

# High Speed Rail: Investing in Britain's Future

Consultation Summary

February 2011

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Department for Transport  
Great Minster House  
76 Marsham Street  
London SW1P 4DR  
Telephone 0300 330 3000  
Website [www.dft.gov.uk](http://www.dft.gov.uk)

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# Summary

The Government believes that a national high speed rail network offers a once-in-a-generation opportunity to transform the way we travel in Britain.

High speed railways were first built in Japan in the 1960s, and now span countries across Europe and Asia. The pace of development shows no sign of slowing, and China, France and Spain, amongst other countries, are all pressing ahead with ambitious plans. Britain cannot afford to be left behind. Our current railway system dates back to the Victorian era and will not be sufficient to keep Britain competitive in the twenty-first century.

A new high speed rail network would transform the country's economic geography. It would bring our key cities closer together, enable businesses to operate more productively, support employment growth and regeneration, provide a genuine alternative to domestic aviation, and create a platform for delivering long-term and sustainable economic growth and prosperity.

A Y-shaped national high speed rail network linking London to Birmingham, Manchester and Leeds, and including stops in the East Midlands and South Yorkshire, as well as direct links to the HS1 line and into Heathrow Airport, would cost £32 billion to construct, and would generate benefits of around £44 billion, as well as revenues totalling a further £27 billion.

It would deliver a huge increase in rail capacity to meet rising demand for long-distance rail travel, and ease overcrowding on existing railways.

It would slash journey times between cities, bringing London within 49 minutes of Birmingham, and to within 80 minutes or less of both Manchester and Leeds. Travel times between regional centres would be cut equally sharply, so that Birmingham would be only around 50 minutes from Manchester and just over an hour from Leeds.

By linking the high speed network to the existing East Coast and West Coast Main Lines, London would be brought within around three and a half hours of both Glasgow and Edinburgh – significantly reducing the demand for internal UK flights. Short-haul aviation could be reduced further by international high speed rail services from cities across the country using a direct link via the High Speed 1 line to the Channel Tunnel.

The Government's proposed network also includes a direct link to Heathrow, which would bring Manchester and Leeds city centres within around 70 and 75 minutes of the country's main hub airport respectively.

High speed rail also has the potential to play a central role in promoting long-term and sustainable economic growth. The first phase alone of a national network would support the creation of around 40,000 jobs and contribute to major regeneration programmes in Britain's inner cities.

New high speed links would enable the UK's key urban economies to improve their productivity, attract new businesses, and access more directly the economic strength of London and the South East.

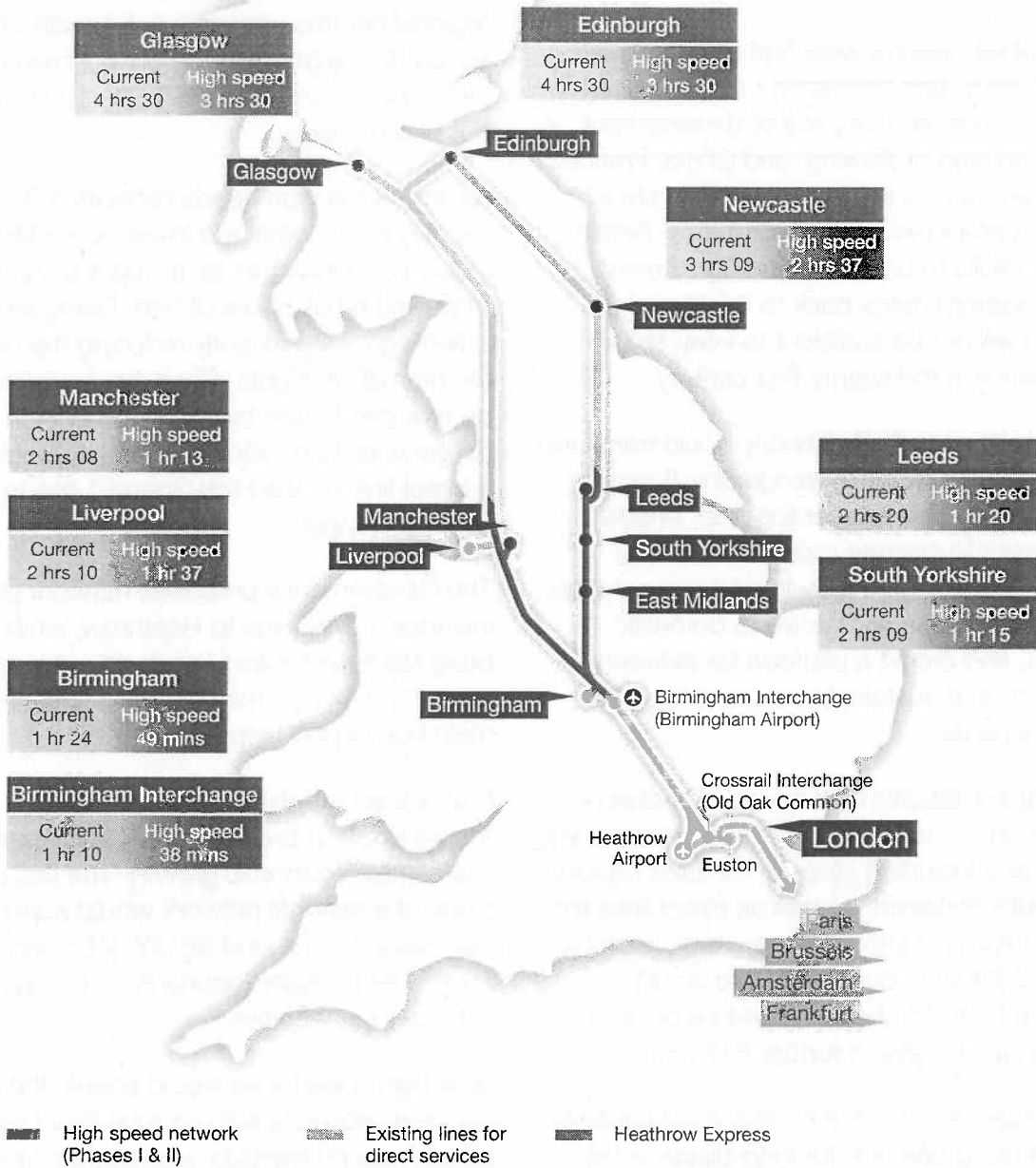


Figure 1 – Journey time savings to and from London by train

The Government believes that a high speed rail network would be a transformational investment in Britain's future and help to bridge the north-south divide. This consultation document sets out the basis on which the Government has reached that view, and seeks your views on its proposed way forward.

Part 1 of this summary document sets out the Government's proposed high speed rail strategy, and describes:

- the wider context in which high speed rail has been considered;
- why additional rail capacity is needed;
- the options for providing additional capacity and the case for high speed rail; and
- the Government's strategy for delivering a national high speed rail network, including links to Heathrow and to the Channel Tunnel.

Part 2 explains how the Government's recommended route for an initial high speed line from London to the West Midlands has been identified. It describes the core principles underpinning this work, and sets out the proposed route in detail, including its sustainability impacts. It also explains the main alternatives considered and why these were rejected.

Part 3 sets out the questions on which the Government is seeking views through this consultation process, and explains how to respond.

## **PART 1 – THE CASE FOR HIGH SPEED RAIL**

### **The Fast Track to Prosperity**

The Government is committed to providing a strong basis for long-term and sustainable economic growth by creating the right environment for private enterprise to flourish and by re-balancing our economy.

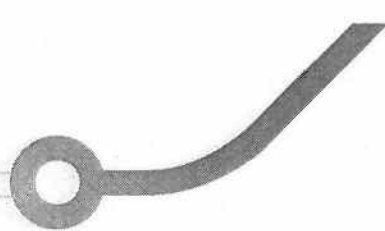
High speed rail can play a key strategic role in delivering these objectives.

For Britain and its major cities to compete effectively in the 21st century, it is vital that the right infrastructure is in place. Infrastructure helps promote competitiveness – by boosting productivity, reducing costs and increasing efficiency, and expanding business and labour markets.

The National Infrastructure Plan sets out the Government's strategy to deliver the infrastructure our economy needs to compete in the modern world. Investment in transport is a core element.

The UK's transport networks provide the crucial links that enable firms to operate efficiently. The business sector consistently underlines the importance of reliable transport systems, with an October 2010 survey finding that 95 per cent of companies agree that the UK's road and rail network is important to their business and its productivity.

The central role played by the country's rail links cannot be overstated. Rail commuter networks support the deep labour markets that underpin the productivity of the UK's cities. Inter-city lines have an unrivalled capacity to enable rapid and direct journeys between central business districts – avoiding traffic jams and the difficulties of finding parking space. And the rail



freight industry is playing an ever stronger role in ensuring goods and raw materials get to the right place at the right time.

### The Capacity Challenge

Britain's rail network is seeing a continuing pattern of steeply rising demand. As a result, rail capacity is under increasing strain and services are growing more crowded.

Between 1994/95 and 2009/10, total passenger miles travelled rose from 18 billion to almost 32 billion. The fastest growth of all has been in demand for long distance travel, which continued to rise even through the recent recession. The total number of long distance journeys made more than doubled in the period from 1994/95 to 2009/10.

### Standing room only

As capacity on the network becomes ever more intensively used, the scope to meet rising demand by running additional services and longer trains is becoming increasingly limited. This means that some of the country's key rail routes are forecast to be completely full in peak hours in the next 20 years.

High levels of crowding are already being seen, particularly in the peak, across a growing proportion of the network. Many services on the West Coast, East Coast and Midland Main Lines are already extremely full. Despite the capacity increases provided by the West Coast Route Modernisation programme, long distance services on this route are regularly overcrowded. Almost half of all long distance Midland Main Line trains arriving into St Pancras International in the peak have passengers standing.

This picture of rising demand is underpinned not only by growth in inter-city travel but also very significant increases in long-distance

commuting from places such as Milton Keynes, Northampton, Peterborough and Kettering.

If demand carries on rising in this way, it is clear a substantial long term expansion in capacity will be needed to enable the rail network to respond.



### The Long-Term Challenge

Industry and government forecasts show that these patterns of growing demand for rail travel are set to continue.

Some of the highest levels of future demand growth are anticipated on the West Coast Main Line. Network Rail forecast that demand on the London-Manchester route will grow by around 60 per cent by 2024.

High levels of demand growth are also expected on the East Coast and Midland Main Lines, on both of which Network Rail predicts overall long-distance growth of more than 70 per cent in the period from 2007 to 2036. Even higher levels are forecast over the same period on specific routes including from London to Nottingham, Sheffield and Leeds.

The Government is currently investing heavily in projects to enhance the capacity of the network, for instance through the Thameslink project and the electrification of key intercity and suburban lines.

In the longer-term, however, the scope to increase capacity on the main routes out of London will be increasingly constrained and eventually exhausted, with Network Rail recently concluding that by 2024 "the West Coast Main Line, particularly at the southern end of the route, is effectively full and subsequent additional capacity could only be provided by exceptionally expensive infrastructure solutions."<sup>1</sup>

Whilst the capacity challenge is most severe on the West Coast Main Line, forecasts of demand growth carried out for HS2 Ltd indicate that over the coming decades all three main north-south routes out of London will become very highly congested, particularly in peak hours.

This would lead to unprecedented levels of crowding, worsening reliability and a deteriorating travel experience.

The Government's view is that significant investment will be needed to tackle the capacity challenges set out above. Because major rail infrastructure projects take many years to develop and implement,

decisions on how such investment should be taken forward cannot be postponed or delayed.

The Government believes the priority should be the main north-south inter-city routes out of London – beginning with the West Coast Main Line corridor.

### **Enhancing Network Performance**

Rising demand for travel and increasing overcrowding are not the only challenges facing Britain's rail networks.

Experience on the West Coast Main Line following the completion of the route modernisation programme indicates the value placed by travellers on reducing journey times and improving reliability.

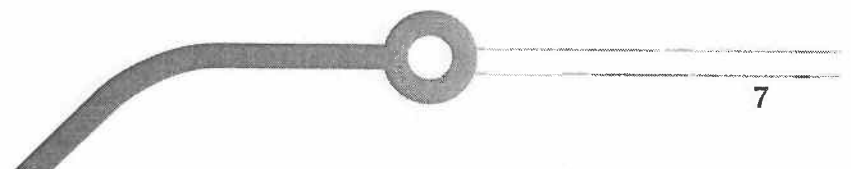
But maintaining current levels of reliability is likely to become increasingly challenging as more services are accommodated on the network, and enhancements to transport and communications networks are leading to ever rising public expectations about the speed and convenience of travel – particularly as other countries are seen to invest in improving connectivity.

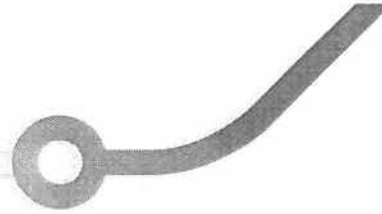
### **High Speed Rail**

High speed rail has provided a highly effective answer to these challenges in countries across Europe and Asia. It has improved the capacity, speed and reliability of rail journeys, with demand rising sharply as a result. Significant shifts away from aviation have been achieved.

International experience also shows that high speed rail can be a powerful tool for supporting city economies and drawing in new investment.

<sup>1</sup> Network Rail, *Draft West Coast Main Line Route Utilisation Study*, December 2010; available at [www.networkrail.co.uk](http://www.networkrail.co.uk)





Lille has seen increasing demand for office space and growth in urban tourism as a result of its location at the centre of the European high speed rail network. And in Zaragoza high speed rail links have supported a major programme of regeneration and contributed to the city's success in hosting Expo 2008.

The Government believes that Britain cannot afford to be left behind; cannot afford to ignore the benefits offered by high speed rail.

Britain needs a rail network which matches its growing ambitions:

- enabling rising numbers of journeys to be comfortably accommodated;
- improving the speed, convenience and reliability of links between our big cities and international gateways;
- supporting sustainable growth – given the UK's Climate Change commitments; and
- keeping pace with developments in other countries.

The following sections set out the basis on which the Government has reached this view.

## **The Case for a National High Speed Rail Network**

Britain's road network cannot offer an effective solution to the rail capacity issues described above. The unreliability and delay caused by congestion in cities, and particularly in central London, make road travel an unattractive option for the journeys into city centres which are seeing the highest levels of demand growth on the rail network.

Therefore the Government has focused on reviewing the costs and benefits of the key strategic rail options for meeting the capacity

challenge. These include new lines – both high speed and conventional – and upgrades to existing infrastructure.

Its assessment is that a new high speed rail network would generate significantly greater benefits for travellers in terms of capacity, connectivity and reliability than any of the other options considered, as well as offering valuable potential to support the Government's wider strategy to promote long-term and balanced economic growth.

### ***The strategic case for high speed rail***

The Government believes that high speed rail can play an important role in promoting valuable strategic change in the economic geography of Britain, supporting sustainable long-term growth and reducing regional disparities.

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



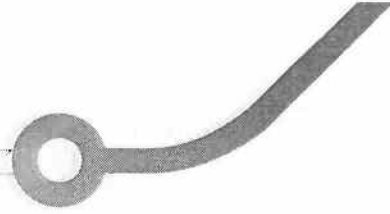
line alone could support the creation of around 40,000 jobs.

Successive governments have sought to bridge the north-south divide – a national high speed rail network could provide a unique opportunity to finally ensure it happens.

### **Assessing costs and benefits – high speed rail**

The Government favours a Y-shaped high speed rail network, comprising a line from London to the West Midlands and onward legs to Manchester and Leeds. This network would cost around £32 billion to construct, and would deliver very significant benefits for rail travellers, including unprecedented increases in capacity and reductions in journey times, as well as making a major contribution to economic growth, job creation and regeneration. These benefits are set out in more detail below:

- **Increased capacity:** A national high speed network would transform rail capacity between London and the major cities of the Midlands and the North. New high speed lines would enable 14 or more additional train services per hour and be designed to accommodate larger and longer trains able to carry up to 1,100 passengers.
- Transferring long-distance services to this network would also enable capacity to be released on the West Coast, East Coast and Midland Main Lines, which could be used to increase the number of services to other important destinations. HS2 Ltd's modelling suggests, for example, that enough capacity could be released to increase service levels to Milton Keynes to as many as 12 trains per hour.
- **Faster journeys:** Speeds of 225 miles per hour (and potentially faster in future) would transform journey times, bringing Birmingham within 49 minutes of London, and Manchester and Leeds within 80 minutes. Travelling from Birmingham to Manchester would take around 50 minutes and to Leeds just over an hour.
- Stops in the East Midlands and South Yorkshire would provide reductions in travel times for cities in these regions. And links back onto the West Coast and East Coast main lines would enable through running services to reach Liverpool, Newcastle, Glasgow and Edinburgh – cutting journey times from London to Scotland's major cities to around 3 hours 30 minutes.
- **Enhanced integration:** Links to urban transport networks (such as Crossrail at Old Oak Common) would further reduce end-to-end journey times – bringing Leeds and Manchester within 1 hour and 40 minutes of Canary Wharf.
- **Modal shift:** This enhanced capacity and connectivity could see as many as 6 million air trips and 9 million road trips a year shift onto rail.
- **Improved Reliability:** High speed rail can deliver high levels of reliability. The High Speed 1 line to the Channel Tunnel has an annual average of just 6.8 seconds delay per train due to infrastructure incidents.
- **Wider economic benefits:** The additional capacity and connectivity created by new high speed links would generate valuable wider economic benefits, for instance by contributing to increased business productivity. A London – West Midlands line alone would deliver benefits of this kind worth approximately £4 billion.



The construction of a Y-shaped network linking London, Birmingham, Manchester and Leeds, as well as the Channel Tunnel and Heathrow, would cost £32 billion. In total, and on conservative assumptions, it would generate estimated benefits with a net present value of around £44 billion, plus fares revenues with a net present value of approximately £27 billion.

A national high speed rail network could deliver these very significant benefits whilst remaining broadly carbon neutral, despite a significant increase in passenger miles. At best, high speed rail has the potential ultimately to deliver valuable carbon reductions, depending in particular on the level of modal shift achieved from aviation.

Over a 60-year period, which is the standard approach to appraising major transport infrastructure schemes, its net present cost to the public purse (calculated as capital and

operating costs with a net present value of £44.3 billion less fare revenues with a net present value of £27.2 billion) would be £17.1 billion. The net present value of benefits generated over the same timescale would total £43.7 billion. This results in a benefit:cost ratio (BCR) of 2.6.

This BCR is important, but it is not, by any means, the whole story. The Government believes that high speed rail would deliver significant non-monetised benefits, such as its contribution to job creation and regeneration and its potential to promote sustainable and balanced economic growth. It is these non-monetised benefits which underpin the strategic case for high speed rail.

There are also, however, important non-monetised costs which must be considered, particularly in relation to high speed rail's potential impacts on the local environment and communities.



HS2 Ltd's proposed London – West Midlands route, for example, would generate noticeable noise increases in a number of areas, as well as having an impact on the landscape, including in the Chilterns Area of Outstanding Natural Beauty (AONB). The redevelopment of Euston Station would require the demolition and replacement of a significant number of homes in four local authority blocks. A more detailed summary of these impacts and the Government's planned approach to mitigating them is provided in Part 2 of this document.

Although such impacts cannot be eliminated entirely, HS2 Ltd's recent work to review and improve its proposed alignment demonstrates that sensitive route design and refinement can substantially reduce them. Work on assessing the opportunities for noise mitigation, for example, has seen the number of homes potentially affected by 'High Noise' levels fall from 350 to around 10.

Taking account of these non-monetised costs and also the significant non-monetised benefits that have been identified, the Government considers that the overall case for high speed rail is strong.

### ***Assessing costs and benefits – alternatives to high speed rail***

New conventional speed lines would not be able to offer the same value for money as high speed rail. They would not be significantly cheaper to construct and operate than high speed lines, and any reduction in environmental impacts would be relatively small, but they would generate far fewer benefits and revenues. In respect of a London – West Midlands line, HS2 Ltd estimate that reducing line speed would deliver only a 9 per cent cost reduction, whereas

fare revenues would drop by 24 per cent and overall benefits by 33 per cent.

With regard to enhancements to existing infrastructure, the Government has commissioned a strategic analysis of three enhancement scenarios on the key north-south inter-city routes out of London.<sup>2</sup> These aim to deliver longer trains, high frequency services and reduced journey times respectively.

The capacity and journey time benefits which these scenarios would be able to deliver are in all cases much smaller than those from high speed rail, and the works required to deliver them would be very substantial, affecting all three main north-south routes out of London. As a result, only the higher frequency scenario would generate benefits in excess of its costs.

The net present cost to the public purse of this scenario, calculated over 60 years, would be £7.7 billion (£18.7 billion capital and operating costs less £11.0 billion fares revenues). The transport benefits from this scenario have a net present value of £10.9 billion – less than a quarter of those potentially delivered by a new high speed rail network. This results in a BCR of 1.4.

In addition, whilst they would have lower impacts than new infrastructure in respect of factors such as visual impact, land take and noise, the level of disruption caused to travellers as a result of enhancements on this scale to existing lines would be extremely high. Although the works on any individual line would not be as substantial as those carried out under the recent West Coast Main Line route modernisation, the network is now being used much more intensively, which would increase the level of disruption caused.

2 *High Speed Rail Strategic Alternatives Study: Strategic Alternatives to the Proposed Y Network.*





The Government's view therefore is that such enhancements cannot provide a strategic value for money alternative to high speed rail.

## **A National High Speed Rail Strategy**

### ***Delivering a national high speed rail network***

The previous section set out why the Government supports a Y-shaped core high speed rail network, which would link the UK's largest conurbations, enhancing capacity, transforming journey times and promoting growth.

The Government proposes that this network should be delivered in phases, beginning with an initial London-West Midlands line. This is for four reasons:

- First, phasing the project would help to ensure rapid and early progress in developing high speed rail in the UK. Under the previous Government, initial work was commenced on the London-West Midlands line, which could now be taken forward.
- Second, the parliamentary process for securing powers is likely to be complex and lengthy. Seeking powers at a later stage for the subsequent legs of the network would help to reduce the scale of the task and speed up the commencement of construction.
- Third, as developing a major piece of new infrastructure on this scale involves significant cost, the impact on the public finances would best be managed by a phased approach to construction.
- Fourth, the task of constructing the network would also be best managed through a phased construction programme.

The initial London-West Midlands phase could be operational by 2026, with the second

phase to Manchester and Leeds opening in around 2032-33.

Whilst work was underway on designing and constructing the two phases of the Y, the Government would expect to work with the Scottish Government and others to identify and evaluate options for developing the network further.

### ***Connecting to international gateways***

The Government considers that there is a strong strategic case for linking a UK high speed rail network to the country's major international gateways. Future patterns of economic activity are likely to depend increasingly on international connectivity. The Government also believes that we should be seeking alternatives to flying, which high speed rail is well-suited to deliver.

For this reason, the Government commissioned HS2 Ltd in June 2010 to provide advice on the options for direct links to Heathrow and to the High Speed 1 line to the Channel Tunnel. This section sets out its preferred way forward.

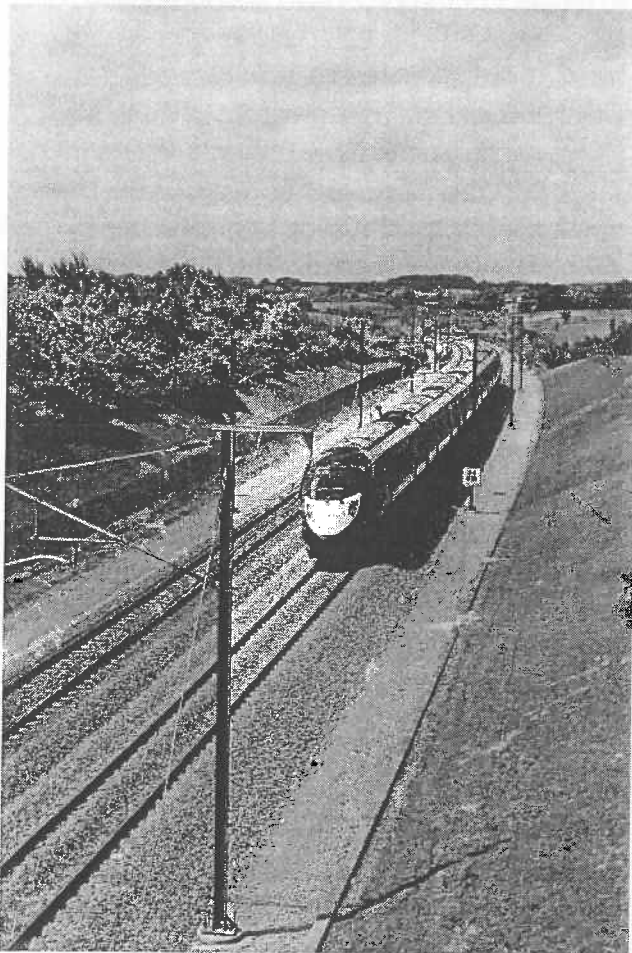
### ***Heathrow***

The Government considers that a direct link between the high speed rail network and Heathrow would have important strategic advantages:

- Releasing capacity at the airport through mode shift from short-haul aviation to rail would provide an opportunity to boost its resilience and potentially to develop its route network.
- A direct link would transform the accessibility of Heathrow from the Midlands and the North. This could generate valuable economic opportunities for these regions, making them more attractive locations for investment.

- It would also contribute to Heathrow's future development as a multi-modal transport hub, further boosting demand for high speed rail access to and from the airport.

The Government favours serving Heathrow by a spur from a main London-West Midlands high speed line. Such a spur would retain the flexibility to be extended to form a loop back onto the main line in future, enabling through services via the airport to London. The Government proposes to work with BAA and others to determine the optimal location for a station at the airport, and HS2 Ltd has been commissioned to develop route proposals for a spur by the end of 2011.



As with the main network, the Government prefers a staged approach to connecting Heathrow to a high speed rail network. Whilst only the London-West Midlands line was operating, the station at Old Oak Common would be the most appropriate option for serving Heathrow, given likely passenger demand. Passengers could change here for frequent and fast Heathrow Express services into the airport.

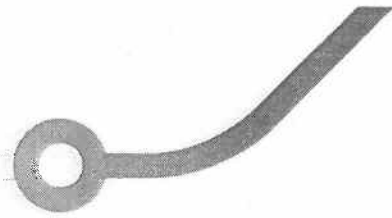
A full Y-shaped network would be likely to generate additional mode-shift from aviation. Demand to access Heathrow would be expected to grow accordingly, and so it is at this stage that the Government favours the construction of the direct link to Heathrow. To anticipate this development and reduce potential disruption to a new London-West Midlands line, the junctions for the spur from the main line would be constructed as part of the first phase.

### **High Speed One**

At present, services on HS1 and the Channel Tunnel are relatively inaccessible for those outside London and the South East. By providing direct access to the wider European rail network for services from Manchester, Birmingham and other cities, a link between a national high speed rail network and the current HS1 line could address this.

The Government favours a direct rail link between HS2 and HS1, which would run in tunnel from Old Oak Common to the North London Line and then use existing infrastructure to reach the HS1 line north of St Pancras International.

This would enable direct high speed services from across Britain to European destinations via the Channel Tunnel. An indirect link – such as improving the interchange connectivity between the respective London termini of the two lines – would come at a lower cost than a direct link



but would not deliver the same strategic benefits, particularly in terms of reduced dependency on aviation.

It is not possible to adopt a staged approach to linking HS2 to HS1. For technical reasons, it would be necessary to complete construction of a tunnel linking Old Oak Common to the North London Line before services became operational. Therefore, any link between HS2 and HS1 would be constructed as part of Phase 1, the line between London and the West Midlands.

### ***Other international connections***

The Government will also explore the case for high speed rail links to other international gateways. The Birmingham Interchange station would bring Birmingham International Airport within 40 minutes of central London, and HS2 Ltd is considering the case for stations serving Manchester and East Midlands Airports as part of its current work on route proposals for the legs to Manchester and Leeds.

### ***Next steps***

The Secretary of State for Transport will announce the outcome of this consultation process and the Government's final decisions on its strategy for high speed rail before the end of 2011.

The Government proposes to seek the necessary powers and consents for constructing any new high speed lines via the hybrid Bill process. This was the approach adopted for both the HS1 line to the Channel Tunnel and for Crossrail, and allows those affected by the proposals to petition Parliament directly to seek amendments to the proposals or assurances and undertakings.

Subject to the outcome of this consultation, the Government's intention is that the necessary

preparations, including a full Environmental Impact Assessment, should be carried out in time to introduce a hybrid Bill for the initial London-West Midlands phase of the proposed network in October 2013, with a view to achieving Royal Assent at the beginning of 2015. On this basis, construction of a new line could begin early in the next Parliament. The construction process would be expected to last in total approximately seven to eight years (although on most parts of the line, construction would only be underway for a period of two years or so), and would be followed by a period of testing and commissioning, with the proposed line opening by 2026.

In respect of the proposed second phase to Manchester and Leeds, following receipt of detailed advice from HS2 Ltd later this year, which will include assessments of route and station options, the Government's intention is to consult on its preferred way forward and subsequently to introduce a second hybrid Bill in the next Parliament. The Government expects that construction could commence on this basis in the mid-2020s, allowing the lines to open by 2032-33.

### ***Property impacts***

The Government and HS2 Ltd would ensure that timely and full information is made available to those affected by proposals for any new high speed line. Minimising uncertainty and protecting the legitimate interests of private property owners would be of paramount importance.

If the Government decides, following consultation, to go ahead with any new high speed line, it would aim to safeguard land from future development. Details of the statutory provisions on blight and compensation that would apply for any new high speed line are set out in an annex to the main consultation document.

The Government is also considering what additional measures may be appropriate to help those whose properties would be unlikely to need to be compulsorily purchased in order to build a new line, but who may still experience a significant loss in the value of their property as a result of its proximity. For the purposes of this consultation, the Government has identified a range of approaches that it is considering applying to any additional discretionary arrangements and these are also set out in the annex to the main consultation document, along with some options for how such arrangements might operate.

### **Conclusion**

A national high speed rail network would deliver unprecedented improvements in rail capacity and connectivity, as well as supporting job creation, urban regeneration and business productivity. Such a network could also promote longer-term strategic changes to Britain's economic geography – with potential to enhance economic growth and help to bridge the north-south divide.

The network would be delivered in two phases, with the first phase being a high speed line from London to the West Midlands, including links to Crossrail and HS1, and connecting back to the West Coast Main Line in order to provide improved journey times to a wide range of cities on that corridor.

Part two of this document explains the work that HS2 Ltd has undertaken to identify and consider route options for that initial line, and then sets out the Government's proposed route and its potential impacts in detail.

## **PART 2 – HS2: LONDON TO THE WEST MIDLANDS**

### **Developing a new high speed line**

The Government's proposed route for a new high speed line from London to the West Midlands, and the first phase of a national high speed rail network, is based on work carried out by HS2 Ltd over the past two years.

The focus has been on developing proposals for a safe and reliable railway, using proven European standards, technology and practice. Key aspects include:

- **Speed:** A line capable of up to 250 miles per hour but with a maximum train speed of 225 mph assumed at opening.
- **Capacity:** Up to 400 metre long trains with as many as 1,100 seats, and up to 14 trains per hour in each direction; developments in train control technology are expected to see that increase to 18 trains per hour on a wider network.
- **Minimising impacts on the environment:** For instance, by following existing rail or road transport corridors, using deep cuttings and tunnels, and avoiding sensitive sites wherever possible.
- **Controlling Cost:** Balancing cost and the other design aims.

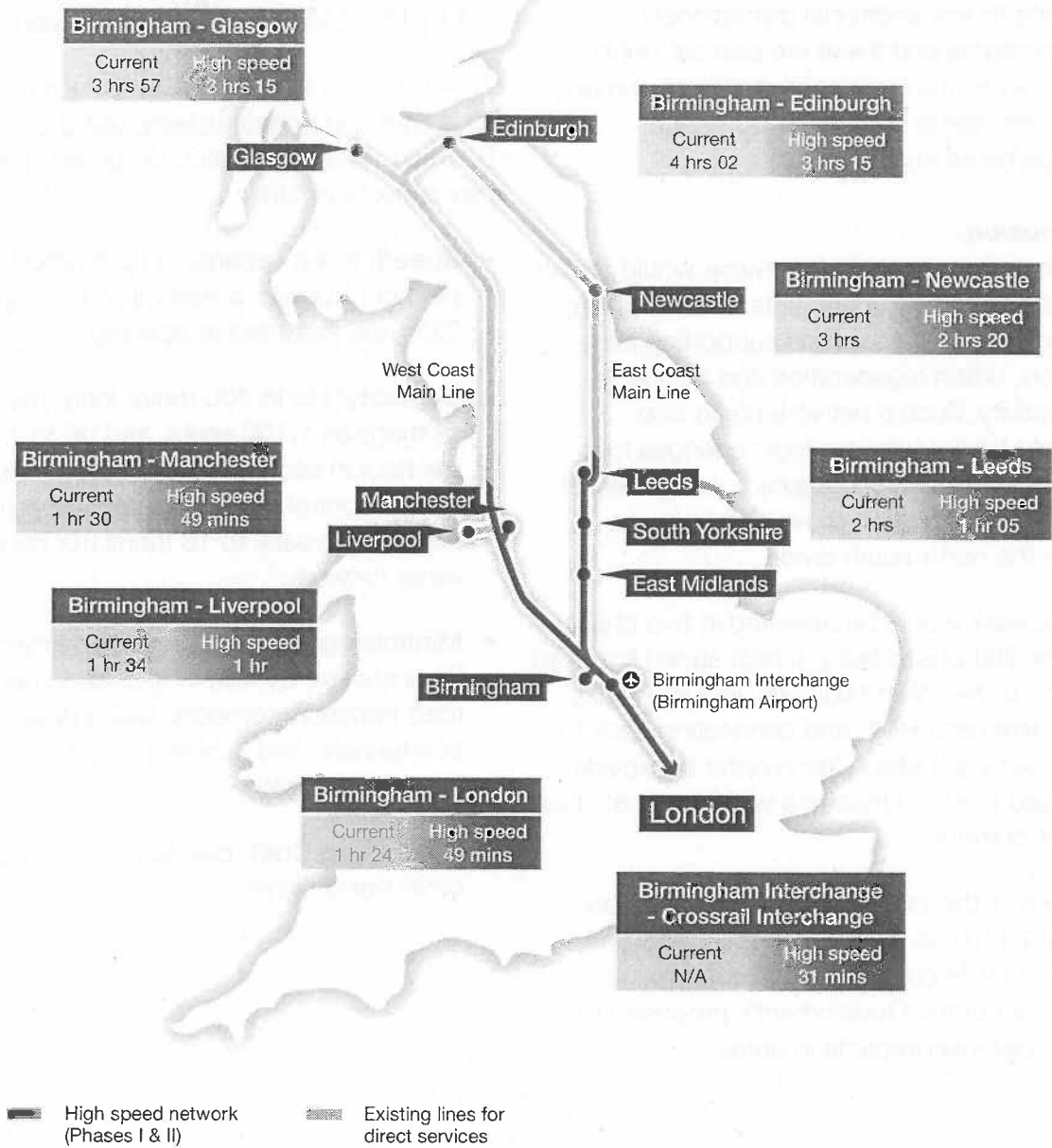


Figure 2 – Journey time savings to and from Birmingham by train



## Designing HS2

The economic case for HS2 relies heavily on ensuring that decisions are informed by the journeys that people want to make. Route design focused mainly on city centre station locations with high quality onward transport links.

Sustainability issues have been addressed in detail through an Appraisal of Sustainability (AoS) covering the four principles of sustainable development:

- reducing greenhouse gas emissions and combating climate change;
- protecting natural and cultural resources and enhancing the environment;
- creating sustainable communities (including noise); and
- achieving sustainable consumption and production.

The full AoS, together with a non-technical summary, has been published to inform this consultation.

In sifting route and station options, HS2 Ltd considered cost and engineering feasibility, demand (i.e. how well they would serve the journeys people want to make), and environmental impacts. More than 90 options were considered for stations and line of route sections during the selection process.

Recommended and alternative routes were submitted to Government by HS2 Ltd in December 2009, and were published in March 2010.

Additional advice was provided between September and December 2010, including on options for environmental mitigation, and the Government has now identified its preferred route for consultation.

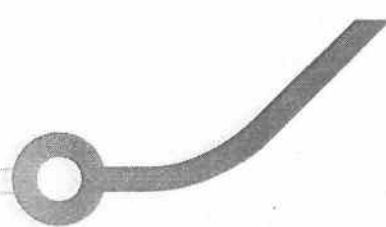
## The Government's Preferred Route for HS2 (London – West Midlands)

HS2's London terminus would be a redeveloped Euston station serving both high-speed and conventional lines. The station would need to be extended to the south and the west and the platforms would be built two metres below the current level, allowing new development above them and the opening up of east-west routes across the site, which is largely occupied currently by a Royal Mail shed.

Leaving Euston, the route would descend into tunnel for about four and a half miles, surfacing at a new interchange station at Old Oak Common in west London. Passengers would be able to interchange here with Crossrail, the Heathrow Express, the Great Western Main Line and other local public transport. A direct link to HS1 would also run from the main high speed line at Old Oak Common.

From Old Oak Common towards the M25, the route would run along the Chiltern Line corridor to West Ruislip and then cross the Colne Valley on a two-mile long viaduct. Junctions for a future connection to Heathrow would be provided in this section.

Immediately before the M25, the line would enter a six-mile long tunnel, emerging just north of Amersham. It would continue towards Aylesbury, largely in tunnel or cutting, along the A413 corridor. Beyond Aylesbury it would broadly follow the disused Great Central Line corridor to Calvert, and pass to the east of Brackley.



The line would head north-west towards the gap between Kenilworth and Coventry, before curving north to Coleshill. A new interchange station would be constructed where the line of route passes the National Exhibition Centre (NEC) and Birmingham Airport.

North of the interchange station the route would pass west of Tamworth to Lichfield, where it would join the West Coast Main Line for services to Manchester, Liverpool and Scotland. A junction at Water Orton would provide a link into Birmingham city centre, which would follow the existing rail corridor and terminate at a new high speed station at Curzon Street.

## **Protecting the Environment and Promoting Growth**

### ***Mitigating the impacts of HS2 (London – West Midlands)***

Since recommending the route to Government in December 2009, HS2 Ltd has identified refinements to around half its recommended route, including more than a mile and a half of “green-tunnels” to maintain local access and minimise noise and visual impacts, lowering large sections of the proposed line and reducing the number of viaducts, while some changes to the alignment have moved it further away from settlements and important heritage sites. HS2 Ltd’s analysis of the sustainability impacts of its refined route is set out below.

### ***Sustainable Communities***

HS2 stations could act as a catalyst for major regeneration in London and the West Midlands. The proposed station at Old Oak Common in West London would contribute to the regeneration of the surrounding area and would support planned employment growth of up to 20,000 jobs. HS2 could also support growth in employment of more than 8,000 jobs in the West Midlands around the proposed Curzon

Street terminus and the interchange station near to Birmingham International Airport; and it could support a further 2,000 jobs around Euston.

Released capacity on the West Coast Main Line could provide additional fast commuter services in and out of London and Birmingham, supporting major growth areas, such as Northampton, Rugby and Milton Keynes.

HS2 would, however, require a number of property demolitions, particularly around Euston where around 200 mainly local authority owned homes would need to be demolished and replaced with new, high quality, social housing. HS2 Ltd intends to work closely with the London Borough of Camden and the GLA with the intention of agreeing a joint strategy for the Euston area, including through engagement with local people, businesses and community representatives.

Around 30 dwellings would need to be demolished to make way for the proposed rolling stock maintenance depot at Washwood Heath in Birmingham. Elsewhere, property demolitions, although significant to those people directly affected, would be relatively low in number.

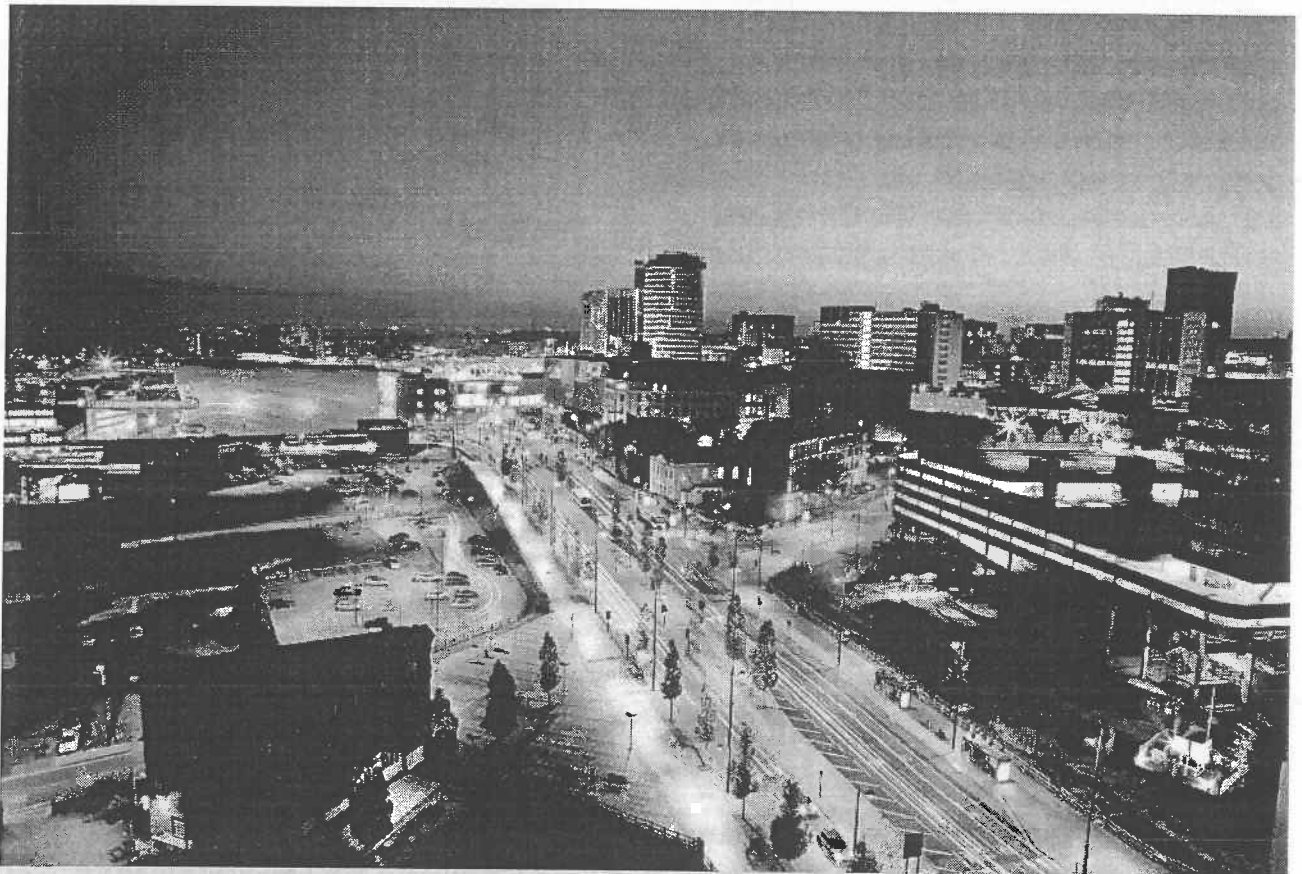
HS2 Ltd’s work on mitigation has substantially reduced potential noise impacts. Around 10 dwellings would be likely to be affected by high noise levels, with around 150 additional properties likely to experience levels of noise which would qualify for noise insulation under Noise Insulation Regulations, and around 4,700 properties potentially experiencing some noticeable increase in noise levels.

Experience from HS1 and other high speed railways shows that significant effects from vibration and ground-borne noise in properties over tunnels can be avoided. The engineering design of HS2 will build on this experience and it is not expected that there will be significant effects on properties above tunnels.

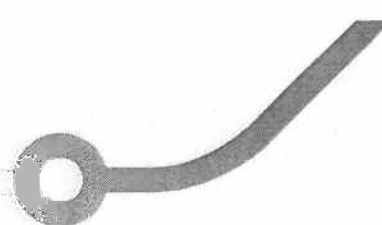
For the construction phase, HS2 Ltd would develop and implement a code of practice for its contractors to reduce impacts to a practicable minimum and protect the environment and the amenity of people along the proposed route.

***Landscape, townscape and Cultural Heritage***

The Chiltern Hills would be crossed predominantly in tunnel and deep cutting with short elevated sections on embankment or viaduct to the south of Wendover where the proposed route is in close proximity to the A413 and Chiltern Railway. Extensive tree planting, as well as the creation of planted earth mounds or 'bunds', carefully blended into the natural contours of the land, would help to reduce noise, screen views and integrate the railway into the landscape. Overall HS2 Ltd expect to plant more than two million trees along the proposed line from London to the West Midlands.



**Birmingham's Eastside: the location of the proposed Birmingham terminus for HS2**



No Grade I or Grade II\* buildings would be demolished, although a number of Grade II buildings would need to be demolished or relocated. The route would pass through three Registered Parks and Gardens, and two scheduled monuments would be directly affected. HS2 Ltd would work with relevant partners to ensure these effects were minimised. Although no internationally protected sites of ecological interest would be adversely affected, partial landtake would be required from one site of special scientific interest (SSSI).

### **Sustainable consumption and production**

The proposed new railway would make good use of land that has had a previous industrial or railway use, although some productive agricultural land would be lost. Construction of the proposed scheme would generate and consume large quantities of excavated materials and opportunities would be taken to re-use spoil as part of embankments and landscaping.

If the scheme is taken forward, further detailed consideration would be given to mitigation and how this is best developed, refined and incorporated into the design and into the way that HS2 would be built and operated, with tailored solutions for the specific characteristics and challenges of each section of the route. Appropriate local mitigation would be discussed and agreed with local authorities and communities through additional targeted consultation processes.

### **Alternative Routes and Stations**

HS2 Ltd considered a number of alternatives to the key elements of its recommended scheme. Two main alternatives were considered to the recommended option for a single-deck extended station at Euston: a double-deck solution on a smaller footprint at Euston was found to cost more to construct, would be very

intrusive in the local area and would impose unacceptable disruption to existing services during construction, while an alternative location on the Kings Cross Lands would have serious impacts on developments currently underway.

HS2 Ltd identified two main alternative lines of route, plus a later consideration of a further route via Heathrow.

- The Government considers that there is a compelling strategic case for being able to link the high speed network to Heathrow. HS2 Ltd's Route 4, which follows the West Coast Main Line corridor more closely through the Chilterns, would make this impractical. It would also cost more and mean longer journey times, and therefore lower benefits.
- The alternative route through the Chilterns, Route 2.5, would create an entirely new transport corridor through the Chilterns Area of Outstanding Natural Beauty and would be very intrusive in the Hughenden Valley. It would cost more and lengthen journey times, reducing overall benefits.
- The alternative route via Heathrow would be substantially more expensive and its longer journey times would lead to reduced benefits. Although it would have less direct impact on the Chilterns AONB, it would adversely affect other sensitive areas.

In Birmingham, HS2 Ltd considered a new station at Warwick Wharf, but the Curzon Street site was found to have less effect on local conservation areas and would require fewer demolitions. HS2 Ltd also considered an approach along the Coventry (West Coast Main Line) corridor, but the Water Orton corridor performed better in terms of sustainability.

In addition to the above options, HS2 Ltd and the Government reviewed the proposed site put forward independently by Arup for an interchange near Iver in Buckinghamshire, with a light rail link to Heathrow. Routing the line via this site shared many of the disadvantages of a direct Heathrow route without offering the benefits of an on-airport station.

## Conclusion

The Government's view is that the route recommended by HS2 Ltd, following its additional work on mitigating environmental impacts, appropriately balances the benefits and impacts of such a line, and provides a better solution than any of the alternatives considered.

For this reason, the Government believes that this route for an initial London-West Midlands high speed line should be taken forward, as the first phase in the development of a national high speed rail network.

Part 3 explains the questions on which the Government is seeking views on both its high speed rail strategy and on the proposed route described above, and sets out how to respond to this consultation.



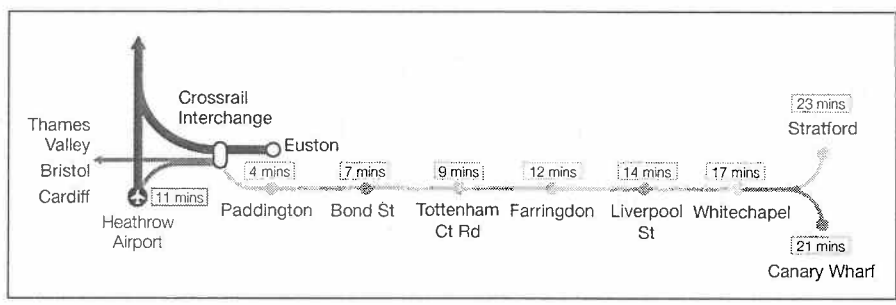
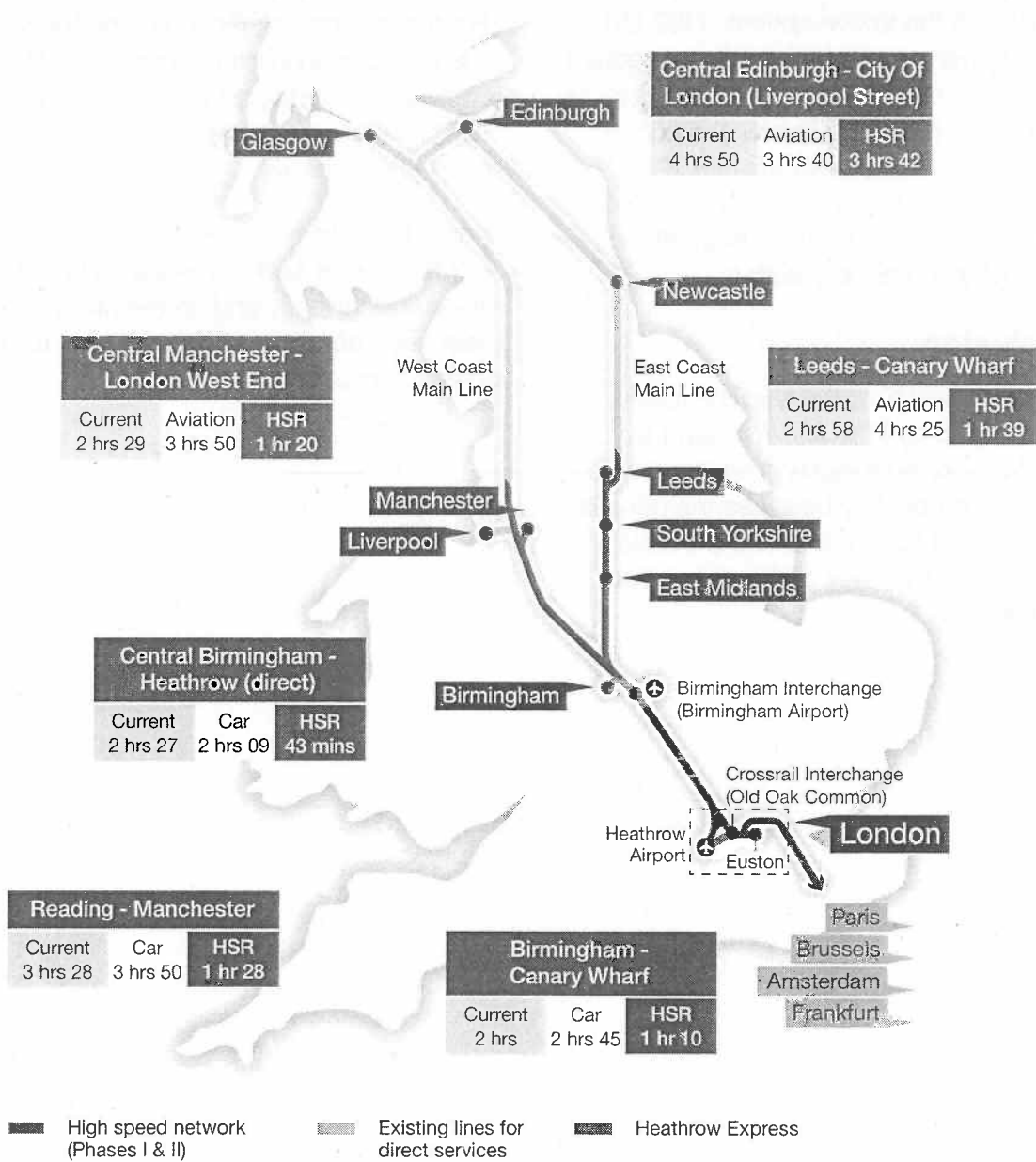


Figure 3 – Journey time savings via Crossrail Interchange

## **PART 3: RESPONDING TO THE CONSULTATION**

This consultation seeks views on the proposed national high speed rail strategy described in Part 1 and on the recommended line of route for an initial London-West Midlands line set out in Part 2.

The questions on which the Government is seeking views are set out below. In each case, the Government is interested in whether or not you agree with its proposals and why, as well as in any additional evidence that you feel it should consider in reaching its final decisions.

### **1. This question is about the strategy and wider context:**

Do you agree that there is a strong case for enhancing the capacity and performance of Britain's inter-city rail network to support economic growth over the coming decades?

### **2. This question is about the case for high speed rail:**

Do you agree that a national high speed rail network from London to Birmingham, Leeds and Manchester (the Y network) would provide the best value for money solution (best balance of costs and benefits) for enhancing rail capacity and performance?

### **3. This question is about how to deliver the Government's proposed network:**

Do you agree with the Government's proposals for the phased roll-out of a national high speed rail network, and for links to Heathrow Airport and to the High Speed 1 line to the Channel Tunnel?

### **4. This question is about the specification for the line between London and the West Midlands:**

Do you agree with the principles and specification used by HS2 Ltd to underpin its proposals for new high speed rail lines and the route selection process HS2 Ltd undertook?

### **5. This question is about the route for the line between London and the West Midlands:**

Do you agree that the Government's proposed route, including the approach proposed for mitigating its impacts, is the best option for a new high speed rail line between London and the West Midlands?

### **6. This question is about the Appraisal of Sustainability:**

Do you wish to comment on the Appraisal of Sustainability of the Government's proposed route between London and the West Midlands that has been published to inform this consultation?

### **7. This question is about blight and compensation:**

Do you agree with the options set out to assist those whose properties lose a significant amount of value as a result of any new high speed line?

You can provide your answers online via the consultation website at:

<http://highspeedrail.dft.gov.uk>

or you can send written responses to:

Freepost RSLX-UCGZ-UKSS  
High Speed Rail Consultation  
PO Box 59528  
LONDON  
SE21 9AX

Responses must be received by:

Friday 29 July 2011.

