



Department
for Transport

Supplement to the October 2013 Strategic Case for HS2

November 2015

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Executive summary

1. HS2 will stand alongside the railways built by the Victorians and the motorway network built after the Second World War as a major infrastructure investment that changes the lives of Britain's citizens for generations to come. The Strategic Case for HS2 rests on the transformation in rail capacity and connectivity that will be provided between our major cities.
2. In terms of capacity, Britain's railways have seen an unprecedented period of growth over the past 20 years. 735 million journeys were made on Britain's railways in 1994-95. In 2014-15, this number was 1,654 million journeys, with recent growth averaging around 5 per cent a year.
3. Britain's key strategic rail corridor is the West Coast Main Line (WCML). Inter-city services on the WCML link London to Birmingham, Manchester, Liverpool and Glasgow. Commuter services into London, Birmingham and Manchester also operate on the route and around 40 per cent of all Britain's rail freight traffic uses the WCML at some point in its journey.
4. Between 1998 and 2008, Britain invested £9 billion in upgrading the WCML. The upgrade increased peak service levels on the Fast Lines into Euston from nine trains per hour (tph) to 13-14tph and reduced journey times, such as those between London and Manchester, by around 20 per cent. However, despite the considerable cost and disruption involved, within seven years of completion of the works:
 - Over 60 per cent of the additional peak inter-city seats provided by the upgrade are already being filled
 - More trains are being operated on the WCML's Fast Lines ("Fast Lines") in the peak hour (up to 15-16tph¹) than was envisaged when the upgrade was planned. No significant increase in peak services into London is possible without either compromising performance or requiring major investment
 - In part due to this intensity of operation, reliability of the services on the WCML is poor. Recent London Midland punctuality was 83.2 per cent compared to 88.7 per cent for the wider London commuter network. Virgin West Coast's punctuality was 85.1 per cent compared to 87.5 per cent for the long distance sector as a whole²
5. As rail demand continues to grow, pressures to run more services on the WCML will inevitably arise. This is because:
 - The existing peak trains, some of which are crowded now, will become severely overcrowded – even if they are all run at maximum length
 - Today's WCML timetable is a compromise. Lack of capacity means that opportunities to improve frequency of commuter services around Birmingham and

¹ 15tph are operated in the high peak hours of 08:00 to 08:59 and 17:00 to 17:59. On weekdays between 08:02 and 09:01 this increases to 16tph, which is enabled by reduced calls by London Midland Fast Line services south of Rugby. There are also 16tph between 18:00 and 18:59 on Fridays.

² PPM MAA figures from the Office of Rail and Road (ORR) for Quarter 1 2015/16

Manchester are constrained. It also limits the ability to run more long-distance services to link London directly with other cities across the West Midlands, North West, Scotland and Wales

- As international trade expands, there is an urgent demand for more freight paths on the WCML, which links the nation's major ports with inland freight terminals. Rail freight brings annual benefits of around £1.5 billion to Britain's economy
6. This leaves the Government with a choice. It can either undertake a "patch and mend" style continued upgrade of the WCML – at considerable cost and disruption - or it can make a transformational investment that solves the capacity and reliability issues of Britain's key strategic rail corridor for the long term.
 7. In HS2, Government has chosen a transformational investment. Dedicated high speed lines will allow for faster, more frequent and more reliable inter-city travel whilst at the same time releasing capacity on the existing network to enable radical improvements to commuter and freight services. Once the HS2 network is complete, released capacity could also "de-pressurise" the WCML and allow performance and reliability to improve. Alternatives to HS2 that involve upgrading the existing network simply do not provide the ability to address the wide range of capacity and performance pressures faced by the WCML in one go.
 8. Britain's second major strategic rail route, the East Coast Main Line (ECML), is about to see a significant increase in capacity via the new Intercity Express Programme (IEP) trains and a number of line improvements to be carried out by Network Rail. However, despite this, forecasts suggest that by the 2030s, more capacity will be needed. Providing this capacity via an "eastern leg" of HS2 will result in a new high speed network that will transform rail connectivity in Britain.
 9. Whilst providing more capacity and improving reliability are the driving needs for HS2, the benefits that it will bring are much broader. By significantly reducing journey times between our major cities, HS2 will bring people and businesses closer together giving the prospect of a much wider national economic benefit, including supporting the Northern Powerhouse. Indeed, structural changes in the economy over the past 30 years indicate that HS2 is the right type of infrastructure investment to allow the economy of tomorrow to thrive:
 - First, in recent years, cities have become increasingly important for job creation. Against the backdrop of a significant fall and subsequent recovery in employment, 700,000 jobs were created in Britain's ten biggest city regions between 2008 and 2014. In contrast, only 500,000 jobs were created elsewhere in Britain over this period. HS2 will provide faster and more reliable connections between eight of Britain's 10 biggest cities, making it easier for business in these locations to connect and trade
 - Second, the Strategic Economic Plans of Britain's city regions focus heavily on promoting knowledge-based sectors such as advanced manufacturing, digital and creative industries and financial and professional services. Travel pattern surveys demonstrate that employees in these sectors have a higher propensity to travel by rail – both for business and commuting purposes. These sectors of the economy will benefit from the better inter-city connections provided by HS2, and from the extra commuter services that will be able to run on the existing network
 10. While all regions will benefit from HS2, analysis shows that it brings a proportionately greater transformation in business and labour market connectivity in the North and the Midlands. HS2 could therefore help the North and the Midlands emulate the success of regions elsewhere in Europe such as the Randstad in the Netherlands

and the Rhine-Ruhr in Germany where efficient and effective transport systems unite smaller towns and cities into single economic areas. In doing so, HS2 could play a big part in spreading prosperity beyond London and the South East and in meeting the Government's wider objective of rebalancing the economy.

11. Put simply, HS2 is critical for Britain's future. It gives the capacity that is needed urgently to keep pace with demand on our most strategically important rail corridors, and it provides the high quality connectivity that will allow the economies of our major cities, particularly those outside of London, to thrive. In doing so, HS2 can contribute to the rebalancing of the national economy and the emergence of a new Northern Powerhouse.

1.2013 Strategic Case for HS2

Introduction

- 1.1 The Strategic Case for HS2, published by the Department for Transport (DfT) in October 2013, set out how HS2 would meet the Government's objectives to:
- Provide sufficient capacity to meet long term rail demand and to improve resilience and reliability across the network
 - Improve connectivity by delivering better journey times and making travel easier

Demand and capacity

- 1.2 Britain's single most important rail route is the West Coast Main Line (WCML). The WCML serves a number of markets – all of which are of strategic national importance:
- Inter-city services on the WCML (currently operated by Virgin West Coast) link the major cities of London, Birmingham, Manchester, Liverpool and Glasgow
 - At the southern end of the route, London Midland operates commuter trains from Birmingham, Milton Keynes and Northampton into London
 - Throughout the North West and the Midlands, commuter trains and other regional services use the WCML to serve the major cities of Birmingham, Liverpool and Manchester – as well as many other regional centres such as Coventry, Crewe, Warrington, Preston, Chester, Stoke-on-Trent and Wolverhampton
 - Around 40 per cent of all freight trains on the UK rail network use the WCML at some point of their journey. Many of these freight services are time-critical and provide essential links in Britain's domestic and international distribution chains
- 1.3 The WCML has already been the subject of a major renewal and modernisation programme. This cost £9 billion and was completed in 2008 after a decade of major works. The upgrade allowed around 1,000 additional trains to run each week and reduced key long distance journey times, such as those between London and Manchester, by around 20 per cent.
- 1.4 However, the October 2013 Strategic Case for HS2 noted the following important points in respect of the WCML:
- Over the last two decades, Britain's railways have seen an unprecedented period of growth. Across the network, journeys grew from 735 million in 1994/95 to 1,501 million in 2012/13. Growth on the WCML, particularly in inter-city travel, has outperformed this national trend, despite a five-year period when major works took place along the line of route and passenger numbers did not grow
 - The WCML modernisation programme envisaged that following the upgrade, there would be a maximum of 13-14tph using the Fast Lines into and out of Euston. By October 2013, plans were being developed to squeeze in more fast commuter

services which would take the peak service level up to 15-16tph³. This is a higher intensity of operation than on major Fast Lines in other European countries, including purpose-built high speed lines. This is despite WCML's complex mix of commuter, freight and inter-city traffic

- Operating the WCML at this level of intensity was making it challenging to achieve target levels of performance reliability. In 2013, long distance services on the WCML were achieving 85 per cent punctuality – around 4 percentage points worse than average for other long distance services. The performance of the relevant parts of the London Midland franchise was also around 85 per cent - 6 per cent below the national average for equivalent commuter services

1.5 The Strategic Case went on to set out the medium to long term consequences for overcrowding on trains, if the constraints on WCML route capacity, highlighted above, meant that additional services could not be added to the timetable. It noted that in 2013:

- Some trains between Euston and Birmingham carry as many as 160 passengers for every 100 seats⁴
- More than 10 per cent of passengers arriving on peak hour services into Birmingham and Manchester were standing
- Inter-city services were experiencing significant surges of demand on Friday and Sunday afternoons and evenings when people make leisure trips for the weekend in addition to business/work travel

1.6 Given these trends, there was seen to be a risk of serious overcrowding by 2026 on both WCML commuter and inter-city trains serving London, Birmingham and Manchester.

1.7 The Strategic Case then considered how both HS2, and the Strategic Alternative⁵ (a package of interventions designed to get more capacity out of the existing route), would address the growing congestion on the WCML. It concluded that the alternatives to HS2:

- Would not provide sufficient additional capacity to meet the long term needs for the railway
- Would not release significant additional capacity for commuter and freight traffic on the WCML
- Would fail to solve the problem of resilience and performance on the WCML

Improving connectivity

1.8 The Strategic Case examined how improvements in connectivity brought about by major investments in transport infrastructure such as HS2 could increase the competitiveness of areas outside London and change the future pattern of economic growth in Britain. These effects were expressed in two ways:

³ This would be achieved by increasing commuter services' top speed to 110 miles per hour (mph) and so reducing their speed differential against the inter-city trains, which run at 125 mph

⁴ Although control measures put in place since publication of the Strategic Case have helped to mitigate this problem

⁵ The report "HS2 Strategic Alternatives, Final Report, DfT" (28 October 2013) sets out the work that was undertaken on alternative options for meeting the capacity and connectivity objectives set by the Government when developing its plans for HS2. The work was undertaken by DfT and Network Rail and supported by consultants Atkins. We summarise the Strategic Alternative in Chapter 4 of this report

- Businesses becoming better connected to one another – improved transport links mean that businesses are better able to connect with potential suppliers, enabling them to access higher quality and/or lower cost inputs. Businesses are also better able to connect with potential customers, enabling them to supply markets further afield
 - Businesses becoming better connected to labour – improved transport links mean that individuals are able to access more jobs, whilst businesses are able to draw on a wider and deeper pool of potential workers
- 1.9 Analysis produced at the time of the Strategic Case, demonstrated that HS2 would bring about transformative improvements in labour and business connectivity by rail. Whilst all regions would benefit, these benefits would be proportionately greater in the North and Midlands than they would be in London and the South East. Therefore, HS2 could make an important contribution to the Government's wider strategy of rebalancing the economy.

Purpose of this document

- 1.10 This document provides an update to some of the evidence set out in the 2013 Strategic Case, drawing upon further analysis commissioned by DfT of the latest levels of passenger demand and forecast growth, as well as patterns of business travel. The following chapters demonstrate that:
- With growth in demand for rail travel in the UK continuing to be strong, the case for major investment in the capacity of the WCML and in Britain's rail network more widely, remains compelling
 - Structural changes in the UK economy, such as the growing importance of city centre employment and of knowledge-based industries where employees have a relatively high propensity for commuting and business travel by rail, indicate that HS2 is the right transformational transport intervention to boost productivity and the economy in general, and support the emerging Northern Powerhouse in particular
- 1.11 This document is supported by two more detailed annexes:
- Annex One: Demand and Capacity Pressures on the West Coast Main Line
 - Annex Two: HS2 and the Market for Business Travel

2. Key developments since the publication of the 2013 Strategic Case for HS2

Continuing growth in rail demand

- 2.1 Since the Strategic Case was published, demand for rail travel has continued to grow at a rate that is well above the long term forecast that underpins DfT's Economic Case for HS2. From 2013 to 2015 (years ending 31 March), the number of rail journeys in Great Britain grew by 10.2 per cent from 1,501 million to 1,654 million. This is an annual growth rate of 5 per cent – more than double the growth of around 2 per cent assumed in the Economic Case for HS2.
- 2.2 Since 2013, on the WCML:
- Virgin West Coast has seen its annual passenger numbers grow by 13.5 per cent from 30.4 million in 2013 to 34.5 million in 2015, equivalent to 6.5 per cent annual growth
 - London Midland, the key commuter operator into London Euston, has seen its passenger numbers grow by 7.9 per cent from 60.5 million to 65.3 million – equivalent to 3.9 per cent annual growth
- 2.3 As a result of these trends, Euston is now the fastest growing terminus in London⁶.
- 2.4 In order to keep pace with this growth in demand, it is notable that the WCML operators have already implemented many of the measures within the Strategic Alternative to HS2 that increase capacity without requiring a major investment in infrastructure. For example:
- More 11-car Pendolinos are operating and Virgin West Coast has started converting some First Class capacity to Standard capacity on 9-car trains. Of the 27 morning peak Virgin West Coast services in the December 2014 timetable, 20 are operating at 11-car length. This compares to all Pendolinos being operated as 9-car trains in December 2011
 - Between 08:00 and 09:00, London Midland is now operating 5tph on the WCML Fast Lines into Euston, increasing operations (commuter and inter-city) to 15tph. This means that more trains are now operated in the morning rush hour than was envisaged when the WCML upgrade was undertaken
 - London commuter services are increasingly operated with full-length 12-car trains. Six of the busiest 13 London Midland services arriving between 08:00 and 09:00 and six of the 12 London Midland services leaving between 17:30 and 18:30 are now 12-car trains
- 2.5 On the East Coast Main Line, the number of passengers on the main inter-city operator, now run by Virgin East Coast Trains, has also grown strongly from 19 million in 2013 to 20.7 million in 2015 – equivalent to 4.4 per cent annual growth. The

⁶ Source: ORR Estimates of Station Usage 2013/14

East Coast operation has comparatively high load factors⁷ as it has not benefitted from as much investment in infrastructure and rolling stock as the WCML over the past 15 years.

- 2.6 To meet demand and address overcrowding, the new franchise, let to Virgin East Coast Trains, which began on 2 March 2015, will see:
- 65 new Inter-city Express trains brought into service totalling 500 new cars
 - Investment in infrastructure that will allow seven long distance trains to operate in the evening peak hour as compared to six today
 - New direct services to Huddersfield, Sunderland, Middlesbrough, Dewsbury and Thornaby
- 2.7 Taken together, this will provide 3,600 additional seats in the evening peak period – a 55 per cent increase in capacity of the franchised East Coast operator.

The importance of connectivity in rebalancing the economy

- 2.8 Since the October 2013 Strategic Case was published, there has been growing focus on the role of high quality transport infrastructure in improving productivity – and therefore the potential of HS2 to help rebalance the economy.
- 2.9 A 2014 study for DfT by independent academics Venables, Overman and Laird, “Transport Investment and Economic Performance” (2014), found that transport investments ‘can deliver economic benefits over and above conventionally measured benefits to transport users’ because:
- ‘Transport fosters intense economic interaction that raises productivity, both within narrowly defined areas or more widely by linking areas’
 - ‘Transport shapes the level and location of private investment, potentially leading to higher levels of economic activity in some areas’
- 2.10 The March 2015 “Northern Transport Strategy, The Northern Powerhouse: One Agenda, One Economy, One North” (2015) placed transport connectivity at the heart of its vision for reinvigorating the North’s economy. It suggested that transforming connectivity would give an economic stimulus by providing:
- Better connections between economic centres, allowing clusters to develop, even where companies are located apart
 - Better commuting opportunities to the centres of economic activity, allowing businesses to access more of the skills that they need to have a competitive advantage
 - Better travel information and ticketing systems that can expand travel horizons for businesses and individuals
- 2.11 The long term transport strategy of the Midlands Connect Partnership, launched in October 2015, has similar aims and principles, placing a strong emphasis on better connectivity, both via HS2 and across the Midlands more generally.
- 2.12 Therefore, HS2 has become an integral part of the shared vision between the Government, Transport for the North and Midlands Connect. By transforming journeys between London, the Midlands and the North’s key growth areas, it provides

⁷ The number of Standard Class passengers on a service expressed as a percentage of the maximum stated Standard Class passenger capacity for that service

one of the foundations for a Northern Powerhouse that will be able to compete with the best performing regions of Europe.

- 2.13 More recently, the July 2015 HM Treasury document, “Fixing the Foundations – Creating a more prosperous nation” confirmed that cities outside of London needed to do better in order to maintain national prosperity. Alongside effective governance, long term investment in transport links was seen as the key driver. Excellent connectivity would bring cities in the regions closer together and help create the critical mass that will allow them to compete globally.

3. Capacity on the West Coast Mainline

The WCML today

- 3.1 Today, the WCML Fast Lines carry 15-16 trains per hour (tph) at the busiest peak periods. This is more than the 13-14tph envisaged at the time of the upgrade due to the pressure to run more outer-suburban commuter services along with today's inter-city timetable. This is a higher intensity of operation than on major Fast Lines in other European countries, including purpose-built high speed lines, as shown in Figure 1.

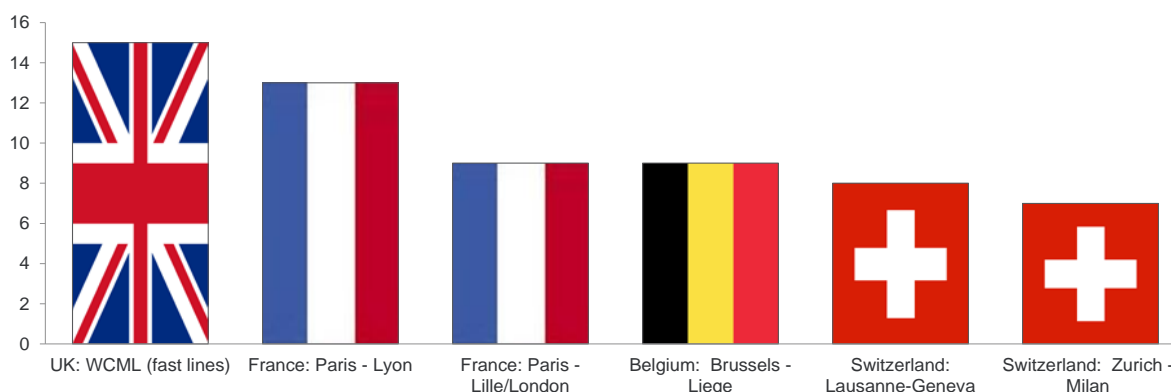


Figure 1 Comparison of intensity of operation between the WCML Fast Lines and selected major Fast Lines in other European countries⁸⁹

- 3.2 Despite its recent modernisation, the WCML rail corridor remains highly constrained meaning that the route is operating at close to capacity in the peak and it is difficult to increase service levels still further. This is due to:
- Physical constraints with the infrastructure such as the flat junctions¹⁰, two-track sections and bottlenecks at station approaches
 - The complex mix of inter-city, commuter, local and freight traffic that operates on the rail corridor, with trains having varying speeds and stopping patterns
- 3.3 It is notable that these constraints impact the traffic that can be operated all along the route. They limit how many commuter services run into Birmingham and Manchester and the ability to run additional freight trains in the North and Midlands – not just the number of passenger services that can be run into Euston in the peak.
- 3.4 Figure 2 splits the WCML into nine route sections. Each section of the route has different individual capacity constraints. However, because most trains need to be

⁸ Sections of other lines on Britain's rail network operate at a higher level of intensity but they do not have services with the same top operating speed or mix of traffic

⁹ Source: Network Rail working timetable, www.bahn.de and the European Rail Timetable, Summer 2014

¹⁰ This is where a crossing move is made such that a train travelling in one direction needs to cross the track used by trains travelling in the opposite direction at the same level. By use of flyovers and dive-unders ('grade separation') it is possible to reduce the adverse performance and capacity effects of flat, at-grade, crossings

found operating paths across several of these route sections in order to provide a timetable that works, any solutions that would introduce more trains need to be developed in a joined-up way along the route. With the route used so intensively, a constraint in one section can affect the timetabling of trains a considerable distance away in another section of line.

3.5 Because of this, investing in the WCML corridor to allow more services to operate – whether they be passenger or freight – is complex. Indeed, the most recent WCML renewal and modernisation programme took a decade to carry out and when it was completed in 2008, it had involved 100 million person-hours of work. It was also highly disruptive to the travelling public. For over five years, passengers endured route diversions and rail replacement bus services during weekend closures of sections of the WCML. Furthermore, a section of route via Stoke-on-Trent had to be closed entirely for over two months in 2003.

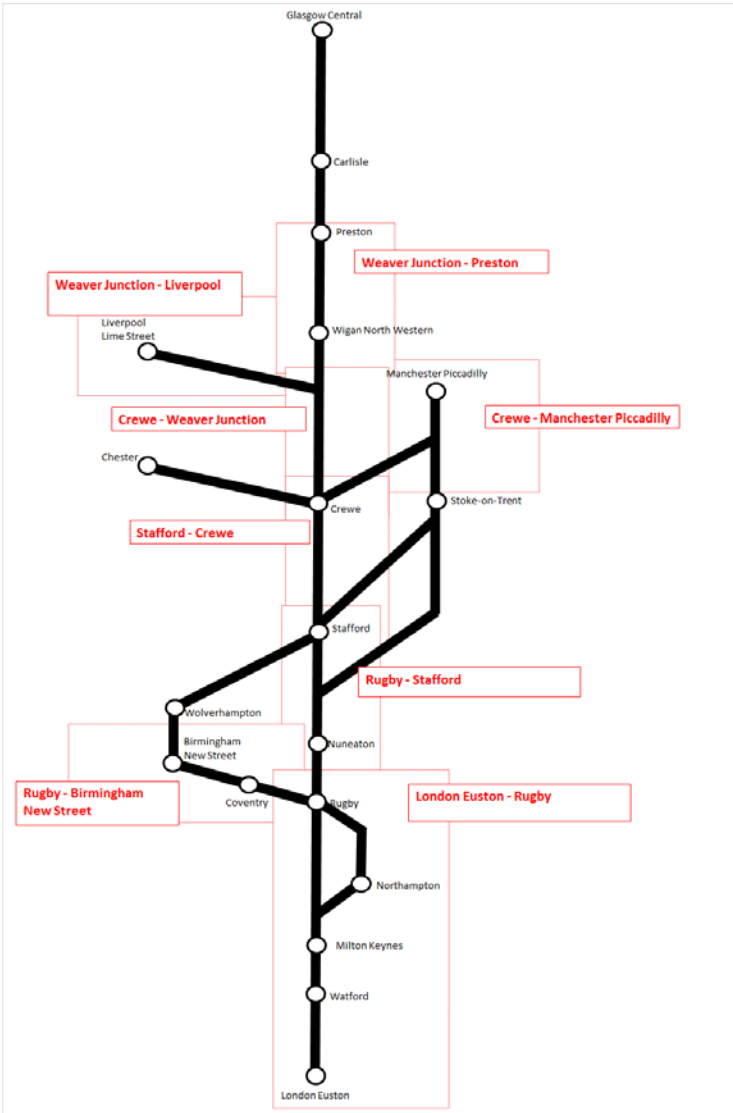


Figure 2 West Coast Mainline split by key route section

3.6 For each of these nine route sections, Table 1 summarises the key constraints – whether with the physical infrastructure, or with the mix of traffic – and sets out the implications this has for the service levels that can operate on the route.

Route Section	Constraint	Impact on Services
London Euston to Rugby	<ul style="list-style-type: none"> The mix of traffic. Fast Lines carry 125mph inter-city trains and 110 mph outer suburban trains. More paths would be available if trains operated at uniform speed Flat junctions at Ledburn and Hanslope where commuter trains have to slow down to 60 mph to cross over from the Fast Lines to the Slow Lines, requiring precise timing of trains Capacity is lost due to the uneven stopping patterns of London Midland trains, and two inter-city trains stopping at Milton Keynes/Watford Junction On the Slow Lines, there are no places for trains to pass each other between Wembley and Northampton 	<ul style="list-style-type: none"> peak service level limited to 15-16tph, so very limited ability to address crowding once existing peak trains are extended to full length No capacity to give more towns and cities, particularly from the North West, direct services into London in the peak other than by starting existing trains further out Calls by inter-city trains at Watford Junction and Milton Keynes have had to be reduced to accommodate the 3tph London to Birmingham/Manchester timetable. In addition, direct links between Watford Junction and Liverpool, North Wales and Scotland have been withdrawn
Rugby to Birmingham New Street	<ul style="list-style-type: none"> Coventry station, which has flat junctions at each end and is on the main freight route from the port at Southampton, the Midlands and North West. Passenger and freight services need to be carefully planned through these junctions The approach to Birmingham New Street where five routes join together Knitting together the local West Midlands services with the Cross Country and West Coast timetable 	<ul style="list-style-type: none"> To accommodate the inter-city timetable, stopping trains between Coventry and Birmingham have been split into two services and the stopping trains from Coventry – Wolverhampton are no longer cross-linked meaning a change of train is needed for many cross-city journeys Inter-city services that used to run between Coventry/Birmingham International and the East Midlands/Yorkshire/the North East have been withdrawn
Rugby to Stafford	<ul style="list-style-type: none"> Brinklow – Attleborough Junction – Northbound 60-75mph freight services have to be slotted in around 125mph inter-city trains on a three track section Colwich Junction – where two northbound inter-city trains per hour leave the route and cross in front of southbound trains on a flat junction The two-track section between Colwich Junction and the approach to Stafford. Here inter-city and freight services (with significant speed differentials) share the track 	<ul style="list-style-type: none"> More fast services along the Trent Valley to London from Stafford, Rugeley, Lichfield, Tamworth and Nuneaton cannot readily be provided Constraints make it highly challenging to operate any more peak inter-city services from the North West to London without reducing the reliability of other trains on the route The number of day-time freight paths is limited
Stafford to Crewe	<ul style="list-style-type: none"> Although this section is mainly four-track, the service mix and flat junctions, both at Stafford and Crewe, restrict route capacity Crewe is a major passenger and freight hub. Complex crossing movements limit the number of available paths for passenger and freight services and the number of useable platforms for services to stop 	<ul style="list-style-type: none"> Limited availability of paths means that freight traffic to/from London and Birmingham needs to be held up for extended periods Capacity constraints here and on other sections mean that the inter-city trains between Birmingham and Manchester cannot readily be accelerated. At present, the journey time is 1 hour 26 minutes for 85 miles
Crewe to Weaver Junction	<ul style="list-style-type: none"> The two-track section between Winsford and Weaver Junction, where a mix of service and train types share the same track At the North end of Crewe station, the line splits into three and there is a flat crossing 	<ul style="list-style-type: none"> It is difficult to increase local services because of the number of inter-city and freight trains Extended journey times for services between Birmingham and Liverpool
Weaver Junction to Preston	<ul style="list-style-type: none"> The diverse mix of service types that operate on the two-track sections between Weaver Junction and Preston, which includes a number of flat crossings. A number of regional services cross the WCML or run on it for short distances and thereby limit through capacity 	<ul style="list-style-type: none"> Limited ability to run additional inter-city services Growth of freight paths to and from Scotland is constrained.
Weaver Junction to Liverpool	<ul style="list-style-type: none"> The two-track section from Weaver Junction through Runcorn and over the River Mersey The flat junction at Allerton where Liverpool-Manchester and WCML services merge 	<ul style="list-style-type: none"> Limited ability to increase services

Route Section	Constraint	Impact on Services
Crewe to Manchester Piccadilly	<ul style="list-style-type: none"> The two-track section between Sandbach and Cheadle Hulme, where fast long distance services from London and South Wales mix with slower stopping local trains Flat junctions at Cheadle Hulme (where trains from London via Stoke-on Trent join) and at Stockport (see below) Approach to Piccadilly where the mix of stopping patterns and train origins/destinations curtails operational flexibility 	<ul style="list-style-type: none"> One out of every two Chester – Northwich – Manchester peak commuting trains was removed in 2008, forcing passengers to change at Stockport Although Northern Hub will provide some more capacity in the Manchester area, it may not be sufficient to address all aspirations for improvements in services to Sheffield, Birmingham, Staffordshire, Shropshire and London There is limited connectivity from Shropshire and from Staffordshire to Manchester Airport
Colwich Junction/ Norton Bridge to Manchester Piccadilly	<ul style="list-style-type: none"> At Cheadle Hulme, the lines from Crewe and Stoke-on-Trent converge into a busy two-track section The Stockport station area, where the lines from Chester, Sheffield, Hazel Grove and Buxton merge together for the approach to Manchester Piccadilly 	<ul style="list-style-type: none"> The Buxton – Blackpool service was split into three new services in 2008 to accommodate today's inter-city service Services connecting Rose Hill in Manchester with Bolton via Oxford Road were also curtailed

Table 1 Main constraints and impact on service levels different on sections of the WCML

3.7 The combination of these network constraints, and operating the WCML at such a high level of intensity, is having clear implications for punctuality as identified in the October 2013 Strategic Case.

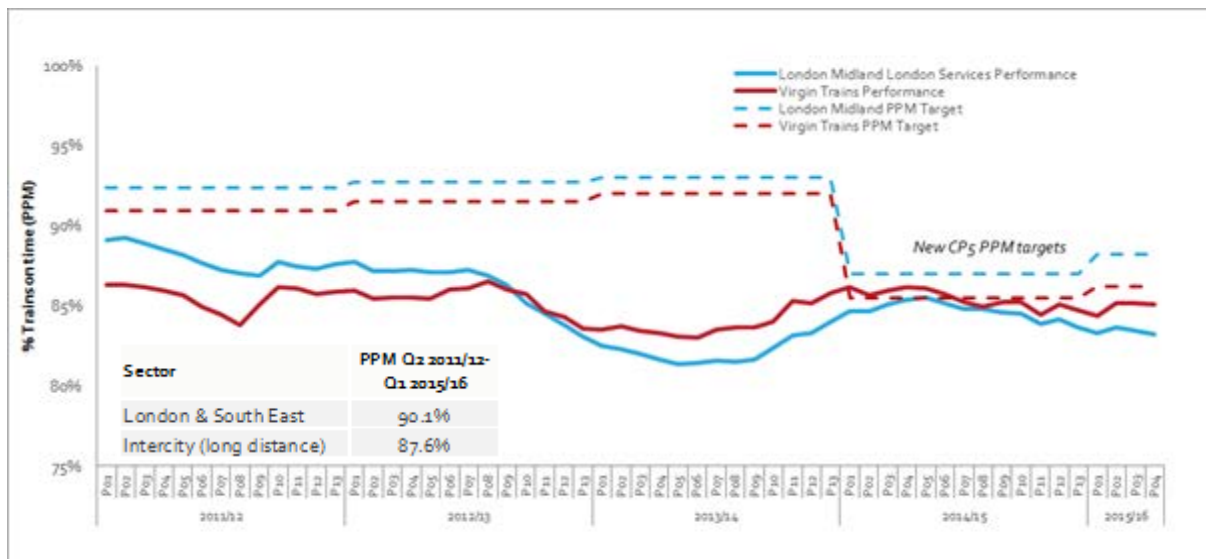


Figure 3 Performance (PPM Moving Annual Average) of Virgin West Coast and London Midland (London services only) Train Operating Companies¹¹

3.8 Both the WCML inter-city operator, Virgin West Coast, and commuter operator London Midland, operate below their performance targets. Punctuality of Virgin West Coast has plateaued averaging 85 per cent over the last four years. Over the same period, punctuality was 87.6 per cent across Britain's inter-city operators as a whole. This means that around 5 million WCML inter-city passengers arrive at their destinations more than 10 minutes late each year. On the relevant parts of London Midland (those services classified as London and the South East), punctuality has averaged 84.4 per cent over the last four years. This is 5.7 percentage points worse than the London and South East average over the same period. Notably,

¹¹ Data Source: ORR

performance has deteriorated since December 2014 when extra peak-hour commuter services were added to the timetable in order to meet demand.

- 3.9 The difficulties of operating additional trains on the WCML, particularly in the peak, have previously been acknowledged by the Office of Road and Rail (ORR). Between 2011 and 2013 the ORR turned down applications from Alliance Rail, Grand Central Railway, London Midland and Virgin West Coast to run additional services. This was because the performance risk of effectively filling the Fast Lines from the start of the morning peak until after the end of the evening peak was considered to be too great, as the service would have only limited opportunities to recover from any perturbation.
- 3.10 Two further applications have since been at least partially successful. However, the circumstances in which the additional services have been permitted lend weight to the evidence that it is difficult to operate additional trains on the WCML in the peak.
- 3.11 The first of these applications was for the two further peak hour London Midland trains, introduced in December 2014, increasing the peak hour frequency on the Fast Lines to 15-16tph. ORR could only grant access because the additional services were timetabled by operating faster 110mph rolling stock and 'flighting' two 110mph trains in a path previously occupied by one 100mph service. Making this timetabling solution work also required reducing commuter stops south of Rugby.
- 3.12 The second, and most recent award (August 2015), is the 10 year track access rights granted by the ORR to Alliance Rail to operate six daily (five on a Sunday) off-peak return services between Blackpool and Queens Park station in London from December 2017. This means that some of the limited capacity available on the WCML in off-peak periods (when the service pattern falls from 15tph to 12tph) will be taken up. However, no additional peak trains will be operated.
- 3.13 In the meantime, DfT will continue to work with the industry, particularly via the upcoming franchise competitions for the West Midlands and InterCity West Coast (ICWC) to seek innovative ideas to increase peak capacity. There may be some marginal capacity gains to be made through changing timetables but these would probably involve further compromises on the number of intermediate towns and cities served by long-distance and outer suburban services in order to ensure punctuality and reliability are not adversely affected.

Pressures for further investment

- 3.14 Three pressures will lead to a requirement for the Government to make a further major investment to increase the number of trains that can operate on the WCML corridor. These are considered in turn below.

Relieving overcrowding on existing services

- 3.15 At some point in the future, both the existing commuter and long distance WCML services will become unacceptably overcrowded, even if all peak trains are operated at their maximum length. With rail demand growing at 4-5 per cent a year, this is a question of when and not if.
- 3.16 To illustrate this issue of overcrowding, two growth cases are presented below, covering the period up to 2033/34 when the full HS2 "Y" network is scheduled to open. The base data for this analysis are the latest train by train count figures which are provided to DfT by all train operators, including London Midland and Virgin West Coast.

- 3.17 The 'Reference Case' applies the passenger growth rates from DfT's Planet Framework Model (PFM) – the model that underpins the HS2 Economic Case. Averaged out over the period from 2014/15 to 2033/34, these are growth rates of 1.8 per cent per annum for West Midlands franchise services (currently operated by London Midland) and 2.0 per cent for Inter City West Coast (ICWC) services (currently operated by Virgin West Coast). These growth rates take into account the impact of exogenous demand drivers such as Gross Domestic Product and population growth, but do not take into account the initiatives of train operators to grow demand such as marketing, new products and service quality enhancements.
- 3.18 The Higher Growth Case uses 'high sensitivity' growth rates from the DfT's Network Modelling Framework (NMF). In this Case, the growth rates averaged out at 3.0 per cent per annum for West Midlands services and 3.7 per cent per annum for ICWC services.
- 3.19 These 'high sensitivity' growth rates are closer to the actual growth in demand seen on Britain's railways in the period since privatisation. However, even these figures are significantly lower than the actual growth that has been witnessed. Since 1997, the number of passenger journeys on the London and the South East commuter network has grown at a rate of 4.3 per cent per annum whilst the number of inter-city journeys has grown at a rate of 4.7 per cent per annum.

West Midlands

- 3.20 Historically, West Midlands has been one of the most crowded London commuter train operating companies (TOCs). In each of the last seven years, crowding on the current operator, London Midland, has exceeded the London and South East average. In Autumn 2014, Passengers in Excess of Capacity (PiXC), which is the measure of overcrowding used in DfT's published statistics¹², was 6.5 per cent across the AM and PM peaks, making London Midland the second most crowded TOC. This compared to PiXC of 4.1 per cent across the wider London commuter network.
- 3.21 The most crowded London commuter TOC in Autumn 2014 was Greater Western with PiXC of 10.1 per cent. A series of major investments are in progress at Greater Western to mitigate this crowding. These include:
- Remodelling of Reading station and the surrounding track layout to improve the performance and capacity of the network
 - New rolling stock – both as part of the Inter City Express Programme; and in the form of electric commuter trains
- 3.22 Figure 4 presents projected peak overcrowding in 2033/34 in two operational scenarios:
- Today's capacity: This assumes that the December 2014 timetable continues to be operated with the same size train fleet
 - All 12-car trains: Assumes that all AM and PM peak services (December 2014) are operated at their maximum 12-car length

¹² <https://www.gov.uk/government/statistics/rail-passenger-numbers-and-crowding-on-weekdays-in-major-cities-in-england-and-wales-2014>

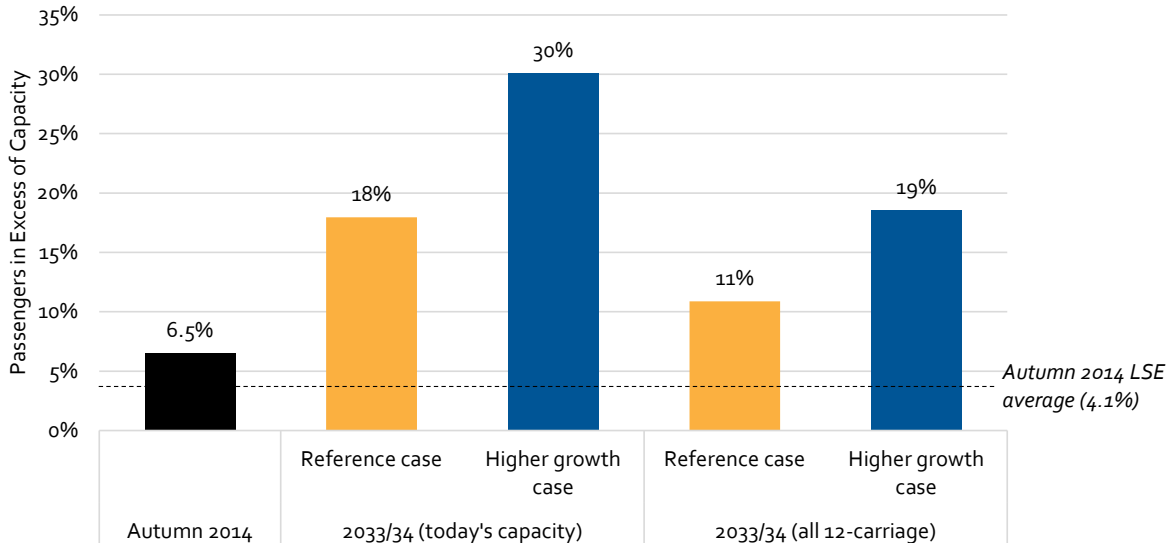


Figure 4 West Midlands historic and forecast PIXC – AM and PM peak combined¹³¹⁴

- 3.23 Figure 4 demonstrates that continuing to operate the current train service in 2033/34 could result in overcrowding levels of 18 per cent in the Reference Case and 30 per cent in the Higher Growth Case - three to five times greater than overcrowding levels today. This is likely to present severe operational difficulties, such as extended dwell times, as large numbers of passengers attempt to board and alight from trains. This would have a knock-on impact on punctuality.
- 3.24 This overcrowding could be mitigated in part by operating all trains at maximum length¹⁵. However, even then, PiXC is forecast to range from 11-19 per cent - greater than it is on Great Western today, where major investment to mitigate crowding is already in progress.
- 3.25 Overcrowding will become a serious operational issue on West Midlands franchise services to/from Euston much sooner than 2033/34, should passenger demand continue to grow at the rate that has been seen on London commuter flows in the period since privatisation. If growth continued to average 4.3 per cent per annum, then by 2026/27, the year HS2 Phase One is scheduled to open, PiXC could be as high as 16.3 per cent, even if all trains had been lengthened to 12-cars. Higher capacity rolling stock and swapping station stops could potentially help to ameliorate this situation, but it would result in more standing for passengers and potentially longer journey times from some stations.

Inter City West Coast (ICWC)

- 3.26 On inter-city services, there is an expectation that all passengers will get a seat. However, based on the latest train loadings data, provided to DfT by Virgin West Coast, projections suggest that standing will become a major issue on ICWC services by 2033/34. This is the case even if:
- All peak Pendolino trains are operated at maximum length of 11-car

¹³ Represents PiXC across the AM peak (all arrivals into Euston between 07:00 and 07:59) and PM peak (all departures between 16:00 and 18:59)

¹⁴ Data source: DfT passenger counts/PFM and NMF growth forecasts

¹⁵ Lengthening all trains to 12 carriages on the West Midlands franchise is not a committed scheme

- The current Pendolino trains are reconfigured such that they provide eight cars of Standard capacity and three cars of First Class capacity instead of the seven cars of Standard capacity and four cars of First Class capacity provided today

3.27 The problem could become particularly acute on Friday evenings where load factors above 100 per cent (i.e. more Standard Class passengers than seats) are already experienced today in the busiest hour between 19:00-20:00. Friday evenings see the coming together of a combination of business, weekly commuter and leisure demand – including those passengers visiting families and travelling to major events.

3.28 Figure 5 takes those trains which are projected to have a Standard Class load factor above 100 per cent in 2033/34 (i.e. trains with more Standard Class passengers than seats) and then calculates the proportion of ICWC passengers across the peak who would be standing, assuming that all trains have been lengthened to 11-cars and then reconfigured to have eight Standard Class cars.

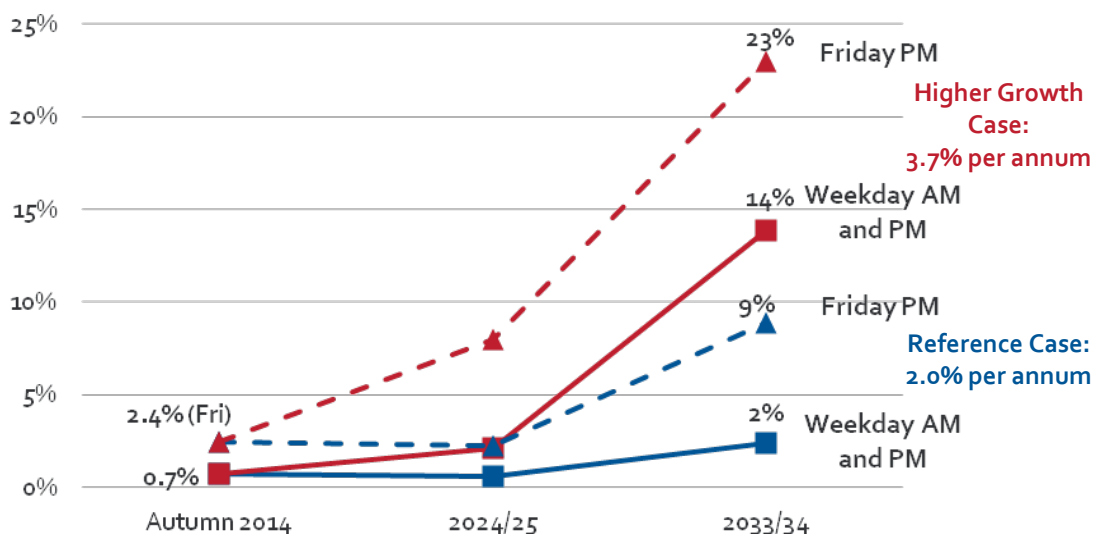


Figure 5 Projected percentage of Standard Class passengers standing (all 11-car, reconfigured trains)¹⁶¹⁷

3.29 Using this approach, Autumn 2014 count data indicates that at present, 0.7 per cent of Virgin West Coast passengers across the AM and PM peaks are standing as trains arrive at/depart Euston. This rises to 2.4 per cent in the Friday PM peak and is forecast to grow by 2033/34 to:

- An average of 2 per cent of peak passengers standing arriving at/departing from Euston during AM and PM peaks in the Reference Case, with 9 per cent of passengers standing on departure from Euston in the Friday PM peak
- An average of 14 per cent of peak passengers standing arriving at/departing from Euston in the Higher Growth Case. This rises to 23 per cent of passengers standing in the Friday PM peak on trains leaving Euston

3.30 In practice, standing is likely to be more prevalent than simply the number of passengers in excess of the number of seats - unless of course the ICWC operator moves to a “reservations-only” system. This is because inter-city trains are typically over 250 metres in length with around 20 access doors. Passengers are not always

¹⁶ Represents the percentage of Standard Class passengers standing when arriving into Euston in the AM peak between 07:00 and 09:59 and departing Euston between 16:00 and 19:59 in the PM peak. The PM peak has been extended to 19:59 to reflect the fact that 19:00 to 19:59 is the hour when ICWC services are busiest

¹⁷ Data source: DfT passenger counts/PFM and NMF growth forecasts

able to spread evenly along trains to find available seats, especially when boarding at intermediate stops. Research by train companies (PDFH)¹⁸ shows that passengers start to perceive adverse impacts from crowding at 80 per cent load factors.

- 3.31 The long distance nature of the ICWC services means that many of the standing passengers identified in the analysis above will be standing for an hour or more. Figure 6 demonstrates this point. For each of the ICWC trains on which it is forecast that there will be standing passengers, the first stop on that service has been identified. This first stop is effectively the minimum period for which a passenger will stand – either because they leave the train at this point or because seats have become available due to other passengers leaving the train.
- 3.32 Figure 6, illustrates a typical weekday in the “Higher Growth” case. In 2033/34 it is estimated that on average, 3,200 passengers will stand on ICWC trains departing London in the PM peak. Of these, 1,350 (40 per cent) will be on trains with a first stop that is 59 minutes or more outside of London.

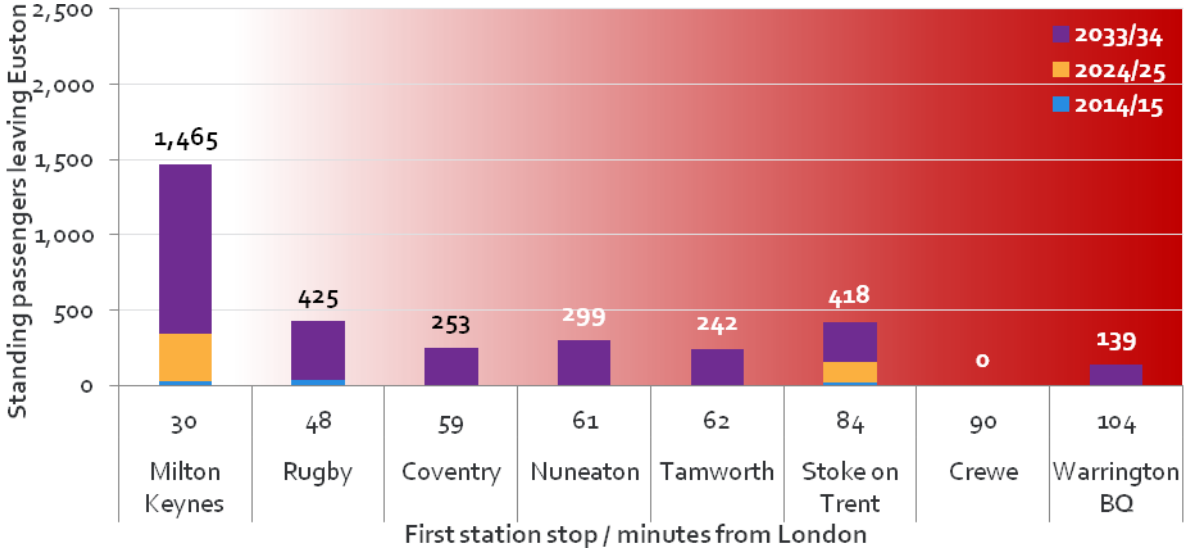


Figure 6 Midweek PM – Analysis of likely duration of standing – Higher Growth Case (11-car, reconfigured trains)¹⁹

- 3.33 On a typical Friday, when passenger volumes rise further, it is estimated that 5,900 passengers will be standing. Of these, 3,500 (60 per cent) will be on trains with a first stop 59 minutes or more outside London. A further 1,300 (22 per cent) will be standing for 90 minutes or more to stations such as Warrington.
- 3.34 Again, it is worth noting that standing passengers will become widespread on ICWC services much sooner than 2033/34 should the growth on inter-city flows in the period since privatisation continue. If growth were to continue to average 4.7 per cent per annum then by 2026/27, the year that HS2 Phase One is due to open, it is forecast that 7.3 per cent of weekday AM/PM peak passengers and 15.8 per cent of Friday PM peak passengers would be standing as they arrive at/depart from Euston. This is even if all Pendolino trains were at full length and had been reconfigured to give more Standard Class capacity²⁰.

¹⁸ Passenger Demand Forecasting Handbook
¹⁹ Data source: DfT passenger counts/PFM and NMF growth forecasts
²⁰ Extending all Pendolino trains to 11 cars and reconfiguring Standard Class carriages are not committed schemes

Meeting demands to serve new markets and reinstate past services

3.35 Constraints on the WCML make it very challenging to provide direct London services to and from all of the places where there is significant demand – particularly in the peak when people want to travel.

3.36 Although some towns and cities such as Shrewsbury, Blackpool and Wrexham now have a limited direct service to Euston, other places do not. In 2013, Network Rail's "Long Distance Market Study"²¹ highlighted the following places from where there is likely to be sufficient demand to support new/enhanced services:

Already have some service, but would seek more:

- Shrewsbury
- Telford
- Blackpool

Not directly connected at all:

- Walsall
- Sutton Coldfield
- Blackburn and the Rossendale Valley
- Bolton
- Burnley
- Rochdale and
- Barrow-in-Furness

3.37 Recent experience on the East Coast Main Line is that opening up markets by providing new direct services to London has resulted in strong growth in passenger journeys – indeed faster than the growth from stations that are already directly served. Examples of this are the new services introduced between London and Hull, and London and Sunderland.

3.38 In addition to this, it should be noted that in order to accommodate the enhanced inter-city timetable introduced after the upgrade in 2008, a number of services had to be either cut back, or changes were made that meant passengers had to make additional interchanges in order to complete their journeys. These included:

- Inter-city services from intermediate stations such as Milton Keynes and Watford to Liverpool and Scotland
- Stopping trains between Coventry and Birmingham, and between Coventry and Wolverhampton which were split in two
- Local commuter services around Manchester such as Chester – Northwich – Manchester and Rose Hill – Bolton via Oxford Road

3.39 Other services such as those between Coventry, Birmingham International, Derby and Sheffield, Leeds and York had been cut prior to this. Put simply, the lack of line capacity on the WCML has meant that a number of compromises have had to be

²¹ <http://www.networkrail.co.uk/improvements/planning-policies-and-plans/long-term-planning-process/market-studies/long-distance/>

made, limiting the ability of the railway to meet all long-distance, regional and local connectivity needs.

3.40 As demand for rail travel has continued to grow, pressure to reinstate these services has increased. Addressing this demand for new/reinstated services is consistent with the Government's policy of improving connectivity both within the North and the Midlands, and between London and the regions.

Meeting demands for extra freight paths

3.41 The WCML is the key freight artery of Britain's rail network. This traffic takes three forms:

- Intermodal – this is the transporting of containers between ports and major inland distribution centres and is largely driven by international trade. These flows join/leave the WCML at a number of points but typically run for a lengthy segment along the WCML itself
- Aggregates and coal – these flows use significant sections of the route and have a diverse flow pattern using a large number of entry/exit points to the WCML
- Other traffic that uses only short sections of the line, but which interacts with passenger trains so has a bearing on the number of services that can be operated on the WCML

3.42 Across these flow types, it is estimated that around 40 per cent²² of all UK rail freight journeys use the WCML at some point.

3.43 Network Rail published its "Long Term Planning Process: Freight Market Study" in October 2013, which forecasts freight volumes for the next 30 years and remains the most up-to-date market assessment. The forecast was developed in consultation with the rail freight industry. Network Rail anticipates that the rail freight volumes will grow above 2011 levels by over 40 per cent by 2023 and by around 90 per cent by 2033. Notably for the WCML, the intermodal segment is expected to grow the fastest as international trade continues to expand.

²² West Coast Project Briefing Note – Network Rail Media Centre, 2008

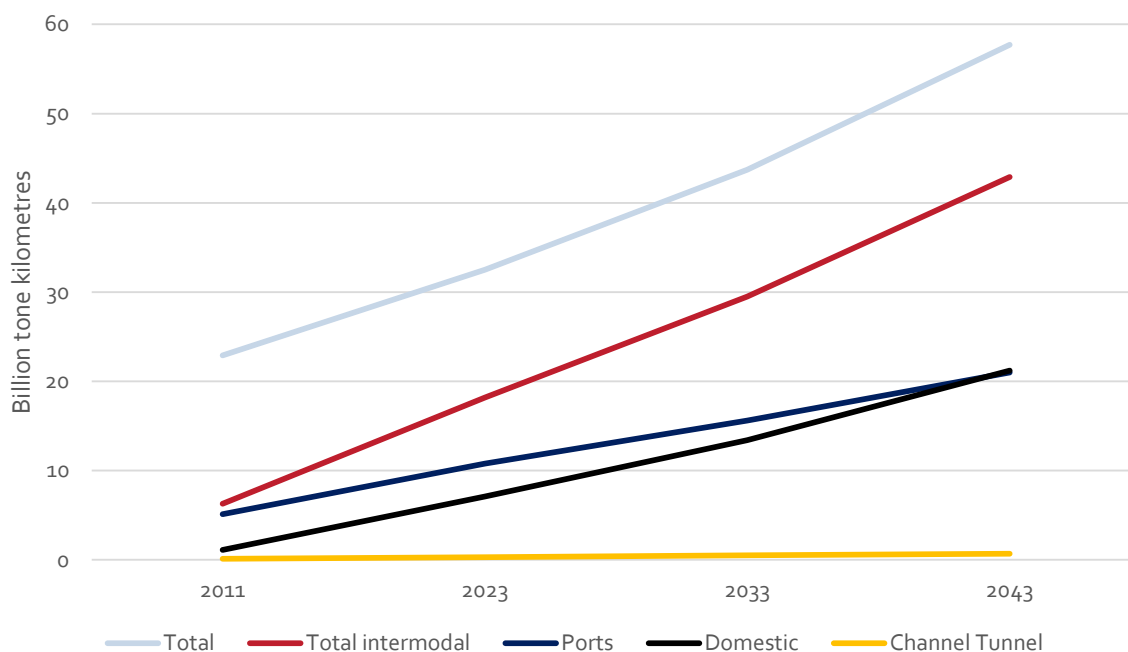


Figure 7 Forecast growth in rail freight demand ²³

- 3.44 In total, DfT analysis of Network Rail’s estimates suggests that this growth in volumes will translate into an increase in demand for rail freight paths on the WCML each day from 42 today to 80 by 2033. Clearly, given the constraints illustrated in Table 1 that are in place all along the WCML rail corridor, it will be impossible to accommodate the expected increase in freight demand without further investment in the infrastructure to increase network capacity. The only alternative would be extensive use of the route at night, which would limit the time available for engineering inspection and maintenance work.
- 3.45 A number of other investments are being progressed to relieve some of the freight pressures on the WCML. These include the Felixstowe to Nuneaton scheme which allows some freight traffic to bypass the southern end of the route and investment in gauge clearance on the Midland Main Line. However, without additional WCML paths for freight, rail will not be able to maintain its key role in Britain’s distribution chains. As international trade grows, freight traffic will increasingly be diverted onto the roads, leading to worsening road congestion and air quality.

Conclusion

- 3.46 These three pressures make it inevitable that Government will need to make major investment in the WCML rail corridor to relieve constraints and allow more services to be operated. In the meantime, as passenger trains become more crowded and the few spare off peak paths are filled up, resilience on the WCML is at risk. Therefore, the choice that the Government faces is not whether it invests in capacity in the WCML rail corridor, but rather how it chooses to make this investment.

²³ Data source: Long Term Planning Process: Freight Market Study, Network Rail, October 2013

4. The impact of HS2 on the WCML rail corridor

Introduction

- 4.1 This chapter explains how HS2 will provide a long term solution to each of the West Coast Main Line (WCML) capacity pressures outlined in Chapter 3. It is useful at this point to compare the impact of HS2 with that of the upgrade of today's railway, provided by the "Strategic Alternative".

HS2

- 4.2 HS2 will impact the WCML in two phases – Phase One, which is planned to open in 2026 and Phase Two, which is planned to open in 2033. In March 2014, HS2 Limited published HS2 Plus which set out proposals for an acceleration to part of Phase Two, known as Phase 2a.
- 4.3 Phase One of HS2 will see a new high speed line constructed from London Euston to north of Birmingham, where it will reconnect with the existing WCML allowing fast services to serve Manchester, Liverpool, Crewe, Preston and Glasgow. New high speed trains will serve both Birmingham city centre as well as an interchange station which will serve both Birmingham Airport and the wider West Midlands. At Old Oak Common in west London, a new interchange will be built connecting HS2 with Crossrail and the Great Western Main Line.
- 4.4 The Phase Two "Y" shaped network will see the new high speed line extended to the north and east. On the western leg, the line will join up with the WCML north of Warrington and there will be a new station in the city centre of Manchester. The eastern leg will join with the ECML approaching York and is discussed further in Chapter 5.

The Strategic Alternative to HS2

- 4.5 The report "HS2 Strategic Alternatives, Final Report"²⁴ set out the alternative options for meeting the capacity and connectivity objectives set by Government when developing its plans for HS2. The most relevant option to compare against the impact of HS2 in the WCML corridor was termed "P1". This contained a package of measures, some of which had been put forward by objectors to HS2.
- 4.6 P1 assumes that all West Midlands and Inter City West Coast (ICWC) peak trains into Euston are run at maximum length and reconfigured as in the crowding analysis set out in Chapter 4. However, in addition to this, P1 includes a package of infrastructure enhancements that would increase WCML Fast Line capacity from today's 15 -16tph into/from London Euston in the peak periods to 16tph across the peak. These have been costed at £2.5 billion and include the grade-separation of

²⁴ Published 29 October 2013 and available at <https://www.gov.uk/government/publications/rail-alternatives-to-hs2>

junctions at Colwich and between Cheddington and Leighton Buzzard, four-tracking between Attleborough and Brinklow and further power supply upgrades and line speed improvements.

- 4.7 Since P1 would involve major works on a live railway it would inevitably be highly disruptive to the travelling public. As with the 1998 - 2008 WCML upgrade, passengers would be required to endure a prolonged period of route diversions and rail replacement bus services during weekend closures of sections of the line.

Impact on passenger crowding

West Midlands

- 4.8 Table 2 illustrates that the infrastructure investment contained within the Strategic Alternative only allows a marginal increase in AM peak West Midlands capacity into Euston over and above running all of today's services with 12-cars. An additional two services could be provided, increasing the number of AM peak trains from 28 to 30 over the 3-hour peak period.

Scenario	Number of Services	Standard class seats	Standard class capacity
December 2014	28	15,132	20,234
All 12-carriage trains	28	19,344	25,884
Strategic Alternative	30	20,580	27,120
With HS2	41	30,330	41,103

Table 2 West Midlands AM peak capacity into Euston (07:00–09:59)²⁵

- 4.9 These additional two services would provide a 4.7 per cent uplift in AM peak West Midlands franchise capacity into Euston (comprises seats and allowable standing under the PiXC measure) – rising from 25,884 to 27,120. This would provide some relief to the 11-19 per cent overcrowding anticipated in 2033/34, when all trains are lengthened to 12 cars. However, it is not a long term solution. Indeed, even under Reference Case growth rates, average loadings on London Midland in 2033/34 are projected to be higher under the Strategic Alternative than they are today - a level at which West Midlands has the second highest PiXC figures across London commuter operators.
- 4.10 HS2 conversely provides a step change in commuter capacity on the WCML corridor. This is because capacity released by operating much of today's inter-city services on dedicated high speed lines could allow the number of West Midlands franchise services in the AM peak to increase from 28 to 41. This results in a 59 per cent increase in AM peak capacity into Euston from 25,884 to 41,103.
- 4.11 With this additional capacity, average loadings across the AM peak would not return to today's levels until 2063 in the Reference Case and 2041 in the Higher Growth Case.

Inter City West Coast

- 4.12 The Strategic Alternative provides a limited increase in ICWC capacity by allowing an additional five trains to arrive into Euston across the AM peak (07:00 to 09:59) and an additional four trains to depart Euston in the PM peak (16:00 to 19:59). However,

²⁵ Source: Analysis of the December 2014 timetable; The Strategic Case for HS2 2013

ultimately, even after the investments in P1 are made, the capacity of the WCML Fast Lines in the busiest hour still remains at 16tph.

4.13 In the Higher Growth Case, equivalent load factors that result in the widespread passenger standing illustrated in Chapter 3 would arise in 2036/37 under the Strategic Alternative, rather than in 2033/34. In effect, the extra inter-city paths provided by the Strategic Alternative provide three years of additional growth over and above the lengthening and reconfiguring of trains. This extra three years of growth would come at considerable cost and only after years of the type of disruption that results from upgrading a live railway.

Scenario	AM peak (07:00 to 09:59)		PM peak (16:00 to 19:59)	
	Number of services	Standard class seats	Number of services	Standard class seats
Autumn 2014	27	11,040	41	15,869
All 11-car reconfigured trains	27	13,974	41	21,162
Strategic Alternative	32	16,704	45	23,490
With HS2 Phase One	44 (26 HS2+18 ICWC)	24,296	68 (40 HS2 +28 ICWC)	38,466
With HS2 Phase Two (not including eastern leg trains)	46 (28 HS2+ 18 ICWC)	29,316	72 (44 HS2 +28 ICWC)	39,566

Table 3 ICWC AM and PM peak capacity arriving at and departing from Euston²⁶

4.14 In contrast, the step change in route capacity provided by having a new dedicated high speed line allows crowding issues on the inter-city services on the WCML corridor to be solved for the long term. In both the AM and PM peak, HS2 offers the potential to operate around 60-70 per cent additional inter-city services. This would not only mitigate the standing issues illustrated in Chapter 3 but also accommodate the significant increase in demand which PFM forecasts will be generated by HS2 itself – primarily due to journey time improvements.

Meeting demands to run additional passenger services

4.15 The investments under P1 would not allow either better local services around Manchester or new peak services to London from towns that do not currently have a direct service. In contrast, Figure 8 summarises the indicative HS2 service pattern that has been presented to the Hybrid Bill Committee.

²⁶ Source: Analysis of the December 2014 timetable; The Strategic Case for HS2 2013

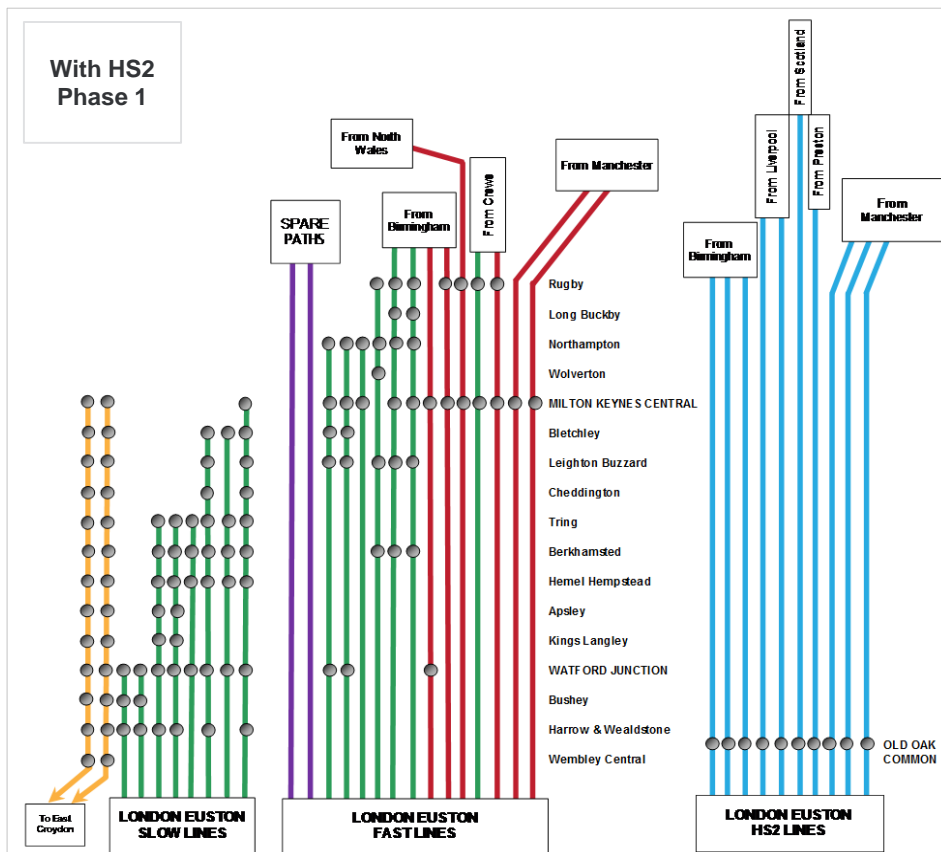


Figure 8 Indicative plan of services on the WCML and HS2 following Phase One²⁷

- 4.16 It should be noted that Network Rail is leading an industry process known as “Capacity Plus” (Phase One WCML) to identify and develop options for the use of capacity released by transferring long distance high speed services onto HS2. No definitive decisions on the use of released capacity have been taken. Indeed, well established, statutory, regulatory and administrative processes will be used to build an open and shared evidence base, consult passengers, communities and freight users in order to establish options and take decisions ahead of the introduction of a new timetable. However, in overview, HS2 Phase One could increase the combined capacity for fast trains on HS2 and the West Coast Fast Lines into/from London Euston from 15tph to 23tph. In turn, increasing the number of outer suburban commuter trains on the Fast Lines would allow a more even stopping pattern on the WCML Slow Lines. This could allow an increase from 8tph to 10tph on the Slow Lines where there is currently a mix of semi-fast passenger, slow passenger and freight traffic. In addition, two spare paths could help depressurise the WCML by providing the resilience which should enable performance and reliability to improve.
- 4.17 In Phase Two, the total number of fast trains into Euston would increase from 23tph to 31tph. The additional 8tph would run on the WCML corridor as far as Birmingham and then operate on the Eastern leg of the HS2 “Y” network.
- 4.18 The second phase of HS2 also adds high-speed capacity on the WCML corridor by a doubling in length of Manchester trains – and potentially of Scottish services too. While Phase One allows a transformation in local and regional services operating over today’s congested ‘Coventry corridor’, Phase Two opens up the prospect of a similar transformation through Greater Manchester’s ‘Stockport corridor’ with new

²⁷ Data Source: HS2 Limited. Version presented by HS2 to Hybrid Bill Committee

services, greater capacity and new connections, as well as better services through Staffordshire and Cheshire.

4.19 Across both Phases, HS2:

- Allows more peak trains for both the existing commuter and the inter-city markets to be operated into London, thereby relieving passenger crowding for the foreseeable future as noted above
- Addresses the shortage of train paths that could enable more direct WCML services to operate to places not served by HS2, such as Bolton and Blackburn
- Allows a better range of services into Birmingham and Manchester, where priority on the main routes was given to inter-city trains at the expense of local, regional and inter-regional services in order to get the 2008 timetable in place

Meeting demands for extra freight paths

4.20 As it adds such limited additional route capacity, the Strategic Alternative offers very little to help meet the increase in demand for WCML freight paths that is forecast by Network Rail. In contrast, by releasing capacity on the WCML, HS2 will facilitate north-south freight movements, particularly intermodal traffic from the ports of the South East and Liverpool.

4.21 Figure 9 and Figure 10 illustrate schematically how the different phases of HS2 will release capacity for freight on the WCML. Following the completion of HS2 Phase One as currently configured, high speed services will join the existing four-track railway at Handsacre Junction to the north of Lichfield, and travel on to Colwich Junction about 20km north, where the routes to Crewe and Stoke-on-Trent diverge. This allows more freight trains, both to run from London, and to join the route at Nuneaton, where they will arrive from the major port at Felixstowe on a cross country route via Leicester.

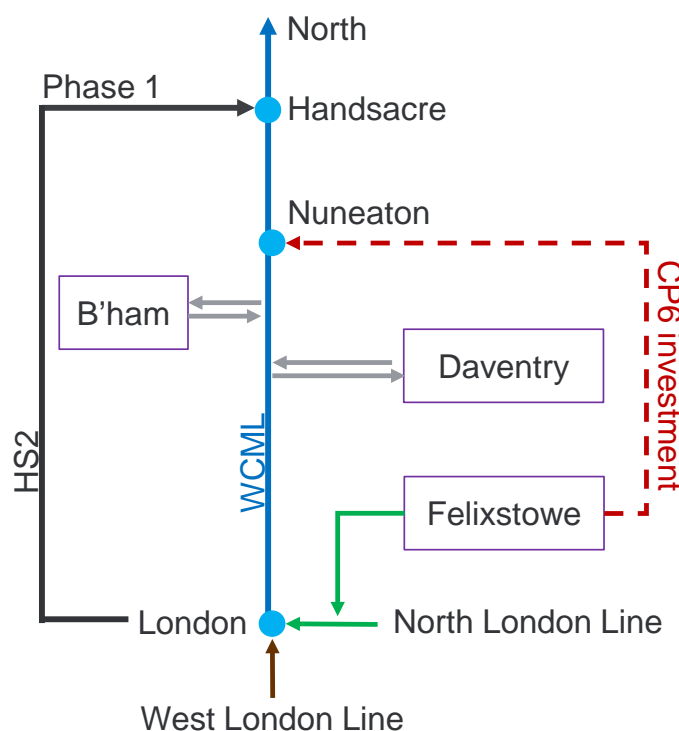


Figure 9 Schematic of WCML and HS2 Phase One

- 4.22 The Train Service Specification (TSS) presented to the Hybrid Bill Committee in January 2015 suggests that at least one extra freight train per hour in each direction could operate post Phase One between London and Handsacre and that a second might be possible as well. This is due to the greater space that would be available on the WCML Slow Lines from Euston if all fast commuter services to Milton Keynes and beyond switch to the Fast Lines by using paths that are currently utilised by inter-city trains. These paths could be used to transport freight to/from ports in London and the South and distribution centres in Daventry, the West Midlands, the North West and Scotland, subject of course to capacity being available in the right places elsewhere on the network.
- 4.23 The key benefit of Phase 2a for freight is that it would allow fast passenger trains to bypass three bottlenecks (the junction at Colwich, the two-track section south of Stafford and the junctions at Stafford itself) thus opening up more capacity for freight trains (and slower passenger trains) in these areas.

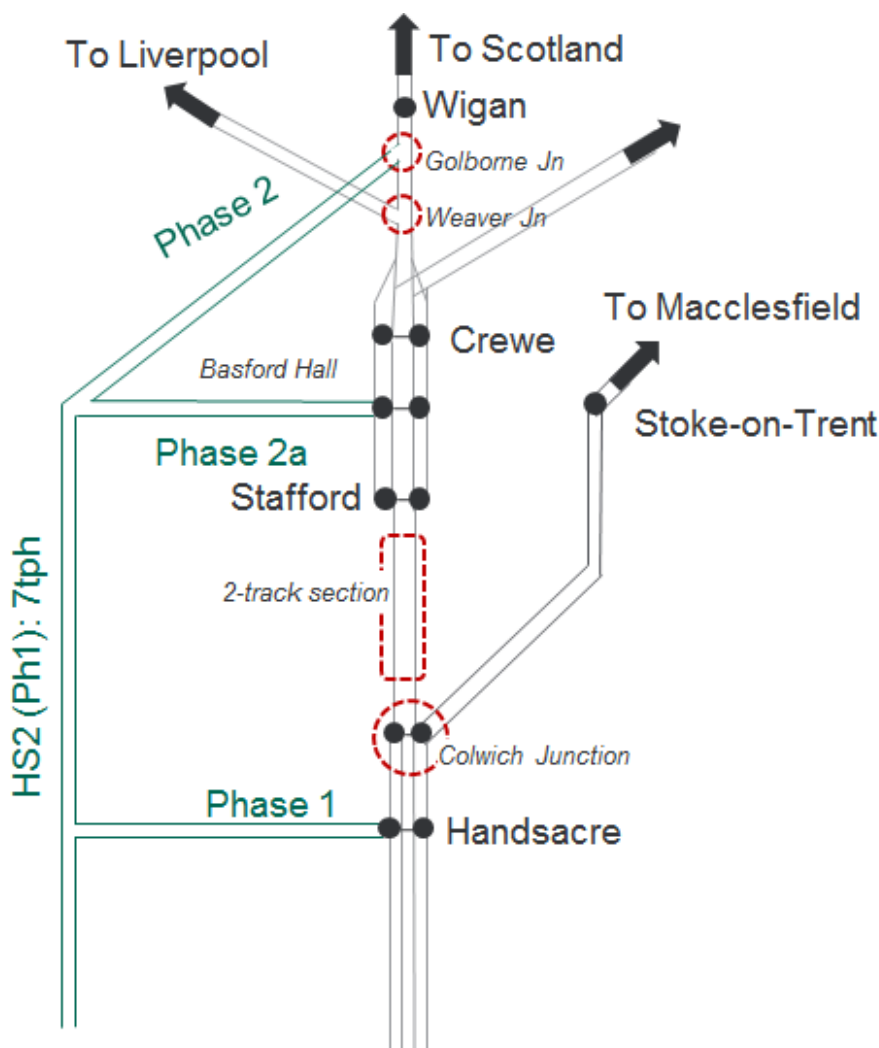


Figure 10 Schematic of WCML and HS2 Phase Two

- 4.24 The freight centre at Basford Hall, just south of Crewe, is a key location for re-forming trains and changing train crew. The approaches to it from Stafford are operationally complex, with non grade-separated junctions. The Phase 2a junction would bypass these crossovers, helping provide capacity for freight traffic between Basford Hall and London/the West Midlands.

4.25 The 2013 consultation for Phase Two proposes a further extension of the high speed line from Crewe to Golborne Junction, just south of Wigan - as well as to Manchester. This could release capacity for freight traffic between Crewe and Weaver Junction, where the route to Liverpool leaves the WCML. This could be utilised by freight services to the West Midlands, Daventry and London from expanded port facilities at Liverpool, once complete.

Conclusions

4.26 Taking these points together, the following table sets out what HS2 offers, by route section in addressing the capacity pressures on the WCML set out in Chapter 4.

4.27 Options for services are also being addressed through Network Rail's "Capacity Plus" work, and no decisions have yet been taken. There is a range of options open for both passenger and freight services and it will be for the industry's normal access planning process to produce the detailed timetable for services on the national network. In the interim, further development of today's network of services is likely. The DfT's franchising process is designed to respond to market conditions as they evolve. In particular, DfT expects that bidders for the next Inter City West Coast and London Midland franchises will explore options for providing more capacity both to London and Birmingham, and improving performance. The analyses of options such as train lengthening and the 'Strategic Alternative' illustrate the kind of challenges from a train planning perspective that the West Coast route faces but should not necessarily be read as indicating what DfT will be seeking in future Invitations to Tender (ITTs).

Route Section	Potential impact of HS2 on passenger and freight services
London Euston to Rugby	<p>New dedicated high speed lines into Euston could allow:</p> <ul style="list-style-type: none"> An increase in London Midland AM peak commuter services from 28 today to 41 allowing peak commuter crowding to be managed for the foreseeable future An increase in peak inter-city arrivals/departures to/ from Euston from 10/11 tph to 16 tph (10 tph via HS2 and 6 tph on the existing WCML) again allowing peak crowding on the core inter-city services to be managed for the foreseeable future An additional path for freight services in the off peak, possibly two, depending on the timetable development process Two "spare" paths could depressurise the WCML and give greater resilience to improve performance and reliability
Rugby to Birmingham New Street	<p>Phase One provides a high speed bypass of this section allowing inter-city trains to run into Birmingham without conflicts with interurban, local or freight services. This could allow:</p> <ul style="list-style-type: none"> An increase in stopping services along the Coventry corridor Cross Birmingham links from Leamington to Walsall and Birmingham International to Wolverhampton/Shrewsbury More frequent inter-city services from Wolverhampton and Shrewsbury to London Reinstatement of cross country service from Coventry/Birmingham International to the East Midlands/North East
Rugby to Crewe	<p>By operating existing inter-city services on high speed lines, Phase One releases five paths per hour on the existing WCML between Rugby and Lichfield. This is extended to Crewe by Phase 2a. This could allow:</p> <ul style="list-style-type: none"> Better service levels to Trent Valley stations New regional services such as Oxford (East-West rail) to Manchester or Milton Keynes to Liverpool Two additional freight services per hour
Crewe to Weaver Junction	<p>By running London and Birmingham to Scotland services on HS2, Phase Two will release two WCML paths each hour. This could allow:</p> <ul style="list-style-type: none"> Two London to Liverpool services each hour Improved regional connectivity with services connecting Crewe, Warrington, Wigan and Preston

	<ul style="list-style-type: none"> • Two additional freight services
Weaver Junction to Preston	<p>Phase Two is planned to join the existing WCML at Golborne Junction between Warrington and Wigan:</p> <ul style="list-style-type: none"> • Similar to the Crewe to Weaver Junction section, the two London/Birmingham to Scotland services will release paths between Weaver Junction and Golborne Junction
Weaver Junction to Liverpool	<ul style="list-style-type: none"> • Likely to benefit from any released capacity on the Crewe to Weaver Junction section of the WCML provided by Phase Two as there is existing spare capacity between Weaver Junction and Edge Hill
Colwich Junction/Norton Bridge to Manchester Piccadilly	<p>With Phase Two, there would in effect be another two-tracks on the approach to Manchester from the South. This could allow reshaping of services, such as:</p> <ul style="list-style-type: none"> • More stopping trains (e.g. from Stoke-on-Trent and Macclesfield) • Extension of the Derby to Crewe service to Manchester Airport • Improved frequency between South Wales and Manchester and Manchester Airport • Service frequency from mid-Cheshire to Manchester could be increased, and more connections via the Northern Hub scheme would become possible

Table 4 Potential for HS2 to solve capacity pressures on different sections of the WCML

4.28 By contrast, the Strategic Alternative would be a “patch and mend” solution to the capacity problems on the WCML. The considerable expenditure and disruption involved would provide some crowding relief via a limited extension of today’s services. However, there would be much less opportunity to reinstate services curtailed to accommodate the VHF (Very High Frequency) timetable, or improve connectivity to places that are currently poorly served. In addition, the opportunity would be missed to release capacity on the WCML to accommodate the growth in demand for freight paths that is forecast by Network Rail.

5. The East Coast Main Line

Introduction

5.1 The 2020 timetable that is planned to be operated by the new Inter City East Coast (ICEC) operator, Virgin East Coast, will increase the service level from 6tph to 7tph and be operated with new Intercity Express Programme (IEP) trains. The IEP trains have more Standard Class seats than today’s rolling stock and in total, the new train service will increase PM peak Standard Class capacity on the franchised East Coast operator by around 55 per cent.

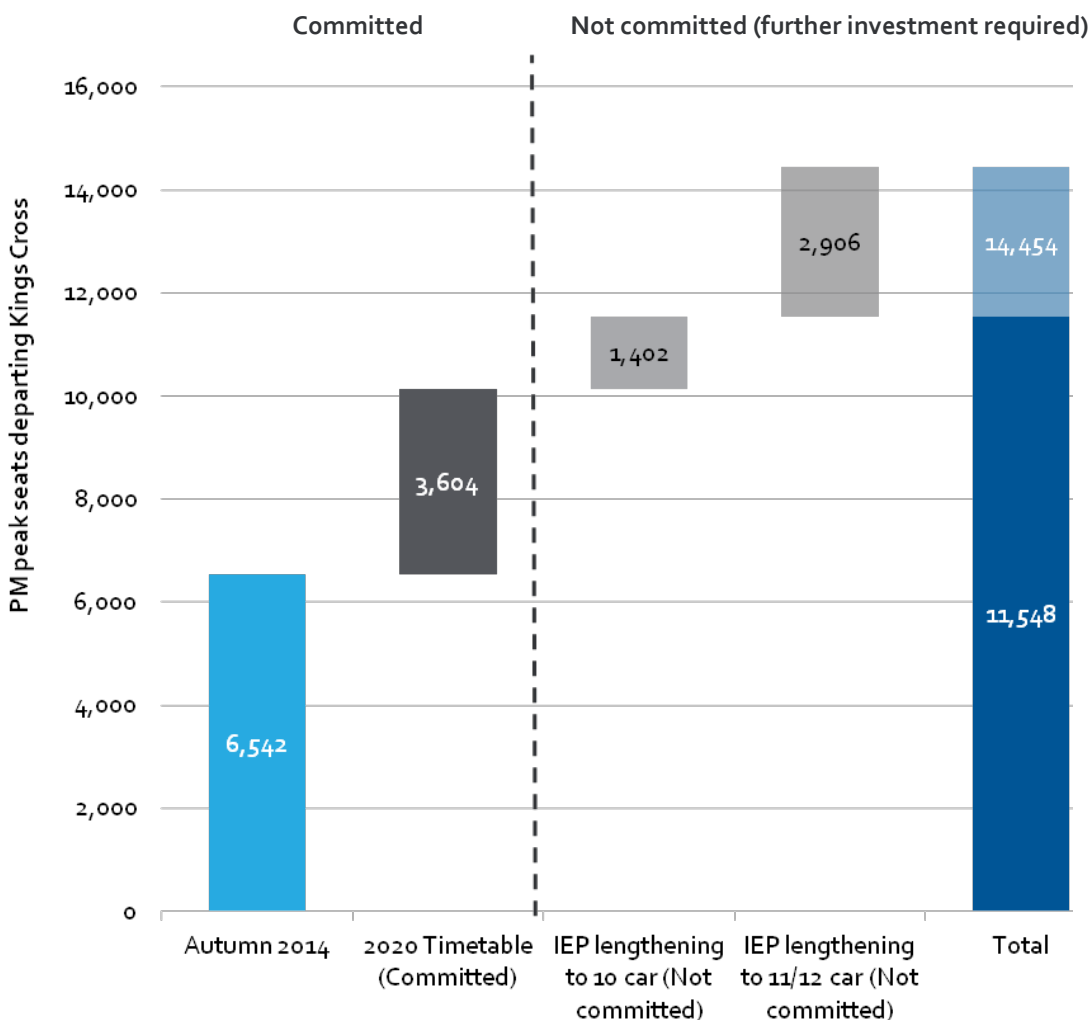


Figure 11 Planned and potential increases in ICEC capacity

5.2 Analysis based on Autumn 2014 count data suggests that if operating the 2020 timetable in 2033/34, PM peak load factors (number of passengers divided by the number of seats), would be 86 per cent under the Reference Case and 110 per cent in the Higher Growth scenario. Current load factors – at a point when a major

injection of capacity on the ECML is about to come on stream – are 83 per cent. This indicates that by the time the eastern leg of the HS2 “Y” network is scheduled to open in 2033/34, there will be a requirement for additional capacity on the ECML.

5.3 There are a wider range of options to increase capacity on the ECML than there are on the WCML. In the short term, all IEP services could be extended to run as 10-cars. There is then potential to move to 12-car operation. However, at this stage, expenditure for 10-car IEP operation is yet to be committed and the 12-car scheme is uncosted and would require platform lengthening and significant remodelling at stations throughout the route, including at King’s Cross, Newcastle and Edinburgh.

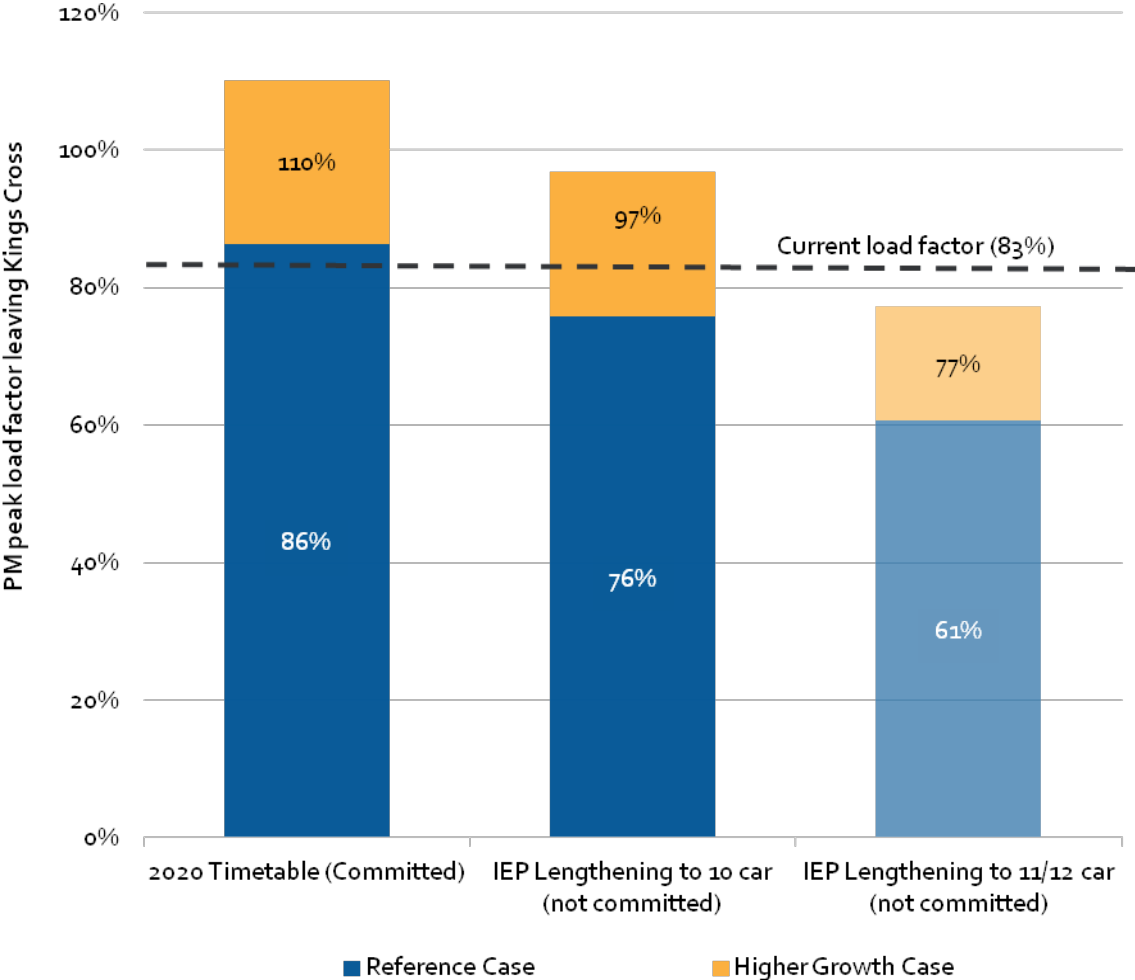


Figure 12 Estimated future ICEC PM peak load factors under planned and potential capacity scenarios

5.4 Whilst these options would help manage loadings, they would not give the same transformative connectivity benefits between Yorkshire and the North East and the East and West Midlands as the HS2 “Y” network. The same is true for potential capacity enhancement schemes on the Midland Main Line. Indeed, it is this combination of meeting long term capacity requirements and transforming connectivity between Britain’s major cities in a way that can provide a platform for rebalancing the national economy that forms the full Strategic Case for HS2.

6. Improving connectivity and delivering the Northern Powerhouse

- 6.1 The benefits of HS2 go far beyond providing a long term solution to the capacity problems on Britain's key strategic rail routes. In addition, by reducing journey times by as much as 40 per cent, HS2 will transform connectivity between Britain's major cities, thereby underpinning Government's wider aims of improving productivity and rebalancing the economy.
- 6.2 To understand how this will happen, it is first important to understand how significant the key inter-city rail connections that will be transformed by HS2 are to business in Britain today.
- 6.3 Ten English city regions, comprising the eight English "Core Cities", as well as Greater London and Derby, account for 35 per cent of the country's population²⁸ and employment²⁹. Of these ten English City Regions, nine will be served by the HS2 "Y" network, either directly or by services that will also use the existing rail network.
- 6.4 As shown below in Figure 13, the nine city regions that will be served by HS2 are currently linked by the WCML (London, West Midlands, Greater Manchester and Merseyside), the Midland Main Line (London, Derby, Nottingham and South Yorkshire) and the ECML (London, West Yorkshire and Tyne & Wear). In addition, Cross-Country services link Tyne & Wear, West Yorkshire, South Yorkshire, Nottingham, Derby and the West Midlands.

²⁸ Data source: Office of National Statistics census data

²⁹ Data source: Business Register and Employment Survey (BRES)

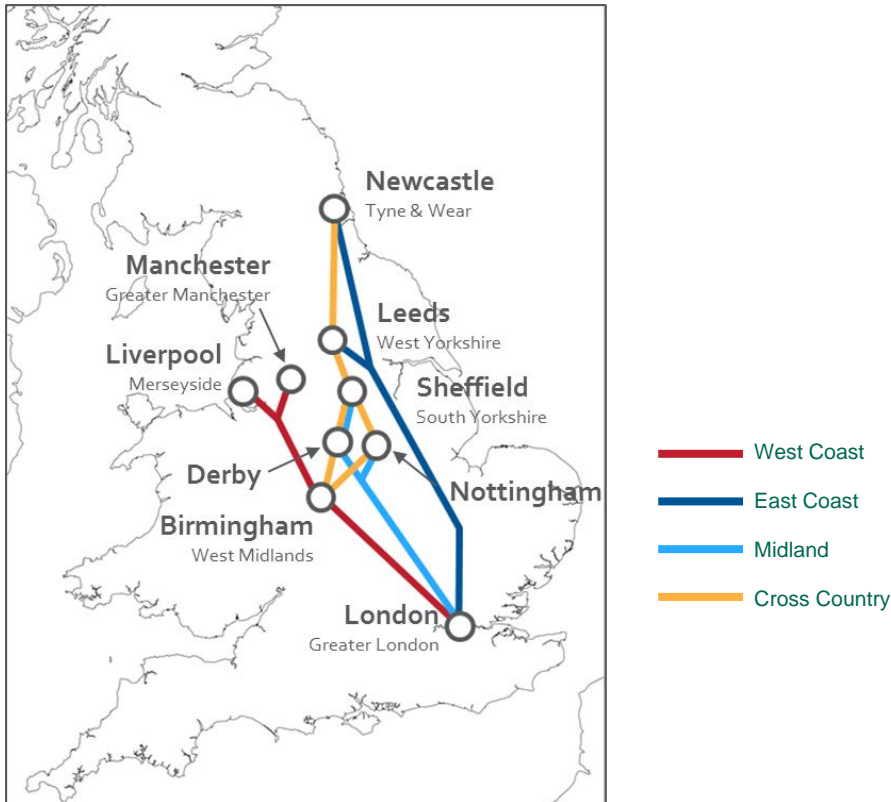


Figure 13 City Regions and Inter-city Rail Linkages

- 6.5 The rail corridors between these city regions are critical to business in Britain today.
- 6.6 Figure 14 below shows 45 per cent of passengers travelling on the rail corridors that will be served by HS2 are travelling for business. This compares to 13 per cent for the rail network as a whole.

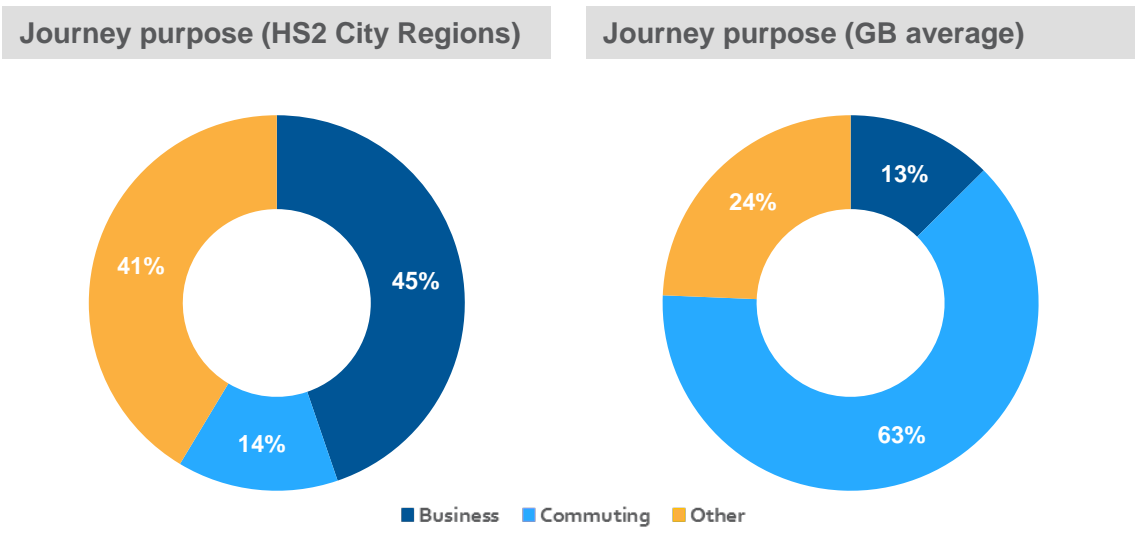


Figure 14 Journey purpose split³⁰

- 6.7 Following on from this, it is not surprising that in 2013/14, Britain’s top rail business flows were largely inter-city flows between stations that will be served by HS2.

³⁰ Data sources: RUDD (LENNON), National Travel Survey (2010 DfT)

Rank	Origin/Destination	Origin/Destination	Business Trips in 2013/14
1	London	Manchester	1,843,000
	London	Birmingham	1,528,000
	London	Leeds	853,000
	London	York	577,000
	London	Liverpool	491,000
	London	Bristol (Temple Meads)	487,000
	London	Coventry	479,000
	London	Cambridge	446,000
10	London	Bath Spa	426,000

Table 5 Business trips by rail in 2013/14, to and from London^{31 32}

6.8 HS2 will also serve three of the top ten non-London business flows in Britain. However, the relative scale of these non-London flows underlines the importance of good connections to London for businesses in the regions. For example, the scale of rail business travel between London and Manchester and London and Leeds is approximately eight times and four times the size of business travel by rail between Manchester and Leeds.

Rank	Origin/Destination	Origin/Destination	Business Trips in 2013/14
1	Glasgow	Edinburgh	314,000
2	Manchester	Leeds	227,000
3	Edinburgh	Newcastle	196,000
4	Birmingham	Manchester	145,000
5	Leeds	Sheffield	139,000
6	Leeds	York	136,000
7	Manchester	Stoke-on-Trent	108,000
8	Manchester	Liverpool	101,000
9	Newcastle	York	96,000
10	Birmingham	Liverpool	94,000

Table 6 Business trips by rail in 2013/14, non-London journeys³³

6.9 Over the last 20 years, these inter-city corridors with high volumes of business travel have seen unprecedented growth in rail travel. Looking at the four corridors that will be served by HS2, journeys have grown by 4.9 per cent each year as shown by Figure 15. This is compared with average annual growth of 4 per cent across the national network. The largest increase in demand has occurred on the WCML, which has experienced growth of 170 per cent since 1994/95.

6.10 As is also clear from Figure 15, the main period of upgrade works on the WCML – between 1999 and 2004 - was a period when the growth in WCML inter-city demand

³¹ Data sources: RUDD (LENNON), National Rail Travel Survey, Steer Davies Gleave analysis. Figures rounded to nearest 1,000

³² Please note that one of the city pairs in the top ten has been redacted from this table at the request of a Train Operating Company

³³ Data sources: RUDD (LENNON), National Rail Travel Survey, Steer Davies Gleave analysis. Figures rounded to nearest 1,000

was static. A similar works programme would need to be undertaken for the Strategic Alternative approach to addressing WCML capacity issues.

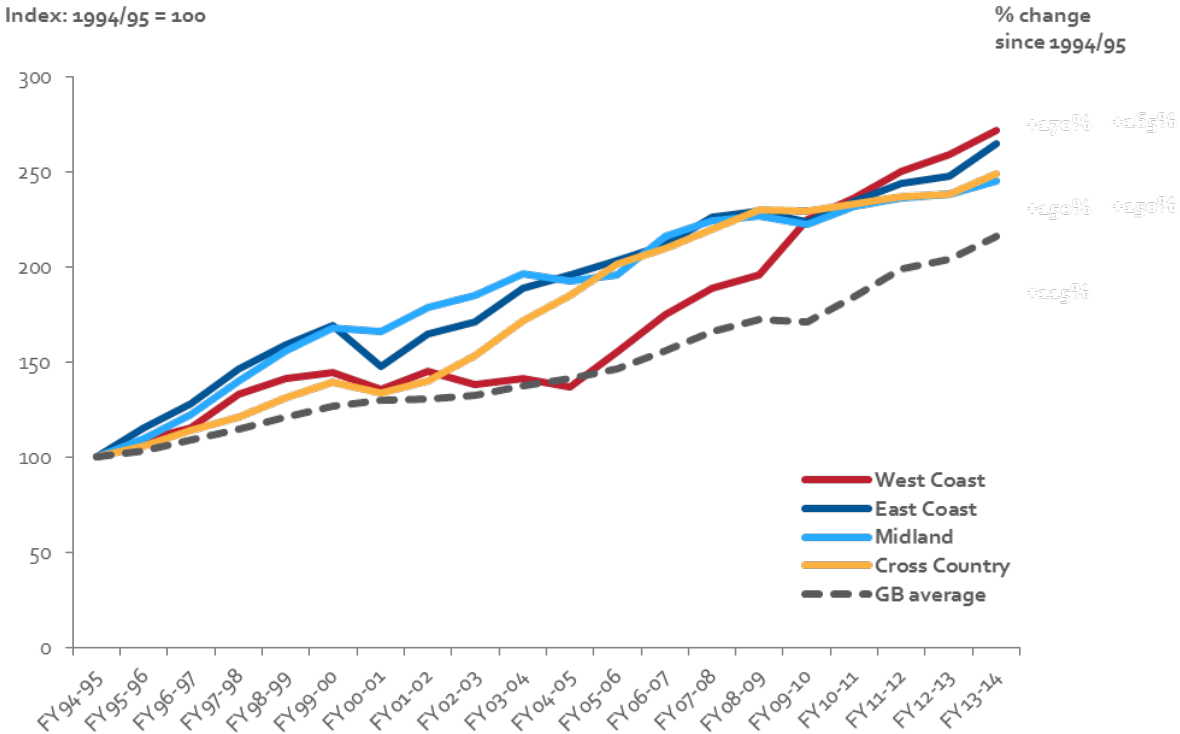


Figure 15 Growth in inter-city rail journeys by corridor, 1994-95 to 2013-14³⁴

- 6.11 Whilst the existing rail connections between Britain’s major city regions are vitally important to business today, changes in the structure of the UK economy indicate that they will become increasingly important over time.
- 6.12 In common with a number of other developed economies, there has been a marked shift in the UK economy away from manufacturing and towards service-based sectors. The extent to which the structure of employment in the UK has changed over the past 30 years is demonstrated by the employment data set out in Figure 16.

³⁴ Data sources: RUDD (LENNON), National Rail Travel Survey (2010, DfT), HS2 Limited

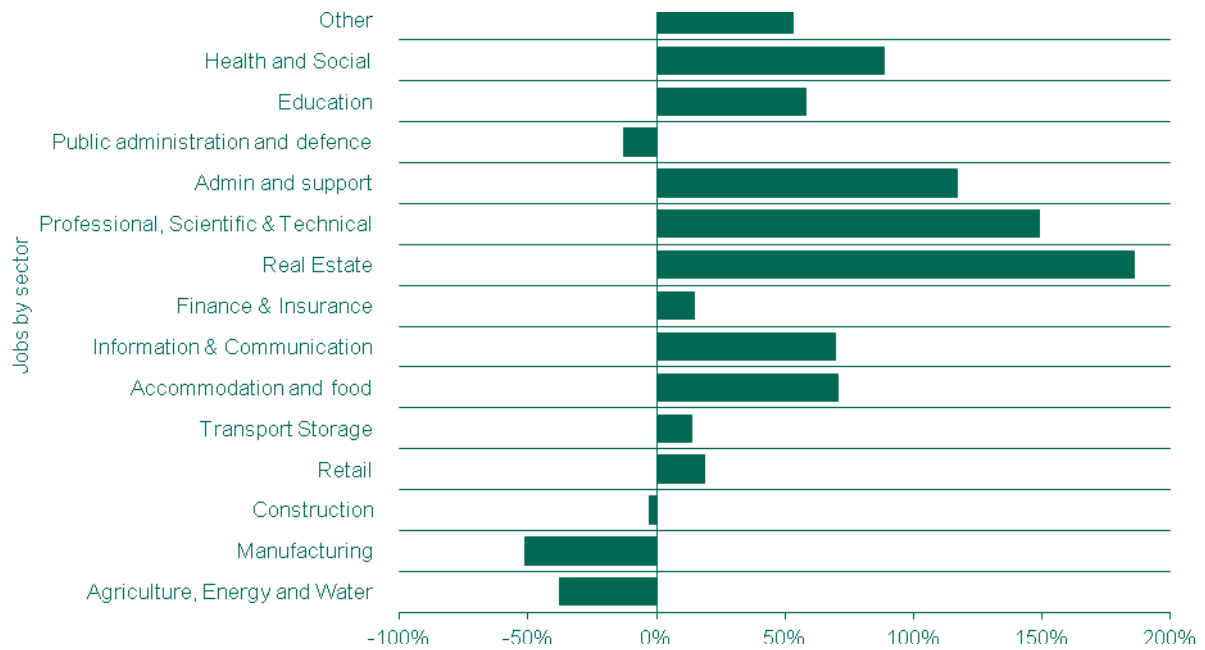


Figure 16 Change in UK jobs (1984 to 2014)³⁵

6.13 Employment data since the downturn in 2008 highlights two further notable trends.

6.14 Firstly, the UK's city regions have become increasingly important for job creation in recent years. Against the backdrop of a significant fall and subsequent recovery in total employment, 700,000 net jobs were created in city regions between 2008 and 2014. This is compared to an increase of 500,000 jobs elsewhere in the country. The rate of job growth in city regions has been more than twice the rate experienced elsewhere (7.2 per cent versus 3.3 per cent).

6.15 HM Treasury's recent report "Fixing the foundations: Creating a more prosperous nation" (HMT, 2015) emphasises the importance of having dynamic cities that can expand and adapt to meet the challenges of the 21st century. Cities attract high value firms and skilled workers, helping to boost the productivity of those who locate there. They also provide deep markets for labour, vibrant competition between firms and enable the rapid development of new ideas.

6.16 Secondly, Figure 17 illustrates that jobs in the information and communications sector and the professional, scientific and technology sector, remained particularly resilient during the downturn, especially when located in city regions. These areas form part of the economy known as knowledge-based sectors.

³⁵ Data source: Business Register and Employment Survey (BRES)

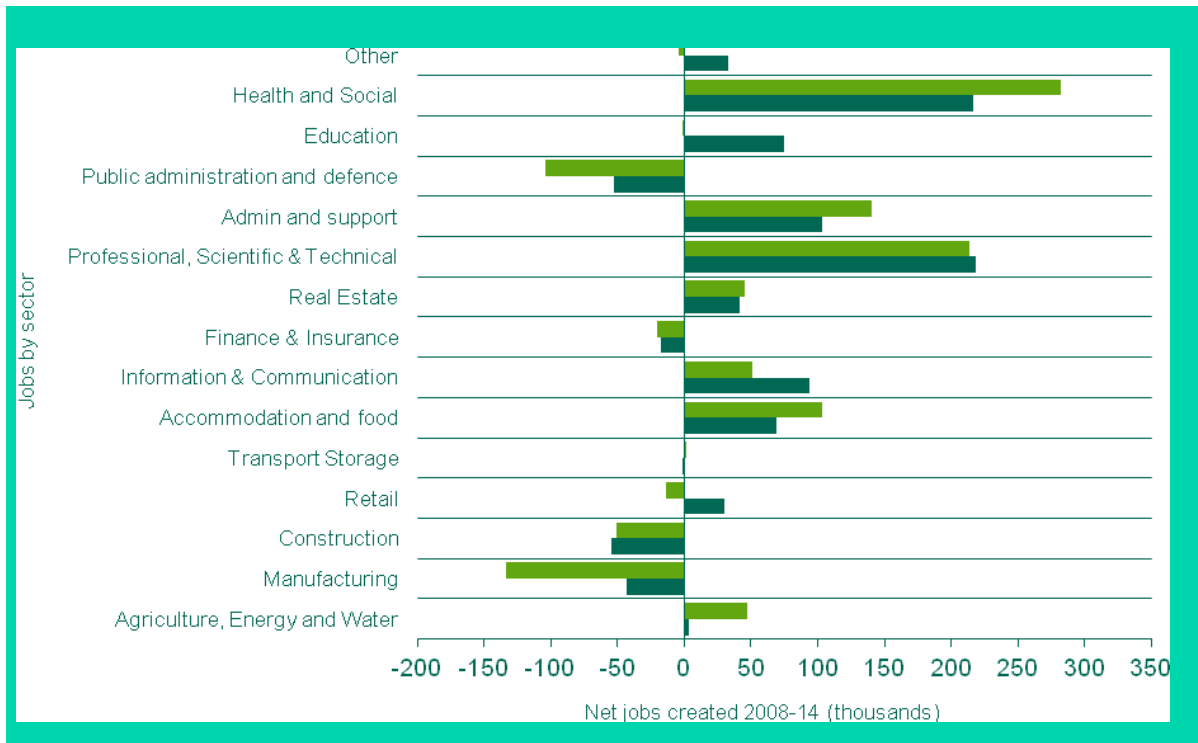


Figure 17 UK employment change by sector 2008-2014 (net jobs)³⁶

- 6.17 Over the past 30 years, employment in knowledge-based sectors such as financial and professional services, information technology and advanced manufacturing has grown from 3.1 million to 4.8 million, an average growth rate of 1.5 per cent per year. By contrast, over the same period employment in all other sectors grew from 20.1 million to 23.7 million, an average growth rate of just 0.6 per cent per year.
- 6.18 Jobs in knowledge-based sectors are highly productive. In 2013-14 knowledge-based sectors accounted for 17 per cent of all employment. However, these sectors contributed disproportionately to the performance of the economy by:
- Generating 23 per cent of national output (£339 billion out of £1,476 billion)
 - Supplying 34 per cent of exports (£170 billion out of £503 billion)

³⁶ Data source: Business Register and Employment Survey (BRES)

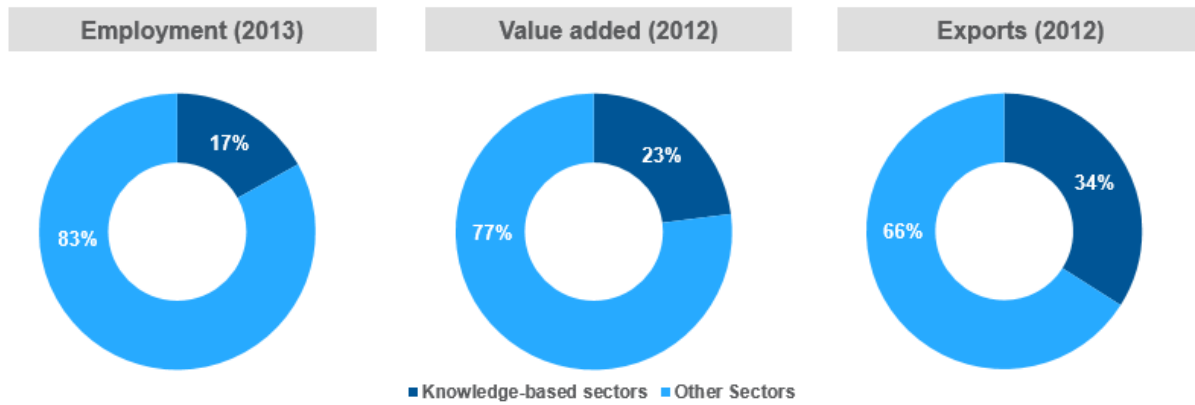


Figure 18 Contribution of knowledge-based sectors to the economy

- 6.19 In recent years, Government has devolved greater responsibility for stimulating local economic growth to those best placed to understand the circumstances that can influence the performance of the local economy. As a result, Local Enterprise Partnerships (LEPs) have developed Strategic Economic Plans (SEPs) which identify those sectors which they will promote as part of the strategic vision for their area.
- 6.20 It is notable that within their Strategic Economic Plans, the LEPs in Britain’s city regions are predominantly targeting knowledge-based sectors as the drivers of growth in their local economies.

City Region	Advanced Manufacturing	Financial and Professional Services	Digital and Creative
Bristol	✓	✓	✓
Birmingham	✓	✓	✓
Manchester	✓	✓	
Sheffield	✓	✓	✓
Leeds	✓	✓	✓
Newcastle		✓	✓
Liverpool	✓		
Derby/Nottingham	✓		✓
London	✓		✓

Table 7 Analysis of Strategic Economic Plans³⁷

- 6.21 The plans of the city regions are echoed in wider Government forecasts. The latest in the series of Working Futures documents published by the Department for Business, Innovation and Skills projects that 1.8 million jobs will be created in the United Kingdom between 2012 and 2022. Of this growth, nearly 40 per cent (or more than 700,000 new jobs) is expected to be created within knowledge-based sectors³⁸.
- 6.22 If rising city centre employment and the expansion of knowledge-based sectors are to be the key drivers of Britain’s economic growth, then analysis of travel patterns and the location of knowledge-based jobs quickly reinforces how HS2 can help the economy of tomorrow to thrive.

³⁷ Data source: Analysis of SEPs

³⁸ Data source: BRES, UK National Accounts (ONS) and Working Futures (BIS)

6.23 Travel data indicates that knowledge-based sectors employ a high proportion of individuals in occupations that travel more by rail for business, commuting and leisure³⁹.

6.24 Figure 19 illustrates the average annual distance travelled by rail for individuals across a range of occupations. Those in managerial (1,161 miles), professional (1,428 miles) and technical (1,174 miles) occupations travel approximately twice the national average distance by rail in a year (625 miles). In 2013 these three groups accounted for over 70 per cent of total rail passenger miles⁴⁰.

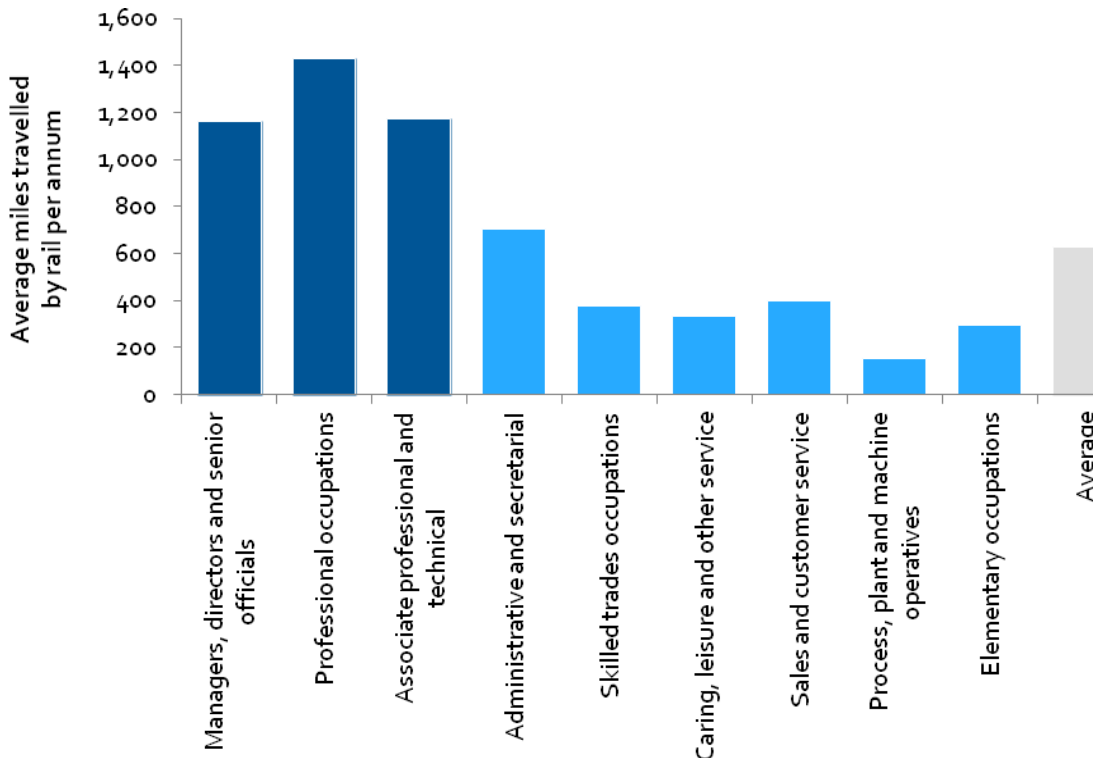


Figure 19 Rail miles travelled per year (2013) by occupation⁴¹

6.25 Figure 20 illustrates, that these are the very occupational groups that are employed most heavily in knowledge-based businesses. As a proportion of the total workforce, knowledge-based sectors employ almost twice as many individuals in managerial, professional and technical occupations as other sectors.

³⁹ Data source: National Travel Survey and Business Register and Employment Survey

⁴⁰ Data source: National Travel Survey

⁴¹ Data Source: National Travel Survey

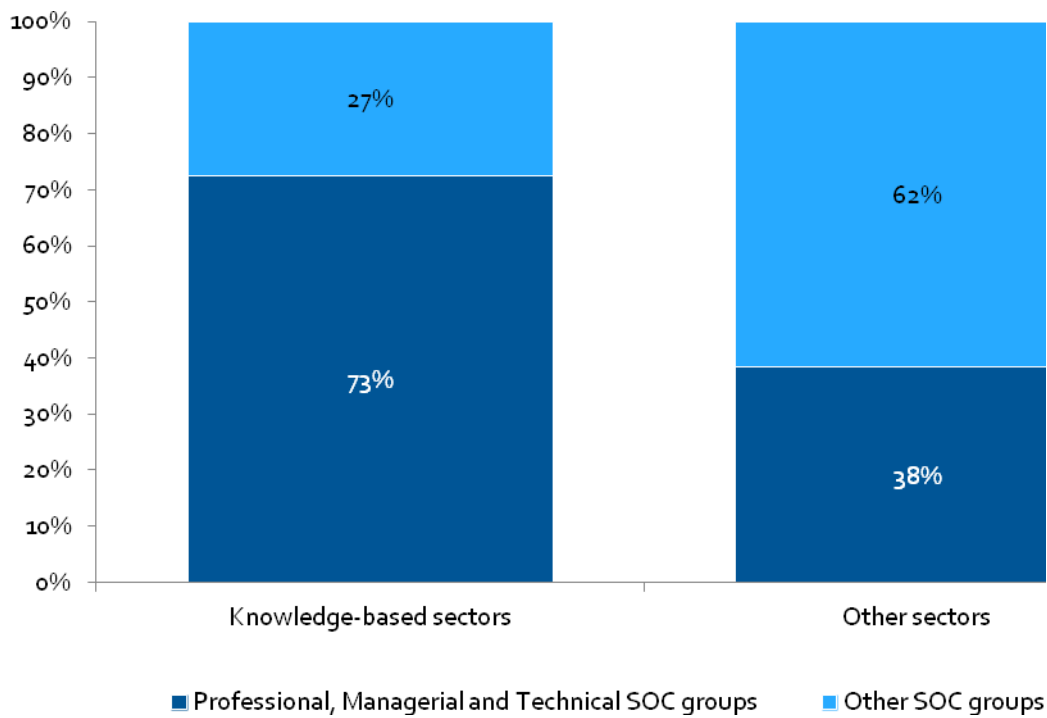


Figure 20 Ratio of managerial, professional and technical Standard Occupational Classifications (SOCs)⁴²

6.26 Furthermore, Figure 21 demonstrates that a large proportion of knowledge-based employment is located in those city regions that will be served by HS2 – either directly or by high speed services that will in part operate on the existing network. This is because cities provide large local markets for specialised labour skills and allow the frequency of interaction and information exchange that knowledge-based businesses require in order to flourish.

⁴² Data source: BRES, National Travel Survey

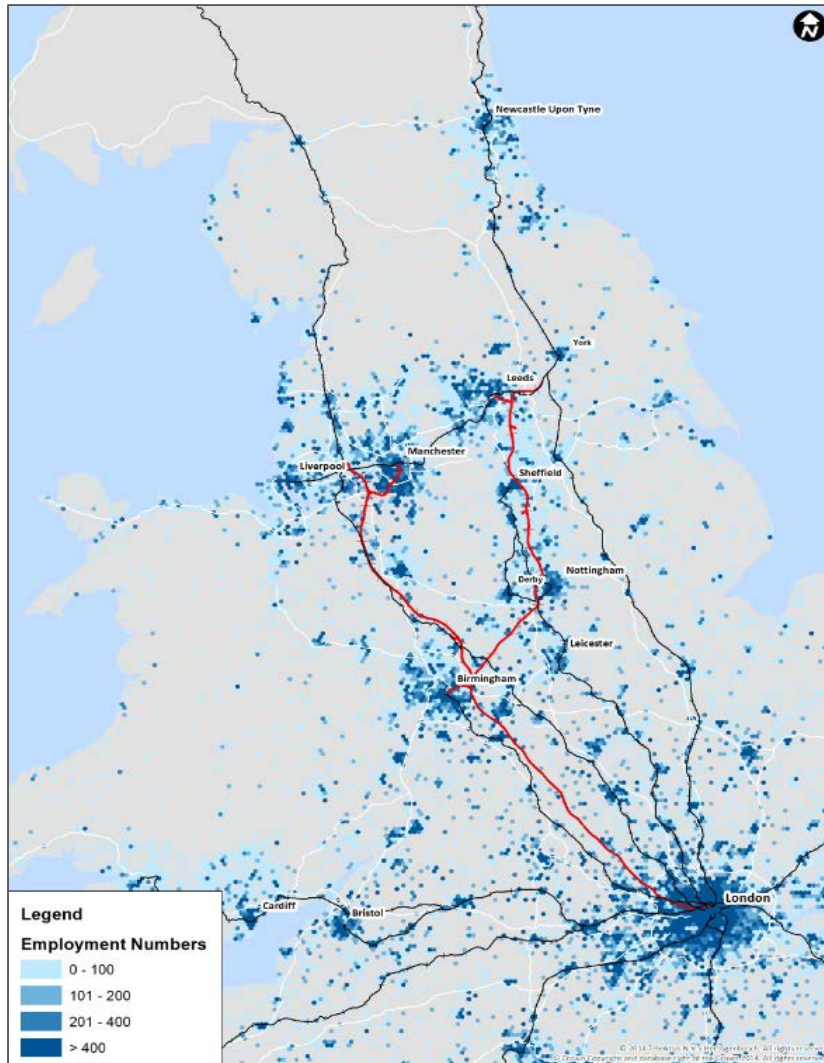


Figure 21 Location of jobs in knowledge-based sectors⁴³

What HS2 will deliver

6.27 Figure 22 illustrates how HS2 will transform journey times between London and Britain’s key city regions. Quicker journey times, higher frequencies, improvements to reliability and a high-quality travelling environment will reduce the barriers to trade between city regions and improve linkages with staff, suppliers, customers and competitors. In conjunction with the initiatives contained within their Strategic Economic Plans around governance and skills, this improvement in connectivity could assist the city regions in achieving their economic goals.

⁴³ Data source: BRES, ONS mid-year population estimates

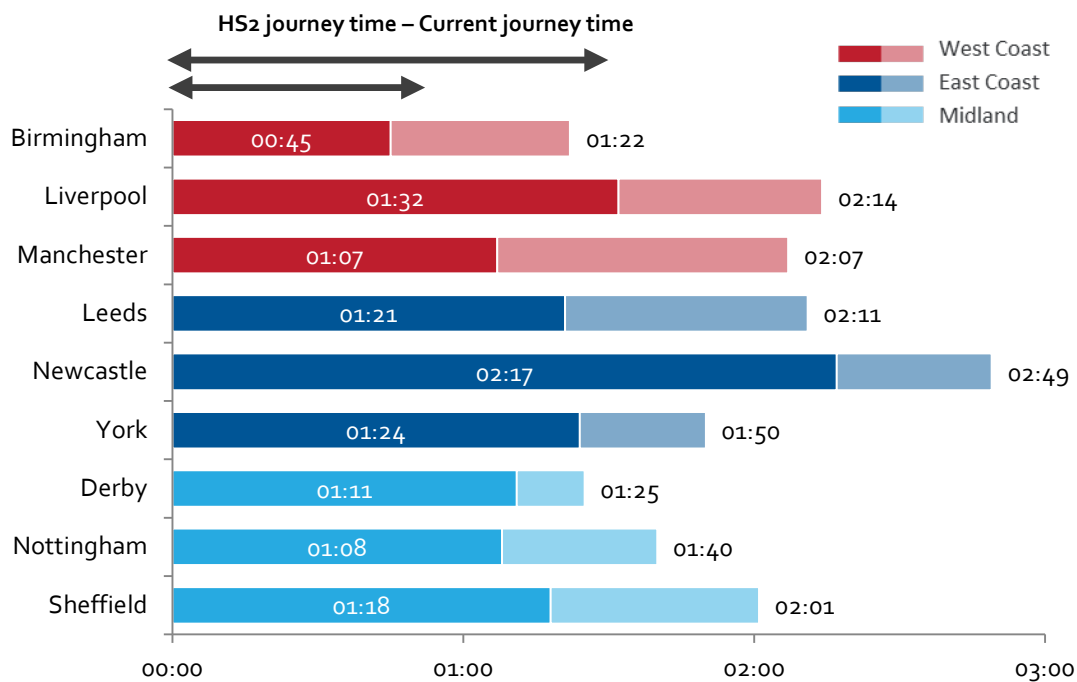


Figure 22 City centre journey times to/from London with and without HS2⁴⁴

6.28 As set out in Chapter 4, HS2 will also release capacity on the existing network, thereby allowing improved rail services for those commuting to city centre jobs - particularly around London, Birmingham and Manchester.

Rebalancing the economy

6.29 Analysis within the October 2013 Strategic Case set out how HS2 Limited (supported by KPMG) had examined the scale of the potential economic benefits of HS2 and their distribution between north and south. In particular it examined how the improvements in connectivity brought about by HS2 could increase the competitiveness of regions outside London and rebalance the future pattern of growth in Britain. These effects were expressed in two ways:

- Businesses becoming better connected to one another – businesses are better able to connect with potential suppliers, enabling them to access higher quality and/or lower cost inputs; closer to competitors, with opportunities to learn from each other and pressure for increased efficiency; and better able to connect with potential customers, enabling them to supply markets further afield
- Businesses becoming better connected to labour – individuals are able to access more jobs, whilst businesses are able to draw on a wider and deeper pool of potential workers

6.30 Figure 23 shows the proportional improvement in business to business and business to labour market connectivity that may be brought about by the full HS2 “Y” network.

⁴⁴ Data source: “High Speed Two: East and West The next steps to Crewe and beyond” (DfT 2015)

The study⁴⁵ showed that the major city regions in the North and the Midlands will experience a bigger proportional gain in these connectivity metrics than London.

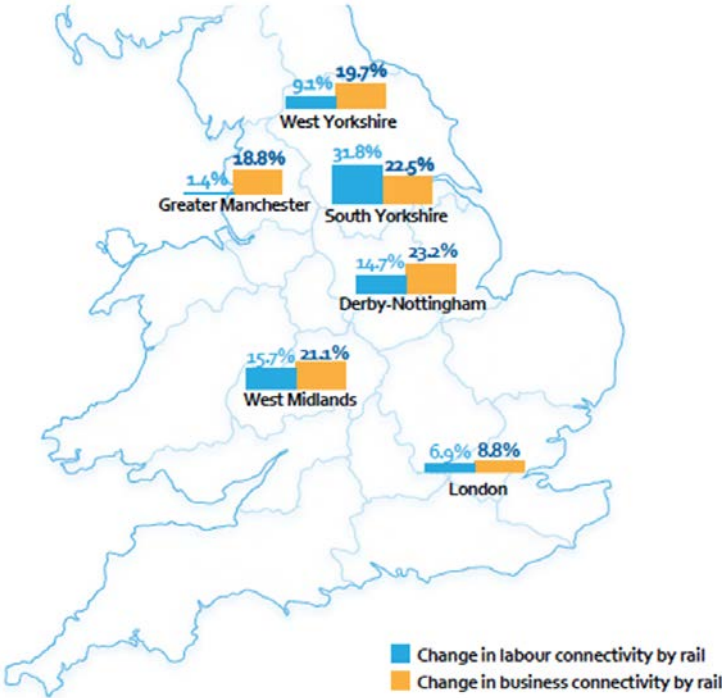


Figure 23 Improvements in rail connectivity for business and labour ⁴⁶

- 6.31 By boosting rail connectivity in this way, HS2 could help the North and the Midlands emulate the success of regions elsewhere in Europe where efficient and effective transport systems unite smaller towns and cities into single economic areas. Examples include the Randstad in the Netherlands and the Rhine-Ruhr in Germany.
- 6.32 The Randstad is one of largest metropolitan areas in Europe and includes the four most populous cities in the Netherlands (Amsterdam, The Hague, Rotterdam and Utrecht), and their surrounding areas. Its population is almost eight million people and it generates around half of the Netherlands’ output (£210 billion in 2011).
- 6.33 Cities within the Randstad are between 30 and 50 miles apart. They are served by an extensive road network and fast and frequent rail services (typically every 15 minutes). These inter-city links are supported by local rail, tram and bus connections. The Randstad is served by Europe’s largest seaport (Rotterdam), and one of Europe’s largest hub airports (Schiphol).
- 6.34 Rhine-Ruhr is the largest metropolitan area in Germany and includes the five cities of Dortmund, Dusseldorf, Duisburg, Essen and Cologne. It has a population of ten million and accounts for 13 per cent of Germany’s output (£250 billion in 2011). The region has a network of fast inter-city rail services, Regional Express (RE) trains serving main and regional centres and S Bahn trains serving all stations within the key corridors and is linked by an extensive Autobahn network.
- 6.35 In comparison to well-connected regions in Europe, journey times between city regions in the North and Midlands are long. Indeed, “One North a Proposition for an Interconnected North” (July 2014) suggests that poor journey times are one reason why the cities the Northern Powerhouse embodies lack the cohesion of the Randstad and Rhine-Ruhr regions. This is cited as a limiting factor on the ability of Britain’s

⁴⁵ Data source: “HS2 The Regional Economic Impact” (KPMG, 2013)
⁴⁶ Data source: Figure 5.5, “The Strategic Case for HS2”, (DfT October 2013)

Northern cities to deliver consistent economic growth⁴⁷. Indeed, Figure 24 highlights the difference between the economic performance of the northern city regions and that of comparator regions in Europe.

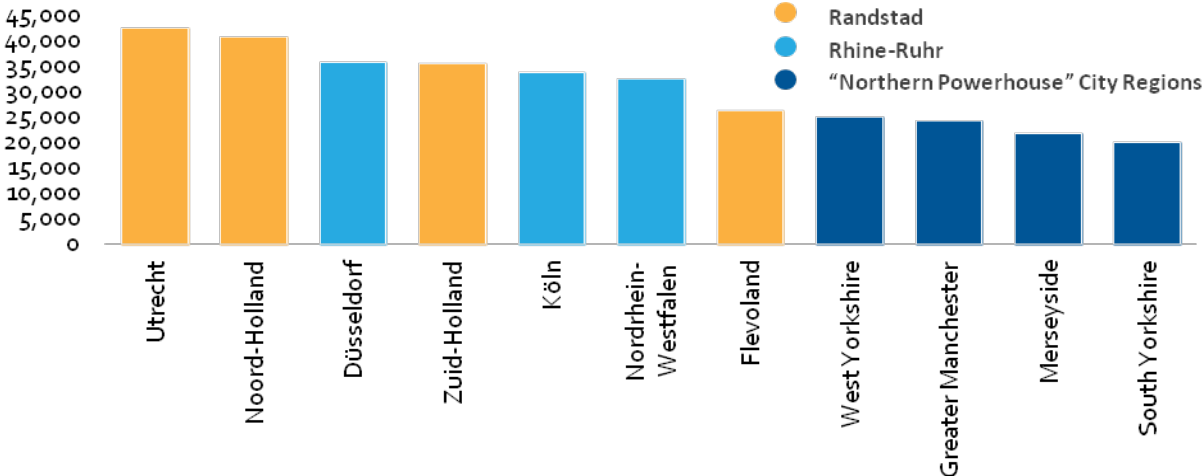


Figure 24 GDP per Capita (€2011)⁴⁸

6.36 Figure 25 sets out three diagrams, showing to scale the comparative rail journey times between the cities of the Northern Powerhouse and the Midlands and the Rhine-Ruhr and Randstad.

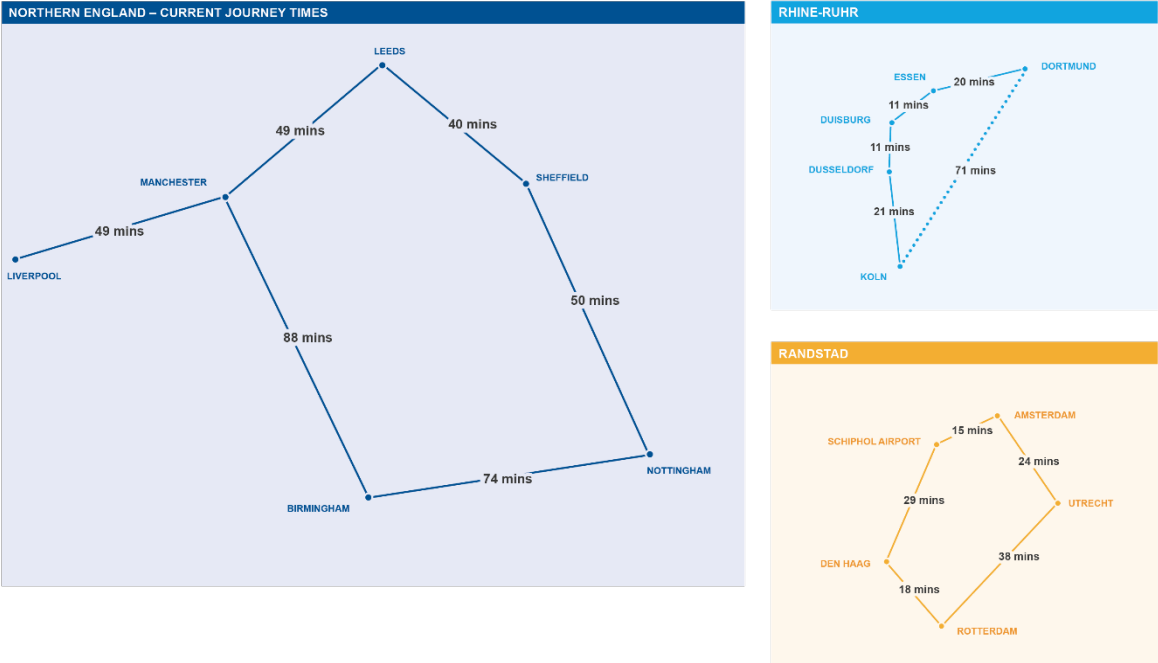


Figure 25 Comparison of rail connectivity between North/Midlands and Rhine-Ruhr and Randstad today

⁴⁷ "A Proposition for an Interconnected North" (One North, July 2014)

⁴⁸ Data source: Eurostat, (2011)

6.37 Figure 26 goes on to show how HS2, and a combination of HS2 and the realisation of the aspirations of the March 2015 Northern Transport Strategy (“The Northern Powerhouse: One Agenda, One Economy, One North” (March 2015) can lead to a step change in inter-city journey times. This transformation in connectivity could help make the North and the Midlands more coherent as economic regions with transport links that are comparable in quality to the Rhine-Ruhr and the Randstad.

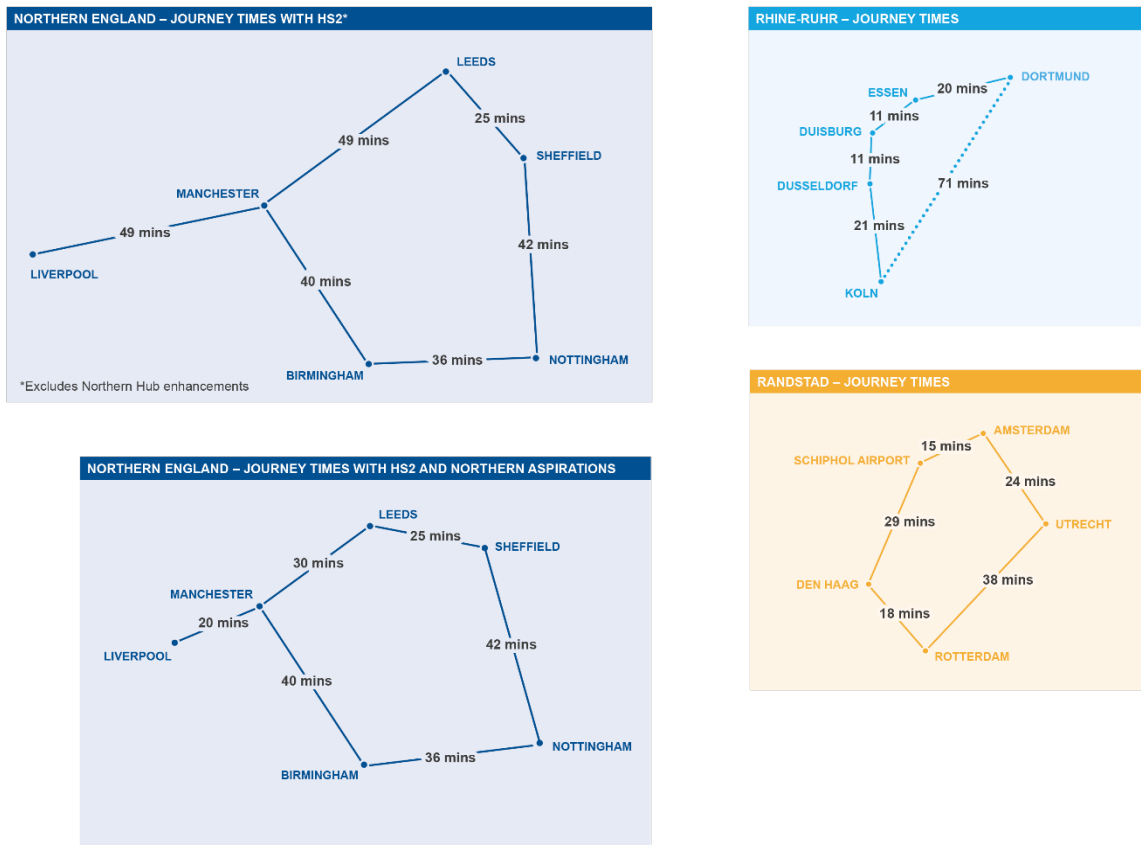


Figure 26 Comparison of rail connectivity between North/Midlands and Rhine-Ruhr and Randstad when HS2 and Northern Transport Strategy aspirations are added⁴⁹

⁴⁹ Data source: Rail Planner, One North (2014). Bahn.de, HS2 journey times are DfT analysis

Glossary

ECML – East Coast Main Line. The major mixed-traffic railway route on the eastern side of Britain, linking London, the South East and East Anglia with Yorkshire, the North East Regions and Scotland

EMU – Electric Multiple Unit

GDP – Gross Domestic Product

HS2 – High Speed 2 - the scheme for a national high speed rail network in Britain, serving London, Birmingham, Manchester and Leeds and a number of intermediate stations

ICWC – Intercity West Coast – the inter-city franchise on the WCML

Load factors – demand divided by capacity under DfT's PiXC measure (seating plus a standing allowance)

MML – Midland Main Line – a major mixed-traffic railway route linking London and Sheffield via Luton, Bedford, Kettering, Leicester, Derby, Nottingham and Chesterfield

Network Rail – the company that runs, maintains and develops Britain's tracks, signalling system, rail bridges, tunnels, level crossings, viaducts and key stations

NMF – the Department for Transport's Network Modelling Framework

ORR – Office of Rail and Road

P1 – an alternative option to HS2

PDFH – Passenger Demand Forecasting Handbook

PFM – Passenger Forecasting Model

Phase One – the first phase of the HS2 programme, involving a high speed rail link between London and Birmingham, to open in 2026

Phase Two – the second phase of the HS2 programme, involving extending the high speed rail network to Manchester and Leeds

Phase 2a – an acceleration of part of Phase Two

PiXC – Passengers in excess of capacity

PPM – Public Performance Measure

Released Capacity – routes and services on the classic rail network that could be made available to franchise operators to develop new markets for passenger and freight services when HS2 becomes operational

Strategic Case – “The Strategic Case for HS2” published by the Department for Transport in October 2013

TOC – Train Operating Company

Tph – trains per hour

TSS – Train Service Specification

VHF – Very High Frequency timetable

WCML – West Coast Main Line. The major inter-city railway route in the United Kingdom linking Greater London, the West Midlands, the North West, North Wales and the Central Belt of Scotland

WM – West Midlands franchise

“Y” shaped network – the HS2 network from London to Birmingham and then to Manchester and Leeds