imperative is clear and the social benefits beckon. Britain must create a high speed rail network. But the comprehensive vision presented by HS2 would, if implemented as a single programme, involve very high cost and great complexity in terms of planning and decision making.

This paper argues first that high cost, and the appearance of high cost, must be mitigated by cost improvement measures and a critical approach to key assumptions, and secondly that a start should be made as soon as possible, however modest, as the beginning of a staged programme.

The proposition is that this initial step might be a dedicated high speed line from Old Oak Common on the new Crossrail route, which will have a connection with Heathrow, to Birmingham and Manchester Airports where city centre links exist. The need for initial connection or integration with the existing network is questioned.

This model - staged with selection for maximum financial VFM, simplicity and separation - is achievable. And the prospect feels a great deal more positive than the probable alternative if a whole network approach were taken: endless deliberation, indecision, intimidating cost and complexity, overruns and reviews. We have succeeded with the Tunnel Link and mindful of our astonishing, proud railway heritage, we should not hesitate to take the next manageable step.

GLOSSARY

CROSSRAIL Crossrail is a new line under development. From 2017 Crossrail will travel from Maidenhead and Heathrow in the West; to Shenfield and Abbey Wood in the East, via new twin tunnels under Central London. It will link Heathrow Airport, the West End, the City of London and Canary Wharf.

GREEN BOOK The UK Government Treasury publishes the Green Book which is the central point for access to guidance on the economic assessment of spending and investment and to the preparation of business cases for the public sector.

HS2 HS2 is the company established by the Government to consider the case for high speed rail services between London and Scotland.

HSR High Speed Rail is defined as a railway capable of operating at speeds in excess of 320km (200mph) and mainly used for transporting passengers rather than freight. In order to achieve this speed, and to be maximally efficient, HSR must be seen and managed as an integrated system.

IPC Infrastructure Planning Commission is an independent body that makes decisions on applications for nationally significant infrastructure projects. These are the large scale facilities that support the economy and vital public services. The projects include railways, large wind farms, power stations, reservoirs, harbours, airports and sewage treatment works.

LA Local authority which is an administrative unit of local government. In this Report it also includes regional authorities.

PPP Public Private Partnership is when a project is funded and operated through a partnership of government and one or more private sector companies.

SPV Special Purpose Vehicle or Rail Agency Model is a body corporate (usually a limited company) created to fulfill narrow, specific or temporary objectives, primarily to isolate financial risk.

TOC Train Operating Companies are the businesses operating passenger trains on the railway system of mainland Great Britain. There are two types of TOC: the majority hold franchises let by the government, to operate services on certain routes for a specified duration. Additionally there are a small number of "open access" operators that hold licenses to provide supplementary services on chosen routes. These operators can run services for the duration of the license validity.

VFM VFM Value for money

BIBLIOGRAPHY

Atkins, *Because Transport Matters: High Speed Line Study, Milestone 7*; London: Atkins, April 2009

Balfour Beatty Report; Old Oak Common Interchange: A Supporting Submission to HS2, 2009-10

Balfour Beatty Report, Old Oak Common: A 21st Century Solution, 2009-10

Commission for Integrated Transport, *High Speed Rail: International Comparisons, Final Report*, Steer, Davies, Gleave, February 2004

Eddington, Rod; *The Eddington Transport Study, The Case for Action*, HMSO, 2006

Edum-Fotwe, F T; *Funding Future Infrastructure Projects, A Review of available and potential options*; Institute of Civil Engineers, October 2009

European Commission; *Air and Rail Competition and Complementarity*, SDG report for the European Commission, August 2006

Gist, Peter; A Presentation on Heathrow Hub International, Arup Report, March 2009

Glaister, Stephen; *Investing in Cities, Report to Development Securities*, Imperial College, London, April 2004

Greengauge 21; *High Speed Two: A Proposition by Greengauge 21*, June 2007

Greengauge 21; *Fast Forward: A High-Speed Rail Strategy for Britain*, 2009

Greengauge 21; *High Speed Rail in Britain, the Heathrow Opportunity*, February 2010

Greenpeace; *High speed rail announcement: Greenpeace response*, Greenpeace press release, August 2009

Harmon, Reg; *High Speed Trains and the Development and Regeneration of Cities*, Greengauge, June 2006

Helm, Dieter; Wardlaw, James; and Caldecott, Ben; *Delivering a 21st Century Infrastructure for Britain*, Policy Exchange, 2009

House of Commons Transport Committee Report; *Taxes and Charges on Road Users*, Sixth Report of Session, 2008-09

Leeds City Region and Sheffield Region; *The Case for High Speed Rail to the Leeds and Sheffield Regions*; Arup, August 2009

London Borough of Hammersmith and Fulham Report, *Old Oak Common Sidings: Regeneration Case for Rail Interchange: Technical Report*, October 2009

Nash, C A ; *The Case for High-Speed Rail*, Institute for Transport Studies, University of Leeds Working Paper 323, 1991

- Network Rail; *New Lines Programme: Strategic Business Case*, 2009
- Network Rail; *Meeting the Capacity Challenge: A case for new lines*, 2009
- Rail Professional, Reader Survey, 2009
- Sea and Water Report; *A Vision for UK Freight Trends towards 2018 and beyond*, March 2008
- SERA; Fast Forwards; *Labour's Case for High Speed Rail*, Edited by Melanie Smallman and Andrew Pakes. September 2009
- Smith, Roderick A; *The Japanese Shinkansen: Catalyst for the renaissance of rail*, The Journal of Transport History, Vol. 24, No. 2, 2003, pp.222-237.
- Strathclyde Partnership for Transport, *Written submission to the Scottish Parliament Transport and Climate Change Committee*, October 2008
- The Northern Way Report: *Transforming Our Economy and our Connectivity; High Speed Rail for the North*, September 2009
- Ulrick, Peter; Duranton, Sylvain, Koehler Martin; *Opportunities for Action: Planes, Trains and Automobiles*, Boston Consulting Group, 2009

APPENDIX 1

High-Speed Network Consultation

We are grateful to the following for their willingness to talk to us about High Speed Rail issues

Andrew Adonis	Secretary of State for Transport	Department for Transport
John Armit	Chairman	Olympic Delivery Authority
David Azema	Director of Strategy and Finance	SNCF
Norman Baker	Shadow Secretary of State for Transport	Liberal Democrat MP
John Balmforth	Chairman	TravelWatch West Midlands
Mark Bayley	CEO	London and Continental
Tony Berkeley	Lord Berkeley	Chairman Freight Federation
Howard Bernstein	CEO	Manchester City Council
Jerry Blakett	CEO	Birmingham Chamber of Commerce
Tom Bloxham	CEO/Founder	Urban Splash
Stephen Broomhead	CEO	Northwest Development Agency
Malcolm Bruce	President, Scottish Liberal Democrats	Liberal Democrat MP
Louis-Roch Burgard	Chief Operating Officer	Vinci Concessions
Jeremy Candfield	Director General	Rail Industry Association
Ben Carlton-Jones	Researcher	For Shadow Minister of Rail
Patrick Carter	Lord Carter	HM Treasury
Andrew Crudgington	Senior Policy Manager	Institute of Civil Engineers
Noël de Saint-Pulgent	President	MaPPP
Brendan Dick	Director, Scotland	BT
John Dodwell	Committee Member	British Waterways Board
Walley Dominic	Associate Director, Corporate Finance	KPMG
Martin Dyer	Director	NEC
David Eastwood	Vice-Chancellor	Birmingham University
Bill Enevoldson	Partner	KPMG
Romain Fournier	Vice-President	RBC Capital Markets
David Franks	Acting UK Chief Executive	National Express Group Plc

APPENDIX 1

Continued

Roger Freeman	<i>Lord Freeman</i>	<i>House of Lords</i>
Martin Gilbert	<i>Chairman</i>	<i>First Group Plc</i>
<i>Stephen Glaister</i>	<i>Director</i>	<i>RAC Foundation for Motoring Ltd</i>
Jacques Gounon	<i>CEO</i>	<i>Eurotunnel</i>
Stephen Greenhalgh	<i>Councillor</i>	<i>LBHF</i>
Stephen Hammond	<i>Shadow Minister for Transport</i>	<i>Conservative MP</i>
Rick Haythornthwaite	<i>Chairman</i>	<i>Network Rail</i>
Dieter Helm	<i>New College</i>	<i>Oxford University</i>
Mike Hewitson	<i>Head of Policy</i>	<i>Passenger Focus</i>
Stephen Hughes	<i>CEO</i>	<i>Birmingham City Council</i>
David Hull	<i>Partner</i>	<i>Hammonds</i>
John Jarvis	<i>Transport Project Director</i>	<i>The Northern Way</i>
Stephen Joseph	<i>Executive Director</i>	<i>Campaign for Better Transport</i>
Luke Jouanides	<i>Senior Policy Adviser, Infrastructure</i>	<i>CBI</i>
Andrew Kaye	<i>Partner, Corporate Finance</i>	<i>Deloitte</i>
Paul Kehoe	<i>CEO</i>	<i>Birmingham City Airport</i>
Sir Richard Leese	<i>Leader</i>	<i>Manchester City Council</i>
Tim Leunig	<i>Economist</i>	<i>LSE</i>
Andrew Mack	<i>Consultant</i>	<i>BCG</i>
Kevin Magner	<i>Director, Corporate Finance</i>	<i>Deloitte</i>
Gordon McCallum	<i>CEO</i>	<i>Virgin Management</i>
Dougald Middleton	<i>Partner & Leader of Transport Practice</i>	<i>Ernst & Young LLP</i>
Geoff Muirhead	<i>CEO</i>	<i>Manchester City Airport</i>
Darryl Murphy	<i>Assoc Partner Global Infrastructure</i>	<i>KPMG</i>
Chris Nash	<i>Professor</i>	<i>Institute of Transport Studies Leeds University</i>
Hugo Parker	<i>Director, Transport Finance</i>	<i>RBC Capital Markets</i>
Gilles Parmentier	<i>Investment Manager</i>	<i>CDC Infrastructure</i>
Tristan Pedelty	<i>Private Secretary (Rail) to Rt Hon Lord Adonis, Secretary of State for Transport</i>	<i>Department of Transport</i>

APPENDIX 1

Continued

Peter Regan	<i>Director, Corporate Finance</i>	<i>Transport for London</i>
Angie Robinson	<i>CEO</i>	<i>Manchester Chamber of Commerce</i>
Paul Robinson	<i>Managing Director</i>	<i>Alstom Transport, UK</i>
John Segal	<i>Director, Rail</i>	<i>MVA Consultancy</i>
Lynda Shillaw	<i>MD Commercial Property</i>	<i>Co-operative Plc</i>
Adrian Shooter	<i>CEO</i>	<i>Chiltern Railways</i>
Peter Simpson	<i>Professor</i>	<i>The Parliamentary and Scientific Committee</i>
Anthony Smith	<i>CEO</i>	<i>Passenger Focus</i>
Mark Smith	<i>Chairman Midlands Region</i>	<i>PWC</i>
Brian Souter	<i>Chief Executive</i>	<i>Stagecoach Group</i>
Jim Steer	<i>Chairman</i>	<i>Greengauge 21</i>
Colin Stewart	<i>Director, Global Projects</i>	<i>Arups</i>
John Stewart	<i>Chairman</i>	<i>HACAN</i>
François Tcheng	<i>European Business Development</i>	<i>Bouygues Travaux Publics</i>
Giles Tucker	<i>Managing Director and Head of Infrastructure Finance</i>	<i>RBC Capital Markets</i>
Romain Verzier	<i>Director of Structured Finance</i>	<i>Vinci Concessions</i>
Theresa Villiers	<i>Shadow Secretary of State for Transport</i>	<i>Conservative MP</i>
James Wardlaw	<i>Consultant</i>	<i>Goldman Sachs</i>
Julian Ware	<i>Corporate Finance</i>	<i>Transport for London</i>
Ian Williams	<i>Director, Business</i>	<i>Leeds, York and North Yorkshire Chamber of Commerce</i>
Adam Wilkinson	<i>Director</i>	<i>Edinburgh Heritage</i>
Riccardo Zampieri	<i>Business Development Manager</i>	<i>Colas Rail, Bouygues Construction</i>

BIOGRAPHIES OF RESEARCH GROUP

ANDREW FOSTER Sir Andrew Foster is Deputy Chairman of the Royal Bank of Canada and is a non-executive director at several companies, ranging from Bus and Train Companies to Health Services. Sir Andrew has recently been appointed Chair of the Commonwealth Games Committee and Chair of The Commission for 2020 Public Services. Previously he had a long career in Public Services being Chief Executive of the Audit Commission, and before that the Deputy Chief Executive of the NHS. Over the last couple of years Sir Andrew has produced reports for the Government on Further Education and Athletics, including his *Review of the Capital Programme in Further Education*, which was published at the end of March 2009.

CATHERINE GRIFFITHS Catherine holds a post within the Future Rail Research Centre at Imperial College, London. A main focus of her research over the past 20 years has been IT investment including an investigation of risk, evaluation of IT costs and outsourcing. At Imperial she has contributed to the establishment of two spin-out companies to commercialize optimization software developed from the research base and is the co-founder of the Outsourcing Unit at the London School of Economics. Catherine has published widely, co-authored the book *Controlling IT Investments*, featured in the business shows for the Sunday Times, is Editor of Journal of Information Technology and a Founder and Trustee of the Association of IT Trust.

BRIDGET ROSEWELL Bridget Rosewell is one of the UK's most influential economists, with a twenty year track record in advising public and private sector clients on key strategic issues. Her specialist expertise includes economic development, transport and agglomeration economics, development evaluation, infrastructure, forecasting, industry dynamics and competition as well as policy analysis related to these areas. She has been responsible for the development of the economic arguments for a number of rail projects including the Channel Tunnel Rail Link and Crossrail. Bridget is one of the founding directors and Chairman of Volterra Consulting, established in 1998 to apply leading-edge mathematical and statistical techniques to solve economic and business problems.

Bridget is currently the Chief Economic Adviser to the Greater London Authority. From 2002 to 2008 Bridget was also the Consultant Chief Economist to the GLA, where she advised the Mayor of London on key economic issues which London faces. In 2007, Bridget was named among the top 25 most influential figures in London (http://www.volterra.co.uk/mediapdf/PRM_0013.pdf) by the Evening Standard.

DAVID ROSS David qualified as a Chartered Accountant with Arthur Andersen & Co. He co-founded The Carphone Warehouse Group plc in 1991 and led the company's IPO and subsequent growth to becoming Europe's leading mobile communications retailer. Since 2003 David has also been involved in leading many other public and private companies, including National Express, Big Yellow Group, Cosalt, Wembley National Stadium and Trinity Mirror.

David has also been a member of Sport England, the Home Office Audit Committee, and Lord Carter's Review of Legal Aid Procurement. He was recently appointed to London United, the body supporting the capital's bid to be a host city for the 2018 World Cup bid, having previously been the Mayor's representative for the planning of the 2012 London Olympics. David is also a Trustee of the National Portrait Gallery.

He is passionate about developing educational opportunities for young people, both as a Trustee of Uppingham School, and sponsor of the Havelock Academy in Grimsby. More recently Northamptonshire County Council agreed for him to sponsor Unity College in Northampton to become an Academy.

RODERICK SMITH Professor Roderick Smith is currently Royal Academy of Engineering Network Rail Research Professor of Railway Engineering, Imperial College; Chair of the Future Railway Research Centre; Honorary Professor at City University, at Central Queensland University, Australia & of the Academy of Railway Science of China. He was recently elected Deputy President of the Institution of Mechanical Engineers. He was previously a lecturer in the Cambridge University Engineering Department (1980-88) and Professor of Mechanical and Process Engineering, University of Sheffield (1988-2000), including a period as Head of Department (1992-95), Head of Mechanical Engineering at Imperial College (2000-2005). He has various Fellowships and extensive Chair experience. Professor Smith has undertaken consultancy work for British Steel plc (1987-90), was involved in crowd safety research assisting the Health and Safety Executive with investigations into the Hillsborough disaster, and has performed consulting work for the Board of British Rail (1992-96). He is a Trustee of the National Museum of Science and Industry, comprising the Science Museum and the National Railway Museum in York, to which he arranged the gift of an original series zero Shinkansen from Japan. He has also worked in Japan with Japanese railway organisations and manufacturers. He has published extensively and is frequently invited to address international meetings and conferences.

