

City of York Council

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**Improving Inter-Urban  
Rail Links to York**

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Assessment of the  
Potential Options

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Potential Options

August 2009

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## Executive Summary

York already benefits from attractive, fast and comfortable rail links to some cities, and this helps to attract investment and make the city a convenient location for employment. York's economy is forecast to grow significantly over the next 20 years, particularly associated with the following sectors bio-technology, education, IT, tourism, public services, plus financial & business services. The number of new houses is also set to increase, with almost 15,000 new homes by 2026. These factors will help to stimulate further growth over the next 10-20 years. Network Rail has recently produced demand forecasts that suggest long distance rail demand using the East Coast Main Line (ECML), North TransPennine and Cross Country routes will increase by 1-2% per annum to 2036. Inevitably, this predicted growth will necessitate capacity improvements for the inter-urban network, with the links to London, Birmingham and Manchester particularly important. There are two main themes to deliver these improvements:

- enhancing existing lines;
- constructing wholly new high speed alignments.

This reports analyses the strengths and weaknesses of those options.

There are a number of opportunities to enhance existing routes, and these could potentially be delivered in a relatively short timescale, with some of the required funding already committed. Network Rail's Strategic Business Plan includes a commitment to invest £560m by 2014 to deliver various infrastructure schemes to boost capacity, improve performance and potentially reduce journey times. Furthermore, a standard pattern timetable and new rolling stock could also be introduced within a similar timescale. Implementing this package of measures could reduce journey times to London by around 15 minutes. The Manchester Hub proposals refer to the approaches to Manchester Victoria and Piccadilly stations. The delivery of the Hub could help to reduce journey times from York to Manchester by around 15 minutes, although the implementation timescale is longer, and the funding sources are yet to be confirmed.

Since the publication of the Eddington Report that principally advocated improvements to the existing rail network, the level of support for High Speed Rail (HSR) has increased significantly. The success of the first UK High Speed Rail Link (HS1) operating between London St Pancras and the Channel Tunnel, together with various continental examples has highlighted a number of transformational benefits. These include significantly faster journey times (to improve accessibility between cities and their labour markets, boosting economic growth), and capacity relief for existing lines.

We have examined various proposals from several scheme promoters. HSR offers the potential to improve rail connectivity from York to other major population and employment centres. However, there are a number of risks associated with the delivery of HSR including:

- magnitude of costs (studies by Greengauge 21 indicate a cost of £100m/km, including optimism bias, significantly higher than the continental schemes);
- complex planning processes leading to lengthy timescales (a timescale of 15-20 years is typical for some continental schemes and HS1);
- relatively modest journey time reductions to some cities, given the costs described above. For example, the headline journey time savings to London are similar to the savings that could be achieved from the planned upgrades.
- It may be difficult for York to make the case for a stop on the HSR, given the proximity to both Leeds and Sheffield, and the resulting trade-offs between journey time savings and access to the network. If York is not connected directly to HSR, the journey time savings would be further reduced.

In addition, the following actions are recommended. City of York Council should:

- work with external stakeholders to secure short to medium improvements to the ECML and North TransPennine Route, to deliver journey time and capacity enhancements. The short term improvements already have committed funding and the delivery of these measures will help to strengthen links with key population centres.
- continue to develop their proposals to improve local rail connectivity to York;
- continue to be supportive of HSR to the Yorkshire and Humber region, albeit recognising there are a number of risks associated with the delivery of HSR, and the scale of the benefits that could be realised for York might be relatively small.

# 1 Background to the Study

## 1.1 Transformational Impacts of HS1

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Since the publication of the Eddington Report that principally advocated improvements to the existing rail network, the level of support for High Speed Rail has increased significantly. The first UK High Speed Rail Link (HS1) operates from London St Pancras, providing fast services to Paris and Brussels, with connections to other continental cities. High Speed Rail (HSR) enables higher operating speeds (typically 300kph), helping to cut journey times.

The construction of HS1 was delivered in two phases and has increased rail mode share (versus air), and helped to transform journey times. This has strengthened the competitiveness of high speed rail versus other modes. For example, the improved rail service now achieves a mode share greater than two-thirds for London to Paris flows. HSR has also helped to deliver other benefits, and is expected to act as a catalyst for delivering major regeneration schemes including Ashford, Stratford and the Thames Gateway. Other continental examples have also delivered a range of benefits.

## 1.2 Primary Objective of Future HSR Corridors in the UK

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During the past 12 months, the discussion of opportunities for high speed rail (HSR) in the UK has significantly risen up the political agenda. The success of the first UK High Speed Rail Link (HS1) operating between London St Pancras and the Channel Tunnel, together with various continental examples has highlighted a number of potential benefits. The main driver for HS1 was improved connectivity between London and Paris / Brussels via the Channel Tunnel. The previous route via south London was very slow in comparison with continental high speed operation.

In contrast, capacity relief for existing lines, particularly into London, has been identified as an important factor in the case for new high speed links. With much of the existing network already operating at or close to capacity on the approaches to London, there is an urgent need to create new capacity to support longer term growth. It has been suggested that if a wholly new alignment is required, this additional capacity should be delivered as a high speed route.

## 1.3 Development of Other HSR Proposals in the UK

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A study commissioned by the Strategic Rail Authority in 2001 examined a number of potential options, and this study produced outline business cases. A number of key conclusions have emerged from the SRA report, including the importance of links to Scotland that would provide an attractive alternative to the domestic air market. Links to Heathrow are important and strengthen the business case by opening up new travel markets.

Greengauge 21 was created as a non-profit-making organisation to lobby for the development of high speed rail. In response to the growing evidence base highlighting the benefits of high speed rail, and resulting political lobbying, the Government has established "High Speed 2". HS2 was established with a remit to examine possible route options by the end of 2009. Proposals have also emerged from other political parties including the Conservatives. An alliance of local authorities known as "2M" has expressed concern about the future expansion proposals for Heathrow Airport and has instead prepared some ideas for a high speed rail network to offset the potential requirement for additional airport capacity.

The inclusion of a TransPennine link could generate economic benefits between West Yorkshire and Manchester. Greengauge 21 estimate faster connections across the Pennines would generate wider 'agglomeration' benefits to supplement the economic business case. These benefits would comprise an important component of the overall

business case, since the financial business case for a TransPennine link is relatively weak, given the scale of the capital costs.

#### **1.4 The Commission**

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Arup has been commissioned by City of York Council (CoYC) to examine the potential for improving strategic inter-urban rail links. Although most journeys to work originate from York and neighbouring North Yorkshire, the longer distance rail links are critically important to support connectivity with wider markets and help to attract inward investment. York's strategic location on the rail network means it benefits from attractive rail links to many parts of the UK, particularly to London, and to a lesser extent, Birmingham, Manchester and Manchester Airport. This helps to make York a desirable place to live, do business and visit for tourism.

This report considers the potential benefits of HSR for York. Understanding the possible implications of them for York is essential to ensure that the Council is able to develop its strategy for rail and, therefore, make the case effectively for the most beneficial package of improvements. It is accompanied by a supporting document describing the latest position on HSR in the UK.

#### **1.5 Structure of the Document**

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Chapter 2 outlines the importance of good connectivity to other city regions, helping to support the delivery of plan-led economic growth and housing. This section also assesses the quality of existing rail links, both to other city regions and local feeder services to York. The factors contributing to the capacity bottlenecks along the main corridors are also examined.

Chapter 3 considers the potential options for HSR if additional capacity is required. The potential benefits and costs are examined, together with the risks, possible value for money assessment and likely timescales for implementation.

Chapter 4 considers alternative solutions to HSR that could be delivered in a shorter timescale. There is scope to deliver incremental enhancements to the network that could generate some of the benefits compared with HSR, but at significantly lower cost and a shorter delivery timescale.

Chapter 5 identifies a possible strategy to enhance inter-urban rail links to York, both in the short to medium term and the longer term.



## 2 The Case for Improved Inter-Urban Rail Links

### 2.1 Current Economic Performance

#### 2.1.1 GDP and Economic Connectivity

The UK population is continuing to grow and in order to accommodate this growth in the future there are challenging targets for housing and job growth across the country. The north is expected to accommodate a significant proportion of this growth. Furthermore, there is an ongoing goal to reduce the north-south divide. In recent years there has been growing interest in the role that transport has in stimulating, growing and supporting the economy.

The Yorkshire and Humber Region’s economy is worth about £82bn, similar to Scotland and Norway. Transport connections from the region to London and Heathrow are vital to support this economic prosperity, helping to attract new investment in key economic sectors. The recent removal of flights to Heathrow Airport for Leeds Bradford International Airport means the region has a major competitive disadvantage, exacerbated by the poor surface connections to Heathrow. Therefore, the quality of rail services to London has become even more important. Links to the global financial centre of London and the international gateway of Heathrow are vital to maintaining and growing the financial, legal and business services sectors in the region.

The value of the York economy is currently about £3.1 billion, which is forecast to grow to £4.3 billion by 2025<sup>1</sup>. The administrative area of the City of York is home to approximately 105,000 workers<sup>2</sup> and the economy is focussed around six core sectors.

|                             |                                   |
|-----------------------------|-----------------------------------|
| • Public sector employment  | • Financial and Business Services |
| • Health and bio-technology | • IT                              |
| • Education                 | • Tourism                         |

York’s role as a key tourism destination is underpinned by the 4.2 million visitors to the city each year. Its status as a centre for science and biotechnology is confirmed by its classification as one of the six ‘Science Cities’ in the UK. The ‘Science Cities’ are designed to lead the development of deeper links between business and the science base and ensure that science, technology and innovation succeed in becoming the engine of economic growth.

A recent report was published by Centre for Cities: ‘York: Prioritising Prosperity’. The report identified that York is a reasonably strong city economically. It has recovered following the decline in its traditional manufacturing base, such as confectionery, restructuring towards higher value service sectors with the growth of tourism, financial services and the city’s science cluster. One of the key emerging conclusions from the report is that York should prioritise policy to support the areas that will make the biggest difference to its economy, namely York Northwest and developing the science and technology cluster. It is important to maintain and develop solid transport links to support the planned growth for the city.

The strength of the financial and business services sector over many years has helped to attract high value jobs, and this prosperity has helped to support high value jobs in other sectors. Transport is acknowledged as the ‘glue’ that will help to create a cohesive city region, as well as integrating the economy more effectively with the rest of the UK.

There is a strong economic case for improving inter-urban rail links serving the wider Yorkshire and the Humber region, and York specifically, given the size of regional economy and its contribution to the UK. Inter urban rail links offer the potential to transform the

<sup>1</sup> Progress in York and North Yorkshire, Yorkshire Forward

<sup>2</sup> Office of National Statistics

regional economy by bringing business within a shorter travel time to London and helping to close the productivity gap with the UK average.

## **2.2 Housing Growth**

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The Yorkshire and Humber Region has experienced rapid population and housing growth, with the economic growth helping to attract new population. York's population in 2007 was approximately 195,000, having increased by 6.6% since 2001<sup>3</sup>. There are proposals for substantial plan-led growth, as set out in the Regional Spatial Strategy, including delivery of 14,450 new homes between 2009 and 2026<sup>4</sup>. This equates to a further 15-20% increase in the population during this period. Delivering this growth will be crucial to expanding and diversifying the economy of the city and the wider city region.

A significant proportion of this growth would be in locations close to the city centre and rail station such as the proposed York Northwest growth point. Delivering this growth in a sustainable way makes it vital to develop the rail services offered from York.

## **2.3 Drivers of Change**

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There has been significant growth in rail demand affecting York. For example, the number of rail passengers to / from York has increased by 27% between 2002/03 and 2007/08. This growth in demand has led to increased load factors using many trains.

Network Rail has recently produced a range of growth forecasts as part of the "Scenarios and Long Distance Forecasts" workstream. Four forecasting scenarios have been defined, and further details of the underlying assumptions are outlined in the Network Rail report<sup>5</sup>. Growth forecasts have been prepared for a number of routes between 2007 and 2036, including the ECML, TransPennine and Cross Country corridors. The forecasts take account of the planned housing and employment growth highlighted earlier in Chapter 1, plus other drivers of demand.

The results indicate between 35-70% growth will occur to 2036, depending on the specific scenario, equating to a 1-2% increase per annum for the routes to London. The growth rates for TransPennine are broadly similar to the London routes, but the forecast rates for Cross Country are about 20% higher.

The results emphasise the requirement for improved rail services to accommodate future growth to London from the Leeds and Sheffield city regions, but also better connections to the Midlands and the North West. These improvements will be particularly necessary during the peak periods, when overcrowding already occurs on many services. The forecast demand growth could also necessitate the introduction of wholly new services from other destinations that are not directly served.

## **2.4 Performance of the Inter-Urban Rail Connections**

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### **2.4.1 London**

The route between York and London attracts significant rail passenger flows (>750,000 trips per annum), reflecting the fast, high quality rail links between the two cities. Links to the global financial centre of London and the international gateway of Heathrow are vital to maintaining and growing the financial and business service sectors in York.

There are currently two services per hour between York and London, with journey times around two hours, resulting in an average speed of about 95mph. The typical load factor using National Express East Coast trains is around 55%, but most services between London and York are significantly busier.

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<sup>3</sup> Office of National Statistics

<sup>4</sup> Regional Spatial Strategy, Yorkshire and Humber Assembly Region

<sup>5</sup> Network Rail "Network Route Utilisation Strategy", Scenarios and Long Distance Growth

Network Rail analysis presented in the RUS indicates the ECML is currently operating close to capacity for the following reasons:

- the current mix of passenger and freight services, given the differences in operating speeds (60/75mph for freight and up to 125mph for passenger services);
- specific capacity bottlenecks approaching London (Hitchin Junction, Welwyn viaduct and Alexandra Palace to Finsbury Park).
- the predominantly twin track layout between Grantham and York causes operational conflicts;
- deployment of a non standard timetable pattern for passenger services which reduces the available capacity;
- some trains (Grand Central from Sunderland, Hull Trains and future Harrogate / Bradford Interchange services) only operate as 5 car formations, thus significantly reducing the seated capacities compared with the National Express East Coast services.

#### **2.4.2 Heathrow Airport**

There are no direct rail links to Heathrow Airport, with passengers forced to travel via central London. Overall journey speeds to Heathrow are slower, given the requirement to interchange. Furthermore, direct flights between Leeds Bradford International Airport and Heathrow are no longer available, reducing the journey opportunities available to travel between the two destinations, mainly for onwards connections. As a result, rail has become increasingly important to provide these links.

#### **2.4.3 Manchester**

There is half-hourly service from York to Manchester Airport, plus an extra service to Liverpool via Manchester. Although York benefits from a high frequency service to Manchester, the attractiveness of these links is constrained by the relative slow journey times compared with journeys to London. Journey times from Manchester to York are currently around 82 minutes, resulting in average speeds of around 50mph.

There are a number of engineering constraints that reduce overall line speeds. The requirement to serve intermediate stations such as Dewsbury, Stalybridge and Garforth further contributes to slow journey times. The timetabling of these longer distance trains is constrained by the interaction with local stopping trains between Manchester and York. Although a small number of services operate during the peak periods as 6-car formations, there are significant overcrowding problems affecting other trains. This overcrowding is forecast to worsen as economies both sides of the Pennines grow.

#### **2.4.4 Newcastle and Scotland**

There are five services per hour to Newcastle from York, with the fastest journey times around 60 minutes, achieving average speeds of about 80mph. There are two services per hour to Edinburgh taking around 150 minutes, with some trains extended to serve other major population catchments, including Glasgow, Aberdeen, Dundee and Inverness.

#### **2.4.5 Midlands and South West**

York benefits from 2 trains per hour to the West Midlands, although services do not depart at regular intervals. Services are extended to the Thames Valley or the South West (Plymouth). Trains via Doncaster offer faster journey times, reflecting the more direct route. There are no direct services from York to Nottingham or Leicester with passengers required to change at Sheffield or Derby. In particular, connectivity to Nottingham is particularly poor, given the slow journey times between Nottingham and Sheffield.

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## **2.5 Assessment of the Intra-City Region Rail Links**

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Although York has good rail services on several corridors, the quality of other routes is relatively poor. Connectivity from Harrogate, Thirsk, Selby and Scarborough to York is relatively poor, particularly in terms of train service frequencies. Some of these settlements have just an hourly service (or less), with some routes constrained by poor quality rolling stock. This highlights a requirement to improve the quality of some local feeder services to strengthen connectivity to York.

However, York is promoting a number of rail improvements to strengthen connectivity. Regional Transport Board funding has been secured for a new station at Haxby, whilst a submission was also prepared to convert the Harrogate Line to tram-train operation, with the proposals linked to the development of the York Central site. The conversion to tram-train would deliver a step change quality in for this corridor.

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## **2.6 Summary of the problems**

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Chapter 2 has highlighted the contribution of York to the wider Yorkshire and Humber economy. Significant housing and employment growth is planned, and this will increase demand for travel, both locally, and for longer distance to the major destinations. This growth is corroborated by the growth forecasts prepared by Network Rail. Chapter 2 illustrates the importance of good transport connectivity to these destinations. Although York does benefit from fast, frequent links to London, there is still scope to deliver improvements. Furthermore, there is significant potential to strengthen linkages to other destinations including Manchester, Birmingham, the East Midlands and local settlements.

### 3 Enhancing the 'Classic' Routes

The discussion in the previous chapters highlighted the importance of improving inter-urban rail links to/from York. There are two main types of solution:

- enhancing existing routes;
- constructing wholly new high speed rail alignments.

In Chapter 3 we examine the potential for enhancing existing routes, principally the ECML and TransPennine links. York already benefits from excellent rail links to London so enhancing the ECML could form a solution offering both lower costs and reduced delivery timescales. There may also be scope to incrementally upgrade the existing TransPennine rail corridor via Huddersfield to improve links between Manchester and York.

#### 3.1 East Coast Main Line

##### 3.1.1 Committed Infrastructure Enhancements

Although the ECML is currently operating close to capacity, Network Rail's Strategic Business Plan has identified incremental capacity improvements to be delivered by 2014. Network Rail is committed to spending £560 million on various infrastructure schemes during the next Control Period (CP4). This investment will help to make better use of existing capacity and reduce journey times. The package of improvements includes:

- 4<sup>th</sup> running line at York Holgate Junction, (currently, north of Holgate Junction, there is only three lines on the approach to York station, and this can lead to delays);
- Shaftholme Junction remodelling to minimise conflicts between passenger and freight services;
- Upgrading the GN/GE joint line (between Doncaster and Peterborough via Lincoln) to create a freight diversionary route;
- Peterborough station area capacity enhancements;
- Grade separated junction at Hitchin;
- Alexandra Palace to Finsbury Park capacity improvements.

The introduction of extra trains using the ECML has led to journey times gradually increasing, with extra performance and pathing time added. For example, current journey times between York and London have been extended by about 5 minutes compared with the mid 1990s. The completion of the infrastructure schemes described above could deliver greater network resiliency and help reduce journey times to levels experienced in the 1990s.

##### 3.1.2 Revised Passenger Timetable

In addition to the Network Rail infrastructure proposals, there are proposals to introduce a new passenger timetable. Network Rail developed this timetable as part of the Route Utilisation Strategy and it is expected to comprise of standard pattern departures. The '6+1' timetable would create sufficient capacity for 6 passenger services per hour, plus an hourly freight service between London and Doncaster. The freight improvements described above for the GN/GE line would also be required to release the necessary track capacity.

The revised timetable would primarily deliver benefits during the off-peak. The higher train frequencies would enable some trains to run non-stop between London and York, with other services calling at the smaller stations south of York. This extra capacity would help to support the growth forecasts highlighted earlier. The amended timetable would also help to reduce journey times. The removal of each station stop could typically save around 5 minutes. The revised timetable would be delivered in the short term, although the recent announcement affecting the National Express East Coast franchise could affect the timescales to deliver these improvements.

### 3.1.3 New Rolling Stock

The DfT recently announced the Agility Trains consortium as the preferred bidder for the Intercity Express Programme (IEP). The new rolling stock this consortium will provide will replace the current mix of High Speed Trains and Class 91 / Mark 4 stock using the ECML offering a number of benefits:

- seating capacities per train will be increased by around 15%;
- trains will be lighter, thus offering better acceleration to achieve faster journey times;
- energy consumption will be reduced;
- journey times will be reduced by around 5 minutes between London and York (pro-rata estimate based on modelled timings between London and Edinburgh).

The new rolling stock will be deployed from 2014.

### 3.1.4 Further Enhancements

Similar to the existing rolling stock, the new Agility Trains rolling stock could operate at 140mph. However, other infrastructure improvements will be required to support the faster operating speeds, particularly better signalling, changes to the track layout and measures to improve the resiliency of the overhead electrification.

In addition, a menu of other infrastructure schemes could also be evaluated. These ideas could help to avoid various speed restrictions or other capacity bottlenecks along the route, for example,

- speed restrictions near Grantham;
- solutions to avoiding the flat crossing at Newark;
- reducing the interaction with freight near Doncaster.

These enhancements could be delivered in the medium to long term and would be subject to passing the value for money evaluation.

### 3.1.5 Overview of the Improvements

The York to London travel market is the largest inter-urban flow, and the route already benefits from frequent, fast services. A package of improvements has been identified to reduce journey times and improve this vital link to improve connectivity from York. Funding to implement these measures has already been highlighted in the Network Rail's Strategic Business Plan, so the delivery timescales are relatively short (within the next 5-10 years). Overall journey times could be reduced by around 10-15 minutes if the package of measures comprising the revised timetable, the new rolling stock and the infrastructure enhancements, was delivered.

## 3.2 North TransPennine Route

### 3.2.1 Manchester Hub

Similar to the ECML, there is also scope to deliver a package of incremental improvements in a short timescale for the North TransPennine Route. Network Rail, in conjunction with the Northern Way, is developing plans for the Manchester Hub. The delivery of this project could generate significant economic benefits, both for longer distance and local passengers. The Hub proposals are still being developed, but could deliver a step change in capacity for the central Manchester area, helping to improve connectivity between key destinations.

Furthermore, a package of other improvements could also be delivered to help reduce journey times to both Leeds and Sheffield from Manchester to about 40 minutes. This would save around 10-15 minutes compared with the current journey times. Examples could include measures to increase line speeds in various locations, including the Huddersfield area, Guide Bridge, and via the Hope Valley. Feasibility studies are currently underway, but there is no committed funding to deliver the infrastructure measures.

### **3.2.2 Holgate Junction**

The additional Holgate Junction capacity described Section 3.1.1 will also help to reduce journey times via the TransPennine corridor from Manchester. This will help to minimise conflicts between services, and the resulting journey time delays.

### **3.3 Links to the Midlands**

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Whilst York benefits from direct links to the West Midlands (Birmingham) and East Midlands (Derby), there are no direct trains to Nottingham or Leicester. Many of the Cross Country services are overcrowded, and this affects service quality. Some of the busiest trains have been lengthened, but residual crowding problems remain. The recently published Yorkshire and Humber RUS has suggested the existing Cross Country service via Doncaster could be re-routed via Leeds. This change will be subject to DfT approval, although it could address some of the overcrowding issues affecting the Leeds route. However, journey times affecting one hourly service between York and the West Midlands would be extended.

Services between Sheffield and Nottingham were improved in December 2008, but journey times are still relatively slow. Various engineering measures could be implemented to cut journey times, subject to meeting value for money criteria. East Midlands Trains has developed proposals to increase frequencies between Sheffield and Derby for inclusion in the December 2009 timetable. Proposals are subject to ORR approval.

### **3.4 Timescales and Costs**

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The proposed enhancements to the inter-urban routes have a short term timescale for implementation. However, enhancing existing lines does need careful management, given the potential implementation risks and scope for cost escalation.

The Network Rail Strategic Business Plan has identified a number of measures during the next Control Period (CP4, for delivery by 2014). Some of the funding to enhance the ECML is already committed as part of CP4, with around £560m allocated. The new Agility trains rolling stock will also be delivered within this period.

Some improvements to the TransPennine routes will also be delivered within the next Control Period, and the ongoing Manchester Hub studies for Network Rail will explore the scope of reducing journey times to Manchester from Leeds and Sheffield to around 40 minutes. In partnership with other stakeholders, CoYC needs to continue lobbying for the delivery of these improvements.



## 4 Potential High Speed Rail Route Options

### 4.1 Understanding the Principal Benefits

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Before examining the possible route options, the potential strategic benefits that could be generated by HSR include:

- capacity constraints affecting inter-urban routes towards London. The identification of possible solutions to alleviate these bottlenecks is the main factor contributing to the development of high speed and driving the consideration of new rail corridors. In particular, the WCML is already very congested, and there is a recognition that HSR could be the most effective way to resolve these constraints;
- a 2001 study commissioned by the Strategic Rail Authority concluded a new high speed line may be more effective and offer better value for money than comprehensive enhancements;
- although the analysis presented in Chapter 3 demonstrates there are incremental solutions to boost capacity, a new HSR would help to alleviate some of the busiest sections of the ECML. This would provide widespread benefits, for the Yorkshire and Humber Region, but also to benefit other locations, including the North East, East Midlands, and the East of England;
- HSR would transform the York economy by bringing business within an easier days travel time to London with the delivery of transformational journey times. Significantly higher operating speeds (typically up to 186mph, 300kph) would be responsible for achieving these journey times;
- builds on the successes of the York economy – York has redefined its economic focus in recent years by delivering financial and professional services, and helping to expand the number of high value jobs would help close the 15% productivity gap with the UK average;
- depending on the alignment proposed, there is potential to transform connectivity from York to the key international gateway of Heathrow, particularly as the city has no easy access to direct flights to Heathrow. It may be possible to improve connections between York and the Leeds and Sheffield city regions.

### 4.2 Summary of Potential Route Proposals

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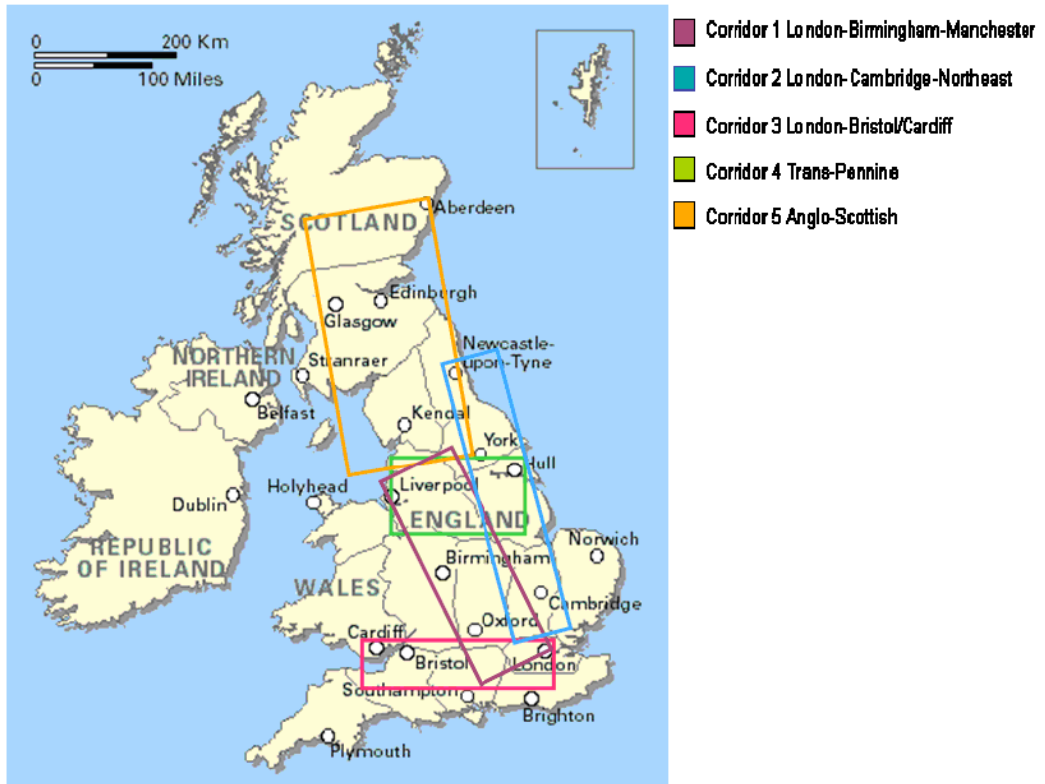
#### 4.2.1 Identification of Routes

The fundamental factor influencing the requirement for a new high speed rail alignment are capacity constraints affecting the existing network. To address these capacity constraints, some potential route options have been identified by different stakeholders, as shown in Figures 4.1 to 4.5. Several of the proposals would potentially alleviate the London / Birmingham / Manchester corridor, given the capacity constraints affecting this corridor. Several other north – south corridors are being examined including alignments via the East Midlands.

The reports published to date develop the discussion on HSR options, but the Government has yet to announce a formal position (June 2009).



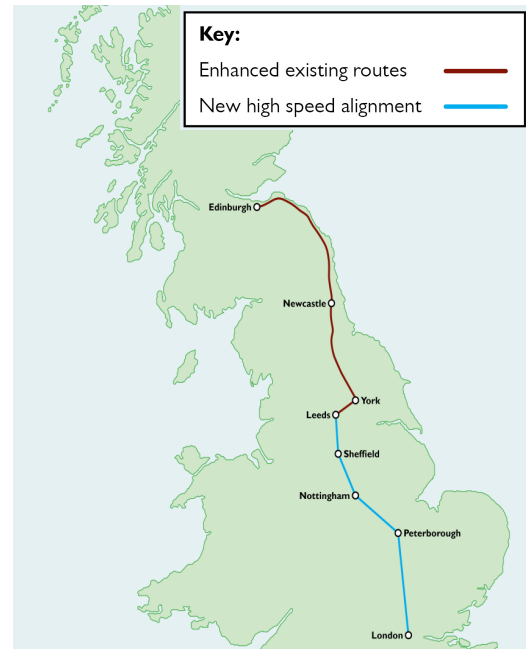
**Figure 4.1: Identification of Possible HSR Corridors – Greengauge 21**

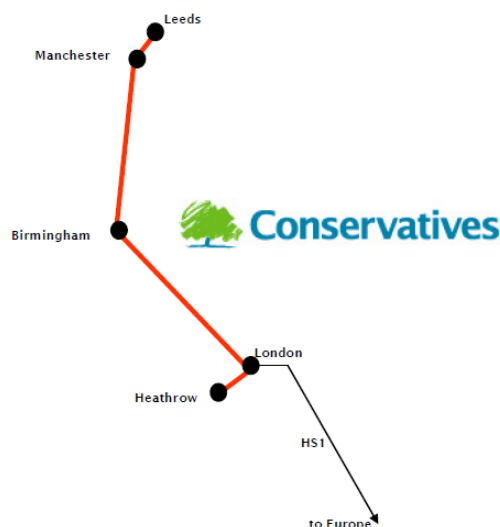


**Figure 4.2: SRA Study – London to Scotland / Manchester**



**Figure 4.3: SRA Study - London to West Yorkshire via Peterborough**



**Figure 4.4: Conservative Proposals for High Speed Rail****Figure 4.5: High Speed Rail – 2M Proposals**

#### 4.2.2 Shortlisted Options

Some of the route options put forward for consideration will offer limited benefits for York. As a result, four options have been shortlisted for more detailed analysis.

- Option 1: London to the North via the West Midlands (SRA Study, 2001)** – a “Y” shaped network is proposed offering north south links to Manchester, Yorkshire and Scotland from London. The routes could diverge south east of Birmingham, with one extending towards Manchester, and the other towards the East Midlands, Yorkshire and Scotland. There is no TransPennine link assumed;
- Option 2: London to North via Peterborough and the East Midlands (SRA Study, 2001):** This option was also identified as part of the SRA study, with an alignment from London to Leeds via Peterborough and Nottingham and a link to the ECML east of Leeds;
- Option 3: London to Manchester and York via WCML and TransPennine link (Greengauge, 2006)** - the emerging thinking from HS2 appears to favour an initial alignment from London to Birmingham. There are aspirations to extend the network beyond Birmingham to Manchester and possibly Scotland and / or Leeds. Rosie Winterton, the Minister for Yorkshire and Humber has met representatives from HS2 Ltd to lobby for high speed rail the Region. Further extensions of the West Coast route options beyond Leeds to York have received limited coverage;
- Option 4: London to the North via the M1 corridor (2M Group, 2008):** this is an alliance of local authorities concerned about the environmental impact of the Heathrow expansion proposals. 2M propose that instead of a third runway, the Government develop a high speed rail network linking London with Heathrow, Birmingham, Liverpool and Scotland to the North. The line would extend north from London and serve Leicester, Nottingham, Sheffield, Leeds, Newcastle, Edinburgh and Glasgow. There would also be spurs to Birmingham, Manchester and Liverpool.

### 4.3 Summary of Key Performance Indicators

A range of performance indicators have been used to understand the relative impact of each option, and these are summarised below.

#### 4.3.1 Journey Time Impacts

The journey times below have been calculated using a number of assumptions:

- Trains will operate at a top speed of 186mph (based on the assumed line speed, and comparable to HS1);
- A stop/start penalty has been applied to reflect the delays incurred to allow passengers to board / alight at intermediate stations. Calculated timings have been benchmarked against other studies, for example, SRA and Greengauge 21 reports, and the timings adjusted accordingly.

Table 4.1 below calculates the best possible journey time savings assuming the HSR network includes a stop serving York. The potential journey time impacts shown in Table 4.1 do require a cautionary note, since it is uncertain whether HSR would serve York. If the proposals did not serve York, hence necessitating an interchange in Leeds or Sheffield, the journey time savings shown would inevitably be reduced. Table 4.1 indicates the introduction of a HSR alignment to London would save between 15 and 25 minutes. Option 4 would generate the largest journey time savings, whilst the differences between Options 1 and 2 reflect the small differences in route distance to London. Journey times to Heathrow are significantly reduced in Options 3 and 4, mainly through the introduction of direct journey opportunities. Smaller savings are achieved in Options 1 and 2, due to the assumed journey time reductions between York and London. Options 3 and 4 would also offer direct journey opportunities to Birmingham and Manchester, cutting timings by around 30-40 minutes.

**Table 4.1: Journey Times from York (minutes)**

| Destination          | London              | Heathrow | Birmingham | Manchester |
|----------------------|---------------------|----------|------------|------------|
| Average Current Time | 124                 | 195      | 120        | 82         |
| Option               | Journey Time Saving |          |            |            |
| 1                    | 19                  | 19       | -          | -          |
| 2                    | 16                  | 16       | -          | -          |
| 3                    | 1                   | 86       | 30         | 37         |
| 4                    | 25                  | 93       | 42         | 37         |

Source: Journey time savings estimated by Arup. Current timings calculated using the National Rail Timetable and include an allowance for interchange (Heathrow journeys). Future journey time estimates calculated using assumed speeds and benchmarked against other data sources.

#### 4.3.2 Intermediate Stops

The likely operating speeds and the relative proximity of major population centres will influence the potential number of intermediate stops. With trains likely to be designed to operate at speed of up to 186mph, a maximum of two intermediate stops serving the Leeds and Sheffield City Regions is suggested. If further stops were included within a relatively short distance this would prevent the top speed being achieved and therefore negate the journey time benefits offered by HSR. As a comparator, continental high speed networks typically have gaps of 100-200km between stations.

The feasibility of a stop at York will need to be assessed as part of a wider strategic assessment. Factors such as population catchment and size of the economy will affect the planning process. Taking these factors into account, the HSR stops may be located close to

Leeds and Sheffield given their status, size of the economy and population, since these urban areas are likely to generate the largest strategic benefits.

**4.3.3 Connectivity to Key Destinations**

As mentioned in the section above, there is a degree of uncertainty over how York will be connected to the HSR network. The table below identifies the implications for York. The city already has direct journey opportunities to London, Manchester and Birmingham. Table 4.2 identifies that without significant journey time savings the potential benefits of HSR are somewhat diminished. In terms of connectivity, Options 3 and 4 could deliver some improved journey opportunities, particularly to Heathrow. If York was not connected to the HSR network, this would necessitate a change at either Leeds or Sheffield, and the resulting interchange penalties could effectively remove the journey time benefits achieved by HSR.

**Table 4.2: Comparison of Connectivity Benefits to Major Destinations**

| Option | Destination                                                                             |                                                                                                              |                                                                   |                                                                   |
|--------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
|        | London                                                                                  | Heathrow                                                                                                     | Birmingham                                                        | Manchester                                                        |
| 1      | No connectivity benefit unless York was directly served by HSR                          | Heathrow is not directly served by HSR. Limited journey time benefits unless York was directly served by HSR | No connectivity benefits                                          | No connectivity benefits                                          |
| 2      | No connectivity benefit unless York was directly served by HSR                          | Heathrow is not directly served by HSR. Limited journey time benefits unless York was directly served by HSR | No connectivity benefits                                          | No connectivity benefits                                          |
| 3      | No connectivity benefits, since journey times via TransPennine and WCML would be slower | Potentially offers significant journey time savings, given the direct link from HSR                          | Direct access to HSR required to achieve any journey time savings | Direct access to HSR required to achieve any journey time savings |
| 4      | No connectivity benefit unless York was directly served by HSR                          | Potentially offers significant journey time savings, given the direct link from HSR                          | Direct access to HSR required to achieve any journey time savings | Direct access to HSR required to achieve any journey time savings |

Source: Arup analysis

**4.4 Costs**

Compared with the likely costs to improve some inter-urban corridors, the capital costs associated with constructing a HSR alignment will be high. We have reviewed the out-turn costs from a range of European projects and HS1 to understand the typical range. The typical range for European schemes is about £25-30 million/km (DfT New Line Capacity Study – Cost Estimates, July 2007).

This cost range is broadly similar to the out-turn costs for the first phase of HS1 south of Ebbsfleet to Ashford. However, the construction of the second phase north of Ebbsfleet to St Pancras via Stratford is predominantly in tunnel. As a result, the cost per kilometre is significantly more expensive, with indicative capital costs of about £85 million/km.

Scheme costs were also prepared to support the SRA study. The typical costs for Options 1, 2 and 4 shown above are about £40m / kilometre. The costs per kilometre for Option 3 are

higher, in excess of £50m per kilometre. However, the cost assumptions presented in the SRA study only include a 30% allowance for optimism bias, and this smaller allowance is not consistent with the DfT guidance.

In contrast, the estimated capital costs for the London to Birmingham section prepared by Greengauge 21 is around £11bn, or around £110m/km. This is significantly more expensive than the continental schemes or even the tunnel sections constructed for HS1. It is likely some tunnelling will be required on the approach to London and possibly Birmingham, helping to explain the higher costs. However, it is expected much of the alignment will be constructed at-grade. The inclusion of 66% optimism bias in accordance with Government guidance contributes to the higher costs per kilometre. The magnitude of these costs does raise concerns about the affordability of HSR in the UK, particularly in a constrained fiscal environment.

## 4.5 Value for Money

The growing funding constraints mean HSR proposals will be subject to greater scrutiny to assess the benefits and costs, and the resulting value for money. The initial business case work prepared for the SRA suggested high speed rail could generate a reasonable benefit cost ratio (up to 1.35) for the different network options evaluated. Table 4.2 presents a summary of the benefits and costs for the options that could potentially serve York. The relatively weak business case for a HSR alignment comprising a TransPennine link is a potential concern, given the possible under-estimation of capital costs and the small allowance for optimism bias. No preparatory business case has been prepared for Option 4.

**Table 4.2: Summary of Benefits and Costs – High Speed Rail**

| Option | Description                      | Benefits (£ bn) | Costs (£ bn) | NPV | BCR  |
|--------|----------------------------------|-----------------|--------------|-----|------|
| 1      | London to Manchester and Leeds   | 22.0            | -17.5        | 4.5 | 1.26 |
| 2      | London to Leeds via Peterborough | 12.2            | -10.0        | 2.3 | 1.23 |
| 3      | London to Leeds via Manchester   | 17.1            | -16.3        | 0.8 | 1.05 |

Source: SRA Study, NPV (net present value), BCR (benefit cost ratio). No

Since the publication of the initial SRA work, the benefits and costs associated with selected HSR proposals have been re-examined. The assumptions have been updated (minimal upgrades to the ECML are included), and the benefit cost ratios have been strengthened to 2.67:1. The revised BCR means the value for money case to deliver HSR via the East Coast has been significantly strengthened. Furthermore, the inclusion of wider economic benefits would further strengthen the economic business case.

Other important factors affecting the robustness of the business case include:

- the links to Scotland appear important, particularly to compete with the air market more effectively;
- links to Heathrow would strengthen the business case, but the impacts are relatively small;
- the inclusion of a TransPennine high speed link offers limited potential value, with the costs exceeding the benefits.

## 4.6 City Centre versus Parkway for Station Location

### 4.6.1 Overview

The location of the station is a critical factor affecting the development of the HSR network. The station must be linked to complementary transport networks that enable the estimated number of passengers to board / alight. A city centre station would provide good access to the adjacent bus and suburban rail networks, but the scope for serving many UK examples

are already constrained by restricted platform availability, limited scope to increase passenger throughput and slow line speeds on the approaches to these stations. The slow speeds restrict the opportunities for through services. Alternatively, entirely new underground stations could be constructed in the city centres, although significant costs would be incurred. Based on the continental examples, city centre stations are generally used at the start / finish of the journey, when the typical journey time penalties are less critical.

Parkway stations are extensively used on the continent to provide intermediate journey opportunities. This type of approach helps to minimise the time penalties incurred with additional stops. The parkways are generally located in locations remote from the urban centres, although they are conveniently located close to the strategic highway network to serve a wide catchment. However, the location of some stations has been criticised for being too remote from the adjacent areas.

#### 4.6.2 Key Performance Indicators

A summary of the key performance indicators is shown in Table 4.1 below.

**Table 4.1 Key Performance Indicators: City Centre Versus Parkway Stations**

| Performance Indicator               | City Centre                                                                                                                                                               | Parkway                                                                                                                                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Proximity to major employment areas | Termini are centrally located, and therefore offer convenient access to major employment trip generators by public transport or on foot, especially high value employment | Poor connectivity to major employment areas, except by car                                                                                              |
| Public transport connectivity       | City centres already have strong public transport connectivity, and HSR would complement this                                                                             | Limited public transport access and likely to require significant upgrading                                                                             |
| Highway access                      | Slow, congested access to the city centre. Lengthy timescales to reach the strategic highway network.                                                                     | Convenient access to the strategic highway network, although extra traffic on the approach to the station could exacerbate existing congestion problems |
| Station Infrastructure              | Already in place but limited room for expansion                                                                                                                           | New build station could be designed for the purpose of HSR.                                                                                             |
| Passenger Circulation               | Station may already be approaching capacity, and insufficient space to accommodate extra passengers generated by HSR                                                      | New station could be built designed to HSR needs and large capacity                                                                                     |
| Journey Time Impact                 | Extra city centre stop will have a significant impact on overall journey times due to the reduced operating speeds                                                        | Inclusion of an additional stop has a smaller journey time impact compared with city centre stations                                                    |
| Connecting Travel Opportunities     | Convenient access to bus and suburban rail networks                                                                                                                       | Requirement for onward connections to the city centre reduces the advantages of high speed rail                                                         |
| Car Parking                         | Facilities already operate close to capacity, and there is generally limited space for major expansion                                                                    | Sufficient space adjacent to the station to construct a large car park                                                                                  |

Source: Arup proposals

#### 4.6.3 Implications for York

York has a well established city centre rail station with good public transport links and direct access to city centre businesses. In addition the York Northwest area which includes York Central and British Sugar is a mixed use proposal that will be developed within close proximity of the existing rail station. York Northwest is likely to deliver significant economic benefits to the city of York. Therefore any rail improvements that offer journey time savings and/or better service to wider UK destinations, will support city centre growth and make



York Northwest an attractive investment opportunity. The benefits might be comparable to the impacts in other cities, for example, the Business Park that has developed adjacent to Lille city centre.

#### 4.7 Timescales and Risks

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High Speed 1 is a 70 mile high speed rail link running from London St Pancras to the Channel Tunnel. From the Channel Tunnel portal to Ebbsfleet, HS1 largely follows the M20 motorway corridor. The section from Ebbsfleet to central London is mainly constructed in tunnel. The initial proposals came forward in the early 1990's and the eventual project was phased into two sections. The construction of stage one began in 1998 and stage 2 in 2001; the entire project was completed towards the end of 2007. This timescale is broadly similar to the development of the French schemes.

Using the timescales for delivering High Speed 1 as a suitable comparator, it is likely to take about 15 years to plan, design and construct a new alignment. Therefore, the earliest date for completing HSR2 is around 2025, although these timescales will inevitably be extended if the implementation is phased.

Large scale infrastructure projects can take years to deliver. HSR proposals may go through several iterations before a viable scheme is ready to be delivered. In addition the UK planning process can slow down the progress of proposals.

The capital costs associated with the HSR project will increase dramatically if a lengthy planning process is involved before delivery. Environmental issues will also be prevalent with any HSR proposal. For example, if HSR proposals assume a route via the Chilterns corridor, the timescales for implementation may be further extended. The risks associated with HSR are difficult to calculate at this stage, with no firm political date set for delivering HSR. A measured assumption at this stage therefore is that relying on HSR is a risky approach given the fluidity of the proposals and the costs involved.

#### 4.8 Overview

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Although high speed rail offers the potential to transform journey times to selected destinations, and alleviate capacity constraints, a number of concerns have been highlighted, including the cost, timescales and affordability of the proposals. The indicative capital costs for the London to Birmingham route assumed by Greengauge 21 are significantly higher than any other European scheme and this could affect the affordability of a route via the East Coast. The lengthy timescales to implement an alignment to York, combined with very high capital costs, mean there are **significant** risks associated with this strategy.

## 5 The Future Inter-Urban Rail Strategy

### 5.1 Short to Medium Term Strategy

The York to London travel market is the largest inter-urban flow when compared to the other strategic destinations including Heathrow, Birmingham and Manchester. The forecast demand growth will necessitate improvements to the existing inter-urban services. The analysis presented in Chapter 4 demonstrated HSR represents a longer term solution, so it is recommended CoYC works with external stakeholders to deliver the following short to medium term improvements.

The following is a set of actions that York should pursue with the aim of delivering future rail improvements:

- *Lobby Network Rail to ensure the committed investment for the ECML scheduled for CP4 (2009-14) is delivered, helping to boost existing capacity, and reduce journey times*
- *Engage with the DfT to lobby for the proposed timetable changes, enabling more trains between York and London, with reduced journey times*
- *Lobby DfT to ensure the new Agility trains replace the current rolling stock is replaced within the specified period*
- *Work with DfT, Network Rail and other stakeholders to identify further incremental improvements and develop financial and economic business cases*
- *Support the Manchester Hub proposals to improve links with Manchester and the North West. Work with industry stakeholders to develop a robust financial and economic business case, and lobby DfT and regional stakeholders to secure funding*
- *Continue to develop proposals to improve the complementary local rail network including Haxby Station and the tram-train proposals for the Harrogate Line to strengthen connectivity to the long distance network*

### 5.2 Long Term Strategy

HSR represents a longer term solution that could deliver headline journey time savings to selected destinations, particularly Heathrow Airport, with smaller savings to Manchester, Birmingham and London. Whilst HSR offers the potential to boost the York economy, these impacts need to be offset against the significant risks including affordability, value for money and indicative timescales. Furthermore, there is no certainty that York will even be directly connected to the HSR network.

- *Support proposals to bring HSR to Yorkshire and Humber*
- *Maintain a watching brief on the emerging proposals to understand the implications for York, and if appropriate, develop service proposals to benefit the City*