

Leeds City Region and
Sheffield City Region

**The Case for High
Speed Rail to the Leeds
and Sheffield City
Regions**

Report on Main Findings

FINAL

ARUP

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Sheffield City Region

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Speed Rail to the Leeds
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1 Introduction

1.1 This Report

This report sets out the response from the Leeds and Sheffield city regions to the call for evidence on high speed rail. It sets out the economic case for a high speed rail link, as part of a coherent package to improve the rail network as a whole, serving the two city regions. It is supported by a background report setting out more detailed analysis and information.

1.2 Main Conclusions

- High speed rail should be developed as a project to deliver national economic transformation, helping improve the connectivity of the north of England with the key economic zone of London, as well as strengthening links between city regions in the north to create a stronger non-London economic zone as part of an approach to develop a more diverse and better distributed UK economy.
- There is a positive and strong economic case for a high speed rail link to the Leeds and Sheffield city regions, based on the size and scale of the two city regions which combined have a population of 4.4 million and around 2 million jobs. A new high speed line to the Leeds and Sheffield city regions would deliver substantial standard transport benefits of around £29bn and have a positive Benefit to Cost Ratio of 2.5¹. On top of these standard transport benefits, the enhanced connectivity provided by a high speed line to the Leeds and Sheffield city regions could deliver additional productivity gains of at least £1.5 billion (within a sensitivity range of £1.3bn to £3.1bn depending upon assumptions and options) to the two city regions, and to London. This estimate is based on using existing methods for assessing Wider Economic Benefits, which are best suited to quantifying the benefits of commuter rail routes, and may not capture all of the transformational benefits of long-distance high speed routes.
- High speed rail should be considered as part of a coherent strategy for the development of the wider rail network over the next 20-30 years – the development of high speed rail lines and the upgrade of existing rail routes are not mutually exclusive options, and it will be important for the Leeds and Sheffield city regions to secure upgrades to existing lines to improve connectivity and address capacity constraints in the short to medium term.
- Indeed, our analysis suggests that, in addition to substantial standard transport user benefits and a positive Benefit to Cost Ratio, enhancements to the East Coast Main Line could deliver £0.6-0.9bn in productivity gains which is also very significant. These improvements would deliver benefits to the Leeds and Sheffield City Regions, including Doncaster and York. An upgraded Midland Main Line could deliver almost £0.35-0.54 billion in productivity gains, mainly for the Sheffield city region, and electrification of the line could be delivered at no net cost to the rail industry over the relevant operating period. There is also a strong economic case for upgrades to the main Transpennine routes.
- Alongside options for improvements to long distance travel routes, commuter lines should also be improved to enhance capacity and connectivity by rail to support the Leeds and Sheffield City Region economies. It is vital there is good connectivity from across the city regions to the main nodes for fast national inter-urban or high speed rail. There is a strong case for electrification of several regional and local routes serving the two city regions.
- Options should be kept open on routes for High Speed Rail to the north of England. High Speed Two should be developed in a way and on a route so that it could be

¹ Source: Updated study undertaken for Strategic Rail Authority (2008)

extended to the Sheffield and Leeds City Regions on the east side of the Pennines. This will have implications for the alignment of HS2 between London and the West Midlands. The scope for a high speed route with a more easterly alignment (via the Cambridge-Peterborough area) should also be considered.

1.3 The Leeds and Sheffield City Regions

The Leeds and Sheffield city regions are a powerhouse of the economy of the north of England. They have around 2 million jobs and a population of 4.4 million.

The core cities Leeds and Sheffield are the main business and employment centres for the city regions. The city of Leeds provides work for over 400,000 employees, the highest level of employees in any district in the north and the third highest in England. Leeds has the highest level of employees in legal, financial and business services out of all districts in England outside London. With around 250,000 employees, Sheffield is also a significant employment centre, with a growing business services sector and strengths in advanced manufacturing, ranking within the top ten centres in the country. In the last five years to 2008 there was 6% jobs growth in Sheffield, a higher rate than Manchester, Birmingham or Leeds.

Linked to the core cities of Leeds and Sheffield are other important economic locations, including, in the Leeds City Region: Bradford (which is the 3rd largest city in the Region and an important location with the headquarters of several major companies); York (which is a science city and important concentration of financial services jobs); Halifax, Huddersfield, Wakefield and Harrogate. In the Sheffield City Region important economic locations include: Rotherham (which along with Sheffield is home to the advanced manufacturing cluster), the city of Doncaster, Barnsley (which is part of both city regions) and the northern parts of the East Midlands region that have close functional economic links to Sheffield.

Transport, and in particular rail, supports the economy of both city regions. It supports labour markets by enabling commuting to the main business centres. It provides vital links between the city regions to London, including some of the most significant, and until recently, fastest growing long distance rail markets in the UK. Transport also links the two city regions with each other, as well as neighbouring Manchester city region and the three cities (Nottingham, Leicester and Derby). But these inter-city region rail links are generally slow, limiting economic agglomeration between them.

1.4 Analysis Undertaken to Support this Report

The Leeds City Region and Sheffield City Region commissioned Arup with Volterra to advise on the benefits to the Leeds City Region and Sheffield City Region of a new high speed rail route, and / or upgrades to existing routes to provide faster journey times. The focus of the work has been to consider the wider economic and policy case for high speed rail to the two city regions, not to undertake a detailed assessment of route options. The work has comprised a high-level assessment of the possible journey time savings between key points to secure such benefits. This has been based on outline scenarios for the upgrade of existing rail routes, as well as for new high speed rail routes. An outline qualification of the wider economic benefits has been undertaken. A workshop was held with senior representatives of the relevant local authorities, the two city regions and Metro and South Yorkshire PTE to discuss strategic policy issues.

2 High Speed Rail as a Project to Deliver National Economic Transformation

2.1 Overview

A main conclusion from our analysis is the importance of high speed rail as a project to transform the UK economy, and in particular to enhance the economic competitiveness of the north of England. It is not just a project to address rail capacity constraints on routes in London and its surrounding regions.

2.2 Context

The economies of the three regions of the north of England (Yorkshire and the Humber, North East, North West) lag behind the other regions of England. According to the Northern way, there is a £30 billion productivity gap between the north and the other regions of England. Whilst the north of England did experience substantial economic growth during the decade before the current recession, this was at a lower rate than for other regions. A key Government Public Service Agreement target is to reduce the rate of divergence in regional economic growth rates².

Regional GVA figures highlight the disparity between the north and south. Yorkshire has the second lowest GVA per head in England (after the North East). This disparity has not reduced over the last twenty years, during which time London has pulled away and all Midland and Northern regions have dropped further behind. Yorkshire's per capita GVA is fifteen percentage points below the UK average, whilst London is 52 percentage points above.

Economic restructuring in recent decades, particularly the transition in employment from manufacturing to services has affected the national pattern of economic growth. The development of the national economy has been driven largely by growth in London and its surrounding regions, dominated by financial and business services and other knowledge based sectors. In the last decade alone, the UK has lost 1.2 million manufacturing jobs and gained the same number of jobs in business services. London has become known as the banking centre of the world and Europe's main business centre.

The main cities of the north have also been growing over the past 15 years, following previous decades of decline. The cities in the north that have grown most rapidly, including Leeds, Manchester and (in recent years and albeit from a lower base) Sheffield have been the most successful in developing financial, business and other knowledge-based sectors and services. In 2006, Leeds has the third highest level of employees in Financial Services out of all districts in the country, after the City of London and Tower Hamlets. In the five years before the current recession, there was 6% jobs growth in Sheffield, a higher rate than that for Manchester or Birmingham. The Sheffield city region has a significant proportion of jobs in knowledge intensive sectors, including advanced manufacturing. Investment in both city regions is needed so that this asset can be built upon and can continue to be the economic powerhouses of Yorkshire.

The Northern Way – the partnership between the three Regional Development Agencies in the north – has identified the economic importance of city regions, which comprise 90% of the economy of the north. City regions support concentrations and networks of firms and

² The Regional Economic Performance PSA target is to "Make sustainable improvements in the economic performance of all English regions and reduce the persistent gap in growth rates between the regions". See, <http://stats.berr.gov.uk/reppsa2/>

skilled labour markets, and face-to-face communications in key economic sectors³. These concentrations of high value functions, knowledge, services and people have been greatest in the most successful cities. However the effects of economic restructuring have impacted unevenly on different places. Some cities have been engines of growth, but the realisation of benefits to other locations, sometimes in geographical proximity to key business centres, has been limited, partly by poor transport links.

There are a number of factors that have been holding back the economic progress of the north. These include an under-skilled workforce, a poor quality housing offer, and barriers in terms of access to investment. Poor transport links have also impaired the ability of the north's city regions to fulfil their economic potential. Links within city regions are in some cases poor, with slow journey times, capacity and congestion problems and a poor journey experience. Recent work for the Northern Way on the relationship between city region connectivity and economic performance concluded that, "*It is clear that the issue of connectivity between core cities and their neighboring areas plays a key role in explaining differences in regional economic performance between the North and the Greater South East*"⁴.

Links to the main national hub of London and international gateways such as Heathrow are vital, particularly for knowledge based sectors that trade increasingly internationally. But these links are of variable quality, and face capacity constraints in the future. Yorkshire and Humber is at a particular disadvantage because it no longer has direct flights to Heathrow, despite the fact that there are around 407,000 air passenger journeys each year from people who live in the Leeds and Sheffield city regions. In contrast there are 15 flights each weekday from Manchester to Heathrow.

Links between city regions are a particular issue. Research has suggested that through greater collaboration between Manchester and Leeds, the two largest economies in the north of England, and between the Leeds and Sheffield city regions and main cities of the East Midlands increased agglomeration benefits could be accrued⁵. Through creating more synergy between these economies it may be possible to achieve the 'spill over benefits' that have been recorded in the south east. However poor quality transport, particularly rail links between city regions, limit the scope to achieve such agglomeration benefits.

Because of existing slow rail journey times, capacity constraints (on road as well as rail) and, in the case of Leeds-Sheffield poor frequencies of the fastest services, it is difficult for people to live in many parts of one city region and commute to main business hubs in an adjacent city region, despite the fact that the distances involved are not huge (Leeds, Sheffield and Manchester are only around 40 miles apart). In contrast the London and South East mega-city region extends 60-70 miles from London. The problem is illustrated by the fact that the average journey times of the fastest trains between Leeds and Sheffield is only 47mph, and the frequency of these fastest services is only hourly. The average speed of the Leeds – Sheffield – Nottingham services is only 36 mph, an almost two-hour journey to cover a distance of around 70 miles.

In the context of the recession there is an opportunity to consider how a more diverse, better distributed model of economic growth might be pursued. This could be based on a wider range of knowledge-based services, including financial and business services, and also advanced manufacturing and technology, health and education. Within this context a major policy challenge is to develop the distinct economic strengths and potential of the north in a

³ See, "*The Roles and Functions of City Regions of the North*", Centre for Urban Policy Studies, University of Manchester, Institute for Political and Economic Governance, University of Manchester with David Coates, independent economic researcher, on behalf of the Northern Way, 2008

⁴ See, "*City Links: Integration and Isolation*", Lucci, P. and Hildreth, P. Centre for Cities and Centre for Sustainable Urban Futures at Salford University for Northern Way, 2008.

⁵ See, "*Connecting the North: Interdependence and barriers: road air and rail links*", Centre for Urban Policy Studies, University of Manchester, Institute for Political and Economic Governance, University of Manchester with David Coates, independent economic researcher, on behalf of the Northern Way, 2008

way that is mainstream, not incidental to the UK. This will require a move away from the narrative of the “north versus south.” It will require policy propositions based on what investment and sustainable growth in the north can offer to a more balanced approach to the economic development of the UK.

2.3 The Potential Role of High Speed Rail

As well as supporting the economy of London and the South East by expanding their economic reach and catchments for labour, high speed rail could support the development of a stronger economic zone in the north of England and East Midlands⁶. In particular, by strengthening linkages between the Leeds, Sheffield, Three Cities (Nottingham, Leicester and Derby) and Manchester city regions and connections from them to London and its international gateways, there is significant scope to enhance networking benefits and integrate labour markets.

Whilst unrealistic, and probably undesirable, to expect high speed rail to result in daily commuting to London, these city regions could be made more economically connected to London by making business travel to the capital far quicker and easier. Faster connections to Heathrow and rail connections to the continent by High Speed One would significantly enhance the economic competitiveness of city regions outside London and the South East

Within the north, high speed rail could help expand and integrate the economic space and labour market catchments of city regions. This could be achieved either through new high speed connections directly between key locations in different city regions, or by freeing up capacity for faster conventional rail services.

The role which HS1 is expected to play in regenerating parts of the South East and examples of its impact in Europe are discussed in the next section.

⁶ See, “*Regional Futures: England’s Regions in 2030?*”, Arup with Oxford Economic on behalf of England’s RDAs, England’s Regional Assemblies, CLG and DfT; and a paper based on the Regional Futures work, “*Regional Development and High Speed Rail*”, Greengauge 21:

3 The Economic Benefits of High Speed Rail Serving the Leeds and Sheffield City regions

3.1 Overview: the case for High Speed Rail for the Leeds and Sheffield City Regions

There is a strong economic case for High Speed Rail serving the Leeds and Sheffield City Regions. It would:

- According to previous work⁷, deliver substantial standard transport benefits of £29bn and a positive Benefit to Cost Ratio of 2.5 for the East Coast route.
- In addition to standard transport benefits, deliver additional productivity gains of £1.5 billion (within a sensitivity range of £1.3bn to £1.9bn) to £2.4 billion (£2.1bn to £3.1bn) productivity gains to the two city regions and London⁸ (the benefits to London would be those that stem from improvements to connectivity to the Leeds and Sheffield City Regions);
- Transform the regional economy by bringing business within an easy days travel time to London;
- Build on the successes of the main economic centres – the Leeds and Sheffield city regions are the location for 2 million jobs and 4.4 million residents; Leeds is the largest employment location in the north, and the largest concentration of financial services jobs of any city in England outside London; and Sheffield has been one of the fastest growing UK regional cities in terms of jobs in the past five years;
- Improve transport connections from the region to London – the routes between Yorkshire and London include some of the largest and fastest growing rail markets in the UK and play a key role in the region's attractiveness for investment in key economic sectors;
- Address problems of future capacity constraints on existing north-south rail routes;
- Address the problem of poor rail links between main centres in the region, and with key centres in adjacent regions (for example the average speed of the Leeds-Sheffield-Nottingham services is 36 miles per hour) – which limit the ability of businesses to access markets and people to access jobs in adjacent city regions, limiting economic agglomeration benefits.
- Improve links from the region to key international gateways – the region is at a major competitive disadvantage from having no flights, and poor surface connections to Heathrow; and
- Help improve connections between the Leeds and Sheffield city regions (the current average speed of the fastest trains between Leeds and Sheffield is 47 miles per hour) supporting business clustering, and expanding the labour market of main business centres.

3.2 Evaluation Methods

3.2.1 General Issues

Whilst many reports have been published on the potential benefits of high speed rail, none have completely concluded about the reason why we want it or the correct evaluation method for it. For example, an unresolved issue remains that a high speed line through the West Midlands which reduces travel times to London to less than one hour could result in

⁷ Atkins work on High Speed Rail for the Strategic Rail Authority, updated in 2008.

⁸ Net Present Values of estimated annual productivity gains over 60 year period.

Birmingham becoming a commuter suburb of London and effectively being integrated into the Greater South East. This scenario and its effect on the economies of the Midlands and the North have not been assessed completely.

Similarly, whilst studies have considered the potential benefits of lines to the North West or Yorkshire or both, none have attempted to assess the potential detrimental effect a line going to one but not the other could have upon the future economic development of the North. Before any conclusions are reached, these issues should be addressed.

We conclude that a strong economic case does exist for further high speed rail in the UK – using the DfT guidance on pure agglomeration and European examples highlights that it could result in real and significant benefits. However gaps in the analysis still exist which should be filled prior to deciding on route preferences.

3.2.2 Wider Economic Benefits

Guidance from the Department for Transport on Wider Economic Benefits (WEBs) is intended to quantify the potential economic impacts of transport improvements upon business productivity.

One aspect of this methodology, ‘pure agglomeration’, estimates the increase in productivity for existing workers as a result of a higher density of workers being closer together. This is the element which has been used most widely in studies to date to assess the potential benefits of High Speed Rail.

The WEBs guidance emerged following a particular type of investment (Crossrail) that increased the accessibility to a single key business area (London) and as a result the approach is most appropriate for assessing the benefits of relieving (commuting) capacity constraints into productive city centres.

High speed rail links can and often do improve accessibility to key business areas and it is envisaged that the domestic services on HS1 will be used significantly for commuting into London, making the WEBs methodology very appropriate for assessing the benefits of that high speed line. However it is important to consider the ranges of travel times being effected by HSR before applying this methodology and interpreting the results.

It is generally accepted that journey times of under an hour begin to appeal as commuter routes, journey times up to 2-3 hours allow businesses to carry out face to face day meetings on a semi-regular basis and journey times of over 3 hours are associated with less frequent business travel, for which air travel begins to compete. In the context of Leeds and Sheffield city regions, it is the central bracket which high speed rail will primarily impact upon – making it more practical to conduct day meetings between businesses in Yorkshire and London.

The ‘pure agglomeration’ element of the WEBs methodology captures this impact to a reasonable extent. It evaluates the productivity benefits of business centres becoming ‘effectively’ denser – that is to say that if there are 10 jobs in place A and 20 jobs in place B and they are 30 minutes apart, both places A and B become effectively denser by reducing the travel time between them as they have more ready access to the other place’s labour market and business services.

We use the ‘pure agglomeration’ method to assess the relative benefits to the Leeds and Sheffield city regions of options for enhancements to existing lines and options for high speed rail. In summary, we find that enhancements could lead to annual productivity benefits to the two city regions of between £5m and £10m and high speed options would increase this to £19m-£34m, with similar magnitudes of benefits also accruing to London.

The following four scenarios were evaluated against the current situation:

- Enhanced Midland Main Line: upgrade of existing route including new vehicles, removal of line speed constraints, in-fill electrification between London and Leeds via Sheffield,

two trains per hour assumed from London and Sheffield, and one additional fast service between Sheffield to Leeds via Wakefield Westgate is assumed (for example one MML service would continue from Sheffield to Leeds in addition to the hourly Cross Country service);

- Enhanced East Coast Main Line: upgrade of existing route including new vehicles, introduction of a revised timetable and the removal of line speed constraints between London-York/Leeds-North East-Scotland;
- High Speed Rail – central alignment⁹: new alignment between London-Leicester-Nottingham-Sheffield-Leeds-Newcastle-Edinburgh-Glasgow; and
- High Speed Rail – eastern alignment¹⁰: new alignment between London-Peterborough-Nottingham-Sheffield-Leeds with links to classic rail for onwards journeys to the ECML to the North East and Scotland.

The first two are enhancements to existing routes and the latter two are options for high speed rail routes. We estimated journey time savings based on benchmarks from other routes, and used standard DfT guidance on productivity, elasticities and discounting to evaluate these options.

The journey time assumptions stemming from these scenarios are set out in Table 3.1 overleaf. Further details on the modeling process including assumed future journey times between station pairs are provided in the background note on assumptions.

We have not considered a high speed rail option from Leeds to London via Manchester and the West Midlands. This is because this is unlikely to deliver any significant journey time to the Leeds City Region, and would not serve the Sheffield City Region. The benefits to the two city regions in terms of north-south connectivity would therefore be modest. However the Leeds City Region would benefit from improved links to the Manchester City Region. However substantial improvements could also be delivered to the existing transpennine route and services, through line-speed improvements, removal of capacity constraints and possible electrification.

Table 3.1: Assumed Journey Times (minutes) Between Key Points for Scenarios for High Speed Rail and Enhancements to Existing Routes

Origin	Destination	Do Nothing	Enhanced MML and ECML	High Speed Rail – Central Alignment	High Speed Rail – Eastern Alignment
Leeds	London	135	120	106	114
Sheffield	London	127	114	81	88
Leeds	Sheffield	42	38	25	25

Source: Estimated by Arup

3.3 Estimate of Wider Economic Benefits

3.3.1 Benefits of Main North South Options

The table below summarises the estimated annual productivity benefits and the Net Present Value (NPV) over a typical 60 year appraisal period, discounted to 2002 prices, to the two city regions and London (as defined below) from the four options against a Do Nothing scenario. In order that the benefits can be compared against one another without being confused by discounting factors, we have assumed that the improvements all occur at the

⁹ Based loosely on the 2M Group's proposals for high speed rail. See: <http://www.2mgroup.org.uk/>

¹⁰ Based loosely on Option 16 considered in the Atkins report of high speed rail for the Strategic Rail Authority

same future point in time and assessed them all against the existing situation. Within the analysis wherever there are judgements to be made, we have been conservative. It should be stressed that the figures set out in the table are the wider productivity benefits from the different options, which would be in addition to the standard transport user benefits which would also be significant given the forecast capacity constraints on existing lines.

Our analysis has considered the journey time savings from all LCR and SCR districts to each other and destinations in London, Scotland, the North East and the Midlands. We have also undertaken the analysis to assess the benefits to London from these options. The figures reported for London are only partial however as they value the benefits to London of improvements in travel times to Yorkshire but the travel times are kept constant to the other destinations (Scotland, North East and Midlands).

Table 3.2: Annual Productivity Gains of (£m, 2002 prices), Additional to Standard Transport User Benefits, for Scenarios for High Speed Rail and Enhancements to Existing Routes

	Enhanced ECML	Enhanced MML	High Speed Rail – Central Alignment	High Speed Rail – Eastern Alignment
Leeds City Region	8.4	0.9	23.5	11.0
Sheffield City Region	1.4	4.4	10.5	8.0
London	9.7	4.8	30.5	20.6
Total	19.5	10.1	64.4	39.7

Source: Volterra Note For the purposes of this table Barnsley is included in the SCR but not the LCR, to avoid confusion and double counting

Table 3.3: 60 Year Net Present Value (£m, 2002 prices) of Scenarios for High Speed Rail and Enhancements to Existing Routes

	Enhanced ECML	Enhanced MML	High Speed Rail – Central Alignment	High Speed Rail – Eastern Alignment
Total	710	370	2360	1450
Leeds and Sheffield City Regions	360	190	1240	700

Source: Volterra

The table above shows that the high speed lines yield benefits which are significantly higher than the enhancement options. On the whole, the LCR benefits more than the SCR but both would benefit from significant annual productivity gains as a result of all options. Of the high speed options, the Central Alignment route results in the highest overall benefits but the Eastern Alignment route results in a more even division of benefits between the two city regions. This result is reasonably accurate for the two city regions of primary interest here, but the overall benefits from the Eastern Alignment route are likely to be higher than this because the magnitude of the results presented are partially due to the geography over which we have carried out the evaluation – the route of Eastern Alignment would suggest it may result in larger benefits to the East Midlands, for example, which is only partially considered here.

The previous work which is most comparable to the analysis we have discussed in this report is the SDG North-South Connections study which estimated that an entire northern network (West, East and trans-Pennine routes) would result in productivity benefits to the

north of £10bn (60yr NPV). Of this, just under half, or £4.8bn, was due to the eastern route, with around 18% attributed to Yorkshire. This is equivalent to annual productivity gains in Yorkshire of £24.2m or a 60yr NPV of £0.9bn. This is very comparable to our estimates of the benefits to the Leeds and Sheffield city regions, giving us confidence that the methods used are reasonably consistent.

3.3.2 Benefits from Enhanced Leeds – Sheffield Service

In addition to the pure agglomeration benefits described and estimated above, there may be some commuter benefits, which can be valued in terms of people moving to more productive jobs. The capacity increases on the existing Sheffield-Wakefield-Leeds line would occur as a result of the additional fast train per hour between Sheffield and Leeds via Wakefield Westgate as part of the assumed Midland Main Line enhancement and further increases in capacity between Leeds and Sheffield would occur if a high speed route was developed. It is estimated that together there would be around 1,500 seats of additional capacity in the commuter period on this line. If this was entirely used by new commuters moving to more productive jobs, this would result in ‘move to more productive jobs’ benefits of around £60m (60yr NPV). These are small in comparison to the pure agglomeration benefits but important nonetheless.

3.4 Wider Impacts

3.4.1 Overview

Whilst this method goes some way to quantifying the benefits of high speed rail, it does not explicitly capture the potential transformational impacts which high speed rail could have upon the future development of the country’s economic geography. If the delivery of high speed rail is accompanied by planning policies to support sustainable economic development, European examples suggest that it can have very positive impacts.

For example, the French cities of Lille and Lyon suggest (qualitatively) that HSR can have very beneficial impacts upon the economic development of a city. However this doesn’t just happen automatically. These examples underline the importance of aligning economic development strategies with transport strategies. Lille for example was supported by planning policies which enabled significant development to occur (see section 3.4.3) near the high speed station and various other regeneration strategies.

Accentuating existing trends is nearly always easier than completely redefining a place. Building upon the already strong assets of Leeds as the centre of the Yorkshire economy, supported by a growing economy at Sheffield, and improving the links both northbound with the North East, Scotland and southbound with the East Midlands and London should offer positive potential for future economic growth.

3.4.2 Example of High Speed One

Table 3.4 below summarises the Economic impacts of High Speed One estimated in a recent evaluation by Volterra.

Table 3.4: Summary of Economic Impacts – High Speed One

Benefit	£bn
Transport benefits	3.8
Wider Economic benefits	3.8
Regeneration benefits	10.0
Total benefits (PV over 60yrs)	17.6

Source: Volterra

The transport benefits were primarily time savings, and the wider economic benefits (WEBs) were split almost evenly between move-to-more-productive-jobs and pure agglomeration benefits. As with all transport evaluations, it should be noted that WEBs are completely additional to standard transport user benefits, hence the addition of the benefits in the table above. It should also be noted that the domestic services are expected to be used significantly for commuting purposes, making the incentives, drivers and benefits of the scheme quite different in some ways from other proposed HSR lines.

HS1 is also credited with significant regeneration impacts. It has enabled the delivery of three major development schemes in Ebbsfleet, Stratford and Kings' Cross. Those schemes will significantly impact on three regeneration areas with plans for over 15,000 homes and 70,000 jobs resulting in quantifiable residential spending and output.

3.4.3 Examples from Continental Europe

These examples highlight the need to align city/regional economic development objectives with investment in infrastructure. High Speed Rail on its own will not deliver transformational change but these examples suggest that alongside strategic plans for other investment and planning policies which support growth, it can have very beneficial effects.

The importance of joined up planning and strategic fore-thinking is highlighted by examples where HSR has not had the envisaged beneficial impacts. For example Tours did not benefit significantly, commentators suggest this might be because the economy which was there before did not fit well with HSR (it was mainly tourism). Many smaller places which are stopped at infrequently appear to have been limited in success too (Le Creusot for example).

This implies a need to balance transport provision with good local services so that surrounding smaller towns do not lose out. There is some evidence that success in some cities (benefiting from HSR) could result in economic losses in neighbouring centres (e.g. Lyon v Dijon). This could be mitigated by good regional transport links.

Very little quantification has been carried out in this area although the following projects were evaluated ex-post:

- TGV Sud-Est (Paris-Lyon) – Bonnafous (1987)
- AVE (Madrid-Seville) – de Rus and Inglada (1997)
- Japanese Shinkansen – Banister and Berechman (2000)

The ex-post evaluations show increases in commercial activity, and hence land values around some, but by no means all, high speed rail stations. For example between 1983 and 1990, there was a 43% increase in office space around Lyon Part-Dieu station; whilst in Japan land values in commercial areas rose by 67% with a Shinkansen station (Nakamura and Ueda, 1989). However, it is recognised that these measures may reflect displacement of activity from elsewhere and should not be interpreted as being indicative of net growth.

Lyon

Due to physical constraints around the existing station, a major new station to accommodate TGV services was built adjacent to an emerging commercial district. Since the start of these services, further development around the commercial area has followed:

- Businesses relocated to the commercial district, and office accommodation became more valuable;
- The scale of business and commercial relocation has created its own momentum in attracting further such activities;
- The urban public transport system has been developed to enable access to the area (and the TGV station) from surrounding areas;

- Hotels have been built in an area formerly lacking them; suggesting that the TGV service has also expanded tourist travel to what was already an important tourist destination. The author suggests that this may also indicate that visitors value hotels close to their place of arrival.

Lille

Historically, Lille had been heavily reliant on industry, being at the heart of a key industrial region. The city benefitted from incorporating the plans for high speed rail into a wider long term vision to transform the city as a whole. In 2004, Lille gained the position of European City of Culture.

- A new through station strictly for TGV services (Lille Europe) was built on a former barracks site near to the original station. Most of the rest of this site was used for a major commercial centre with offices, hotels and a large modern retail centre. The remainder was made into a public park, replacing former open space used to build the new approach lines to Lille Europe. The whole area is adjacent to the old city centre and has formed an extension of it;
- Further programmes have led to substantial new building of offices, public housing and a very large conference and events hall in areas adjacent to Lille Europe. This forms part of a continuing strategy of development for the area. Further expansion is now in hand (at the time of writing) to take in redevelopment of a closed railway goods yard and other disused land beyond the conference hall;
- Reorganisation of the local universities has included locating some faculties in former cotton mills in older areas, thus creating local employment and businesses in these areas. These older areas have also benefited from regeneration programmes. In turn some of the traditional university buildings have been taken over by larger businesses, often for regional head offices;
- Complementary programmes of regeneration have been undertaken in other parts of the conurbation, notably in the former cotton towns of Roubaix and Tourcoing. These have seen disused public and industrial buildings modernised for reuse as offices, leisure and community centres, and specialist education. Notable is the Euroteleport complex at Roubaix, adjacent to a modern retail centre designed to enhance the traditional city centre. In parallel, housing areas in these towns have seen programmes of improvement and new building.

Cologne

In 1988 the Cologne city authorities decided that, with the planning of the Brussels–Cologne–Frankfurt high-speed corridors, the station should be rebuilt as part of a major redevelopment of the whole area around the Cologne Fairground. This redevelopment includes offices, hotels, retail and leisure centres, and housing, as well as redevelopment of the main Fair site venues. Commentators believe that combined with access by high-speed trains from much of Western Europe, this puts Cologne in a stronger position to host international events. The new station also acts as a key node on regional rail services and local transit. Furthermore, because the station is less than one kilometre from the centre of the city, and linked by bridges, it is able to complement the more traditional activities based there.

4 The Need for High Speed Rail to be Considered as Part of a Coherent 20-30 Year Strategy for the Wider Rail Network

4.1 Overview

The possibility of a high speed line to the Leeds and Sheffield city regions should be considered as part of a wider coherent 20-30 year strategy for the development of the rail network as a whole serving the two city regions. In particular it is important to emphasise:

- The case for upgrades to existing routes to address capacity constraints and provide improved connectivity in the short to medium term, given that high speed rail is a long term proposition (construction of a new route is unlikely to be completed for at least 20 years, possibly much longer for it to reach the north);
- The need to consider the interface between high speed services and lines and existing rail routes; and
- The importance of improved connectivity within city regions and between neighbouring city regions.

4.2 The Case for Upgrades to Existing Lines

4.2.1 Overview

It is clear that whilst the potential benefits of High Speed Rail to the Leeds and Sheffield City Regions would be substantial and its impact would be transformational, there would be long timescales (20-30 years minimum) and significant costs and risks to delivery. Our analysis shows that major benefits to the two city regions could be achieved through upgrades to existing lines.

Any High Speed Rail route will need to interface with existing lines (particularly as it is likely to be built in phases), it will impact on capacity on and demand for services on existing routes, and it will require local and regional transport networks to act as feeders.

Table 4.1 overleaf sets out some of the issues when considering the scope for High Speed Rail alongside upgrades to existing routes.

4.2.2 North-South Lines

There is a strong case for a package of capacity and journey-time enhancements to the East Coast Main Line and the Midland Main Line (including electrification of the Midland Main Line). These benefits could be delivered in the short-to-medium term, far more quickly than High Speed Rail, and these interventions would be significantly more affordable and pose far fewer risks to delivery.

A main finding of our work is that the options to upgrade to existing lines and possibility of a High Speed Rail link to the Leeds and Sheffield City Regions are not mutually exclusive. Upgrades to either the East Coast Main Line or the Midland Main Line would deliver substantial productivity benefits.

4.2.3 Transpennine Lines

There is also a very strong case for upgrading existing Transpennine routes. With capacity improvements, including the Manchester hub, and line speed improvements, there would be scope for journey-time reductions of around 15 minutes. This would bring the journey times to Manchester from Leeds and Sheffield to 40 minutes. Recent work for the Northern Way¹¹ estimates the overall economic value to the UK economy (standard transport benefits plus

¹¹ Manchester Hub Conditional Output Statement, SDG for Northern Way, April 2009

Wider Economic Benefits) of the Manchester Hub project would be £12.7 billion to £16.2 billion.

Table 4.1 Issues to Consider in Comparing Benefits and Problems / Issues between High Speed Rail and Upgrades to Existing Routes

	New High Speed Rail	Upgrades of Existing Routes
Benefits	Step change in journey times, scope to transform connectivity	Incremental journey time reductions achieved
	Less disruption to existing network	Reduced land-take, and potential cost and time savings
	Releases capacity on existing network	More affordable, strong overlap with existing funding commitments, and offers scope for early wins
	Strong value for money on some corridors	Improved environmental performance from electrification
Problems / issues		Scope for new connections to existing routes (e.g. Leeds / Sheffield to ECML)
	Requires significant land-take	Impacts are incremental, not transformational
	Affordability - higher costs incurred	Smaller capacity increases on some routes
	Longer timescales due to planning processes and cost	Some disruption during construction
	May still need to use parts of existing conventional routes with implications for capacity for other services	
	Carbon emissions are greater than for electrified conventional rail	

4.3 Interfaces Between a Possible High Speed and the Conventional Rail Networks

A main issue with any high speed route will be compatibility with the current network, in terms of the capacity of the network and train characteristics. Many TGV services in France switch at various points from high speed to conventional rail routes. Many UK city centre stations are already operating at or near capacity, and many station approaches are constrained in terms of speed and capacity. However high speed services may use these routes to access city centres. While it can be expected that some of the current fast inter-urban services will be abstracted to new routes, their place may be taken by semi fast services primarily serving intermediate calling points not served by new high speed services. This would have implications for assessing track capacity. The compatibility of high speed rolling stock used on new routes may also be an issue.

On some corridors the approach to delivering a high speed route (or higher speed route) may be through upgrading and augmenting existing lines. For instance it may be possible to upgrade the East Coast Main Line to achieve train speeds of up to 140mph in places (the existing stock has 140mph capability, but upgraded signalling and track revisions would be required to enable trains to run at this speed). There is also scope to build new sections of line to bypass main capacity constraints and to contribute to faster journey times and

possible dedicated high speed routes in the future. For example the proposed Stafford bypass on the West Coast Main Line is an identified opportunity for a 50 km new line to avoid a congested area, with the opportunity to 'future proof' it for high speed (300kph) running capability. While this is a relatively short section the contribution this could make to a north-south long distance route has been considered.

4.4 Station Locations

It should not be assumed automatically that new lines will be able to use existing city centre stations. The cost and practical difficulties of accessing city centre stations are likely to be substantial. Train formations may also be of a greater length than the existing stations can accommodate. It will be important to understand, at different locations, whether the key users of a high speed line would arrive at intermodal transfer stations (such as airports, parkway stations or new stations on intersecting conventional rail lines) or would be generated at city centre stations such as Leeds, which are the hub of commuter and regional network services. It will be important to consider these issues alongside the wider drivers for change. For instance, the possibility of major new settlements or growth nodes outside existing city centres could provide opportunities for new stations, and sites with development potential could, to some extent, offset construction costs of high speed stations.

However, it is also clear that city centres provide currently the main economic and service hubs in the Leeds and Sheffield City Regions, and existing land-use policies are to support a pattern of development based on these centres. The public transport network feeds into city centres. There is also significant potential for development and intensification on brownfield sites in areas in proximity of the main stations in Leeds and Sheffield. Therefore, any stations in other locations could alter the spatial distribution of land-uses and economic development in the city regions, and the implications of this would need to be considered carefully.

An important feature of High Speed One between London and the Channel Tunnel is the way that development potential around the stations was packaged as part of the funding of the new line, and the way that alignment of land use and regeneration policy is realising the potential to create new hubs of development at Kings Cross, Stratford, Ebbsfleet, and Ashford (see section 4.6). Table 4.2 considers some of the issues affecting the choice of city centre or parkway stations.

Table 4.2 Issues in Relation to City Centre or Parkway Stations on High Speed Rail routes

City Centre	Parkway Stations
Strong connectivity with business and other public transport links	Used to serve intermediate catchments with ample parking
Expansion of existing stations is complex, expensive & disruptive	Reduces connectivity to wider public transport networks and business – journey time savings could be eroded as a result
Capacity implications for existing routes	Scope for new stations to be hubs for development and regeneration
Substantial costs involved	

4.5 The Case for Improved Connectivity Within City Regions and Between Neighbouring City Regions

4.5.1 Overview

Chapter 2 of this report has set out the potential economic and policy case for better linkages between city regions.

There is also increasing recognition of the economic importance of city region connectivity. The Eddington Transport Study (2006) set out the vital role of transport in supporting city region economies by enabling key business centres to draw on a pool of skilled labour. Work undertaken by Centre for Cities¹² has identified the high levels of economic benefits that could be achieved by improving connectivity within the Leeds City Region, particularly access to Leeds. Work undertaken by SDG for South Yorkshire Local Transport Plan Partnership has set out the productivity benefits of transport improvements in South Yorkshire, and in particular the benefits stemming from improving access to jobs from areas with high levels of worklessness¹³.

High speed rail could help transform connectivity between key points between city regions. However it is unlikely that there would be more than one high speed line station in each city region. Even without a high speed line it is also unlikely that aspirations of all places to have a frequent direct rail service to London can be realised, although upgrades to capacity of existing lines will provide some benefits in this respect. Therefore connections within city regions to the key rail nodes for fast / high speed inter-urban services will be vital. High speed routes could relieve capacity on existing routes that provide connectivity within and between city regions that are unlikely to be connected directly to a high speed network; however improvements to these routes would be required to realise these opportunities.

4.5.2 The Case for Electrification of Regional and Local Routes in the Leeds and Sheffield City Regions

It is vital that there are improvements to regional and local transport networks to provide the base-levels of connectivity necessary to connect people to jobs in the city regions and to provide better quality feeder services into stations providing national rail connections.

One of the issues for the Leeds and Sheffield City Regions is that the rail network plays multiple roles with fast national inter-urban, inter-regional and local services using the same routes and capacity. On some routes, journey times, service quality and the environmental performance of rail is poor. These problems could be addressed through electrification.

The publication of the Network Rail business case assessment examining the benefits and costs, together with increasing political support, has increased the awareness of electrification. In addition to the Airedale and Wharfedale Lines, the Leeds and Sheffield city regions also benefit from electric traction operating via the East Coast Main Line to London, Doncaster, Leeds, the North East and Scotland. An expanded electric network could offer the potential to transform local routes, generating a number of potential benefits including:

- **environmental benefits:** electric multiple units (EMUs) do not produce any emissions at point of use. Furthermore, carbon dioxide emissions for EMUs will be 20% lower than those of diesel multiple units (DMUs) by 2010;
- **energy security:** in response to the rising fuel costs, the benefits of greater energy efficiency should be recognised, particularly given the recent fluctuations in diesel prices;

¹² "The Case for Better Transport Investment: Agglomeration and Growth in the Leeds City Region", Marshal, A. and Webber, C., Centre for Cities, 2006

¹³ "South Yorkshire Transport and Economic Productivity Study", SDG for SYLTP Partnership, 2007.

- **value for money:** lower rolling stock maintenance charges per kilometre, whilst lease costs, traction and variable track access costs are also lower;
- **rolling stock fleet requirements:** the number of spare vehicles could be reduced as reliability improves;
- **journey time savings:** EMUs are capable of faster acceleration and deceleration than conventional diesel rolling stock. The scale of the journey time savings will vary according to the nature of the route. Corridors with relatively short gaps between stations will generally achieve the largest savings, and help to achieve modal shift away from car.

In addition to the above benefits, journey ambience would also be improved, with the quieter, more comfortable rolling stock.

The ECML is also affected by the lack of diversionary routes, in the event of engineering work, but also service perturbation. For example, there are a very limited number of electrified diversionary routes. Selected in-fill schemes in the Leeds and Sheffield city regions could create several new 'diversionary' routes between Doncaster, Leeds and York. These schemes would help to improve wider network flexibility and resiliency.

Potential Network Expansion

The coverage of the electrified rail network in the Leeds and Sheffield city regions would need to be expanded incrementally, given the feasibility and business case work required before implementation. This phased approach is therefore required, with some short to medium term schemes, and other long-term aspirations. Building on the proposed strategic electrification of the Midland Main Line, three schemes have been proposed for in-fill:

- Sheffield to South Kirkby Junction (allows line capacity increases and would allow electric services to operate between Leeds and Sheffield via Rotherham. This would build on the national scheme to electrify the Midland Main Line between Bedford and Sheffield)
- Sheffield to Doncaster (allows Leeds-Doncaster-Sheffield electric services and creation of an East Coast Main Line diversionary route) if delivered in conjunction with the proposal above;
- Neville Hill Junction to Colton Junction and Selby (allows electrified local services on the York/Selby line and creation of a diversionary route for the East Coast Main Line)

The potential second phase includes the Trans-Pennine corridor via Huddersfield to Manchester, with extensions beyond York / Selby. This would build on the recent Government to electrify between Liverpool and Manchester. Other routes that could benefit from electric traction include the Harrogate, Barnsley and Caldervale Lines.

Other Potential Improvements

The lengthy timescales for electrifying some corridors mean alternative short to medium term interventions may be required. For example, taking the Caldervale Line as a case study, a package comprising better rolling stock, selected infrastructure improvements that would enable achieve faster journey times, and extra capacity would help to improve connectivity, particularly between Halifax / Bradford and Leeds. A similar approach would also benefit the Huddersfield Line, particularly given the interaction with the longer distance transpennine services, and also the Sheffield-Barnsley-Wakefield Kirkgate-Leeds line. Extra capacity is also required for the Harrogate Line, although the introduction of electric traction could be linked to the development of the tram-train proposals.

4.6 Issues in Relation to Route Choice for High Speed Rail

Our work has not considered detailed issues of route choice, however based on our analysis some general conclusions can be reached.

High Speed 2, the development company established by the Government is considering route options for a High Speed Line to the West Midlands, including access (potentially via interchange) to Heathrow Airport. Addressing capacity constraints that will occur shortly on existing north-south rail routes is the main rationale for high speed rail. The scope to upgrade some existing lines, particularly the West Coast Main Line is very limited, except for modest train lengthening. From the perspective of the Leeds and Sheffield City Regions the alignment chosen between London and the West Midlands could be significant. A central / easterly alignment between London and the West Midlands (i.e. that accessed the West Midlands conurbation from the area between Coventry and Leicester) would provide the option of being extended north on either (or both) sides of the Pennines. However a southerly / westerly alignment (similar to the M40 across the Chilterns) could preclude further extension north to the east of the Pennines.

The Northern Way have made the case for a transpennine High Speed Rail route. This could transform journey times and capacity between key cities across the north of England. However the costs are likely to be very substantial indeed, with potentially lower demand than that for north-south connections. The Atkins work for the SRA suggests that value for money of a transpennine high speed route would compare poorly to north-south routes. A High Speed Route from Leeds to London via Manchester would not offer significant journey time savings over existing conventional rail routes. There is scope for achieving significant journey time savings and capacity improvements through upgrading existing transpennine rail routes.

Alternatively a new High Speed Route that accessed the two city regions from London via the Cambridge / Peterborough area (i.e. similar to the East Coast Main Line alignment) could provide benefits in terms access to locations such as Cambridge, Stansted Airport, High Speed One to the continent, and the City of London / Docklands. Such a route could also utilise and link with existing sections of the East Coast Main Line. The Atkins work for the SRA suggests that such a route serving the Leeds and Sheffield city regions would have a stronger BCR than a more central alignment.

It is also important to consider the merits of city centre stations versus parkway stations on High Speed Rail (see table 4.2 previously).

4.7 Issues in Relation to Alignment of Wider Policies

It is clear that there is a strong economic case for improvements in the connectivity from the Leeds and Sheffield City Regions to London and its international gateways, between the two city regions, and within the city regions. High speed rail could play a valuable role over the medium to longer term in better connecting this key part of the economy of the north of England, with the UK economic hub in London and the South East. It is also clear that high speed rail, whilst potentially transformational in terms of connectivity and the economy, is a long term proposition. There is a need to secure in the short to medium term upgrades to existing north-south lines, and better connectivity on existing rail routes between and within the city regions.

For the benefits of improved rail connectivity to be realised there needs to be a clear understanding of how rail can support the future economic and spatial development of the Leeds and City Region. This needs to be informed by a strong understanding of how the city region's function in terms of the different roles of and linkages between places, and how the economic reach of the city regions can be expanded and merged with each other and with neighbouring concentrations of economic activity in the Manchester City region, the East and West Midlands and the North East.

It is also important that wider economic development, regeneration and land-use policies are aligned with strategies to improve the rail network. There is an opportunity to exploit the potential of main stations as focal points for development, urban intensification and as business and employment hubs. High Speed One in London and Kent provides an example in this respect: the route provides international connectivity, enhanced regional / commuting links, and four major hubs for regeneration, employment and housing growth.

The consideration of a high speed rail network to the north of England needs to be based on an understanding of how key business, employment and growth locations such as the Leeds to Sheffield city regions can strengthen their economic contribution towards UK plc.