



LEEDS CITY REGION

HS2 CONNECTIVITY STRATEGY



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Introduction

High Speed 2 (HS2) is a planned high speed railway designed to transform connectivity between our major cities, making it easier for businesses to locate across the Midlands and the North of England¹. This will help to rebalance the economy across the UK.

Early construction work of HS2 Phase 1 has already commenced between London and Birmingham. With detailed planning already underway, construction of the line to Leeds is planned to start in 2024, with the line to open in 2033. Some services will terminate at an expanded Leeds Railway Station and others will travel onto York Station.

Our Leeds City Region is growing and HS2 is vital to support the next steps in transforming our economy. With the arrival of HS2, it is vital that we plan how we can best distribute the economic benefits across the Region. The Leeds City Region HS2 Growth Strategy sets out how Leeds City Region will work with Government, businesses, schools, colleges and universities to maximise the benefits of HS2.

This document sets out the strategy for delivering the step change in connectivity required to enable the transformative impact of HS2 to be realised across the City Region, through improved links within and beyond the City Region. This will form a key input to the broader Connectivity Strategy for the City Region.

Engagement

As part of the wider engagement on the Leeds City Region HS2 Growth Strategy, between 15 January 2018 and 2 March 2018, comments were invited on the LCR HS2 Connectivity strategy.

The engagement report highlighted strong stakeholder support to the strategy and highlighted a number of areas where the strategy could be strengthened. The full engagement report is available on the West Yorkshire Combined Authority website. This version of the LCR HS2 Connectivity Strategy has been updated to reflect the comments received through the engagement. The key changes made as a result of the engagement are:

- Chapter 2 An additional objective around the role of Environment has been included.
- Chapter 4 (Strand 1) The strand has been updated to reflect the latest position around transport future technologies
- Chapter 4 (Strand 2) The strand has been updated to reflect the latest position around Northern Powerhouse Rail ('NPR') and also introducing a Northern Hub 2 concept
- Chapter 4 (Strand 3) The strand has been updated to give greater corridor distinction between Leeds – Bradford and Calder valley line
- Chapter 4 (Strand 4) The additional strand has been updated to set out our principles for developing station gateways and to highlight the importance of our City Region gateways

¹ An overview of the HS2 scheme can be found here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/629380/high-speed-two-from-concept-to-reality.pdf

This Document

Following the Executive Summary, this document is structured as follows:

- Chapter 1 sets the ambition for the region
- Chapter 2 defines the connectivity objectives
- Chapter 3 sets out the analytical work which identifies the strategic case for change
- Chapter 4 describes the three key components of the LCR HS2 Connectivity Strategy
- Chapter 5 provides an overview of our proposed approach to developing our transformational connectivity corridors
- Chapter 6 concludes the work to date and next steps

Executive Summary

The ambitious vision for the Leeds City Region (LCR) HS2 Growth Strategy is for:

*“HS2 to be the catalyst for **accelerating and elevating** the Leeds City Region’s position as an internationally recognised place of vitality, connecting the North and creating an inclusive, dynamic economy, accessible to all.”*

This document summarises the strategy for delivering the step change in connectivity required to enable the transformative impact of HS2 to be realised across the City Region, through improved links within and beyond the City Region. This will form a key input to the broader Connectivity Strategy for the City Region and also links to our emerging Local Inclusive Industrial Strategy.

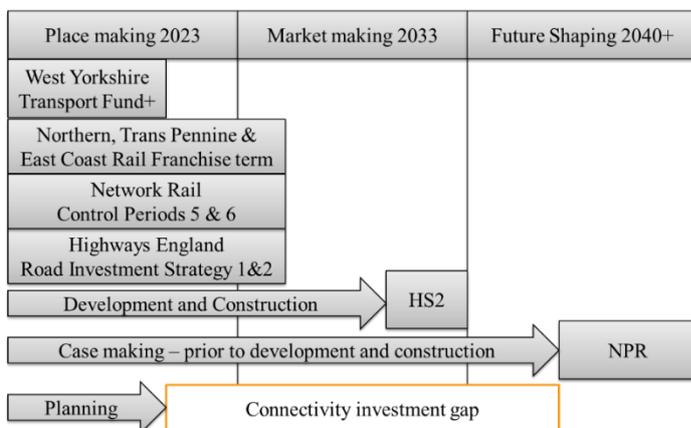
Delivery of the LCR HS2 Connectivity Strategy will bring new and more productive jobs within reach of people (enabling them to move job without moving house), new markets within reach of businesses, new talent within reach of employers, and new knowledge and investment in reach of innovators and entrepreneurs. An accelerated programme of transformational connectivity is a prerequisite to enabling the economic geography of the City Region to be reshaped through HS2.

Transformational connectivity will play key a role in tackling low levels of productivity and stubborn levels of deprivation which have both been identified as key challenges to be addressed through the Leeds City Region's Inclusive Industrial Strategy², reflecting the fact that the pattern of deprivation has changed little in decades.

The Strategy aligns with Transport for the North’s Strategic Transport Plan as well as the West Yorkshire Transport Strategy and builds on our existing connectivity priorities for Northern Powerhouse Rail (NPR) as well as the planned upgrades to the Trans Pennine Route, East Coast Main Line and Calder Valley Line.

It sets out that to cater for the additional 146,000 Full-Time Equivalent (FTE) jobs forecast across the City Region including the 24,500 additional FTEs in Leeds city centre, we need to plan for at least an additional 25,000-30,000 trips into Leeds city centre in every morning peak by 2033. This equates to at least a 25% increase in trips on top of current levels into the city centre.

Taken together, the current committed and planned investments in bus, rail, walking and cycling do



not provide the required capacity or sufficiently address the deprivation or productivity challenges facing the City Region.

The City of Leeds and the City Region therefore face a major 'investment gap'. Identifying solutions to this Investment challenge which also address the Industrial Strategy productivity priorities is a core focus for this strategy.

² Following the launch of the Industrial Strategy White Paper, Further details around the Leeds City Region Local Inclusive Industrial Strategy can be found in the papers to the Combined Authority on 14 December: <http://westyorkshire.moderngov.co.uk/documents/s4760/Item%2010%20-%20Inclusive%20Industrial%20Strategy%20FINAL.pdf>

Components of the LCR HS2 Connectivity Strategy

To achieve the HS2 Growth Strategy outcomes and address the challenges, the Leeds City Region (LCR) HS2 Connectivity Strategy has four strands:

1. Embracing technology to create an integrated network :

- Designing transport services which have a strong core network with a move towards more feeder and on-demand services. This will create opportunities to shape the role of more responsive solutions which change how transport services are currently provided
- Using technology to support the ability for people to access transport in different ways (e.g. shared access of cars through car clubs). By combining transport services from public and private providers through a unified gateway, transport users will be able to pay through a single account on a 'pay per trip' or a 'monthly fee' basis as part of a "Mobility As A Service" offer
- Embracing innovative new mobility service providers such as ride-sharing, bike-sharing and car-sharing services as well as on-demand bus services.
- Information is vital as a means of creating network performance. We will work with TfN and Public Transport Operators to transform the user experience, and integrate services and ticketing in particular for disruption messaging.
- Improvements to pedestrian and cycling infrastructure will help overcome severance issues and lead to a greater uptake of active modes, providing connectivity for shorter trips. More people choosing to travel on foot or by bicycle will make the transport network more sustainable, improve air quality and benefit the health and wellbeing of those living in the LCR.

2. Delivering our existing city region transport priorities:

We cannot wait till the 2040s to begin this transformation. Through working collaboratively with Government and Network Rail, our ambition is for:

- Northern Powerhouse Rail to transform East-West connectivity in the Leeds City Region. It will provide more choice for our residents on where they work and will provide our businesses with access to a massive labour market. The objectives of the Northern Powerhouse Rail Programme will be maximised through implementation of city centre stations in Leeds, York and Bradford city centres.
- Trans Pennine Route Upgrade must be delivered without delay by 2022 to provide improved connectivity and capacity between Manchester, Leeds, Huddersfield and York.
- Calder Valley Line improvements are needed in the short term to meet the needs of Leeds, Bradford and Halifax, prior to Northern Powerhouse Rail.
- East Coast Mainline improvements set out in the Hendy report should be delivered on time or earlier and to make the most of the released capacity through HS2/NPR (e.g. works to make the line more resilient, allow the new longer trains to run, changes to better allow fast and slow trains to interact through over taking).
- Develop a comprehensive industry response to enable the growth of the rail services particularly in and around Leeds through a 'Northern Hub 2'.

3. **Delivering Inclusive Growth through transforming connectivity on the corridors where the economic need is greatest.** In reviewing the current investment plans there is a clear gap in taking forward investment in connectivity for HS2 and this Strategy plans to fill the gap. Based on economic analysis, a set of priority corridors have been identified through careful analysis of a range of economic and transport indicators. These corridors will connect major communities, including some of the most deprived to HS2. Some corridors are pan-northern, others enhance cities across the Leeds City Region and others are local to Leeds and Bradford.
- Having defined the corridors which need the greatest intervention, we now plan to examine in detail the transformative solutions that are most suited to maximise the benefits and deliver value for money.
 - The corridors defined here are only the start of the overall network solution. We are setting a bold ambition for the future network and will develop an incremental and well-planned approach to achieving it.
 - The next stage is to develop bespoke **Inclusive Growth Corridor Plans** and business cases for each of these prioritised corridors. The approach to establishing the scale of the capacity required as well as the technological modes which may best deliver this scale of connectivity is outlined in this report.

The LCR HS2 ‘Transformational **City Region** Priority Corridors’ are:

- Leeds – Bradford - Halifax and the Calder Valley
- Leeds – York
- Leeds – Harrogate - York
- Leeds – Dewsbury - Huddersfield
- Leeds – Wakefield/Barnsley and Sheffield
- Leeds – Five Towns
- Leeds – Skipton
- Leeds – Selby

There are also a number of local corridors which are priorities to Leeds and Bradford. These local corridors will need to build on existing development and regeneration priorities as well as schemes within the West Yorkshire plus Transport Fund as well as the Leeds Public Transport Investment Programme. The ‘Transformational **Local Priority** Corridors’ are summarised below:

- Leeds Bradford cross city connectivity
- Strengthening high value assets in the North West of Leeds, the University of Leeds, Kirkstall Forge and the Airport.
- Accelerating inclusive growth in the East of Leeds towards St James’ Hospital and the East Leeds extension.
- Extending the Southbank opportunity to the south of the City.
- Stimulating development from the City Centre into North Bradford towards Shipley, Saltaire and the airport.
- Encouraging new development from the City Centre to South Bradford and North Kirklees

4. **Creating multi-modal interchanges which are gateways to the City Region.** Development of gateways in the Leeds City Region has not kept pace with the expectations of businesses, passengers and the needs of modern towns and cities, with the result that individual facilities may have actually constrained economic development. This LCR HS2 Connectivity Strategy

identifies a series of priority gateways which should be developed in line with our gateway principles. Our priority gateways include delivery of:

- The full Leeds Station Gateway through the Integrated Station Masterplan (including upgrades to the existing and HS2 components of the rail station)
- York Central Masterplan as the region's second HS2 termini and NPR hub
- Bradford Interchange and Bradford Forster Square
- Huddersfield and Halifax
- Wakefield Stations
- Harrogate
- Selby

Developing the Inclusive Growth Corridor Plans

The core focus for the next stage in work is the development of Inclusive Growth Corridor Plans for each of these prioritised corridors. Each corridor will be developed in the context of an overall network ambition. These corridor plans will:

- Reflect the views of local communities, elected members and politicians, businesses and stakeholders
- Identify how to create the sense of place with the available corridor space, through adopting a 'healthy streets' approach
- Bring together the medium to longer term regeneration and broader development plans which transformational connectivity can support
- Consider the transport mode technology options required to provide the capacity required for the scale of current and future demand using the corridor
- Examine the detailed skills and supply chain interventions which can be clearly integrated within the Connectivity Strategy
- Integrate with wider social policy interventions required on the corridors to support the drive in productivity growth and inclusive growth
- Development of these detailed Corridor Plans will be a collaboration with City Region partners including key stakeholders, Local Authority Districts and TfN

The corridors defined here are only the start of the overall ambitious network solution and will incorporate the gateway proposals. We are setting a bold ambition for the future network and will develop an incremental approach to achieving it. Each corridor will require a bespoke solution and timeline for delivery. Development of corridors will need to be prioritised, considering their value for money, deliverability and acceptability. Development will be phased/staggered during 2018, with the intention that by the end of financial year 2018/19, the outputs of the work will set the clear pipeline of short, medium and longer term projects/interventions across each of the policies areas described above.

From a transport perspective the choice of transport modes on each of these corridors will be influenced by a range of factors including the characteristics of each corridor, the potential to enhance the quality of the places within the corridor, the scale of capacity required and the city's aspirations in terms of transformative impact. A bespoke approach will be needed for each corridor – some may be better suited to rail or car, others to a blend of modes including city/mass transit and active modes to deliver the future capacity required. Delivering the capacity has to be achievable within the constraints of the geography – which will favour modes with higher space efficiency. In establishing the technology we will also need to look at how we can improve the experience for the customer and the performance of the network to establish how we can make best use of any released capacity.

The output of the 'Inclusive Growth Corridor Plans' will be detailed short, medium and longer term transformational projects/interventions across each of the policies areas described above. This will form the basis for the future pipeline, with additional corridors added as they become identified through the overarching LCR Connectivity Strategy.

1. THE LEEDS CITY REGION HS2 AMBITION

The 2040 West Yorkshire Transport Strategy sets out that our ambition is for:

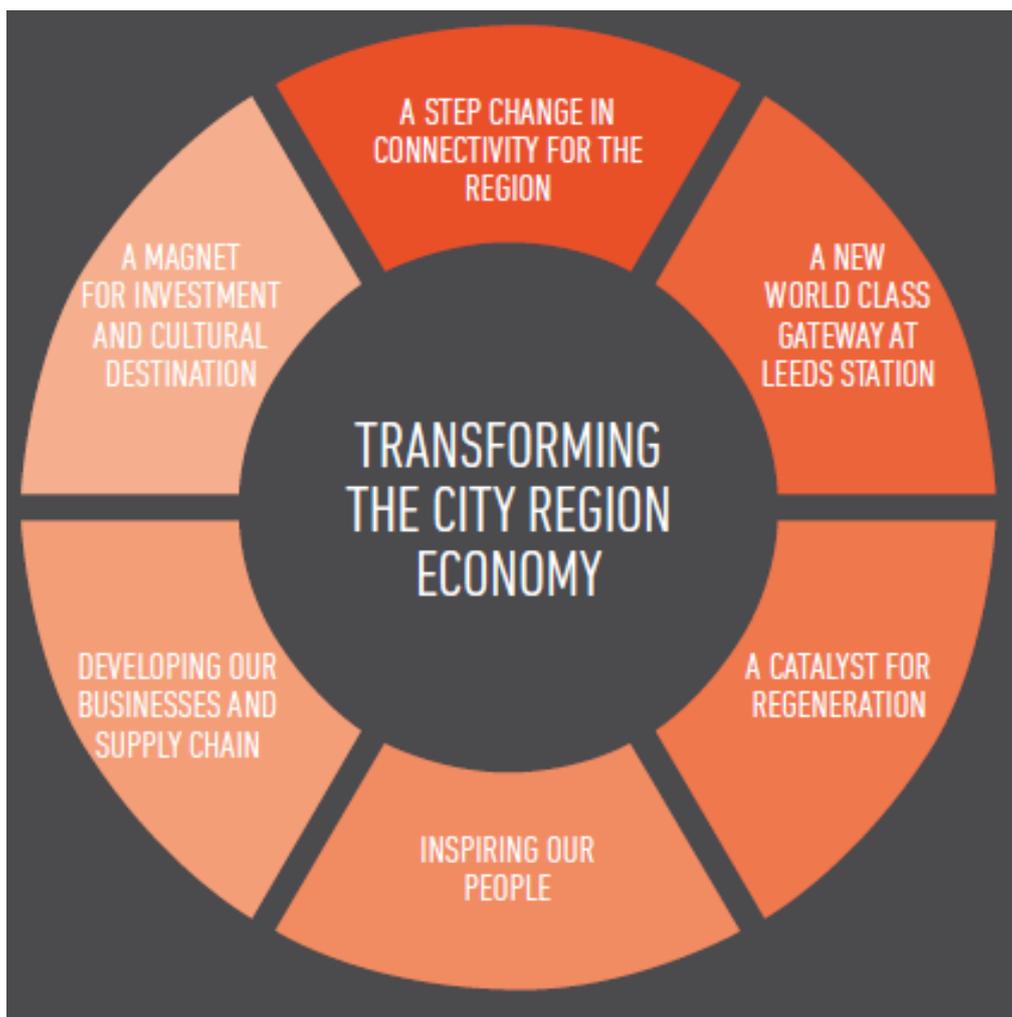
“A world class public transport system that connects different modes of transport seamlessly into one comprehensive, easy to use network.”

The ambitious vision for the Leeds City Region HS2 Growth Strategy is for:

*“HS2 to be the catalyst for **accelerating** and **elevating** the Leeds City Region’s position as an internationally recognised place of vitality, connecting the North and creating an inclusive, dynamic economy, accessible to all.”*

Six principles form the basis of our HS2 Growth Strategy and are set out below. Delivering against these will transform our region’s economy by improving connectivity across the region, up-skilling our workforce, developing our supply chain, and promoting the opportunities that HS2 can bring.

As a key part of the LCR HS2 Growth Strategy, the LCR HS2 Connectivity establishes the major local and regional connectivity priorities which are required to deliver the vision of the West Yorkshire Transport Strategy and enable and maximise growth associated with HS2 coming to the Leeds City Region. The HS2 Connectivity Strategy will help create the spatial plan for transport across the City Region.



HS2: A once-in-a-Generation Opportunity

LCR is one of the strongest performing city regions in the country and in the Northern Powerhouse, producing more than one quarter of GVA in the Northern Powerhouse in 2015. However, despite the high concentration of skilled jobs, productivity is still considerably below the national average and well below the European average.

LCR is successful, but it could be doing much more to fulfil its potential. There are big changes on the way which offer opportunities for transformational change to the way the LCR economy functions—how it trades, the depth and breadth of the labour market, and the opportunities for regeneration.

HS2 and Northern Powerhouse Rail will create a step change in the connectivity of LCR. By bringing the major cities closer to other cities in the North and to London through faster journeys, the dynamic of trade will change and opportunities for development will help boost the LCR economy in the medium to long-term. HS2 has the potential to help the Combined Authority and our partners deliver the West Yorkshire Transport Strategy through:

- Reshaping our economic geography by bringing together the city regions centred on Leeds, Sheffield, Nottingham and Birmingham into a coherent and integrated economic zone of over ten million people, five million jobs, and some of the UK's most significant manufacturing clusters. HS2 will enable people to have greater access to jobs and attract businesses to invest here.
- Adding capacity to the national high speed network and therefore freeing up capacity. This will create opportunities to improve the frequency and reliability of rail services for commuters, business travel and potentially freight on the local and regional network.
- Being a catalyst for growth – in Leeds and York where HS2 currently arrives and then, with improved local connectivity, to economic hubs in Barnsley, Bradford, Calderdale, Craven, Harrogate, Kirklees, Selby and Wakefield.
- Creating opportunities for skills and employment which the LCR is well placed to take advantage of with fourteen further education colleges and eight higher education institutions, the latter producing 35,000 graduates every year, many in high value STEM subjects.
- Transforming Leeds Station – the proposals for an integrated station will create a single interchange between HS2 services, and local rail services to places such as Bradford, Wakefield, Huddersfield and Halifax, and potentially future NPR.

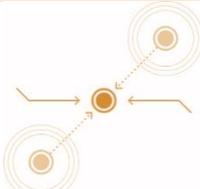
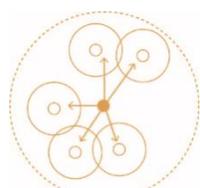
The HS2 Growth Strategy builds on our current investment pipeline and Strategic Economic Plan. Taken together, these strategies will transform Leeds, making it a more attractive place to do business and bringing it closer to other major economic centres. However, the increased demands on infrastructure (particularly housing and transport) that will be created through these new opportunities, will require LCR to look to long-term investments which will make the most of these major programmes.

The LCR HS2 Connectivity strategy will help realise this transformation by providing the capacity, journey times, frequency and integration required to distribute the benefits of HS2 not just in Leeds, York and Bradford, but across the City Region; in Halifax, Huddersfield, Wakefield, Barnsley, Selby, Harrogate and Skipton.

Transformational connectivity will bring new and more productive jobs within reach of people (enabling them to move job without moving house), new markets within reach of businesses, new talent within reach of employers, and new knowledge and investment within reach of innovators and entrepreneurs.

2. STRATEGIC CONNECTIVITY OBJECTIVES

Our Strategic Economic Plan, West Yorkshire Transport Strategy and HS2 Growth Strategy together outline common objectives for the LCR. Based on these, the LCR Connectivity Strategy sets five connectivity objectives which address the changes this strategy will bring. These themes are particularly relevant for considering how to make the most of the future transformational changes in transport connectivity and economic development. These five themes represent inclusive growth for both people and place, across the whole of the LCR, while recognising the need to make the most of the economic strengths.

	<p>Put people first in town and city centres</p> <p>Well-functioning and people-friendly town and city centres are important for increasing productivity, supporting innovation and growing the economy.</p>
	<p>Invest in skills and attracting business</p> <p>To retain and strengthen its competitive edge, the LCR must create the right environment to attract businesses and workers who in turn, create higher value through higher skills.</p>
	<p>Increase employment in growing sectors</p> <p>To build a successful and resilient economy, the LCR will require investment in transport which supports the demand for sites in rapidly growing sectors such as technology, science and technical services. This will be focused in urban centres.</p>
	<p>Build on the Leeds-Bradford Powerhouse</p> <p>Leeds and Bradford generates 48 percent of LCR's GVA with their city centres only 7 miles apart. Future growth must make the most of the point-to-point connectivity between the two city centres by creating broader connectivity from the main rail stations.</p>
	<p>Share the benefits of growth through strategic connectivity</p> <p>Without strategic connectivity reaching out from major hubs served by HS2 and NPR, the LCR risks losing out on opportunities for urban centres to grow the jobs and sectors for which they have a competitive advantage.</p>
	<p>Have a positive impact on our built and natural environment</p> <p>Air pollution, carbon emissions and climate change are significant challenges facing the Region. Schemes which deliver inclusive economic growth should also have a positive environment impact and enhancing people's quality of life.</p>

3. THE CASE FOR CHANGE

This Strategy is developed on a 'why', 'what', 'how' basis. This section summarises a much more detailed Case for Change Technical Report³ and sets out the key challenges across a range of Economic, Social, Transport and Capacity criteria.

It demonstrates that business as usual for connectivity will not enable the social and economic constraints to be resolved or the economic opportunities to be achieved.

Economic and Social: An economy that is not performing to its potential, with long term inequality.

Need to increase productivity

- Productivity per employee in the LCR is 15% below the national average and 5% below the Northern Powerhouse. This is by far the most important challenge to creating an effective market economy that grows effectively and fairly.

Raise skills levels to attract business and innovate

- In terms of highly skilled occupations, LCR is just above the Northern Powerhouse average but still behind England as a whole.

Industrial changes meaning a need to retrain people with new skills

- Adapting skills and training to new jobs is a long-term challenge. Our Skills programmes are being developed to tackle this.

Tackling deprivation through greater access to skills training and jobs

- Despite being a wealthy and successful economic region, there are longstanding deprived areas in the LCR, with low skill levels and low levels of accessibility.

GVA and jobs focus on city centres

- Fast growing sectors, such as knowledge intensive business services and technical services are changing development patterns, and demand for better public realm, vibrancy and active transport options in city centres.

Transport: A network that cannot accommodate good growth.

Network capacity that cannot support the opportunity

- A rail network that is already full, especially at peak times and even with planned investment crowding will worsen
- Historic dominance of the car and a plan to divert through-traffic away from Leeds city centre will allow a reduction in road space in the city centre which may result in future capacity issues if there is no investment in public transport
- HS2 and NPR will create significant new demand for travel
- Significant plans for growth require more capacity - and greater efficiency in the use of available infrastructure
- A congested corridor between Bradford and Leeds, the largest economic centres.

Limited access to opportunities

- Lack of integrated door-to-door connectivity
- Poor integration limits accessibility to opportunities
- An underused bus network that is difficult to navigate
- Cost of travel a barrier to take-up opportunities.

Sustainable travel is not the obvious choice for many

- Public transport is often a second choice to the car, and mode share for sustainable and active modes is low
- Severance caused by large and busy roads
- Poor air quality in Leeds city centre and low physical activity levels across LCR.

³ This more detailed technical report is not on the website but is available on request.

The Capacity Challenge

The economic opportunities in Leeds created by HS2, including the planned doubling of city centres through the Leeds Southbank and the York Central proposals, create a major capacity challenge through the additional trips they will generate on the local and regional transport network.

The LCR HS2 Growth Strategy sets out the substantial increases in employment forecast for the City Region. These forecasts include the potential impact of HS2 and the Growth Strategy and demonstrate that Leeds city centre will see 40% growth in jobs up to 2043.

Total change in FTE from 2017 Levels

Source: REM	2017 FTE Jobs	2017 - 2033	2017 - 2043
Leeds city centre (North and South Bank)	109,000	+25,000	+43,000
Across the LCR	1,228,000	+147,000	+260,000

The growth will be experienced across the LCR however with the arrival of HS2, Leeds city centre in particular is a focus for this capacity challenge:

- When HS2 arrives in 2033, even with the additional capacity planned through the current Northern and Trans Pennine franchise commitments, rail crowding on key regional corridors will be worse than current levels.
- Historic dominance of the car and a plan to divert through-traffic away from Leeds city centre will allow a reduction in road space in the city centre which may result in future capacity issues if there is no investment in public transport.
- High mode share for private transport modes leads to a network that is susceptible to congestion

Taken together, the highway and rail networks as currently planned, do not have

the capacity to enable people to access the business, leisure or employment opportunities within the city centre that will result from HS2 and the economic development that will be brought forward.

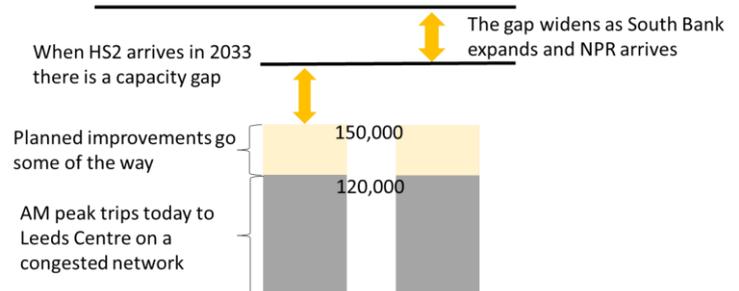
To meet expected demands in 2033, an additional 25,000 trips into the Leeds city centre in the AM peak need to be catered for. This forecast demand continues to grow with the full roll out of the Southbank and the arrival of NPR.

An accelerated programme of regional and local investment in connectivity is therefore a prerequisite to the creation of a world class gateway at Leeds station, the Yorkshire Hub, to achieve the economic growth potential of the LCR.

In developing this programme of regional and local investment, the LCR HS2 Connectivity Strategy has established from an economic perspective, the corridors where the case for change is greatest. Some corridors are regional, connecting places like Huddersfield and Halifax to Leeds; others are local to Leeds and Bradford. The Strategy also identifies the capacity required on each corridor before the opening of HS2 in 2033 as well as the objectives in developing solutions which address the constraints.

The need for this programme of regional and local investment is essential in advance of HS2 opening. Whilst capacity and East-West Connectivity delivered through Northern Powerhouse Rail (NPR) is a key priority for LCR connectivity, the capacity challenge occurs in advance of NPR opening.

A transformed LCR, with South Bank built out and Northern Powerhouse Rail requires capacity for 255,000 trips to Leeds in the AM Peak by 2043



Sources: REM, WYCA Transport Strategy and LISM capacity summary analysis report

4. COMPONENTS OF THE HS2 CONNECTIVITY STRATEGY

To achieve the HS2 Growth Strategy outcomes and address the challenges set out in the Case for Change, the Leeds City Region (LCR) HS2 Connectivity Strategy has four strands:

STRAND 1: EMBRACING TECHNOLOGY TO CREATE AN INTEGRATED NETWORK

STRAND 2: DELIVERING OUR EXISTING TRANSPORT PRIORITIES

STRAND 3: DELIVERING INCLUSIVE GROWTH - TRANSFORMING CONNECTIVITY ON THE CORRIDORS WITH THE GREATEST ECONOMIC NEED

STRAND 4: CREATING MULTI-MODAL INTERCHANGES WHICH ARE GATEWAYS TO THE CITY REGION

A summary of each strand is provided on the following pages.

Chapter 5 sets out the next stage of work which will develop our approach to transforming connectivity to create a clear pipeline of projects/interventions which form the priorities for the City Region.

STRAND 1: EMBRACING TECHNOLOGY TO CREATE AN INTEGRATED NETWORK



ONE NETWORK

Improvements to transport are needed at different scales; connecting LCR to Birmingham and London, Northern neighbours, and equally importantly the businesses and residents within LCR.

We also need to integrate transport improvements with other HS2 Growth Strategy interventions to realise the full potential of this major investment. For example, the role of skills and supply chain is critical to the success for LCR, but without improved connectivity, the opportunities created through improved career choices and business interactions will be undermined.

Therefore a key outcome of the HS2 Connectivity Strategy will be to integrate all the existing and future transport provision into one network that is easily navigable. This is not only achieved through the physical integration of transport through the delivery of multi-modal transport hubs and feeder services, but through the local application of smart data and innovation to enable users to

quickly and seamlessly travel across the region with greater efficiency than that presently enjoyed by the private car.

Transport hubs - where mass-transit, car share and sustainable transport options such as e-bike share and walking integrate seamlessly both physically and in information/presentation will assist users to more easily access the jobs, skills and services of the region. These hubs also have the potential to add value to the local area through improved linkage to local centres and residential areas, improving economic vitality of the area.

SMARTER AND SERVICE-BASED SOLUTIONS

Technology is rapidly changing the way people consume transport and expectations about provision. We want to embrace the opportunity smarter solutions provide for delivering a more effective, reliable, accessible and shared transport service. Mobility as a Service and the sharing economy present new opportunities to give people choice which should ultimately reduce the pressure on our road and rail networks. This strand of the strategy also embraces opportunities around active and healthy travel, car-sharing, car clubs, more flexible working patterns and touch-down hubs, for example.

Technology can be shaped and adapted to effectively target the local strategic challenges of reducing transport poverty, improve network efficiency and deliver high quality environments including cleaner air.

The potential here is important for the whole of LCR and can provide solutions to transform people's access to opportunities by providing a more flexible way of enabling a wide range of movements throughout the day and night. It cuts across specific corridors, and can provide the basis for a more joined up network. The West Yorkshire Combined Authority must be at the forefront of attracting investment by demonstrating we are 'open for business' through new partnership working to trial new mobility modes. We are currently working with TfN, the University of Leeds Institute for Transport Studies and local tech firms to harness these new solutions which can improve network effectiveness and serve areas where there are gaps in provision.

Research into different emerging technologies has identified their potential role in improving the regions connectivity and ensuring a prosperous, resilient, diverse, inclusive and healthy City Region:

- **Mass Movement** – our key corridors will major on advanced mass-transit models to ensure the most efficient and expedient movement of people from key hubs to jobs, new skills and services. New technologies have the potential to offer high frequency mass-transit lower capital investment costs than in the past. These include autonomous and battery powered tram systems, high quality bus rapid transit and construction techniques such as small-bore tunnelling to improve the business case for mass movement investment. Our LCR corridor work will also identify where on-demand feeder services have a role to play in reaching peripheral areas on our corridors, especially where traditional public transport models would not be considered appropriate.
- **New Mobility Modes and Smart Ticketing** – The rise of 'disruptive technology' such as Uber have revolutionised the flexibility of on-demand transport provision and the ease of payment. This technology has the potential to support inclusive growth aspirations, by providing travel options for populations where traditional transport provision is ineffective, or to open up travel opportunities to new markets for whom existing travel and payment mechanisms are not cost-effective or personalised enough. The City Region will develop trials on key corridors where on-demand and responsive transport and app based payments

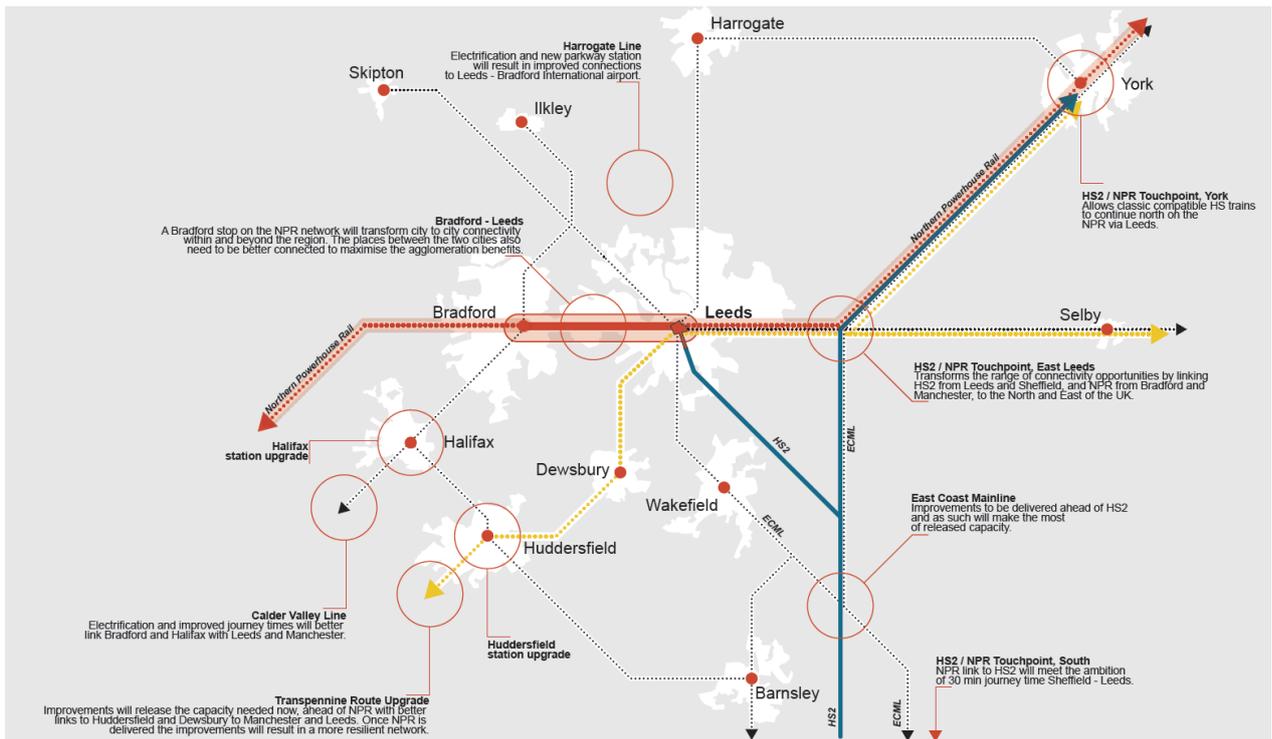
can be introduced to ensure 21st century technology supports connectivity improvements for all.

- Future of the bus – The bus will continue to play a vital role in providing integration with local, regional and national transport provision. However it needs to change by becoming more user friendly, with greater efficiency and agility to retain existing users and attract new users. On future corridors, the incorporation of data and technology will be used to create corridor and bus network efficiency and significant improve information provision to create a stepchange in performance.
- By attracting investment in new approaches to ‘dynamic transport’ such as on-demand transport provision, new market segments can be explored and new models of connectivity tested on corridors, creating the foundations for future rollout. Park and ride sites are obvious fixed route journeys where this technology can be trialled in the City Region before wider rollout.
- Data – If used effectively and intelligently there are significant data opportunities to create efficiencies on the existing network through the use of aggregated data to forecast user demand – ensuring sufficient supply, a better understanding of network conditions to smooth journey times and to use data to trial new services.
- Active travel – The arrival of new bike share schemes presents sustainable and low cost travel options for short trips or to help the first and last mile of journeys incorporating other modes. The creation of ‘healthy streets’ in the City Region offers the opportunity to ensure our connectivity hubs support walking and cycling, with incorporation of bike share and cycle parking where possible. The hubs should also ensure integration with the surrounding environment and ensure permeability to local areas.
- Car clubs – the placement of car club vehicles at key interchange points can ensure that for journeys where car is required to reach the destination, shared vehicles are possible instead of reliance on private mobility.

The technologies and opportunities are rapidly developing. Each technology will have different strengths in the varied socio/economic and geographical contexts of the Region. Our ability to adapt and embrace different transport technologies of the future that support the Leeds City Region HS2 Connectivity Strategy will be shaped by their appropriateness for particular corridors

Trials and targeted investment to these localities will be developed where these attract investment in transport technologies which support our LCR HS2 Connectivity Strategy objectives and Inclusive Growth ambitions.

STRAND 2: DELIVERING OUR EXISTING TRANSPORT PRIORITIES



NORTHERN POWERHOUSE RAIL (NPR)

Transport for the North has recently confirmed that its emerging vision for the NPR network includes a new Trans Pennine rail line that connects Manchester and Leeds via Bradford.

A Northern Powerhouse Rail Network (NPR) which seamlessly integrates with HS2, radically improves journey times and significantly increases capacity with stops in the city centres of Leeds, Bradford and York will as part of the city region's wider transport network, open up new labour market markets across the North and transform the economy.

The NPR Programme will benefit from the investments made through this programme especially if a **Bradford city centre** location is taken forward.

HS2 SOUTH YORKSHIRE PARKWAY

Connecting **Barnsley, Wakefield** and **South Kirklees** to HS2 without having to travel to Leeds or Sheffield is important to ensure HS2 benefits all in LCR. Without this enhancement improvement to the regional connections will be needed.

CITY REGION RAIL

LCR has a mature rail network providing relatively good local connectivity and has seen substantial and on-going growth in patronage in recent years.

However, much of the network is now heavily overcrowded particularly for local commuter markets. Current investments through franchise commitments will deliver some capacity benefits, but the scale of capacity currently planned does not meet the level of growth forecast. Current schemes are also constrained by the ability to run more services particularly in and around the Leeds area. Our regional rail priorities therefore are focused on strengthening the existing rail network by:

- Lengthening existing train services to increase passenger capacity; and
- Increasing rail network service capacity to enable increases in service frequency/capacity.

We cannot wait until the 2040s to begin this transformation. We therefore highlight our regional rail priorities which need to be in place ahead of HS2 opening:

- **Trans Pennine Route Upgrade.** This must be delivered in full, without delay. This will provide improved connectivity between Manchester, **Leeds, Huddersfield** and **York**.
- **Calder Valley Line.** This improvement is needed in the short term, along with more ambitious improvements which could include electrification to meet the needs of **Leeds, Bradford** and **Halifax**, prior to NPR.
- **East Coast Mainline.** The franchise commitments will improve national connectivity for **Leeds, Bradford, Wakefield** and **York** ahead of HS2. We will work with DfT and Network Rail to maximise the opportunities of the released capacity after HS2 arrives.
- **Connections to Harrogate** and integration to **Leeds-Bradford Airport** is needed through delivery of the new Airport Parkway Station providing direct connectivity to both Harrogate and Leeds, to bring skilled people into the City Region and to ensure we support the growth of our local airport. There are also opportunities to make more of the connectivity via the East Coast Mainline.
- **Connections to Selby** will be important to support local growth plans and widen access to the skilled labour market.

TOWARDS A 'NORTHERN HUB 2'

When considered together, the overall network capacity challenges around Leeds need to be considered together as one. This can only be solved and addressed with a shared and integrated understanding of the rail capacity issues by Government and the wider rail industry.

Network capacity around Leeds Station is a pan-regional, national and industry-wide issue. A holistic assessment of capacity solutions which looks beyond traditional rail solutions for the Leeds wide rail area is required through a Northern hub 2 programme.

NEXT STEPS

The rail network performs a vital role in connecting our people and businesses to opportunities across the country and also in connecting within the City Region. It is however a victim of its own success and of years of under investment.

Our rail network is overcrowded and current planned investment is insufficient to support the level of economic growth to close the gap with the UK and to improve the life choices of the people who live here.

When TfN publishes the updated Long Term Rail Strategy in Winter 2017/18 we will take the Conditional Outputs developed and set out what that means for the LCR's rail network. This will create a clear ambition for our regional rail network that we can take forward with TfN and Rail North.

STRAND 3: DELIVERING INCLUSIVE GROWTH - TRANSFORMING CONNECTIVITY ON THE CORRIDORS WITH THE GREATEST ECONOMIC NEED

The economic potential can only be achieved if the transport network is effective in enabling people to access opportunities. In the context of a network that is already either at or reaching capacity, the Good Growth ambition can only be achieved through investment in transport connectivity.

Based on economic analysis, a set of priority corridors have been identified through careful analysis of a range of economic and transport indicators considered as part of the Case for Change. These corridors will connect major communities, including some of the most deprived to HS2. Some corridors are pan-northern, others are regional and some are local to Leeds and Bradford. The LCR HS2 'Transformational **City Region** Priority Corridors' are:

- Leeds - Bradford - Halifax and the Calder Valley
- Leeds - York
- Leeds – Harrogate - York
- Leeds – Dewsbury - Huddersfield
- Leeds - Wakefield /Barnsley and Sheffield (including the Penistone line)
- Leeds - Five Towns
- Leeds - Skipton
- Leeds – Selby

There are also a number of local corridors which are priorities to Leeds and Bradford. These local corridors will need to build on existing development and regeneration priorities as well as schemes within the West Yorkshire plus Transport Fund as well as the Leeds Public Transport Investment Programme. The 'Transformational **Local Priority** Corridors' are summarised below:

- Leeds Bradford cross city connectivity
- Strengthening high value assets in the North West of Leeds, the University of Leeds, Kirkstall Forge and the Airport.
- Accelerating inclusive growth in the East of Leeds towards St James' Hospital and the East Leeds extension.
- Extending the Southbank opportunity to the south of the City
- Stimulating development from the City Centre into North Bradford towards Shipley, Saltaire and the airport
- Encouraging new development from the City Centre to South Bradford and North Kirklees



This section highlights the key criteria for identification of the local corridors, particularly focusing on the current scale of the demand for capacity and the future capacity requirements to support the creation of more jobs, housing more people and supporting economic growth. We want to accelerate this opportunity for growth and ensure future travel is more sustainable.

Strengthening high value assets in the North West of Leeds



Justification for Selection

- High levels of highly-skilled workers commuting to high value-added jobs.
- Increasing accessibility important for deepening the highly skilled labour market with increased access via NPR and HS2.
- Highest demand corridor in Leeds
- Includes locally important places which act as important economic centres that can be affected by through traffic such as Kirkstall
- Connects several key economic assets
- Significant future rail crowding and road congestion
- Highest population density of all Leeds corridors
- Minimising congestion and reducing journey times helps keep this corridor attractive and could deliver high journey time savings benefits

Accelerating inclusive growth in the East of Leeds



Justification for Selection

- Strategic connection to St James's Hospital, a key asset for Leeds
- Increasing accessibility important for deepening the middle-skilled labour market
- Relatively high existing population density
- Highest level of planned housing in Leeds, including East Leeds Extension
- Corridor penetrates areas of entrenched deprivation including Harehills and Seacroft
- Uncompetitive public transport offer and major issues with severance

Extending the Southbank opportunity



Justification for selection

- Very high levels of existing demand (12,000 AM peak)
- Huge development potential with South Bank - housing and employment
- Notable future rail crowding and road congestion
- There are big challenges around tackling deprivation (average IMD decile of 3) and bring in opportunities and better accessibility.
- Uncompetitive public transport offer and major issues with severance

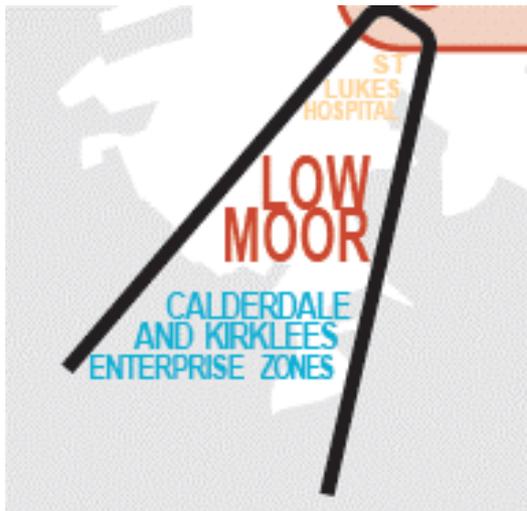
Stimulating development in North Bradford



Justification for selection

- Very high levels of existing demand and high population density
- Strategic opportunity site around the Canal Road corridor connecting Bradford with Frizinghall and Shipley. Overall, more than 25,000 homes are planned within the corridor.
- Provides accessibility for new and future residents to jobs in Bradford city centre and increased connectivity to Leeds through NPR interchange.
- Significant future rail crowding and road congestion
- Penetrates deprived areas but also connects affluent areas in the north of the district
- Uncompetitive public transport offer resulting in high car mode share (70%).

Encouraging new development from the City Centre to South Bradford and North Kirklees



Justification for selection

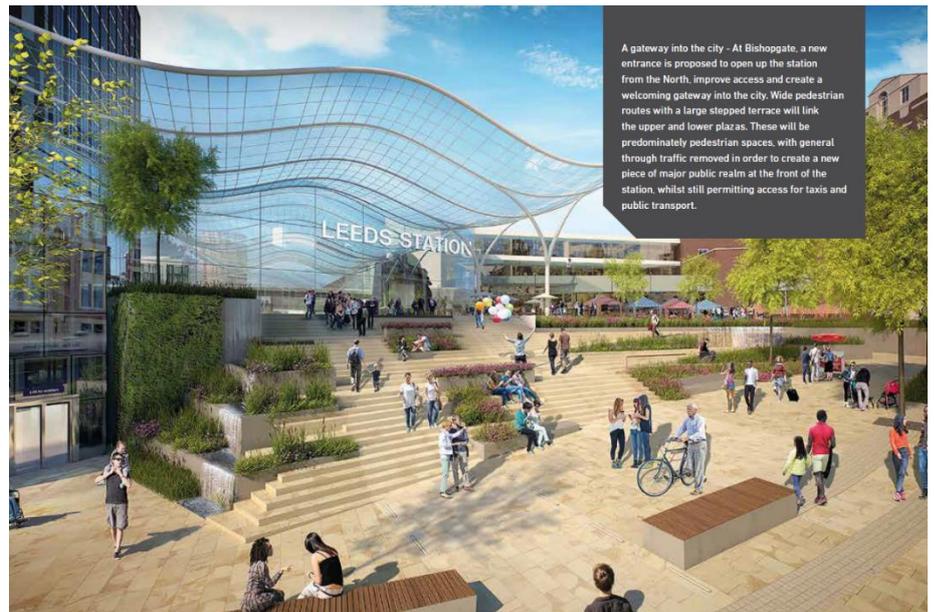
- Provides accessibility for new and future residents to jobs in Bradford city centre and increased connectivity to Leeds through NPR interchange.
- Significant future rail crowding and road congestion
- Significant housing and employment growth zones and future land use change
- Penetrates deprived areas but also connects affluent areas in the north of the district
- Uncompetitive public transport offer resulting in high car mode share

STRAND 4: CREATING MULTI-MODAL INTERCHANGES WHICH ARE GATEWAYS TO THE CITY REGION

Over the last thirty years there has been a substantial shift in the structure of the Leeds City Region economy, from manufacturing to service-based activity. The service based sector is increasingly centralised in city centres as this ensures better access to skilled labour, key markets and suppliers, better collaboration as well as strong connectivity with other parts of the country. Together, these trends for higher skilled, knowledge based occupations, clustering in city centres are driving agglomeration and as the Northern Powerhouse Independent Economic Review identified⁴ are expected to continue.

The economic analysis which underpins this connectivity strategy demonstrates that this growth is forecast to continue to increase substantially, and accommodating additional demand will be essential if sustainable, city-led economic development is to continue.

Our ambition is for a world class public transport system that connects different modes of transport seamlessly into one comprehensive, easy-to-use network. To achieve this, our strategy focuses on creating interchange gateways which align with the following principles:



- **Develop gateways as a single entity:** With multiple organisations, complex relationships and multiple projects impacting on gateways, a holistic overall approach design which brings together all aspects to create a seamless facility from the perspective of the passenger is of critical importance.
- **Maximise multi-modal seamless interchange:** Seamless integration between classic rail, HS2 and NPR services as well as with adjacent bus interchanges is essential to distribute the benefits across the region.
- **Provide capacity for growth:** There are two types of capacity required at gateways; capacity for services, and capacity for passengers. Supporting future demand for both services and passengers has a direct impact on the level of residential and employment growth that a city can sustain.
- **Support sustainable, inclusive economic growth:** given sufficient connectivity and capacity, stations can support sustainable economic growth by helping to accommodate increasing travel

⁴ <https://www.transportforthenorth.com/wp-content/uploads/Northern-Powerhouse-Independent-Economic-Review-Executive-Summary.pdf>

demand and constrain private car use. They can be particularly effective in supporting high density development in the station vicinity, but can also enable a town or city as a whole to grow in a sustainable way over the long term.

- **Improve the image of the City:** stations are a key point of arrival and departure for many business travellers and other visitors, and the quality of the station environment forms part of peoples' overall perception of a town or city. A high quality, well designed station can improve the image of the location it serves, making it more attractive as a place to live, work and invest.
- **Maximise commercial opportunities:** This includes effective exploitation of commercial opportunities around a gateway, redevelopment of adjacent railway land, and enhancing the retail offer within the gateway.

Priority Gateways for the LCR HS2 Connectivity Strategy

Development of gateways in the Leeds City Region has not kept pace with the demands of passengers and the needs of modern towns and cities, with the result that individual stations may have actually constrained economic development, through:

- **Stations restricting physical access across an urban area:** the alignment of railway tracks, restricted access through the station itself and the presence of at-grade car parks and fenced-off areas of railway land often create a physical barrier between different parts of a town or city. In these circumstances, the station becomes the point of delineation between what are often described as central area activities (offices, hotels and higher value retailing), and low density industrial, warehouse and lower quality retail establishments.
- **Insufficient capacity for both services and passengers**
- **A poor quality environment in and around a station discouraging investment:** where station buildings and facilities are in poor condition and the quality of the environment of the surrounding area is low, the resulting image of underdevelopment tends to depress developers' expectations of likely returns and discourage investment.
- **A poor station environment creates a poor impression of a town or city:** A legacy of underinvestment in a station can affect perceptions of a town or city as whole, even undermining the effect of improvements in the centre and other areas away from the immediate station vicinity.

This LCR HS2 Connectivity Strategy identifies a series of priority gateways which should be developed in line with our gateway principles. Our priority gateways include:

- The Leeds Integrated Station Masterplan
- York Central Masterplan as the region's second HS2 terminal and NPR hub
- Bradford Interchange and Bradford Forster Square
- Huddersfield and Halifax
- Wakefield Stations
- Harrogate
- Selby
- And a range of smaller more local gateways.

5. OUR APPROACH TO TRANSFORMING CONNECTIVITY



For all of the priority corridors identified, the next stage is to develop multi-modal **'Inclusive Growth Corridor Plans'**. These will paint a vision of what the world might be like living or travelling along each corridor in the future and link into the Industrial Strategy priorities

The **Inclusive Growth Corridor Plans** will:

- Reflect the views of local communities, elected members and politicians, businesses and stakeholders
- Within the constraints of the available geography, create a sense of place along each corridor and especially local stops, through adopting a 'healthy streets' approach
- Bring together the medium to longer term regeneration and broader development plans which transformational connectivity can support
- Consider the transport mode technology options required to provide the capacity required for the

scale of current and future demand using the corridor

- Examine the detailed skills and supply chain interventions which can be clearly integrated within the Connectivity Strategy
- Integrate with wider social policy interventions required on the corridors to support the drive in productivity growth and inclusive growth
- Build on existing plans (e.g. local plans, WYTF and LPTIP) and bring together the future priorities - from which the transformational connectivity required is identified

Development of these detailed Corridor Plans will be a collaboration with City Region partners including key stakeholders, Local Authority Districts and TfN.

Together conclusions from these Inclusive Growth Corridor Plans will help form the content of the LCR Connectivity Strategy.

Each corridor will be developed in the context of an overall network ambition. This will embed the principles of the network and begin to develop investment plans which are needed to achieve the ambition.

The corridors defined here are only the start of the overall ambitious network solution. We are setting a bold ambition for the future network and will develop an incremental approach to achieving it. Each corridor will require a bespoke solution and timeline for delivery. Development of corridors will need to be prioritised, considering their value for money, deliverability and acceptability. With local funding already identified for the corridors within Leeds, early work is expected to focus on Transformational **Local Priority** Corridors.

From a transport perspective the choice of transport modes on each of these corridors will be influenced by a range of factors including the characteristics of each corridor, the potential to enhance the quality of the places within the corridor, the scale of capacity required and the city's aspirations in terms of transformative impact. A bespoke approach will be needed for each corridor – some may be better suited to rail or car, others to a blend of modes including city/mass transit and active modes to deliver the future capacity required. Delivering the capacity has to be achievable within the constraints of the geography – which will favour modes with higher space efficiency. In establishing the technology we will also need to look at the how we can improve the experience for the customer and the performance of the network.

Outputs

The output of the 'Inclusive Growth Corridor Plans' will be detailed short, medium and longer term small and transformational projects/interventions across each of the policies areas described above. This will form the basis for the future pipeline, with additional corridors added as they become identified through the overarching LCR Connectivity Strategy

The output of the 'Inclusive Growth Corridor Plans' will be detailed short, medium and longer term small and transformational multi modal projects/interventions across each of the policies areas described above. This will form the basis for the future pipeline, with additional corridors added as they become identified through the overarching LCR Connectivity Strategy.

A Supportive Policy Framework

As part of the development of an effective network there are a number of supporting policies which will help ensure successful delivery:

- Densification of land-use on corridors
- Efficient use of road space
- Consolidation of high frequency bus services
- Re-organisation of low frequency bus services to feed the core network
- Prioritisation of active travel and public transport in central areas
- Intelligent Traffic Management to reduce traffic delay and disruptions, ensuring journey time reliability
- Single ticket (or ticketless) journeys

Developing the Network

To develop the connectivity requirements on each Inclusive Growth Corridor Plan, the following approach will be followed:

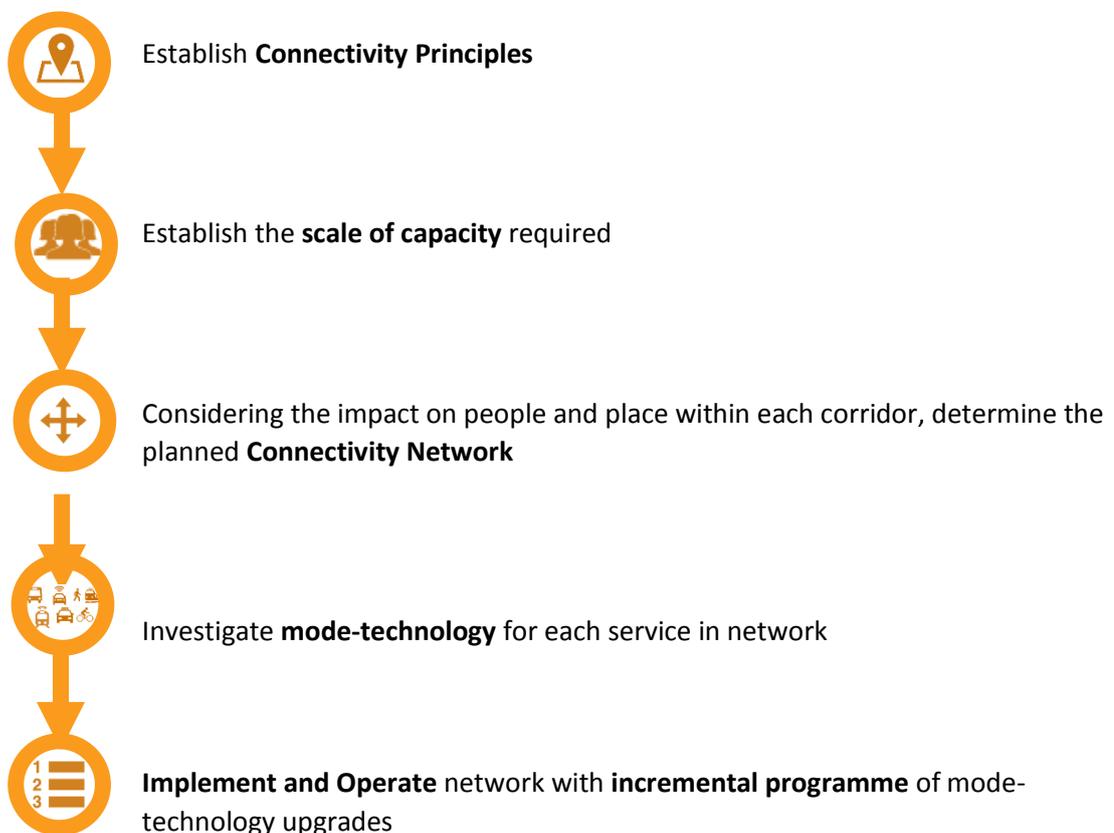
1. Devise a city network, to be operated according to common **Connectivity Principles**
2. Establish the scale of capacity required on each corridor.
3. Consider the **mode-technology**, which is a separate set of choices depending on issues such as demand, corridor geometry and the resulting space efficiency requirements, quality and nature of places, planned growth areas, funding opportunities, capital and operating costs, quality.

The development of the network will start by setting the principles then examining the places and people that need to be served.

In developing the City Connectivity network the needs of other users will be considered. This is particularly important for walking and cycling. We will integrate our network planning to align investment in our future City Connect programme and investment in the City Connectivity Network.

Even with the disruption of new transport options, we see the movement of concentrated numbers of people down corridors will remain a priority for the effective operation of our cities. We must therefore be bold in our thinking and create a network which can transform the customer experience by enabling innovation and designing a network to respond to new solutions.

Transforming city connectivity requires a solution which is **easy to understand, convenient and attractive**. To develop our ambition we have looked at the principles the City Network for our businesses, residents and visitors.



The Connectivity Principles

We have examined national and international examples to develop the principles for connectivity. These reflect the requirements that can deliver a public transport offer that people are attracted to and that meets their travel needs. The principles are not focused on the mode technology, this would be developed to reflect the needs of the route served.

Building from these principles we have begun to look at where investment is most needed to tackle the transport constraints we have identified.

We will have a bold ambition and will develop an incremental programme of investment and change to deliver the scale of transformation required.

1. Core network at Turn-up-and-Go frequency



For example, at least every 12 minutes (5ph)

2. Build 'transfer' into the way the services are arranged and marketed to the public:



Significantly increase the range of destinations

3. Minimise the number of services in the network to maximise user understanding and reduce congestion:



Network is able to be understood easily on a single network plan

4. Consistent operating hours and service frequencies across the network:



Allow for passengers to transfer between similarly operated services at all times

5. Use suitable vehicles:



Build cycling and walking into all plans and prioritising zero emissions options which minimise the public transport congestion on corridors and at stops. Provisions for efficient boarding and alighting.

6. Deliver modern operation and infrastructure:



Maximise operational performance through the use of highway and traffic priorities and intelligent control systems. High quality stop and terminal facilities. Smart payment and real-time information.

7. Develop a supporting feeder network



Medium frequency buses interchanging with main network. Low frequency buses replaced by feeder routes into interchanges.

The Technology Choices

The choice of mode-technology will be influenced by a range of factors that reflect the characteristics of the corridor. Here we highlight examples of the types of solutions which are available:

	<p>Mobility as a Service (MaaS)</p> <p>MaaS is designed to provide an efficient, personalised transport service, integrating a range of modes and presenting the consumer with the best options for the whole journey. The travel services would all be accessed through common platforms – but likely to be operated by a range of service providers. A key consideration for MaaS is collaboration between the public and private sectors to deliver integrated transport solutions.</p>
<p>Typical capacity 3,500 – 20,000 passengers</p> 	<p>Future Rail</p> <p>The future of rail service provision will include more customised information and options. Passengers will expect a service that includes level access, no waiting, smart ticketing, personal security, and effortless planning. The quality of the rolling stock will be transformed and the opportunities to improve the capacity and quality of the network for longer distance travel will remain a vital role for rail. Opportunities to further electrify the network are important to reduce the environmental impact.</p>
<p>Typical capacity 2,400-6,000 passengers</p> 	<p>City/Light/Mass Rapid Transit (LRT)</p> <p>LRT investments within urban areas have a close relationship to urban planning. The opportunity to cluster development alongside routes has proven to be an attractive solution to promoting sustainable urban growth. Advances in LRT technology - such as catenary free systems, larger low floor areas and potential options for automation - highlight that the trams of the future are very different from those that are already in service in other cities in the UK.</p>
<p>Typical capacity 500-1,700 passengers</p> 	<p>Bus Rapid Transit (BRT)</p> <p>Buses remain a vital part of our transport systems, carrying significant numbers of people each day. BRT features dedicated high-speed lanes and freeing up road space for other traffic. The speed of boarding can be solved enabling passengers to pay for trips in advance. Bus based solutions are typically quicker, easier and cheaper to implement than LRT systems, however the evidence of their impact on the urban environment is limited compared to LRT.</p>
	<p>Demand Responsive Transport</p> <p>Demand Responsive Transport is most suited to low demand areas or periods where a scheduled service would be inefficient with regard to cost and use. It is likely that DRT will ultimately become one mode under the wider umbrella of MaaS. It provides the potential to operate as a flexible feeder service to a core network, widening the reach of the network and filling gaps for infrequent journeys.</p>

Developing the Transformational Connectivity Options

To identify a preferred transport ‘technology’ from the range of choices available (from light rail to bus), further detailed investigation of future demand and development potential on each corridor will be required. Delivering the capacity required has to be achievable within the constraints of the geography – which will favour modes with higher space efficiency. A bespoke approach will be needed for each corridor.

However, there are a range of supporting criteria which influence the relative suitability of different mode-technologies. The table below illustrates the suitability of each mode technology in respect of addressing a selection of supporting criteria. The criteria presented here will help develop the next stage of work. By examining each corridor individually, the appropriate mode technology choice can be identified through analysis of demand and how systems address other supporting objectives.

Illustrative mode technology options and key supporting criteria

Key criteria which Influence Technology Choice	Future Rail	Tram-train	Tram	Bus Rapid Transit	Standard Double Decker Bus
Scale of capacity provided per hour	3,500 – 20,000	2,400-6,000	2,400-6,000	capacity 500-1,700	Less than 500
Maximise space for pedestrian realm by minimising space taken by city centre stops	Good	Good	Good	Medium	Poor
Minimise public transport vehicles at city centre stops to minimise congestion and maximise boarding efficiency	Good	Good	Good	Medium	Poor
Interaction with pedestrians	Medium	Medium	Good	Medium	Poor
Minimise boarding and alighting time	Good	Good	Good	Medium	Poor
Minimise driver resource cost	Good	Good	Good	Medium	Poor
Optimise Stop Spacing for journey speed and passenger attraction	Good	Good	Good	Medium	Medium
On or Off-vehicle electric power	Good	Good	Good	Medium	Medium
Integration with heavy rail lines	Good	Good	Medium	Poor	Poor
Can operate on steep vertical alignments	Medium	Medium	Medium	Good	Good

Good suitability

Medium suitability

Poor suitability

6. CONCLUSIONS

TRANSFORMING CONNECTIVITY TO HS2

HS2 provides a catalyst for transforming the connectivity of the LCR. We are developing a bold ambition for connecting our people and business that reflects our good growth ambition.

LCR is successful, but it could be doing much more to fulfil its potential. HS2 and NPR offer opportunities to transform the way the LCR economy functions—how it trades, the depth and breadth of the labour market, and the opportunities for regeneration. To transform connectivity we will:

- Deliver improvements that make it easier for people to make sustainable travel choices with a more integrated network. To achieve this we will embed common network principles in to the Strategy and ensure we support the development of walking and cycling as part of the solutions.
- Work with TfN and Government to transform the regional rail network. We have a number of short term priorities which need to be delivered ahead of HS2 and NPR.
- Work with Government, local businesses and civic leaders to meet the future capacity requirements in the centres of Leeds and Bradford. We have defined a series of network principles which will transform the local network and identified five corridors where we will seek to begin this transformation.

Our approach will support and integrate with plans developed by TfN and Rail North. In delivering the strategy we will build on our existing connectivity priorities and planned upgrades to the Trans Pennine Route, East Coast Main Line and Calder Valley Line.

We will take the funding and finance work we have developed for the HS2 Station Masterplan and examine the elements which can support the Connectivity Strategy, this includes opportunities to capture land value uplifts and the role of capturing local taxation as a result of investment.

We will adopt an incremental approach to delivering the Strategy. This will be focused on realising the overall ambition while responding to local market conditions and the emergence of new technologies that can support delivery. This approach will ensure the Strategy is resilient and adaptable to change. We also will commission specific research to determine the impact of future technologies, for example autonomous vehicles, in the context of the LCR.

Now that the corridors have been established and the engagement has demonstrated strong stakeholder support to the strategy, the next stage is to commence development of the 'Inclusive Growth Corridor Plans' on a phased/staggered basis for each of these prioritised corridors.

The outputs of the corridor plans will shape our longer term pipeline of interventions and priority schemes across the City Region.