

# HIGH SPEED NORTH

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NATIONAL  
INFRASTRUCTURE  
COMMISSION

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# CHAIR'S FOREWORD



From Liverpool in the west to Hull and Newcastle in the east the North requires a transformation in connectivity.

The establishment of Transport for the North (TfN) is a welcome advance. TfN's remit is to address these regional connectivity challenges and the National Infrastructure Commission has been asked to give initial strategic advice.

Our recommendation is to combine strategic early interventions with a long-term plan. Connectivity between the northern cities should be improved in stages, starting now, not waiting for the 2030s before making transformational changes.

On rail, this means kick-starting HS3, integrating it with HS2 and planning for the redevelopment of the North's gateway stations.

On roads, significant funding should be brought forwards to boost capacity on the M62, the North's most important east-west link, alongside funding to identify and assess proposals for tackling a range of other strategic challenges.

The Commission is grateful to TfN, Network Rail, the Department for Transport, Highways England, local authority and business leaders, and the many others with whom we have engaged on this report. The passion for a Northern Powerhouse is palpable; it is time for action.

**Lord Adonis,  
Interim Chair of the National Infrastructure Commission**



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# HIGH SPEED NORTH: IN BRIEF

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It takes longer to get from Liverpool to Hull by train than to travel twice the distance from London to Paris. Manchester and Leeds are less than 40 miles apart and yet on the congested M62 this often takes more than two hours by car. The Commission has been asked to advise on the strategy for improving connections in the north.

Our central finding is that the North needs immediate and very significant investment for action now and a plan for longer-term transformation to reduce journey times, increase capacity and improve reliability. On rail, this means kick-starting HS3, integrating it with HS2 and planning for the redevelopment of the North's gateway stations. On roads, investment should be brought forwards for an early boost in capacity on the M62, the North's most important east-west link, alongside funding to identify and assess proposals for tackling a range of other strategic challenges.

## TRANSFORMING RAIL

The Commission has identified three immediate priorities for constructing 'HS3': a transformed east-west network from Liverpool in the west to Hull and Newcastle in the east.

**Kick-start HS3:** Between Manchester and Leeds, the two largest economies of the north. Phase one should reduce journey times from 49 to 40 minutes and increase capacity by 2022. Phase two could cut times to just 30 minutes. HS3 should make use of key northern sections of HS2 – for example between Leeds and Sheffield where journey times could be reduced to just 30 minutes – upgraded lines, and sections of new track where necessary.

**Harness HS2:** Route decisions on the northern sections of HS2 to be announced later this year should support enhanced high-speed connections within the north, including between Leeds-Sheffield, Liverpool-Manchester, and Sheffield-Newcastle.

**Redevelop Manchester Piccadilly:** A long-term transformation of the station, combined with shorter-term delivery of additional east-west platforms, would unlock this hub and stimulate significant regeneration.

## ROADS FOR THE FUTURE

**Urgent improvements:** Highways England should accelerate enhancements to the M62 between Liverpool, Manchester and Leeds. Comparable work on the M25 delivered up to a 33% increase in capacity and a 19% reduction in journey time.

**Long-term strategy:** Development funding should be provided to accelerate the design of further enhancements to the road network, and better connections to Manchester Airport – the North's international hub – should be prioritised.

## BIG INVESTMENT FOR REAL CHANGE

This report recommends a very significant and immediate investment in the North. This includes:

- Sufficient development funding to prepare a plan for the multi-modal transformation of the North's connectivity.
- Very substantial capital funding to bring forwards vital strategic works on the M62, both in the west from Liverpool-Manchester and in the east from Manchester-Leeds.

# HIGH SPEED NORTH



## TRANSFORMING RAIL

### 1 Kickstart 'HS3'

HS3 could cut journey times between Leeds and Manchester by 40% to just 30 minutes

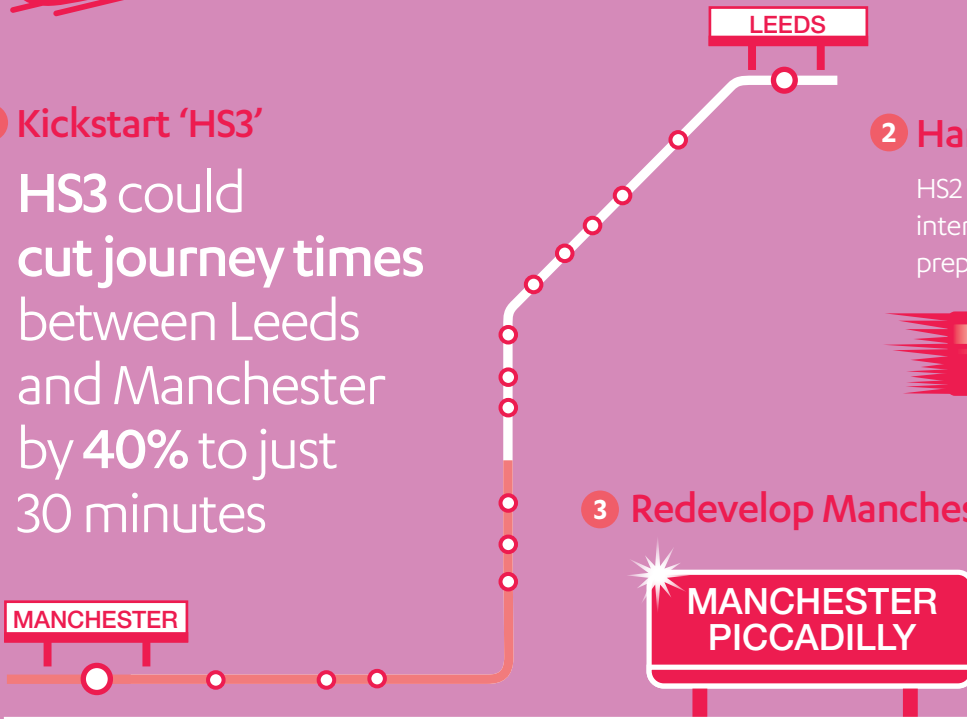
### 2 Harness HS2

HS2 decisions can support inter-city connections, and prepare the ground for HS3



### 3 Redevelop Manchester Piccadilly

Will unlock regeneration across 140 acres in central Manchester



## ROADS FOR THE FUTURE

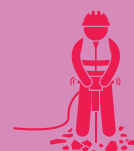


**M62** is the only East West dual carriageway in 200 miles

Investment to increase capacity by up to 33% on the M62 from Liverpool to Leeds



**M56** Enhancements should be prioritised to the congested M56 access from Liverpool to Manchester Airport. This artery has flows of over 120,000 vehicles per day



# EXECUTIVE SUMMARY

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# HIGH SPEED NORTH

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**Transport for the North (TfN) was established in October 2014 with an objective to improve connections between the economic centres in the North. The Commission has been asked to advise on the strategy for taking this work forward.**

It takes longer to get from Liverpool to Hull by train than it takes to travel twice the distance from London to Paris. Manchester and Leeds are less than 40 miles apart and yet on the congested M62 this often takes more than two hours by car. These poor connections make the North a less attractive place to live and do business.

**Our central finding is that the North needs immediate and very significant investment for action now and a plan for longer term transformation to reduce journey times, increase capacity and improve reliability. On rail, this means kick-starting HS3, integrating it with HS2 and planning for the redevelopment of the North's gateway stations. On roads, investment should be brought forwards for an early boost in capacity on the M62, the North's most important east-west link, alongside funding to identify and assess proposals for tackling a range of other strategic challenges.**

It is, however, essential to remember that transport can only form one pillar of the northern powerhouse. Leaders across government, business and beyond from all regions of the North must come together to work with central government to prepare the other foundations required for economic growth and wider prosperity.

**Recommendation one: Improving connectivity between the cities of the North will not be sufficient to create the northern powerhouse, but is necessary. Transformations in transport connectivity should form part of a broader strategy incorporating improvements in education, workforce training, research and innovation, spatial planning and wider infrastructure investment.**

## **Transforming the Rail Network: Immediate action, leading to long-term transformation**

**Recommendation two: To connect northern cities faster and more reliably than today, the Commission recommends that funding be provided to further develop the long-term plan for HS3, which should be conceived as a high capacity rail network, rather than a single piece of entirely new infrastructure. This plan must be fully integrated with proposals for maximising the benefits from currently planned investments.**

HS3 is a transformed east-west network from Liverpool in the west to Hull and Newcastle in the east. It should make use of key northern sections of HS2, upgraded existing lines, and sections of new track where necessary to provide capacity, speed and congestion relief. It should provide enhanced connectivity and improved journey times between the major cities of the North and to Manchester Airport, its most important international passenger gateway.

TfN has made valuable progress, through its Northern Powerhouse Rail programme, in defining the North's long-term ambition for its inter-city rail network, in terms of conditional outputs for capacity, frequency and journey times, and has begun the process of identifying options to enhance connectivity on each key link.

The overall network will inevitably need to be delivered in phases, however, and may take several decades to complete. Therefore, in driving forward the next stage of this work, it will be important for TfN to focus on the links which will provide the greatest benefits for the North and where early progress can be made towards achieving its objectives.

In doing so, it will be particularly important to build on work which is already in hand, to ensure that its benefits are maximised and it is properly integrated with the longer-term strategy.

Over the period to the end of 2017, crucial strategic decisions will be taken in respect of three critical elements of the northern rail network. It is essential that these are developed in an integrated manner, which aligns the long-term plan with more immediate actions.

**Recommendation three: TfN should work with the Department for Transport, Network Rail, HS2 Ltd and other stakeholders to prepare by the end of 2017 a single integrated strategy, combining short-term action with an ambitious long-term vision, which supports the overall plan for the HS3 network and brings together:**

- **The upgrade of the Trans-Pennine line between Manchester and Leeds**
- **The design of the northern phase of the HS2 network, including connectivity between Leeds – Sheffield and Liverpool – Manchester**
- **Proposals for the redevelopment of Manchester Piccadilly station**

Taking these in turn:

1. **Kick-start HS3 between Leeds to Manchester** Network Rail has been commissioned and funded to develop a plan for a major upgrade of the line from Leeds to Manchester via Huddersfield for delivery by 2022. Building on this, proposals should be developed to integrate it with options for a second phase of major route enhancements, which should aim to deliver a 30-minute journey time, together with capacity and frequency improvements. This second phase may not require a completely new line but will require sections of

major new infrastructure, some options for which are outlined in the technical analysis supporting this report. Network Rail, in conjunction with TfN and DfT, should identify and present a full range of options for how this step-change in connectivity may be achieved.

**Recommendation four: The upgrade of the Leeds to Manchester link should form the first phase of HS3 to be developed in detail. It should comprise a long-term programme with the objective of reducing journey times to 30 minutes, alongside substantial capacity and frequency improvements. The first part of this should be a shorter-term plan, to be developed and implemented by TfN and Network Rail by 2022, to cut the journey time between these cities and to onward destinations by roughly 20% from 49 to 40 minutes, enhance capacity and improve service regularity and frequency.**

2. **Harness HS2** The route decisions on the northern sections of HS2, to be announced later this year, have the potential to support enhanced inter-city connections on a number of important links in the North, for example, between Sheffield and Leeds.

**Recommendation five: The design of the northern phase of HS2 should be taken forward by HS2 Ltd, working closely with TfN, to ensure that this is planned and delivered so as to facilitate the development of the HS3 network, enhancing connectivity between Leeds – Sheffield, Liverpool – Manchester (and its airport), and between Sheffield – Newcastle, as well as to onward destinations.**

3. **Redevelop Manchester Piccadilly** David Higgins' recent review has identified options for effectively integrating the needs of HS2 and HS3 at Leeds station. A similar approach is needed at Manchester Piccadilly, the North's other major rail hub. A long-term transformation of the station, akin to the recent transformation of Kings Cross, combined with shorter-term action to deliver additional east-west platforms, would enable the station to operate effectively as a focal point in the wider HS3 network and unlock significant regeneration and commercial development potential, as seen at the redeveloped Birmingham New Street.

**Recommendation six: Proposals for the redevelopment of Manchester Piccadilly station should be prepared jointly by TfN, Transport for Greater Manchester, Manchester City Council, Network Rail, DfT and HS2 Ltd. These organisations should work to together to deliver:**

- a) Detailed plans for the new east-west platforms 15/16 to facilitate delivery early in Control Period 6 and unlock the development potential of the Mayfield site;
- b) A masterplan for the longer-term development of Manchester Piccadilly station as a whole, incorporating capacity for HS2 services and options for the delivery and timing of platform capacity for HS3; and
- c) Proposals for funding and financing the station redevelopment, including for private sector and local contributions.

This approach to developing HS3 in phases, integrating short-term progress with an ambitious long-term strategy, should be used as the model for work on subsequent elements of the network. These should be prioritised on the basis of their benefits, costs and deliverability, including the scope to make early progress and maximise the benefits of currently planned investments by aligning them with a longer-term strategic plan.

**Recommendation seven: TfN should follow an approach that seeks to maximise the benefits of current and planned investments and integrates them with an ambitious longer-term plan, in developing and prioritising proposals for other major inter-city links through its Northern Powerhouse Rail strategy. This should include assessing the case and options for early enhancements to key routes and for improvement and redevelopment at gateway stations including Liverpool Lime Street.**

## Roads for the Future

A similarly phased and networked approach is needed for the strategic roads network.

1. The east-west M62 is the single most important inter-city route in the North for commercial and commuter traffic carrying half of all Trans-Pennine road traffic and two thirds of all freight. It is the only dual carriageway route that runs east-west between Stoke-on-Trent in the south and Edinburgh in the north – a gap of nearly 200 miles. As a result, the ability of Yorkshire and the North West to work together is heavily dependent on one road. The opportunity to deliver early improvements to this crucial link, which could deliver up to a 33% increase in capacity and a 19% reduction in journey time, should be seized.

**Recommendation eight: On the strategic road network, Highways England should accelerate capacity enhancements to the M62 between Liverpool and Manchester and between Manchester and Leeds. Very substantial capital funding should be brought forwards, so that both schemes can be accelerated, with work beginning between Liverpool and Manchester in Roads Investment Strategy year 2017/2018 – two years ahead of schedule – and work between Manchester and Leeds also significantly fast-tracked.**

2. In addition, it is important that the development of other critical road enhancements in the North, including to major ports and airports as well as on key inter-city links, is not delayed. The Commission welcomes the progress that has been made towards enhancing the links to the ports of Hull and Liverpool. It recommends that development funding is prioritised to enable early progress to be made towards the delivery of other key enhancements, including to the congested M56 route from Liverpool to Manchester Airport, which sees flows of over 120,000 vehicles per day and frequent delays.

**Recommendation nine: Development funding should be prioritised for a package of further enhancements to the northern road network, so that these can be completed as early as possible in the next Roads Investment Period. This package should include: upgrades to the M56 (junctions 6-8) around Manchester Airport; the redevelopment of the Lofthouse Interchange and Simister Island junctions; and capacity enhancements to the M1 (35a-39) between Sheffield and Leeds.**

3. Major studies are currently in progress to consider a number of key longer-term challenges for the strategic road network in the North, including the potential to provide a new Trans-Pennine link via a tunnel under the Peak District between Sheffield and Manchester, as well as options to enhance the A66/A69 and the north-west quadrant of the M60.

**Recommendation ten: Highways England, the Department for Transport and TfN should continue the current programme of longer-term studies. This work should take due consideration of consistency with strategic objectives, feasibility, affordability, forecast demand and congestion levels, and environmental factors.**

The outputs of these studies, together with the work underway to identify and assess options for the delivery of later phases of the HS3 network, will provide an important input into TfN's longer-term strategic planning. The ultimate objective of this process should be the development of an integrated, cross-modal strategy, setting out prioritised investment plans that align short-term measures with ambitious long-term plans. This strategy should not look at any element of the transport network in isolation, but should look across road and rail and should incorporate plans for inter-city, regional and urban connectivity, as well as links to key international gateways.

**Recommendation eleven: Sufficient funding should be made available by government to support the development of an ambitious cross-modal strategy for northern transport with HS3 at its heart.**

# PART ONE

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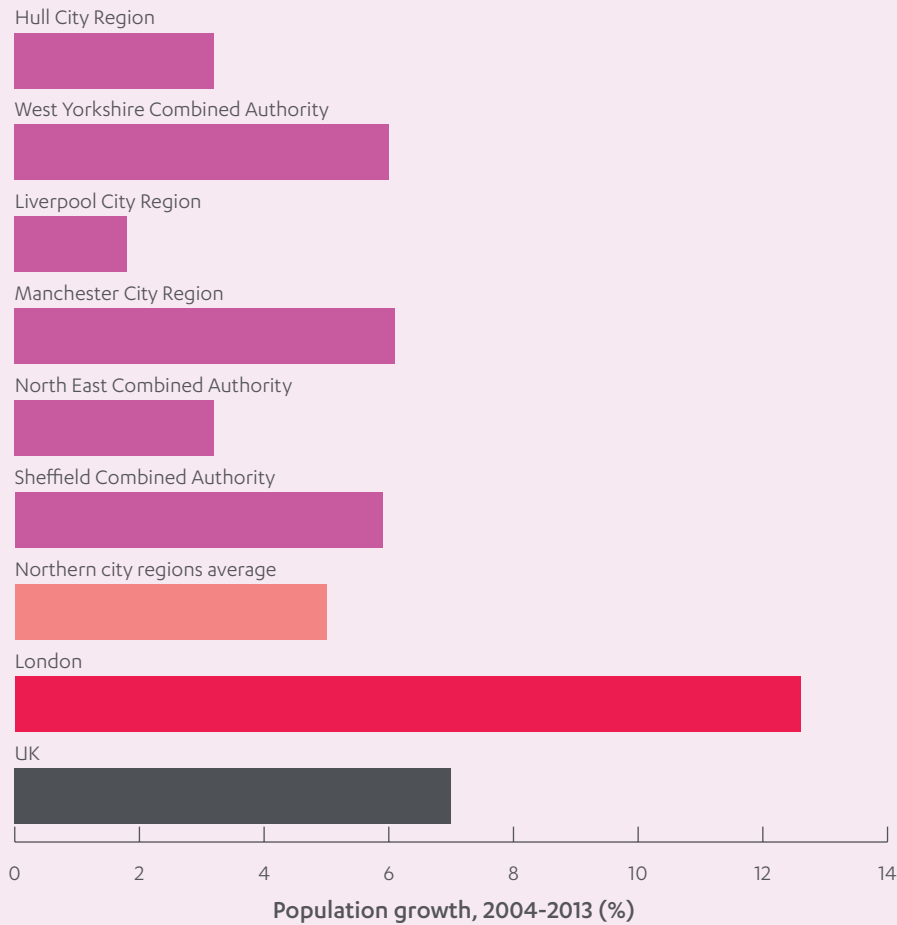
## PART 1 – THE NORTH IN PERSPECTIVE

- 1.1 An historic productivity gap exists between the north and south of England:<sup>1</sup> in 2014 the North West, North East and Yorkshire and Humber all had productivity levels less than 90% of the UK average – and 30% below that of London.<sup>2</sup> Despite being home to a number of the UK’s largest cities – many of which are in relative proximity to each other – poor transport links have hampered the North’s ability to operate effectively as a single integrated economy. Action to address this productivity imbalance should be a national priority.**
- 1.2 The North of England has significant untapped potential. It is home to 15 million people<sup>3</sup> and its city regions alone have a greater population than London,<sup>4</sup> contributing £209 bn of gross value added (GVA) annually to the economy, 13% of the UK total.<sup>5</sup> The universities of the North – which are among the best in the world – are thriving hubs of research and innovation. Some of the region’s infrastructure has benefited from significant investment in recent years, for example the £800 million Airport City project in Manchester and Liverpool’s £300 million SuperPort investment.
- 1.3 However, across a range of metrics the North is under-performing. Over the last decade, rates of population growth have been below those experienced across the rest of the UK. This slow growth – dubbed “relative decline”<sup>6</sup> – follows on the back of years of steady population decline between the early 1980s and late 1990s.<sup>7</sup>



*The city regions of the North have a combined population greater than that of London*

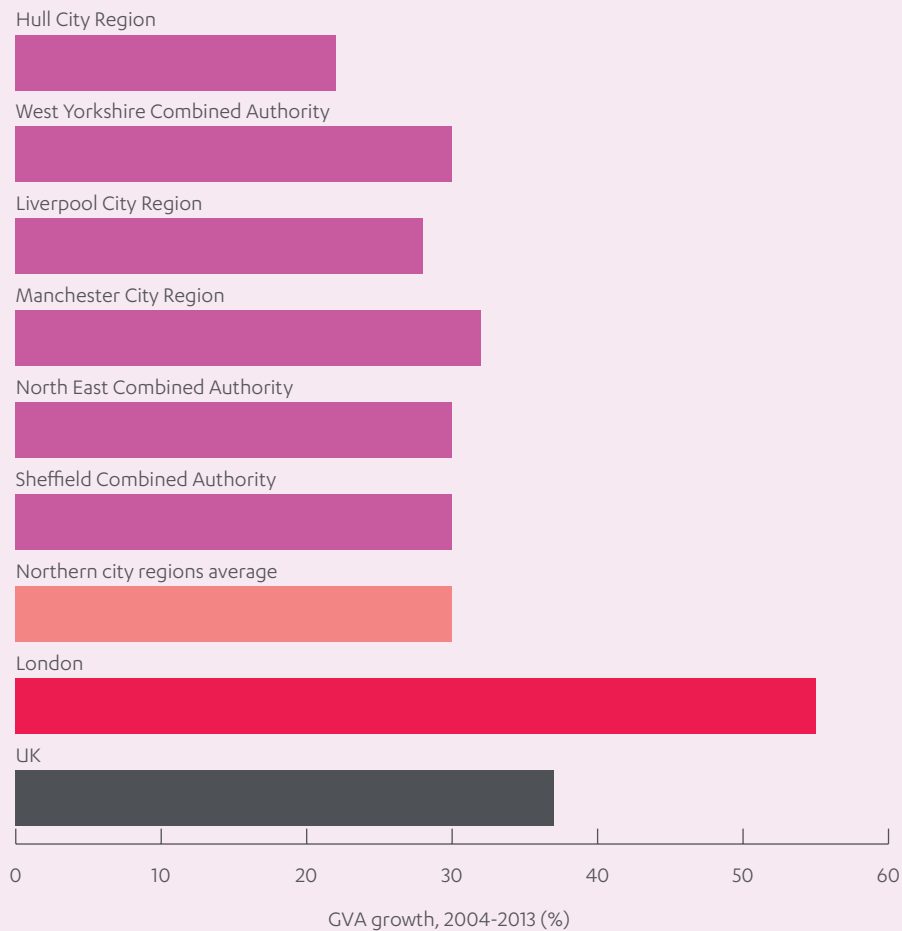


**Figure 1 – Population Growth, 2004 to 2013**

Source: NOMIS 2015. ONS mid year pop estimates, 2004 and 2013 data

- 1.4 Productivity also falls short in the North at less than 90% of the UK average,<sup>8</sup> indeed, if productivity grew to match even that of South West England, the economy of the northern city regions combined could be £7bn larger.<sup>9</sup> Average wage levels and economic performance underperform in the North versus the rest of the UK.<sup>10</sup> A recently conducted Independent Economic Review of the North of England concluded that GVA per capita is 25% below the average for the rest of England, and 15% below the average excluding London.<sup>11</sup>



**Figure 2 – Total GVA Growth, 2004-2013 (%)**

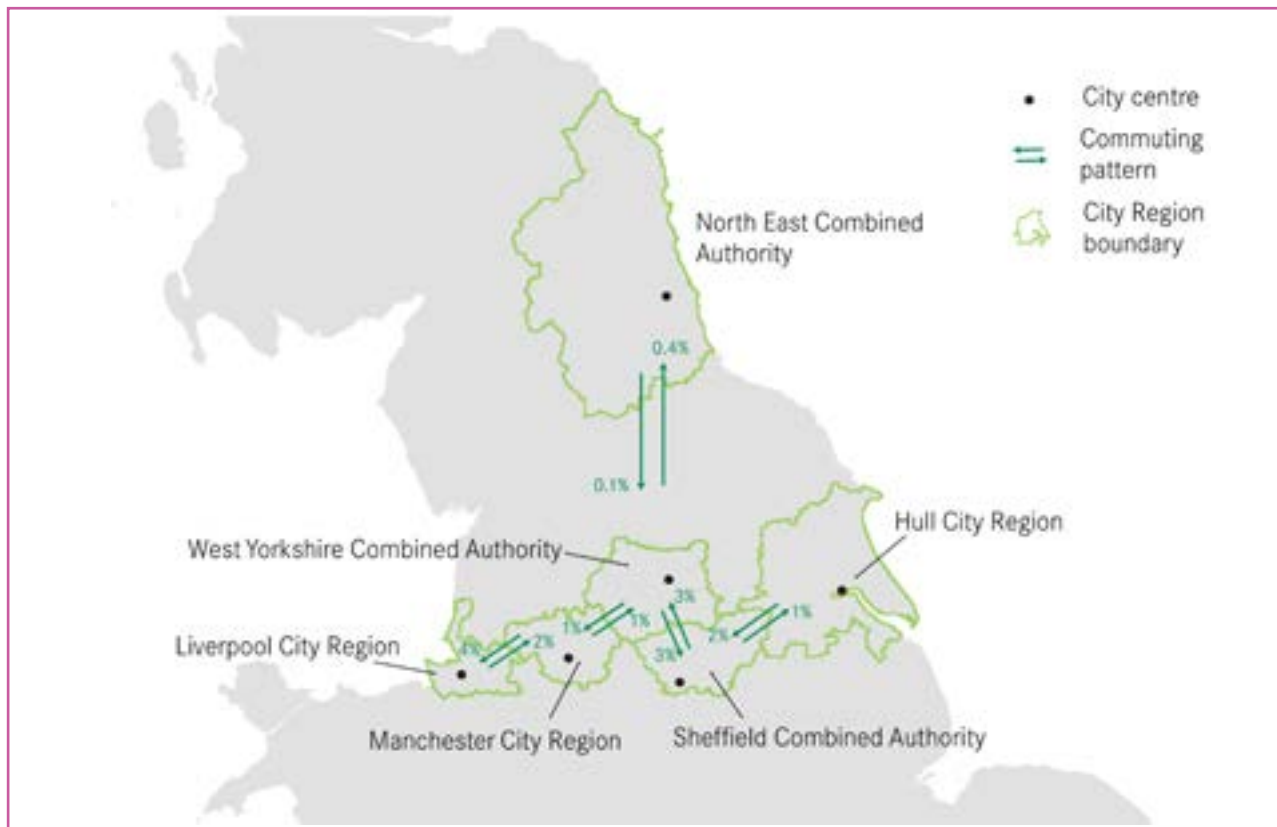
Source: Centre for Cities, based on ONS 2014. Regional, Sub-regional and Local Gross Value Added 2004, 2013 data.

- 1.5 The agenda to grow the northern economy and encourage wider northern prosperity is therefore being pursued through efforts to create a Northern Powerhouse, the primary focus of which has to date been on a radical plan for improved transport connectivity between the cities of the North. This is seen as an important first step towards enabling those cities to function more as a single economic entity and contribute more to the economy than the sum of their parts.
- 1.6 While transport will only ever be one element of any effective strategy to address the North's economic underperformance, the concept of a Northern Powerhouse – based initially on radically improved transport connectivity – and the creation of TfN have altered the policy landscape and acted as a catalyst for wider devolution.

**Transport for the North (TfN)**, established in October 2014, is a collaborative body bringing together combined authorities and local transport authorities from Northern England in order to develop and deliver a multi-modal Northern Transport Strategy. TfN is set to become a statutory body by 2017, and has responsibility for local roads and rail. Their focus to date has been on developing plans for a rail network that delivers ‘aspirational’ journey times and frequencies between Northern cities, including a thirty minute journey time between Manchester and Leeds.

- 1.7 The Commission welcomes the creation of TfN as a body which can bring together decision makers from the major northern city authorities to talk with one voice, and recognises that it should play a central role in the transformation of northern transport connectivity.
  
- 1.8 The North suffers from significant historical transport constraints, particularly in relation to its intercity links. Average speeds of rail travel across the Pennines between the major cities are below 50mph,<sup>12</sup> which has led to the ‘contained’ nature of travel in the northern regions. Analysis of travel patterns between northern cities suggests levels of commuting below what may be expected given their size and relative proximity, with commuting between Sheffield and Manchester, for example, 38% lower than could be expected.<sup>13</sup> A large body of

**Figure 3 – Commuting across the Northern City Regions**

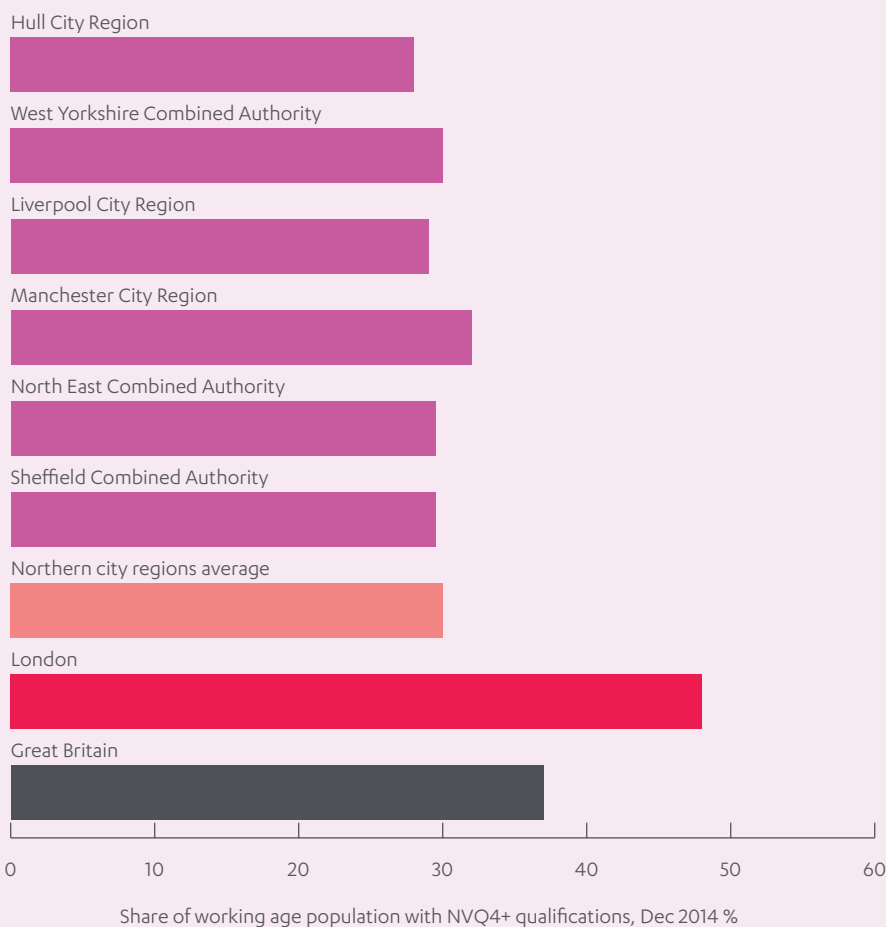


Source: Centre for Cities, based on NOMIS (2015), Census 2011 data

evidence suggests that transport constraints of this kind can act as a barrier to growth, and addressing them to provide greater transport connectivity can help to enable increased productivity and economic activity. Improving travel times between the major cities of the North can therefore play an important role as part of the overall strategy to boost the northern economy.

- 1.9 But the potential for transport alone to address economic disparities should not be over-estimated. Effective transport links are a necessary but not sufficient condition for improving economic performance. Transformational growth will only be achievable through significant improvement and investment on several fronts.
- 1.10 A further explanatory factor behind lower levels of prosperity in the North is the existence of a large skills and educational attainment gap relative both to London and the UK as a whole. The recent Independent Economic Review identified that despite the North being home to several first rate universities and concentrated areas of highly skilled workers, the region suffers from, “low educational attainment, limited job prospects, low aspirations on the part of

**Figure 4 – Share of working age population with NVQ4+ qualifications, Dec 2014 (Centre for Cities) (%)**

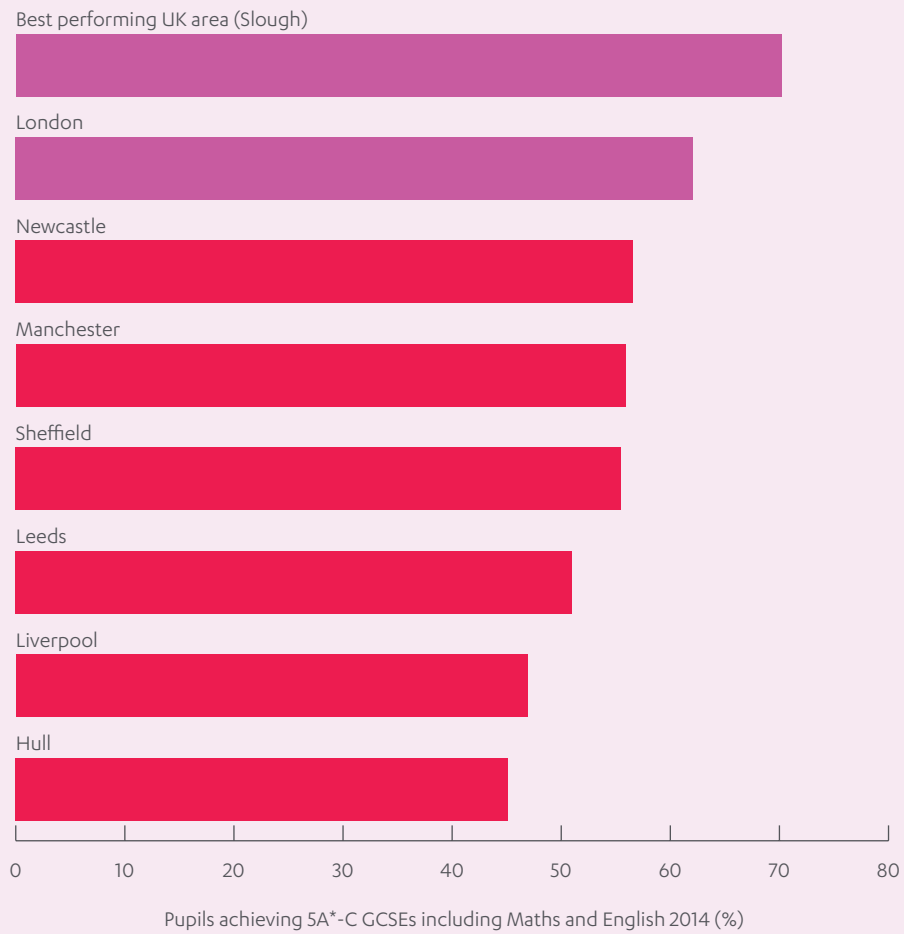


Source: NOMIS, 2015, Annual Population Survey, Dec 2014 data

employers and an insufficiently dynamic economy to attract and retain higher-skilled workers”.<sup>14</sup>

- 1.11 Worryingly, the proportion of the working age population with qualifications at NVQ level 4 or above is below the Great Britain average in each of the northern cities. This attainment gap is evident at an earlier stage too with relatively low rates of GCSEs grade A\* to C in the northern cities. The scale of the problem was recently made clear by Sir Michael Wilshaw, Chief Inspector of Schools in England and Head of Ofsted, who highlighted that “three in ten secondary schools in Manchester and four in ten in Liverpool require improvement or are inadequate compared to one in ten in inner London”.<sup>15</sup>
- 1.12 Addressing economic disparities between the North and the South is an enormous policy challenge requiring strong civic and business leadership across the North and continued focus from central government in order to prepare each of the foundations necessary for wider prosperity. These foundations, which include transport, also need to incorporate an integrated approach to spatial planning in the North, as well as strategies for increasing innovation, growing business and employment and targeting improved educational attainment and skill levels.

**Recommendation one: Improving connectivity between the cities of the North will not be sufficient to create the northern powerhouse, but is necessary. Transformations in transport connectivity should form part of a broader strategy incorporating improvements in education, workforce training, research and innovation, spatial planning and wider infrastructure investment.**

**Figure 5 – Pupils achieving 5A\*-C GCSEs including Maths and English 2014 (%)**

Source: Centre for Cities

# PART TWO

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## PART 2 – OPPORTUNITIES AND THE ROLE OF TRANSPORT

**2.1 Targeted transport investment can play a significant role in supporting growth aspirations for the North. It is not sufficient – improvements in other areas of the economy and infrastructure are also required – but it is necessary. Understanding the mechanisms by which transforming connectivity helps to transform the economy is essential, and to get there clear prioritisation will be required.**

2.2 The Local Enterprise Partnerships and Combined Authorities of the northern city regions are developing ambitious plans to support increased economic growth by, for example, improving skills, investing in infrastructure and housing and seeking to attract skilled workers. Transport will form a significant part of these plans because connectivity – and particularly connectivity into and between city centres – matters.

### The importance of cities

2.3 There is now an established consensus that “cities matter to economic prosperity”.<sup>16</sup> They are the engine rooms of the global economy, generating more than 80% of global GDP. Within the UK, cities account for “9 percent of land use but 54% of population, 60 percent of jobs and 63 percent of output”.<sup>17</sup> If the North is to realise its full economic potential the role of cities will be fundamental.<sup>18</sup>

2.4 Furthermore, as the economy changes and becomes more specialised, cities will become even more important, with a trend towards specialisation in higher value ‘Knowledge Intensive Business Services’ (KIBS) jobs, located in well-connected and resurgent city centres, where the process of agglomeration can result in increased productivity.<sup>19</sup>

### Agglomeration economies

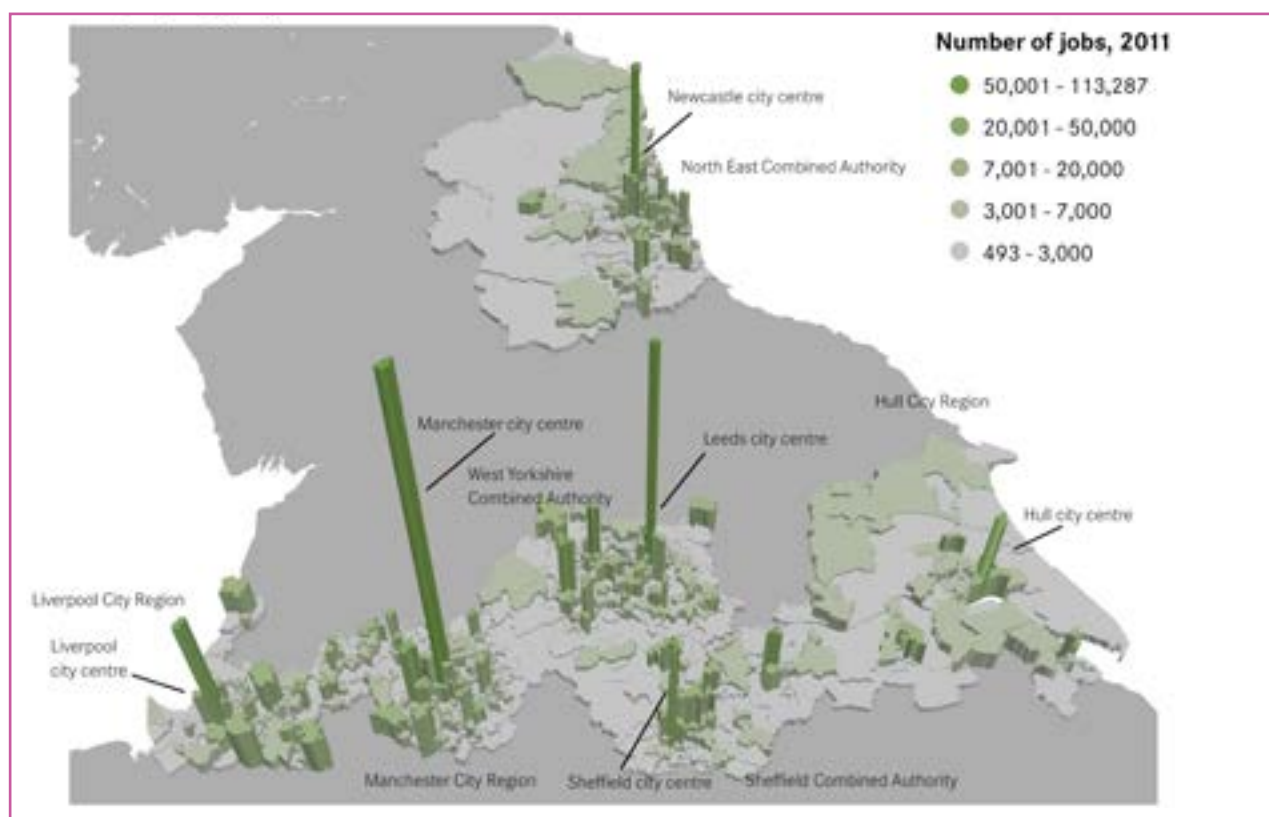
Agglomeration economies are the benefits that come when firms and people are located near one another together in cities and industrial clusters. For example, Rappaport and Sachs (2003) found that 57% of the income in the US was generated within 80 km from the coast and only 13% of the landmass.<sup>20</sup>

There are two main forms of agglomeration economies:

- Localisation economies, where firms from the same industry benefit through proximity, knowledge spill-overs and larger labour pools.
- Urbanisation economies, where firms from various industries benefit through concentration of shared resources

- 2.5 In the North, service sectors such as retail, accountancy, advertising and finance, form a large and growing proportion of the economy, and benefit from being located in “larger urbanised environments” and from the productivity gains that can result from increased transport connectivity.<sup>21</sup> High skilled science and technology jobs in the North are commonly found in or close to main towns and city centres, and gain greater benefit from being located in or around large urban environments, relative to other sectors of the economy.<sup>22</sup>
- 2.6 For this reason, firms specialising in such sectors in the UK’s most successful cities are increasingly based in city centres.<sup>23</sup> To support this pattern, cities need to benefit from strong transport links which facilitate connectivity within and between regions, bringing in workers from a wide catchment area and connecting their firms efficiently with regional, national and international markets.

**Figure 6 – Distribution of jobs across city regions**



Source: Centre for Cities, 2015. Northern Powerhouse Factsheet (2011 Census data).

- 2.7 Improvements in inter-city transport links reduce the time taken to travel between centres of high productivity. While their geographical location is fixed, these locations become effectively closer together. This increase in proximity has important implications for economic performance: expanding markets, improving productivity and increasing agglomeration. As such, addressing the connectivity



needs of the North could be a powerful tool to help ignite northern prosperity – particularly so, given that northern connectivity is generally poor, with slow and heavily congested strategic road routes and rail journeys. For example, trains from Manchester to Sheffield and Manchester to Leeds, travel at less than half the average speed of those between London and Milton Keynes.<sup>24</sup>

## Intra-city connectivity

The key aim of the Northern Transport Strategy, to date, has been on improving connectivity between the major cities of the north.

However, the importance of intra-city accessibility must not be forgotten.

The majority of the workforces of each city live and work within the same city region, and even in London, where there is a highly developed network linking to the wider South East, most of the workforce lives within London. An efficient intra-urban transport network is therefore crucial to the success of the northern cities.

Furthermore, intercity journeys are only ever as good as intra-urban networks allow. Improved local networks would allow full advantage to be taken of improved intercity connectivity in the north.



- 2.8 TfN has set out aspirations for rail journey times as well as capacity and frequency between six core cities in the North: Hull, Leeds, Liverpool, Manchester, Newcastle and Sheffield. The aspirational journey times defined by TfN aim to create a network that allows the North to act as a single economic area. At present, development of options to deliver the aspirational journey times is at an early stage, and no prioritisation of corridors has yet taken place. Prioritisation will be necessary as the projects move from concept to delivery.
- 2.9 In order to prioritise intercity transport connectivity investment effectively, it is important to understand the potential impact of transport infrastructure and where such investment could deliver the greatest benefits. Evaluating optimal connectivity improvements should take account of both: (i) where there is existing need for reduced journey times and increased capacity (i.e. where corridors are already facing high levels of congestion), and; (ii) where improved connectivity is likely to be most effective in enabling economic and employment growth.
- 2.10 In this vein, transport investments should be assessed based on their ability to allow demand to be met, and/or to help drive growth. Investment to meet demand should be targeted at corridors where the economy and transport demand are growing and capacity constraints are beginning to bite. Investment

to support growth should be targeted at those corridors that have the most potential to deliver wider economic benefits. These wider benefits, which it should be noted make up only part of the total benefits of transport investment, can be derived in a number of ways, including through increasing the size and efficiency of labour markets and by enabling firms to share resources and knowledge. To inform its assessment of the priority links for development, the Commission has undertaken analysis of the scope for enhanced intercity connectivity to support agglomeration – one of the key ways in which enhanced transport links can contribute to improving productivity.

## City region economies in the North and their potential for increased agglomeration

2.11 Analysis of agglomeration effects from transport improvements has, in general, previously focused on individual conurbations and considered how enhancements to urban transport systems support agglomeration by bringing firms within a city closer together. It is also possible, however, that by reducing journey times and increasing frequencies between cities, agglomeration effects will be created and strengthened as businesses are able to interact more efficiently and frequently.



The City regions of  
**LEEDS and  
MANCHESTER**  
account for  
more than

**46%**  
of the  
population of the  
**Northern  
city regions**

- 2.12 There are five determinants of the potential for agglomeration benefits to be brought about through improved intercity links: (i) scale of population; (ii) scale of economies; (iii) the distance and quality of existing links between the cities that are connected; (iv) their wider connectivity to the surrounding area, and; (v) the sector/workforce composition. These factors and their relation to the six cities that form the focus of this study are considered below.
- 2.13 **(i) Scale of population.** The size of cities' populations is an important factor in determining the potential productivity gains from agglomeration that could result from improving inter-city transport connections.<sup>25</sup> The northern city regions together have a population of 10.8 million people, around 17% of the UK.<sup>26</sup> The two largest city regions are Manchester and Leeds; they have seen the fastest growth from 2001 to 2014 (averaging around 0.6% per year) and now account for 46% of the Northern Powerhouse population. This suggests a particular role for improving inter-city links to unlock economic growth in these regions, where congestion and overcrowding could otherwise become a constraint.<sup>27</sup>
- 2.14 **(ii) Scale of city economies.** The existing size of city economies can be also an important factor in determining the potential benefit from improved inter-city connectivity. The economic contribution of the combined northern city regions is £209 bn of GVA. The Manchester city region has grown the most rapidly over the past two years with economic recovery following the recession, and the Manchester and Leeds city regions are again the two largest, with 50% of the Northern Powerhouse GVA. This share is more than proportional to their population share, implying higher productivity than the average amongst the northern city regions. While average productivity is higher in the Liverpool city region, the overall economy is smaller than either that of Leeds or Manchester and it is not growing as fast.

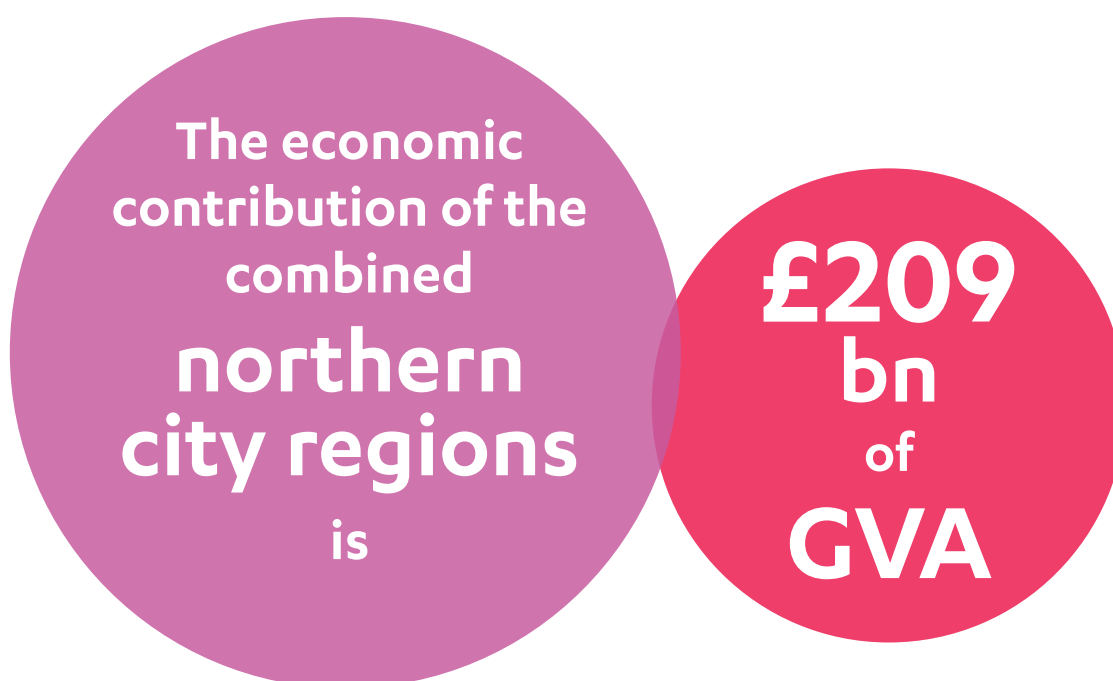
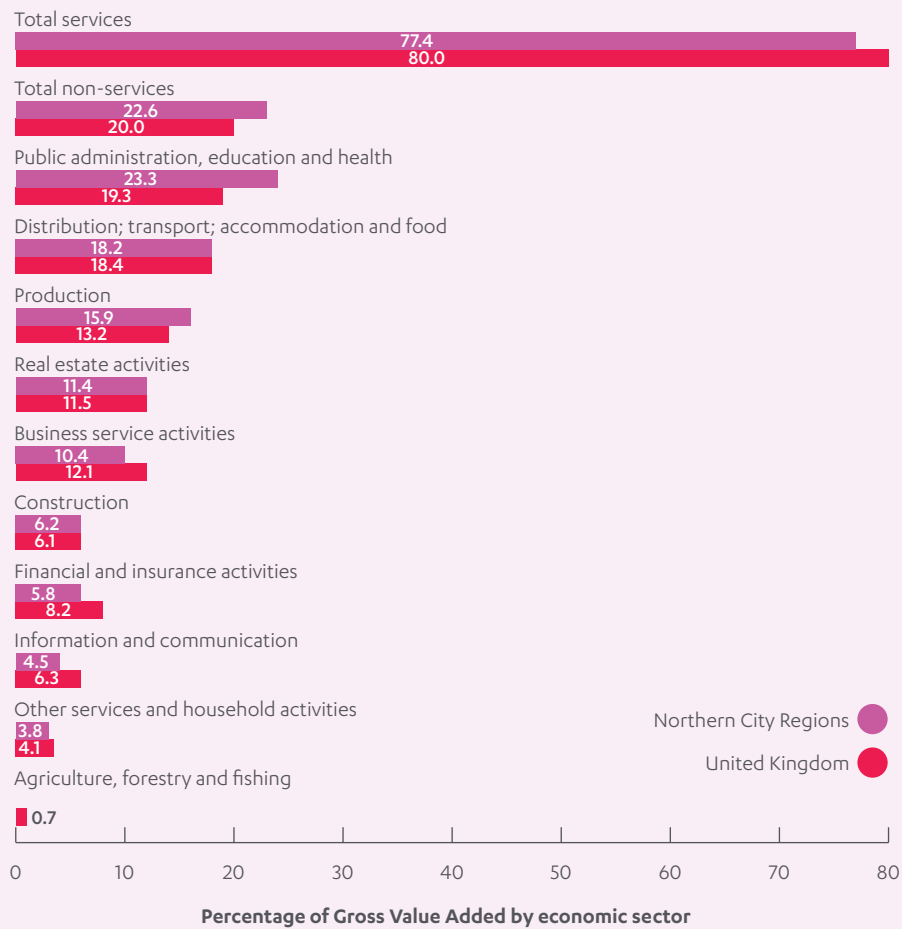


Table 1 – Summary of City Region Characteristics

	Population		GVA		Jobs	Productivity	NVQ 4+	NVQ 3+
	2014, million	2001–14, Average annual growth	2014, £ bn	2001–14, Average annual growth	2013, million	£ GVA/worker	% working age population	
Liverpool city region	1.5	0.16%	28.3	1.01%	0.59	45,950	27%	49%
Manchester city region	2.7	0.64%	57.4	1.43%	1.21	45,550	32%	53%
Leeds city region	2.3	0.64%	47.1	1.49%	0.99	45,650	29%	51%
Sheffield city region	1.4	0.58%	23.9	1.77%	0.53	41,200	28%	51%
Hull city region	0.9	0.41%	17.5	1.07%	0.37	45,300	27%	50%
Newcastle city region	2.0	0.26%	35.4	1.59%	0.77	44,150	29%	52%
<b>Northern city regions</b>	<b>10.8</b>	<b>0.47%</b>	<b>209.5</b>	<b>1.41%</b>	<b>4.46</b>	<b>44,850</b>	<b>29%</b>	<b>51%</b>

2.15 **(iii) Connectivity between cities.** Cities gain from proximity to each other in relation to the travel time between each other as opposed to the geographical distance between them. This means that shorter journey times between cities leads to greater benefits from agglomeration. The relationship between journey time and agglomeration is not linear: agglomeration effects tend to fall away sharply as travel times increase.<sup>28</sup> It is also the case that benefits from improved inter-city connectivity are greatest between cities that can already be accessed in relatively short journey times: a 10 minute reduction in travel time from 40 to 30 minutes leads to greater benefits than a 10 minute reduction from 60 to 50 minutes.<sup>29</sup> For this reason it is likely that there is less potential for inter-city agglomeration for Newcastle and Hull given the larger distances and longer journey times from these to the other four cities.<sup>30</sup>

2.16 **(iv) Wider interurban and regional connectivity.** Agglomeration effects are derived from increasing the number of firms able to interact frequently and efficiently and by enlarging labour pools available to them. By linking city centres that benefit from strong interurban and regional connectivity to the surrounding area, it is likely that a larger number of firms will benefit from better end-to-end transport links, increasing the scale of the agglomeration impacts felt. Leeds and Manchester have the strongest connections into their surrounding areas, as they act as the two key transport hubs for the northern regions and Manchester in particular benefits from good interurban links through its Metrolink network.

**Figure 7 – Sectors in the North (%)**

Source: Nomis. ONS Regional Accounts, 2012 data

2.17 **(v) Sectoral and workforce composition of city economies.** Finally, the composition of both workforce and sectors in the city regions are contributory factors. Within the North, sector composition is generally quite uniform, with the exception of the Hull City region where more of the economy is in production than is the case on average.<sup>31</sup> The Liverpool, Sheffield and Newcastle city regions have greater proportions of their economies in public administration, education and health than the average, while the Manchester and Leeds city regions have a higher proportion of their economies in service sectors such as financial and insurance activities and business service activities.<sup>32</sup> Skill levels appear to be similar in each of the northern regions, though the Manchester city region has the highest proportion of people qualified to NVQ level 4 or above.<sup>33</sup> The presence of larger proportions of service sector employment in Manchester and Leeds, and the presence of a relatively large proportion of highly educated workers in Manchester, give these cities greater potential to benefit from agglomeration since service sector firms gain most from access to a larger labour pool and proximity to other firms.

2.18 On each of the factors known to increase the scope for agglomeration benefits, Manchester and Leeds rank highly amongst the six cities that are the focus of the study. That Manchester and Leeds are the largest cities, have larger economies than the other cities, are relatively close to each other, and have economic compositions more skewed toward services make them the greatest candidates for a focussed effort to increase agglomeration by improving connectivity between them.

The potential for agglomeration between the core cities and other large settlements in their vicinities should also be acknowledged. Bradford, Huddersfield, Rochdale, Rotherham, Warrington and York all have relatively large populations and are each located closer to a core city than the core cities are to each other. Better integration of these places into the transport network should be considered alongside improvements on the corridors between the core cities.

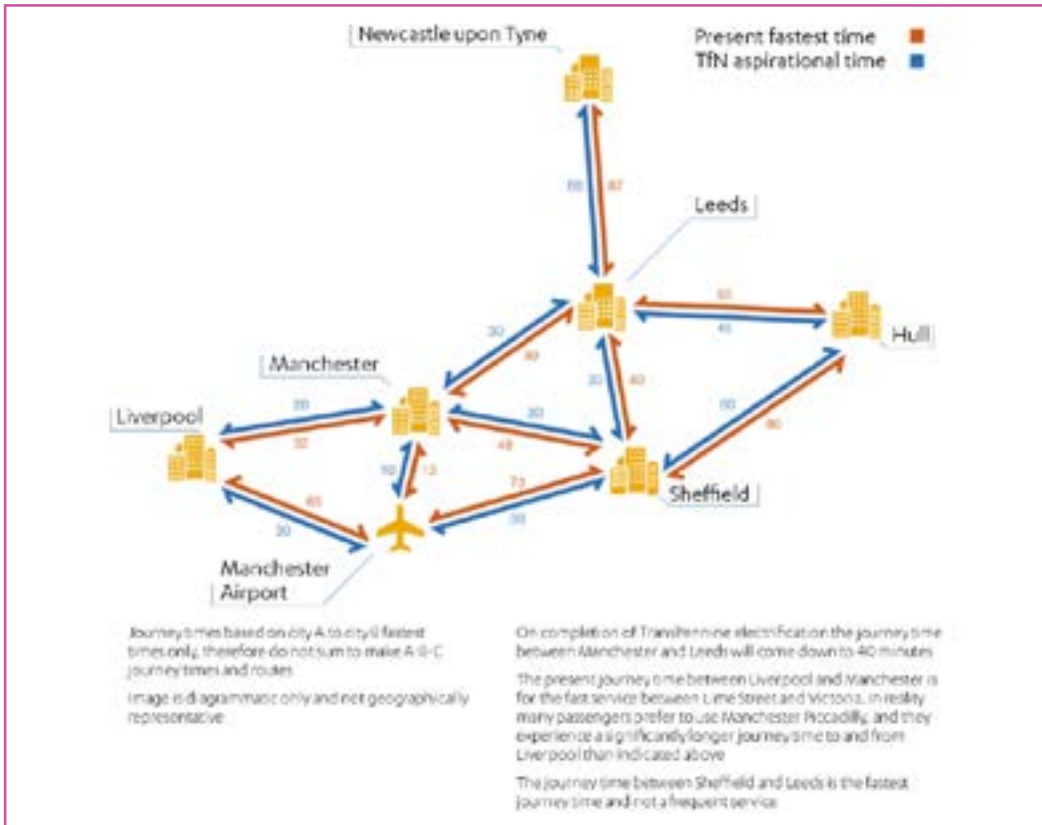
2.19 The conclusion that improving connectivity between Manchester and Leeds offers the most potential for agglomeration is borne out by the analysis carried out for the Commission of the potential productivity benefits of improving connectivity between cities in the North. This looked at the extent to which reductions in inter-city rail journey times<sup>34</sup> – based on the published aspirations of northern city regions – could lead to improvements in access to markets, and in turn, potential improvements in earnings. The focus was on assessing where such impacts could be comparatively greater based on a high-level analysis of potential productivity impacts, (expressed in terms of increased wages) that could be seen through increasing agglomeration under a limited set of scenarios.<sup>35</sup>

2.20 The analysis is intended to be illustrative, and is aimed at supporting an assessment of the corridors where transport improvements are most likely to generate significant benefits for economic growth. It does not provide precise estimates or capture the full variety of benefits, whether conventional benefits to transport users or other wider economic benefits, from enhancing connectivity. Nor does it provide any dynamic assessment of how increasing agglomeration may increase or change the composition of employment or economic activity and as a result generate further economic benefits beyond the first-order effects considered here. As such, estimates of the potential gains associated even with just this one particular aspect of transport's role in improving economic performance should be considered highly conservative.

2.21 In this analysis, scenarios of improved connectivity between four city pairs were modelled –

- Leeds/ Manchester
- Manchester/ Sheffield
- Hull/ Leeds
- Liverpool/ Manchester

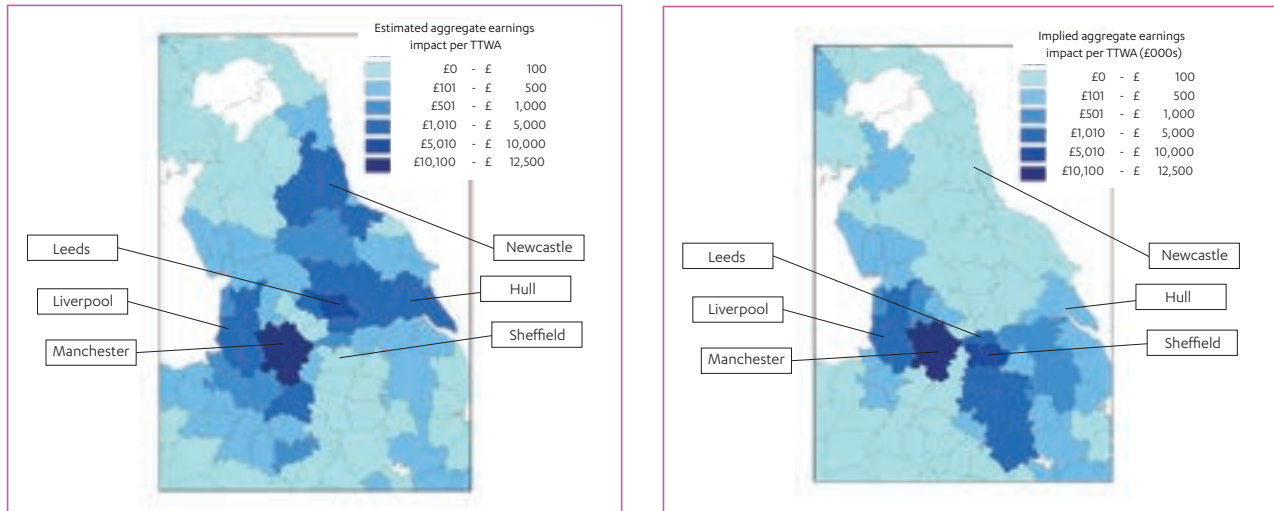
Figure 8 – Aspirational rail journey times between northern cities



Source: Reproduced from Transport for the North (2015a)

- 2.22 In addition, a scenario was modelled where all the journey time aspirations set out by Transport for the North in its conditional outputs (covering links between six cities: Hull, Leeds, Liverpool, Manchester, Newcastle and Sheffield) were delivered.
- 2.23 The largest agglomeration effects from improving any single link – an increase of more than £60 million a year in total aggregate earnings – were seen between Leeds and Manchester. This reflects their status as the largest city-regions and urban economies in the North, with higher levels of productivity, their relative proximity and strong existing connectivity to surrounding regions, and the comparatively large reduction in travel times (c. 40 per cent) to which TfN aspires in this corridor.
- 2.24 In contrast, the scale of agglomeration benefits from enhancing links between Manchester and Sheffield was only two thirds that from Manchester-Leeds. While Sheffield’s economy is comparatively fast growing, it is small compared to that of Leeds and Manchester, with lower productivity and skills levels, and the city is less well linked to the surrounding region, in particular with the Pennines limiting connectivity to the west. As a result, as well as the overall benefits from improving this link being lower than from Manchester-Leeds, more would be felt outside the North of England in the East Midlands, to which Sheffield is well connected. The agglomeration effects from enhancing links between Manchester and Liverpool were less strong, though still significant. Although productivity levels in Liverpool are comparatively high, its coastal location means that the surrounding region to which it is connected is smaller.

**Figure 9 – Implied aggregate change in earnings at Travel To Work Area level: Leeds-Manchester (left) and Sheffield–Manchester (right) cities only linked**



- 2.25 The smallest benefits were seen as a result of improving the link between Leeds and Hull, which reflects a combination of Hull’s coastal location, its smaller economy compared to other core northern cities, the longer baseline travel time and the relatively small improvement proposed.
- 2.26 The most significant agglomeration benefits modelled, however, were generated by the delivery of the overall network strategy, based on all of TfN’s conditional outputs for inter-city rail journey time reductions being delivered. The percentage improvements in accessibility delivered through this scenario are highest in Leeds and Newcastle, given that they start from a relatively lower base. The total aggregate earnings increase is estimated at £189 million per year – some three times that delivered by improving the Leeds-Manchester link in isolation, though almost certainly at a considerably greater cost.
- 2.27 In all cases, it is important to note that this analysis assumes that skills levels and the structure of the city economies remain constant. If the overall Northern Powerhouse strategy is successful, meaning productivity and skills levels improve, the size of the northern city economies increases and their service sectors grow strongly, then the agglomeration benefits could increase markedly. But tackling wider issues such as skills shortages alongside improving transport connectivity will be crucial to achieving this.
- 2.28 Whilst the results of this analysis should only be regarded as indicative, there are some interesting potential implications. It indicates that the largest benefits are to be derived from the completion of the overall strategy to enhance intercity connectivity between the major northern conurbations. However, this does not take into account any of the costs. In taking forward that strategy and delivering the largest net benefits prioritisation will be key. The analysis suggests that improving journey times between the largest, most productive, cities is likely to lead to the greatest gains in accessibility and the largest estimated boost to economic performance.
- 2.29 Transport for the North’s analysis is currently evaluating potential improvements across all corridors. The next phase of its work should be focused on developing



more detailed proposals for the corridors where improving connectivity is likely to generate the largest benefits for the North. This analysis clearly indicates that the case is strongest for Manchester-Leeds to be the first link to be prioritised for detailed development work in this way. Thereafter, a similar process of prioritisation will be required to identify the next phases of the HS3 network for development.

## Other ‘value generators’

2.30 The focus above has been on cities and the potential for improved intercity transport links to foster economic growth. However, too strict a focus on city geographies would risk overlooking the role played by other high value generating centres across the North, in particular, ports and airports:

- Aviation is recognised as a key driver of economic and social growth and prosperity, with key hub airports in particular having significant direct, indirect and wider economic impacts.<sup>36</sup> Manchester Airport – the largest UK airport outside London – operates as a global gateway for the North of England, supports 21,500 on-site jobs and contributes £918million in GVA to the UK economy, of which £627m benefits the North West itself. Currently, Manchester has more than 75 airlines operating to around 200 destinations worldwide and runway capacity to serve 55 million (tourist and business) passengers a year. Over 100,000 tonnes of air freight exports are handled annually. Significant increases in passenger numbers – a doubling by 2036 – and growth of the ‘Airport City’ enterprise zone are anticipated.<sup>37</sup>
- The North is also home to a number of major international ports, which in Lancashire, Cumbria, Humber and the North East, handled 175 million tonnes of goods in 2014, 35% of the UK total. The Humber is the UK’s busiest trading estuary with more than 30,000 vessel movements every year. And a recent study on behalf of Associated British Ports (ABP) showed that ABP interests on the Humber support 33,000 jobs and contribute £2.2bn to the UK economy, with £1.56 bn of this injected into the regional economy. With major private sector investment in ports in the North potentially approaching one billion pounds over the next decade, an increase in freight activity on road and rail connections can be expected.<sup>38</sup>

2.31 Given their scale and economic contribution, it is vital that an efficient northern transport network supports the ambitions of key airports and ports in the North.

## CONCLUSION

2.32 Poor connectivity between the major cities of the north has hampered them from operating effectively as a single economy and acted as a barrier to growth. The strongest benefits from improving intercity transport links are likely to come between cities with large populations, stronger economies, high productivity levels and good links to their surrounding areas, including in particular between Manchester and Leeds. The next Parts set out the current performance of the northern rail and road networks and the Commission’s recommendations for enhancing connectivity in the short- and long-term.

# PART THREE

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## PART 3 – A HIGH SPEED RAIL NETWORK FOR THE NORTH

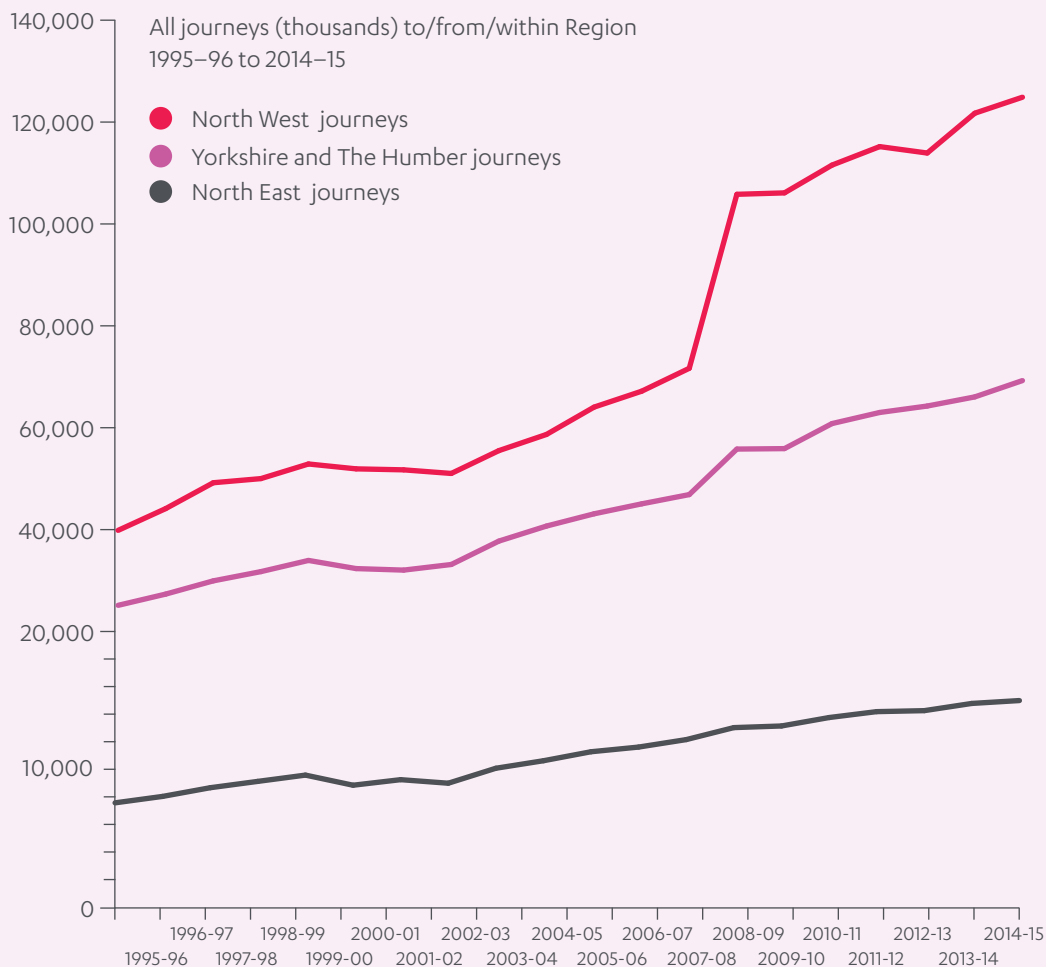
**3.1 The rail network in the North has seen significant growth over the last 20 years, reflecting the increasing importance of rail in supporting the economy. There are signs, though, that continuing growth is now being constrained: the network suffers from crowding, and levels of commuting by rail remain relatively low in comparison to that by car. If the North is to realise its ambitions for resurgent city centres with high concentrations of skilled workers, then better connected cities with broad access to markets and large labour pools will be necessary. Improved rail connectivity between the northern cities will play an important part in delivering this.**

3.2 This Part examines the performance and usage of the rail network in the North, the existing pipeline of planned improvements, and the Commission's near and longer-term proposals for best planning and directing infrastructure investment.

### Rail Performance in the North of England: A growing but constrained network

3.3 The rail network in the North – as across the rest of the country – has seen strong growth over the last two decades and city to city demand is forecast by Network Rail to increase further by 60 to 110% between 2012 and 2043.<sup>39</sup> This trend will likely be buoyed by new Northern and TransPennine Express (TPE) franchises plus arrival of HS2 phase 2, which will bring significant service improvements and transformed north-south access between the North, Birmingham and London.<sup>40</sup>

***“City to city demand is forecast by Network Rail to increase by 60 to 110% between 2012 and 2043”***

**Figure 10 – Passenger Journeys, ORR**

Source: <http://dataportal.orr.gov.uk/>

3.4 Even in the context of recent growth, however, levels of rail commuting between northern cities remain relatively low. Contributory factors that have been identified include:

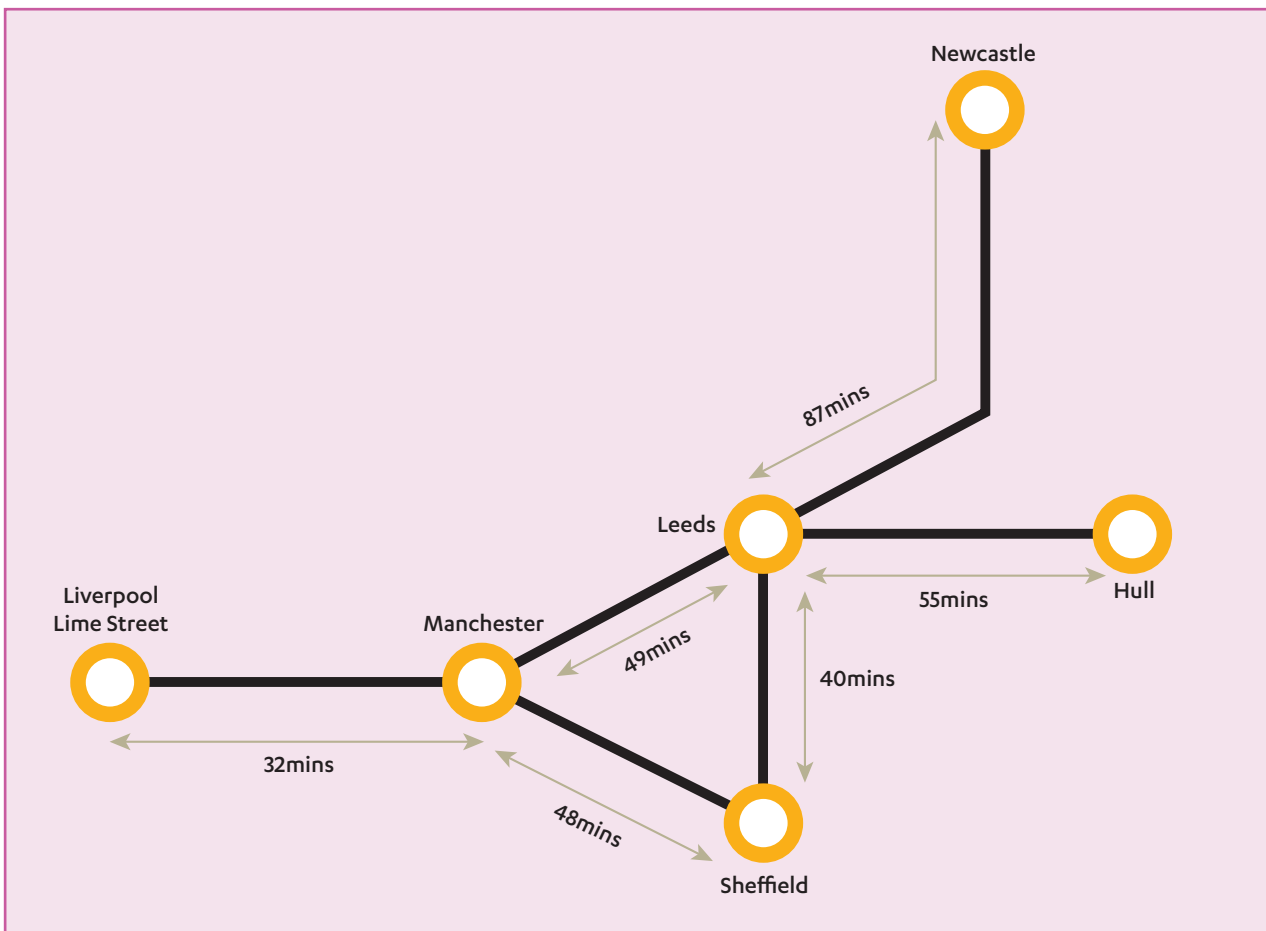
- Poor journey times on certain services, both east-west and north-south
- Low frequencies of some, in particular fast, services
- High levels of crowding at peak times
- Poor quality rolling stock on some routes
- Ticketing, and in particular the absence of smart ticketing technology<sup>41</sup>

3.5 Each of the above can contribute to a perception of poor service which has a deleterious impact on the passenger experience, with the potential to limit growth. For example around one third of commuters (and around a fifth of all passengers) in the North reported dissatisfaction with their services in 2015.<sup>42</sup>

## Characterising the northern rail network

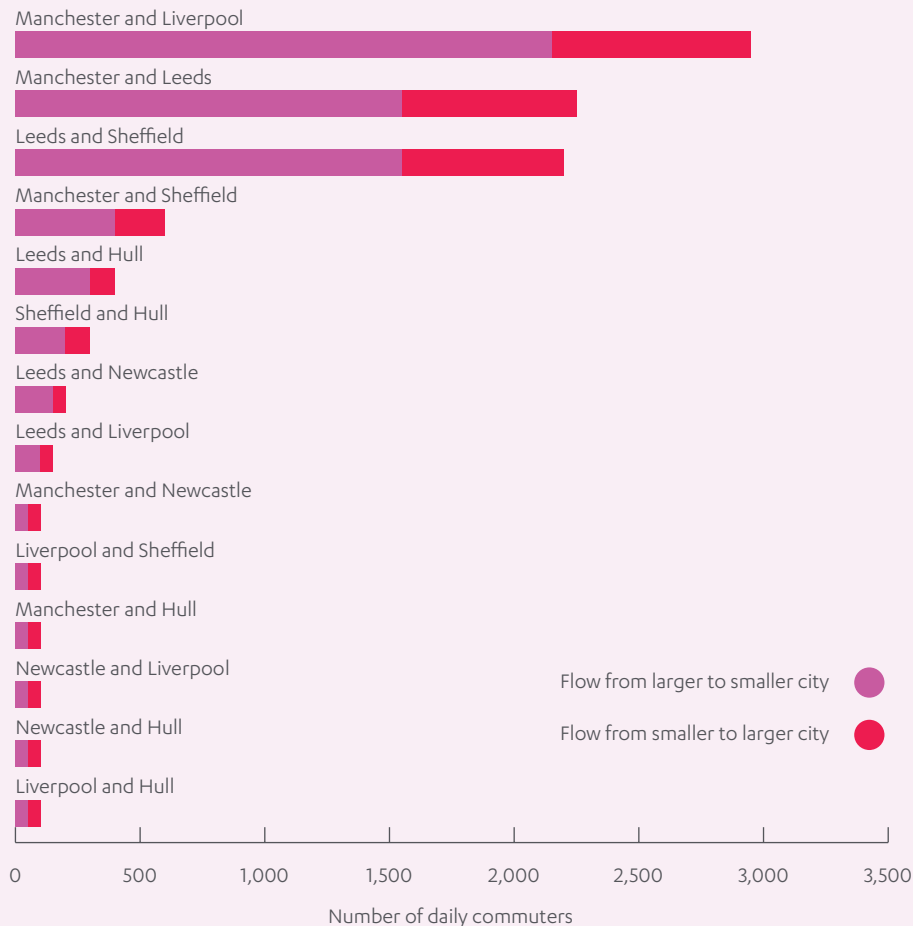
3.6 As is illustrated in figure 11, Leeds and Manchester are particularly important nodes in the northern rail network, with Manchester connecting directly to the West Coast mainline and both Liverpool and Sheffield; and Leeds connecting directly to the East Coast Mainline and the cities of Newcastle, Hull and Sheffield. The Manchester-Leeds trans-Pennine link is critical because it provides the principal route for rail services between the cities and surrounding regions in the west (Liverpool and Manchester) and those in the east (Leeds, Sheffield, Newcastle and Hull).

Figure 11 – Northern inter city train routes and journey times



- 3.7 Intercity rail commuting patterns across the northern cities displayed in figure 12 highlight three particularly busy corridors – Manchester/Liverpool, Manchester/Leeds, Leeds/Sheffield – which link the cities in closest proximity to each other and unsurprisingly therefore see much the greatest commuter flows.

**Figure 12 – Northern inter-city commuting by rail**



Source: Census 2011, Travel to work area data

- 3.8 After these three busiest routes, inter-city commuter flows are far lower for the remaining links; for instance, Manchester-Sheffield has roughly one quarter of Leeds-Sheffield's number of daily rail commuters (500 compared to 2000, approximately).<sup>43</sup>
- 3.9 An analysis of passenger flows through train stations tells a similar story, with Manchester, Leeds and Liverpool all having combined passengers in excess of 28 million per year, reflecting the high demand for rail travel in these locations. Sheffield and Newcastle have 8 million and 9 million passengers respectively, while Hull has 2 million passengers enter and exit its station annually. There has been considerable growth in passengers over the past 5 years with five cities all seeing growth of more than 20%: Leeds (31%), Manchester (24%), Sheffield (21%), York (25%) and Newcastle (21%).<sup>44</sup>

**Table 3 – Busiest stations in northern cities, by number of entries and exits in 2014–15**

Station name	Total number of entries and exits in 2014–15	Percentage change between 2009–10 and 2014–15
Leeds	28,847,648	31%
Manchester Piccadilly	24,614,970	24%
Liverpool Central	15,272,837	-17%*
Liverpool Lime Street	14,870,920	37%
Sheffield	9,112,726	21%
York	8,586,056	25%
Newcastle	8,053,112	12%
Manchester Oxford Road	7,598,295	24%
Manchester Victoria	7,282,062	24%
Manchester Airport	3,460,854	32%
Liverpool James Street	3,215,334	-4%
Hull	2,199,092	2%

\* Liverpool Central was closed for four months for refurbishments in 2012, which coincides with the time during which a large fall in passenger numbers occurred – passenger numbers fell from 18 million to 13.5 million between 2010–11 and 2012–13.

Source: Office of Rail and Road (2015)

Note: This table includes the eight busiest northern stations, by entries and exits in 2014-15, alongside some other important stations for the Northern Powerhouse cities: Manchester Airport; and city centre stations such as Liverpool James Street.

## The Importance of rail freight

Rail freight, which accounts for around 11% of national inland good movements in the UK, has increased by around 70% since privatisation in 1994-95 and is forecast to grow further. There are key freight sites in each of the North's core city regions, and the ports<sup>45</sup> on the Mersey, Humber, Tees and Tyne are each rail connected with rail playing an important role in the onward movement of bulk goods, such as coal for the electricity supply industry, and containers. Immingham, on the Humber, handles 260 freight train movements per week.<sup>46</sup>



## Identifying the constraints on growth in rail demand in the North

- 3.10 Train journey times and frequencies in the North generally compare badly against similar intercity journeys in the South East (and comparator international journeys).<sup>47</sup> For example, the fastest current journey time on the critical Manchester to Leeds link is 49 minutes – though many journeys are almost an hour – whereas a journey of equivalent length between Reading and London is under 30 minutes, with much higher frequencies of fast train departures allowing commuters to ‘turn up and go’.
- 3.11 Crowding on train services in the North has been described as a serious issue, with “crowding on many services, particularly those into the major centres at traditional peak times, but also elsewhere on the network and at non-peak times”.<sup>48</sup> The level of crowding seen on some services makes rail travel unattractive, and suppresses demand.
- 3.12 Table 4 illustrates levels of crowding on train services arriving into each city station at peak morning times, and indicates that trains arriving into Manchester are, by some margin, the most crowded of the core northern cities. On average these trains are 6% over capacity and 20% of passengers stand, which is beginning to approach the levels seen on services into London.<sup>49</sup> Levels of crowding on services into key stations at Manchester and Leeds are in line with the previous evidence that most commuting occurs into Manchester (from Liverpool, Leeds and Sheffield) and into Leeds (from Sheffield).<sup>50</sup>

**Table 4 – Demand, excess demand and passengers standing (peak AM, by city of arrival)<sup>†</sup>**

Station	Total passengers arriving in morning peak hours*	Passengers in excess of capacity (1 hour peak)**	Percentage of passengers standing (1 hour peak)***
Manchester	30,907	5.7%	20.3%
Leeds	25,897	2.5%	14.9%
Liverpool	20,155	0.0%	5.5%
Sheffield	7,224	2.3%	7.8%
Newcastle	4,447	2.2%	9.2%
London	563,354	7.2%	27.9%

<sup>†</sup> Hull is excluded due to lack of data availability.

\* Total passenger numbers include both inter- and intra-city passengers arriving into these stations. As such, the figures shown here are considerably larger than the inter-city passenger numbers in Figure 16. Numbers are for 3 hour AM peak.

\*\* Passengers in excess of capacity and percentage of passengers standing are calculated by the Department for Transport as a percentage of the critical load. The critical load is the highest number of standard class passenger on a service on arrival at (AM peak) or on departure from (PM peak) a city. However, these values are of the same order of magnitude as if they were calculated as a percentage of the total number of passengers arriving. Numbers given are for 1 hour AM peak (3 hour peak data shows a similar pattern, but with slightly lower congestion).

\*\*\*Percentage of passengers standing numbers are for 1 hour AM peak (3 hour peak data shows a similar pattern, but with slightly lower congestion).

Source: Department for Transport, Rail statistics 2014.





- 3.13 Rolling stock utilisation in the North is another important constraint on demand, and has been described as being “at such a level that there are limited opportunities to handle on-going demand growth within the available fleet”.<sup>51</sup> Whilst significant additional capacity can be found through train lengthening<sup>52</sup> the rail network serving northern city regions is in the main a two track railway so the number of trains/routes that can be operated is limited by infrastructure constraints.
- 3.14 It has also been identified that “many services in the North are operated by old and poor quality rolling stock”.<sup>53</sup> The significance of this should not be underestimated given that rolling stock is an issue of major importance for passengers. A 2012 Passenger Focus study found that Northern Rail trains “are felt to be at best uncomfortable but at worst dangerous, and passengers feel that the age and poor appearance of trains is symptomatic of a lack of respect for customers”.<sup>54</sup> Recent improvements to Northern Rail rolling stock replacing two-coach diesel with four-coach electric, trains saw demand growth more than double from 4 or 5% per annum to 11 or 12% per annum.<sup>55</sup>
- 3.15 Each of these factors are reflected in relatively low levels of rail commuting seen between cities in the North. To address these issues, planned improvements to the network and services are important. These are explored in the following section.

## Transforming the rail network in the North

3.16 A number of significant investment and development programmes are currently underway that aim to improve intercity journey times and capacity in the North, including:

- Proposals from the new franchise holders of the TransPennine Express and Northern franchises to increase capacity and frequency across the region
- Network Rail's Northern Hub programme, which will relieve constraints in and around Manchester
- Network Rail's Trans Pennine Upgrade programme, which will deliver electrification and journey time savings between Manchester and Leeds, York and Hull
- High Speed 2, which will substantially improve connectivity between the North and London

3.17 The first two of these are already fully specified and, in the case of the Northern Hub proposals, in the process of implementation. The significant benefits that they will deliver in terms of increased capacity, greater service frequencies and new links, an improved passenger experience and faster and more efficient journeys are set out in the boxes below.

3.18 In contrast, the Trans-Pennine Upgrade programme is currently in development and route design decisions have not yet been taken, following the recent public consultation, on the northern phase of HS2 to Manchester and Leeds via Sheffield. Both of these programmes will also have significant implications for Manchester Piccadilly, one of the North's most important gateway stations, and for the long-term planning currently being undertaken by TfN for a transformational northern inter-city rail network.

3.19 It will be crucial for all of these programmes to be effectively integrated over the period to the end of 2017, when the final scope for the Trans-Pennine Upgrade is due to be published, to ensure that short-term actions are properly aligned with an ambitious long-term vision, and that the whole of the investment planned in enhancing northern rail connectivity does not add up to less than the sum of its parts. The next section of this report sets out the Commission's proposals for how this may be achieved.

## Benefits from new franchises

In December 2015 the Department for Transport confirmed it had signed new contracts with Arriva Rail North Ltd and First Trans Pennine Express Limited for the Northern and TransPennine Express franchises respectively.

The new franchise agreements will bring with them substantial increases in capacity, improvements in the quality of rolling stock and, in particular, improved connections between the major cities of the North.

Improvements in connectivity from the new Northern franchise will include:

- An hourly service between Manchester and Sheffield
- More services to and from Manchester Airport in the early morning and in the late evening
- New hourly direct links from Bradford to Liverpool and Manchester Airport

Improvements in connectivity from the new TransPennine franchise will include:

- A more regular, faster, half-hourly service from Liverpool to Manchester and Leeds
- Two direct trains per hour between Manchester and Newcastle up from one currently, with one linking Newcastle and Liverpool and the other reinstating a direct link between Newcastle and Manchester Airport
- Hourly services from Hull to Manchester and Leeds
- £1.4m station investment at Hull
- Station improvements at Manchester Airport
- Substantial increases in the number of seats into Manchester, Leeds, Sheffield and Newcastle during the morning peak

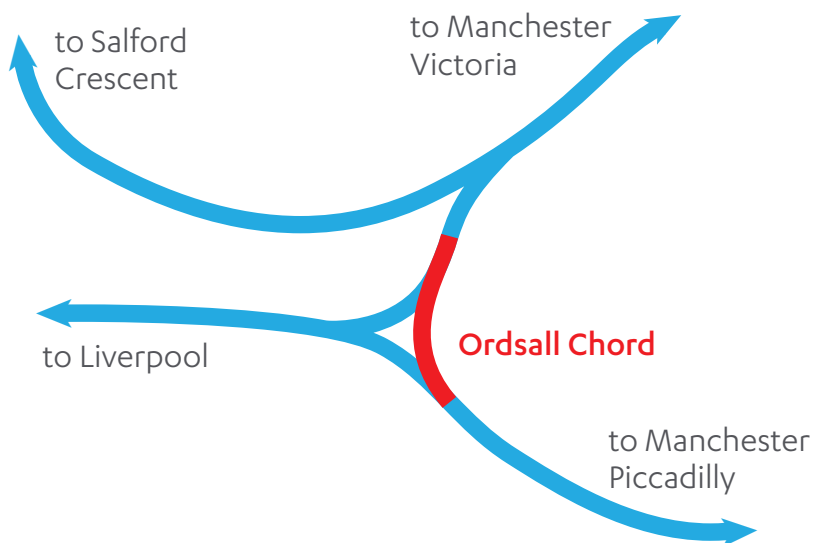
## Improvements under the Northern Hub programme

Network Rail's Northern Hub programme brings together a range of schemes, many of which relieve constraints on the network in and around Manchester. These will allow faster journey times and more direct connections between the cities of the North.

To date various elements of the Northern Hub programme have already been delivered. Construction of a fourth platform at Manchester Airport station was completed in 2015, allowing the station to accommodate more services from across the North. A number of measures, including electrification, have been delivered between Liverpool and Manchester, with the fastest journey time between the two reduced to 32 minutes.

Amongst the key interventions still to be delivered under the Northern Hub programme are the Ordsall chord and the construction of two additional through platforms at Manchester Piccadilly station, both of which will facilitate movements through Manchester. The Ordsall chord, due to complete by December 2017, will connect the line from Manchester Victoria to the line to Oxford Road and Piccadilly stations, allowing better connections across the North and through Manchester to Manchester Airport.

The two additional through platforms at Piccadilly will allow four more trains per hour to pass through the station, thus improving connectivity to the airport and east-west across the North. These new platforms were due to be completed by 2018, but Network Rail's Enhancements Delivery Plan removed this completion date, and as things stand there is no specific target date for completion.



## HS3: Transformational Connectivity for the North

- 3.20 In recent years, forward planning on the rail network in the North has been focused on creating a vision for a network of transformed inter-city rail links, often referred to as 'High Speed 3' or 'HS3', which can meet the aspirations of the northern city regions for shorter journey times, and for increased capacity and frequencies.
- 3.21 The conditional outputs set out by TfN in its Northern Powerhouse Rail strategy represent the improvements in connectivity that the northern authorities believe will be needed in order to work effectively as a single economic unit. It may be possible to achieve these aspirations through upgrades of the existing network, the use of planned new infrastructure, such as elements of the HS2 network, the construction of new lines, or a combination of the three. HS3 should therefore be thought of as a network that aims to deliver the outputs set out by TfN as opposed to a piece of entirely new infrastructure in the same mould as HS2.
- 3.22 TfN has made good progress in agreeing these conditional outputs, and in identifying and assessing options for how they may be delivered on each key intercity link, and this work should continue. It is crucial, however, that the HS3 network is not merely conceived as a distant goal which will take decades to come to pass, and that, as TfN continues to drive forward this work, a clear plan is developed which integrates shorter-term investment programmes, such as the Trans-Pennine upgrade, with the more ambitious longer-term vision, to ensure that continuing progress is made over the coming years towards the achievement of the North's strategic objectives.

**Recommendation two: To connect northern cities faster and more reliably than today, the Commission recommends that funding be provided to further develop the long-term plan for HS3, which should be conceived as a high capacity rail network, rather than a single piece of entirely new infrastructure. This plan must be fully integrated with proposals for maximising the benefits from currently planned investments.**

- 3.23 There will be a particularly important opportunity to bring together planning for three key critical elements of the northern rail network over the period to the end of 2017: the decisions on the eastern branch of HS2 to Leeds and the section of the western branch north of Crewe are due to be taken in Autumn 2016, as is a decision on the first stage of the redevelopment of Manchester Piccadilly (the construction of two new through-platforms) by October 2016, and by December 2017, Network Rail is due to have defined the measures that will comprise its Transpennine Route Upgrade. Given that these programmes each have potential to substantially affect inter-city connectivity in the North, they should be brought together in an integrated strategy in order to maximise their contribution to the wider aim of delivering the HS3 network.

3.24 It will be crucial to integrate the long-term planning being driven by TfN to deliver transformational journey time and frequency improvements with Network Rail's current planning for the electrification and upgrade of the Trans Pennine route, the full scope for which is due to be published by the end of 2017 with works completed by 2022.

**Recommendation three: TfN should work with the Department for Transport, Network Rail, HS2 Ltd and other stakeholders to prepare by the end of 2017 a single integrated strategy, combining short-term action with an ambitious long-term vision, which supports the overall plan for the HS3 network and brings together:**

- The upgrade of the Trans-Pennine line between Manchester and Leeds
- The design of the northern phase of the HS2 network, including connectivity between Leeds – Sheffield and Liverpool – Manchester
- Proposals for the redevelopment of Manchester Piccadilly station

### **Kick-Starting HS3: a transformational approach to the trans-pennine route**

3.25 The long term aim for the HS3 network should be to enhance connectivity from coast to coast across the North – from Liverpool in the west to Hull and Newcastle in the east. Given that the network will inevitably need to be delivered in phases, however, its development and delivery should prioritise those links likely to provide the strongest benefits for the economy of the North. On this basis, the initial priority for detailed development should be the link between the two major economic hubs of the North: Manchester and Leeds.

3.26 Manchester and Leeds have the largest populations and economies in the North, and as demonstrated in Part 2 the greatest opportunity for boosting productivity in the region through improvements to transport infrastructure to provide better connectivity between the two. Furthermore, there is significant potential to deliver improvements in connectivity on this corridor both through programmes that are already underway and through further interventions that could be developed.

3.27 Network Rail has recently published its specified outputs for the upgrade to the Transpennine Route, which will electrify the route and reduce journey times from Manchester to Leeds and York.<sup>56</sup> This programme, to be completed by 2022, began in September 2015 following the pause in June 2015 of the electrification programme as previously defined.

3.28 These upgrades are expected to come at a cost of at least £2bn; it is imperative to maximise the benefits from this very significant investment in terms of speed, capacity and reliability.

## LEEDS TO MANCHESTER TRAIN SERVICE



**Improved timetabling will mean trains  
are better spaced apart**

3.29 The next phase of Network Rail's work will be to define exactly how the specified outputs may be delivered. On completion of the programme in 2022, travel time between Manchester and Leeds should be reduced by almost 20% (from 49 minutes to 40 minutes). The upgrade will also allow trains to operate at regular 15 minute intervals as opposed to the current situation where trains in the morning peak from Leeds to Manchester depart anywhere between 8 and 24 minutes apart. And, train lengthening will increase capacity on the route, relieving crowding. These improvements represent a step change in the service between Manchester and Leeds.

3.30 While these improvements mark an important step forward, to enable a more transformational improvement in connectivity the work must not stop there. A plan therefore needs to be prepared alongside Network Rail's route upgrade for a further phase of improvements in the period post-2022. This should form the first part of the detailed development of the HS3 network, with the aim of achieving the journey time, capacity and frequency improvements identified by TfN between Leeds and Manchester. By integrating in this way the development of the longer-term HS3 strategy with planning for current enhancements, it will be possible to prevent any short-term decisions being taken which will hamper the delivery of the longer-term connectivity objectives.

- 3.31 Network Rail has limited the scope for improvements to be included in the current Transpennine Route Upgrade programme to those that can be delivered within the existing railway boundary. This decision was made in order to ensure the upgrade can be delivered by 2022, since working within the railway boundary avoids the need to engage in a process of gaining powers to use further land.
- 3.32 The Commission therefore engaged Arup to explore options for further potential interventions on the route that could deliver journey time savings involving works beyond the current railway boundary. Arup identified a number of potential interventions that could offer further improvements<sup>57</sup> to the network beyond Network Rail's upgrade programme to 2022. Focusing on the Diggle route (via Huddersfield), options involving the construction of new tunnels and/or the use of disused track were identified that were considered to have potential to reduce journey times between Leeds and Manchester by between 1 and 10 minutes.
- 3.33 Network Rail have also undertaken an initial assessment of potential interventions on the rail network in the North, including on the Manchester-Leeds corridor. Network Rail's work to date has considered interventions on both the Diggle route and the Calder Valley route. While the journey time between Leeds and Manchester on the Calder Valley route is currently slower than that on the Diggle route, the possibility of interventions on the Calder Valley route to deliver TfN's aspirational journey time of 30 minutes should not be ruled out given the extent of engineering works that would be required on either route.
- 3.34 The options identified by both Arup and Network Rail are at an early stage of development (and full development must take into account capacity and reliability as well as journey times), but suggest that there are credible options which should be explored to deliver substantial further time savings between Manchester and Leeds beyond the scope of Network Rail's Transpennine Route Upgrade programme, without the need for an entirely new alignment. These will need substantial investigation, however, to understand how they would interact with measures planned under the 2022 programme and what journey time it may be possible to achieve in practice given the mixed traffic (with both slow and fast services) nature of the route between Manchester and Leeds.

**Recommendation four: The upgrade of the Leeds to Manchester link should form the first phase of HS3 to be developed in detail. It should comprise a long-term programme with the objective of reducing journey times to 30 minutes, alongside substantial capacity and frequency improvements. The first part of this should be a shorter-term plan, to be developed and implemented by TfN and Network Rail by 2022, to cut the journey time between these cities and to onward destinations by roughly 20% from 49 to 40 minutes, enhance capacity and improve service regularity and frequency.**



## Capitalising on HS2

3.35 High Speed 2 will bring a host of benefits for many cities in the North. On completion of the full 'Y' network it will directly serve Manchester, Leeds and Sheffield, while Liverpool and Newcastle will also gain from compatible through services connecting to HS2 via the 'classic' network. The primary benefit will be to reduce journey times between the North and London, with the average time saved for the journey to London from Manchester, Liverpool, Sheffield, Leeds and Newcastle being 50 minutes.

London to...	HS2 journey time (mins)	Current journey time (mins)	Journey time improvements (mins)
Manchester	67	127	60
Manchester Airport	63	144	81
Liverpool	92	134	42
Sheffield	78	121	43
Leeds	81	131	50
Newcastle	137	169	32

Source: Department for Transport, High Speed Two: East and West The next steps to Crewe and beyond, 2015

3.36 While these journey time savings will substantially boost northern city economies, the core HS2 proposals are focussed on north-south connectivity and, unless wider aims are considered, will have only limited benefits for east-west city to city connectivity in the North.

3.37 Building on the coming of HS2 and getting its delivery decisions right is crucial for the long term connectivity of the North. Significant decisions are being made now, and HS2 and TfN should work together to ensure that HS2 will be delivered as a core building block of an enhanced northern network.

Figure 13 – HS2 and connections to the classic rail network



## HS2 North of Birmingham and Crewe

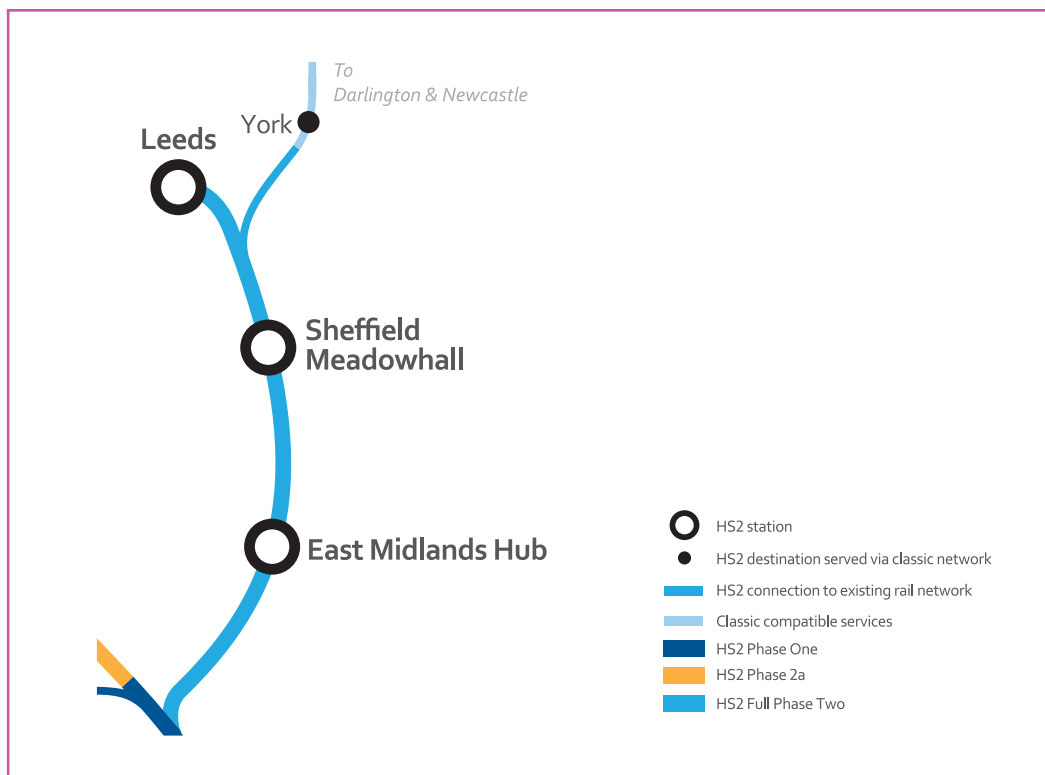
3.38 The Government intends to make a decision about phase 2b of the network (from Crewe to Manchester and onto the West Coast Main Line and from Birmingham to Leeds) in Autumn 2016. To maximise the benefits for the North, it will be important to ensure that design is integrated with the wider strategy for the transport network in the North, as it will have material consequences for the delivery of TfN’s aspirational journey times between the northern cities and to onward destinations.

3.39 Sir David Higgins’ report of 2014 recommended that the western branch to Manchester should be via Manchester airport.<sup>58</sup> This would mean a reduction in journey time between Manchester and Manchester airport to 7 minutes – exceeding TfN’s aspirational journey time between the two. But there are further opportunities to better link the northern cities using the infrastructure of HS2 that have not yet been committed to on the Leeds-Sheffield and Liverpool-Manchester corridors. These are discussed in more detail below.

## Sheffield to Leeds

- 3.40 On the eastern branch, the core proposal is for HS2 to stop at a redeveloped Meadowhall station, situated outside Sheffield city centre by the M1. The journey time between Leeds and Meadowhall would be 17 minutes, down from 49 minutes today. This, in itself, will not result in an improved intercity journey between the centers of Sheffield and Leeds. Options to connect Sheffield city centre to HS2 have been identified, however, that could reduce the journey time between Leeds and Sheffield city centres to TfN's aspiration of 30 minutes or potentially lower.
- 3.41 These include a link from Sheffield Midland station to Meadowhall that would allow compatible through-running of trains on the HS2 line to the north, as well as the possibility of the HS2 station being situated in Sheffield city centre rather than at Meadowhall. Each of these options should be explored to identify how a journey time as close as possible to the 30-minute aim between Leeds and Sheffield city centres could be delivered, how the most effective proposal can be achieved most efficiently and how it can best be integrated with planning for the wider HS3 network.
- 3.42 Delivering this journey time improvement from Sheffield city centre via HS2 would also mean an improvement in connectivity between Sheffield and Newcastle, reducing travel time between the two city centres to around 90 minutes – the current travel time between Newcastle and Leeds. There may also be potential for integration between HS2 and an upgraded East Coast Main Line to deliver journey time savings between Leeds and Newcastle.

**Figure 14 – Proposed Route for HS2 Eastern Leg**



Source: HS2 Ltd

### Liverpool to Manchester

- 3.43 On the western branch, phase 2b of HS2 is planned to extend north of Crewe and split in two directions: (a) to Manchester via Manchester Airport, and (b) to join the West Coast Main Line just south of Wigan, at Golborne. The Secretary of State will make decisions about the HS2 route, including around these proposals, in Autumn 2016.
- 3.44 Liverpool City Region, in their response to the NIC's call for evidence, highlighted that the Golborne link to the WCML would mean HS2 infrastructure covered about half of the distance between Manchester and Liverpool. They propose that with further infrastructure from the proposed HS2 route extending to Liverpool, travel time from Liverpool to Manchester Airport and Manchester Piccadilly could be reduced to 15 minutes and 20 minutes respectively, at an estimated additional cost of £2.6bn. Given that HS2 will deliver high speed infrastructure spanning a portion of the Liverpool-Manchester corridor, the option of using this infrastructure to radically improve connectivity between Liverpool and Manchester should be fully considered alongside other options for enhancing rail connectivity between these cities.

**Figure 15 – HS2 Proposed Western Leg and Potential for Connections to Liverpool**



### Sheffield to Manchester

- 3.45 While the infrastructure delivered by HS2 will not offer opportunities to improve connectivity between Sheffield and Manchester directly, there is potential for it to contribute to reduced travel times on the corridor indirectly.
- 3.46 On completion of HS2 phase 1 in 2026, a number of electric Pendolino tilting trains would be released from the West Coast Main Line. If electrification were

to be delivered in future between Sheffield and Manchester, these Pendolinos could be introduced onto this route in a reconfigured form. In this way it may be possible to achieve a journey time of 40 minutes between the two compared to 48 minutes currently.

**Recommendation five:** The design of the northern phase of HS2 should be taken forward by HS2 Ltd, working closely with TfN, to ensure that this is planned and delivered so as to facilitate the development of the HS3 network, enhancing connectivity between Leeds – Sheffield, Liverpool – Manchester (and its airport), and between Sheffield – Newcastle, as well as to onward destinations.

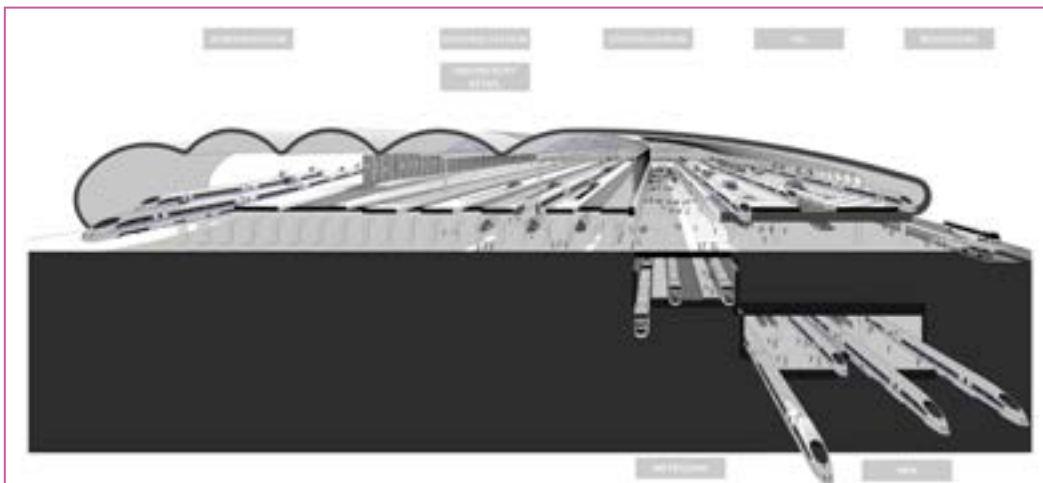
## Opportunities for redevelopment and regeneration at Manchester Piccadilly

3.47 Sir David Higgins carried out a review in 2015 that explored options for the redevelopment of Leeds station.<sup>59</sup> The Commission engaged Arup to undertake a similar exercise for Manchester Piccadilly, the city’s largest station in terms of passenger numbers, and the current preferred location for the HS2 terminus in Manchester.

3.48 In collaboration with Network Rail, TfN, TfGM, HS2 Ltd, the DfT and Merseytravel, the study explored options for accommodating HS2 and HS3 services at the station. It also looked at how commercial opportunities and opportunities for regeneration of the area surrounding the station could be maximised as part of a phased plan, potentially allowing a significant proportion of the costs of redevelopment to be recouped from the private sector, as was achieved at Birmingham New Street.

3.49 A concept was developed for the long-term transformation of the station, akin to the redevelopment of Kings Cross, integrated with shorter term action to deliver additional east-west platform capacity. This could enable the station eventually to operate as a focal point in the wider HS3 network and unlock

**Figure 16 – Manchester Piccadilly “Superhub” concept**



Source: ARUP for the NIC

significant regeneration and development potential. It would be delivered in three phases:

- Phase 1: constructing two new east-west through platforms, which would also provide improved access to the station from the Mayfield regeneration site; and relocating the Metrolink route to the north of the station, opening up the undercroft area for public access and retail.
- Phase 2: delivering the HS2 platforms – which could potentially be delivered before HS2 services to Manchester commence in 2033, in order to provide a temporary increase in national rail platform capacity and accelerate the regeneration and commercial opportunities.
- Phase 3: providing platforms for HS3 underneath the current station (although if these were to be constructed beneath the HS2 platforms, the station box would need to be constructed as part of Phase 2).

## Manchester Piccadilly station redevelopment: regeneration opportunities

Manchester City Council's Piccadilly Strategic Regeneration Framework Area identifies an underperforming zone of 140 acres around the south and east sides of Piccadilly Station where redevelopment could deliver: 4,500 new homes; 625,000 sq m of commercial office space; 100,000 sq m of retail space; and numerous high quality public spaces

The Mayfield area to the south of Piccadilly Station is being progressed for redevelopment and is expected to deliver: 24 acres overall; circa 100,000 sq m of commercial/office space; over 1,500 residential units. The construction of two new through platforms 15/16 and a new southern entrance to the station will improve access to the Mayfield site and unlock its development potential.



3.50 The analysis carried out by Arup for the Commission indicates the potential for a redeveloped Manchester Piccadilly station both to act as a key hub in a transformed northern rail network and to unlock significant regeneration and commercial development potential. The Arup proposals will not necessarily prove to be the right solution for Piccadilly, but demonstrate the importance of developing an integrated plan for the station, combining short- and long-term proposals, alongside work on the Trans-Pennine upgrade and the northern phase of HS2.

**Recommendation six: Proposals for the redevelopment of Manchester Piccadilly station should be prepared jointly by TfN, Transport for Greater Manchester, Manchester City Council, Network Rail, DfT and HS2 Ltd. These organisations should work to together to deliver:**

- a) Detailed plans for the new east-west platforms 15/16 to facilitate delivery early in Control Period 6 and unlock the development potential of the Mayfield site;
- b) A masterplan for the longer-term development of Manchester Piccadilly station as a whole, incorporating capacity for HS2 services and options for the delivery and timing of platform capacity for HS3; and
- c) Proposals for funding and financing the station redevelopment, including for private sector and local contributions.

## Further development of the HS3 network

- 3.51 The long term vision of TfN is to achieve substantially shorter journey times, and increase capacity and service frequencies, across the whole network connecting the core northern cities. The Commission has recommended that the Manchester-Leeds corridor is prioritised as the first link for detailed development, but it recognises the need for subsequent phases of work to consider how the connectivity can be improved between other major cities in the North, as planning is taken forward for the wider HS3 network.
- 3.52 The approach to developing HS3 in phases set out above, which brings together work on the Trans-Pennine Upgrade, the design of the northern phase of HS2 (including links to Sheffield and Liverpool) and the redevelopment of Manchester Piccadilly to provide the initial foundations for HS3, and which integrates short-term progress with an ambitious long-term strategy, should be used as the model for work on subsequent elements of the network. These should be rigorously prioritised on the basis of their benefits, costs and deliverability, including the scope to make early progress and maximise the benefits of currently planned investments by aligning them with a longer-term strategic plan.
- 3.53 In identifying proposals to meet TfN's aspirations for journey times on other intercity links, further measures would need to be delivered. Here again, plans which are currently in development could help pave the way, including to Hull and Newcastle:
- Intercity Express Programme: The initial funded phase of the Intercity Express programme will introduce higher specification rolling stock on the East Coast Main Line, reducing journey times between Newcastle and London. A second phase, if taken forward, could also reduce journey times between Newcastle and Leeds, with further improvements potentially achievable through integration of planning for HS2 with upgrades to the East Coast Mainline.
  - Leeds to Selby Electrification: The section of the Leeds-Hull corridor to Selby will be electrified as part of the Transpennine Route upgrade, which could reduce travel times from Hull to Leeds by 5 minutes and to Manchester by 10 minutes.
- 3.54 It will also be important to ensure that planning for HS3 considers the other key gateway stations in the North, including Liverpool Lime Street, it will be important to consider how these stations can provide sufficient platform capacity to support the delivery of improvements in journey time and service frequency, and how their potential to support commercial development and regeneration can be unlocked.



Recommendation seven: TfN should follow an approach that seeks to maximise the benefits of current and planned investments and integrates them with an ambitious longer-term plan, in developing and prioritising proposals for other major inter-city links through its Northern Powerhouse Rail strategy. This should include assessing the case and options for early enhancements to key routes and for improvement and redevelopment at gateway stations including Liverpool Lime Street.



# PART FOUR

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## PART 4 – ENHANCING THE ROAD NETWORK IN THE NORTH

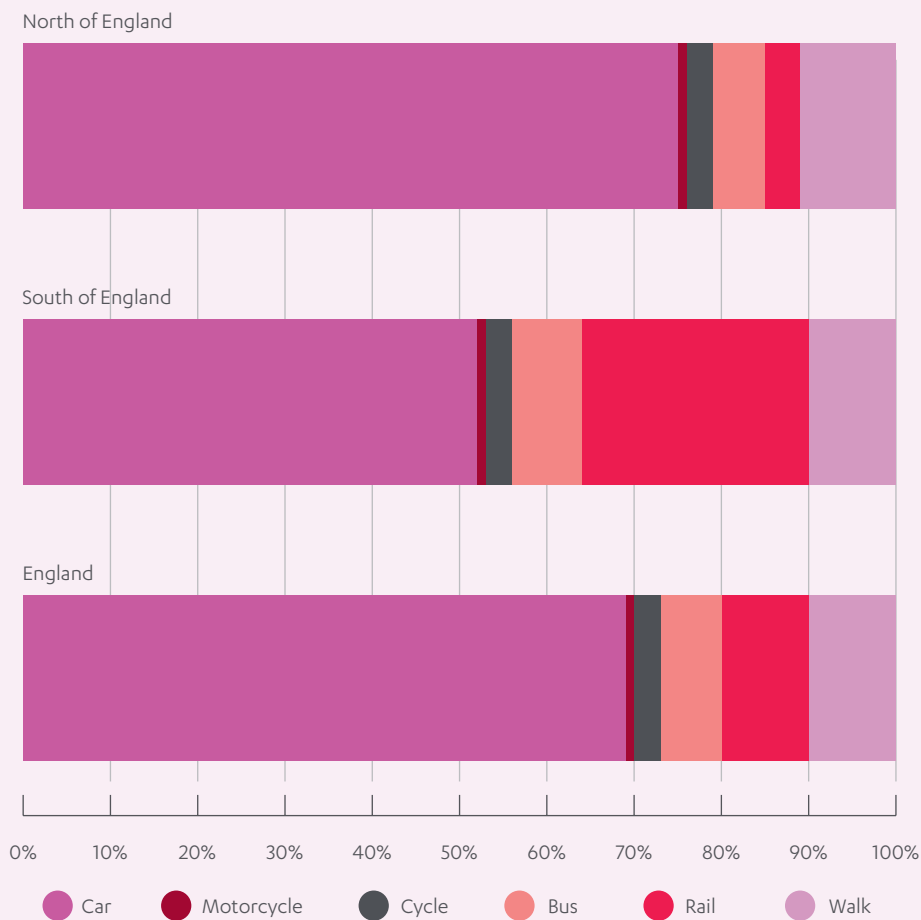
**4.1 Road travel is essential to everyday life in the North, accounting for the majority of total miles travelled per person every year. This means that together with rail, road improvements can be key to unlocking increased prosperity. Ensuring that capacity improvements are at the top of the delivery agenda in the near term is therefore crucial, as is developing longer term plans to ensure the North has a network that is fit for purpose and can help to deliver the aspirations of the city regions.**

This Part examines the performance of the road network in the north, the pipeline of planned improvement measures and the Commission's near and longer term proposals for planning and prioritising investment.

### **Performance of the road network in the North**

4.2 The road network is crucial to everyday life and the functioning of the economy<sup>60</sup> in the North of England, accounting for 74% of all travel to work journeys, more than for the country as a whole.<sup>61</sup> In linking together the cities of the North, the Strategic Road Network bears the greatest share of the load.<sup>62</sup>

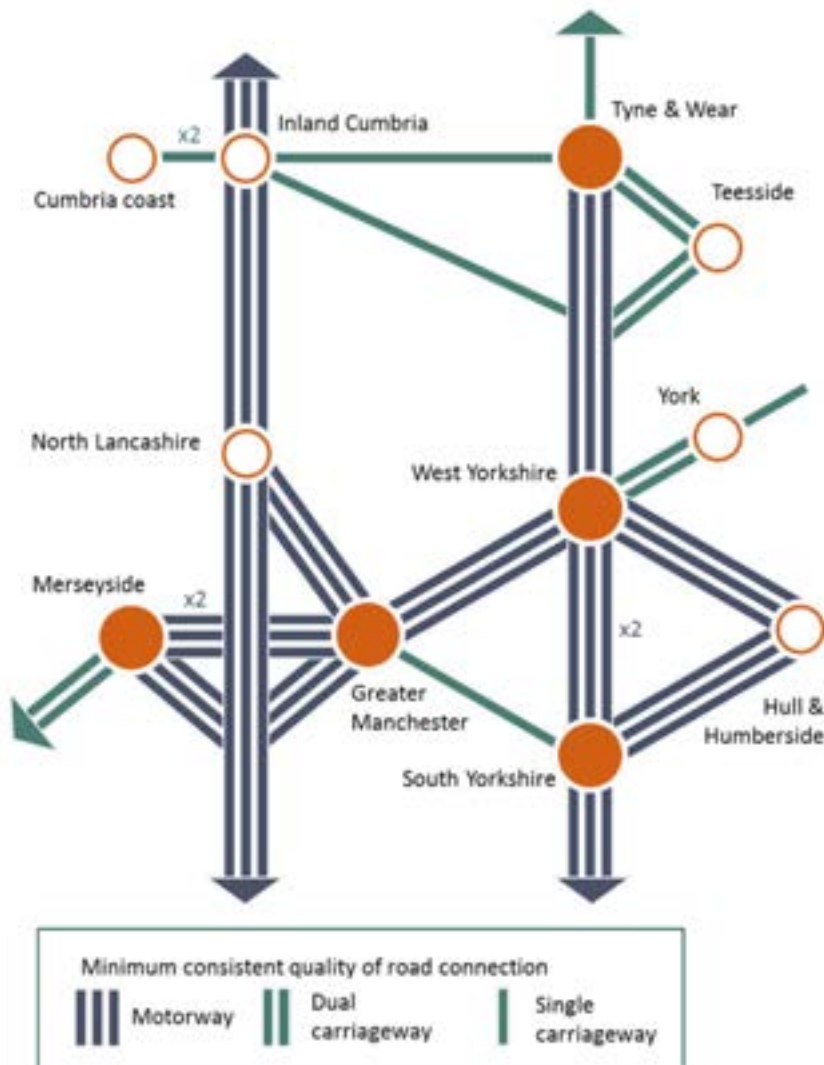
**Figure 17 – Usual method of travel to work by areas of residence**



Source: Nomis, Census 2011, Travel to work method

- 4.3 However parts of the North are underserved in terms of their strategic road links. East-West connectivity in particular is limited as the only motorway on this axis in the North is the M62. This makes the M62 crucial for strategic connectivity between northern cities, but leads to high levels of congestion, with certain stretches experiencing a 70%-80% likelihood of serious congestion during peak periods.<sup>63</sup>
- 4.4 Connections to key ports and airports are also frequently at capacity, with flows of 122,000 vehicles per day experienced along the M56<sup>64</sup> which is critical for access to Manchester airport and the ‘Airport City’ enterprise zone, as well for commuting into Manchester and freight journeys to and from west coast ports.<sup>65</sup>

Figure 18 – The Strategic Road Network in the North of England

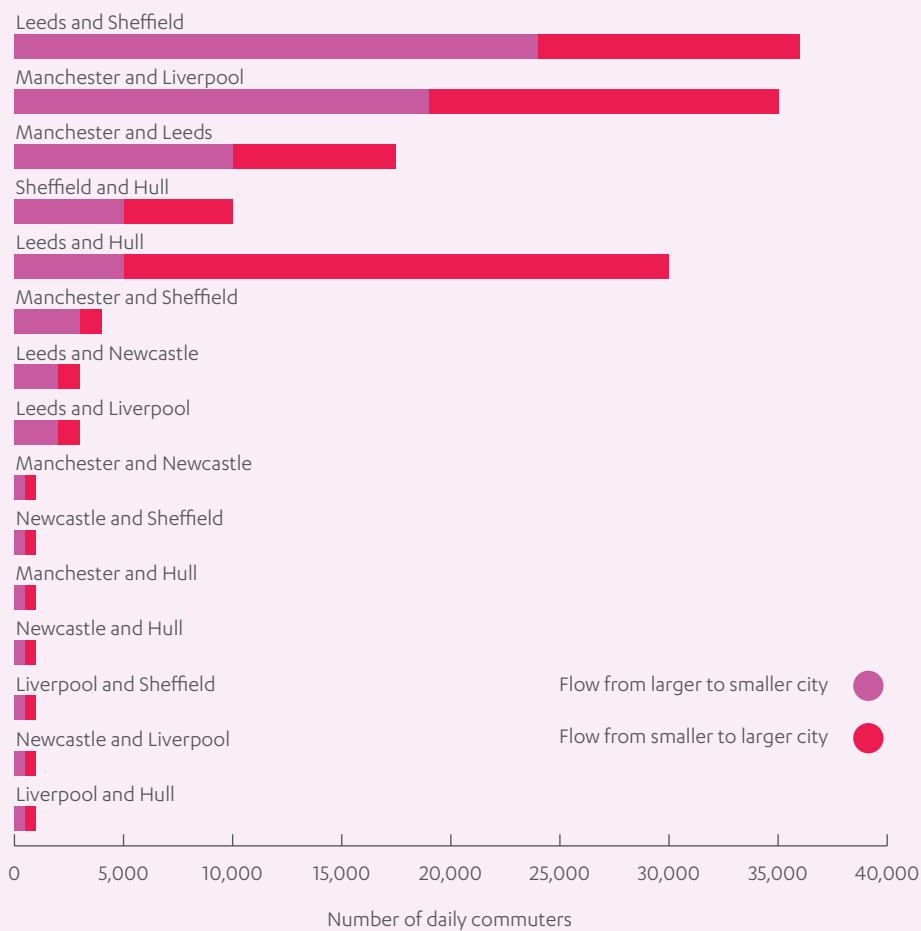


- 4.5 Infrastructure in the North of England is also beginning to age. The pioneering nature of many of the strategic roads in the North mean that they were built to old standards which have not always stood the test of time. The first motorway to be built in Britain was the Preston Bypass, which opened in 1958 and which now forms part of the M6. And the first section of the M62, the Stretford–Eccles Bypass, began construction in 1957, opening in 1960.<sup>66</sup> Key junctions, such as the Lofthouse intersection between the M1 and M62 and Simister Island to the north-east of Manchester are not able to keep up with modern demand.<sup>67</sup> And structures such as the Tinsley Viaduct, which carries the M1 across the Lower Don Valley in Sheffield, need major work to stay open for the long term.<sup>68</sup>
- 4.6 Relieving congestion hotspots and improving capacity is already a necessity, which will only increase as the North delivers the jobs and population growth that it is targeting. Either way, improving the North's roads is a must.

## Demand on inter-city roads

- 4.7 Analysis shows that significantly more commuters travel by car than by rail in the North<sup>69</sup> with the road network supporting a broad range of commuting journeys across the whole of each city-region. As shown in figure 19 below, larger traffic flows are seen from smaller to larger city regions – highlighting their role as major employers – and there are three major inter-city road commuter links, between Leeds-Sheffield, Manchester-Liverpool and Manchester Leeds. There are also several medium sized commuter links, between Sheffield-Hull, Leeds-Hull and Manchester-Sheffield. The remaining city pairs then show a lower level of commuting; which is unsurprising given the greater geographical distances between those city pairs.
- 4.8 Transportation of freight by road is also more significant in the North of England than in the country as a whole, generating 22% more road goods transport per head than the national average and over twice as much as in the south.<sup>70</sup> And, around 30% of national goods transported by domestic road freight originate from the North West, North East and the Yorkshire & Humber regions.<sup>71</sup>

**Figure 19 – Northern inter-city commuting by road: number of people who live in one city and commute to a different city**



Source: Census 2011, Travel to Work Area data. Note: city pairs are named “larger city/ smaller city”, based on pop.

4.9 Unsurprisingly, therefore, freight accounts for a significant proportion of traffic along key routes in the North, including the M62 – where there is a concentration of warehouse space on both sides of the Pennines – and on the M56, which experiences the 5th highest proportion of freight traffic seen across the country, on certain sections.<sup>72</sup>

## Performance of the road network in the North

4.10 The average performance of the road network in the North can be gauged through an analysis of journey times and congestion. A recent SDG study found that “even when the Strategic Road Network is not congested, journey times between many city pairs are long relative to the distance between them”.<sup>73</sup> At peak times journeys are often considerably longer.

4.11 Congestion “is regularly experienced on key road links in the North, particularly where they pass close to major conurbations”.<sup>74</sup> Figure 20, below, highlights the corridors on the strategic road network in the North which have experienced high levels of ‘stress’<sup>75</sup> in recent years. They include:

- Large stretches of the M62 between Manchester and Liverpool and also between Manchester and Leeds
- The M60 around Manchester
- The M1 approaching Sheffield from the south, and between Sheffield and Leeds
- The M6 approaching Manchester from the south
- The M56 from Manchester Airport through to Ellesmere Port
- The A63, towards the centre of Hull
- The A160/A180 at the Port of Immingham
- The A1(m) and A19 from the south towards and around Newcastle

4.12 The above include the sections of the network most used by commuter traffic such as the M1 and M62, which are of strategic importance for north-south and east-west connectivity respectively.

4.13 A number of schemes in the Roads Investment Strategy, either underway in the North or planned, will seek to address some of the congestion illustrated in Figures 20 and 21; this will be examined more closely in the following section. Despite this, congestion in the North is still forecast to increase.

4.14 Scenarios vary, but in the 2040 scenario shown in Figure 21 ‘regular to severe congestion’ (the highest classification) will occur on large swathes of the network between the core cities and on links to key northern assets such as Manchester Airport Sheffield, Manchester, Leeds, Liverpool and Newcastle.

### The Pennines Challenge

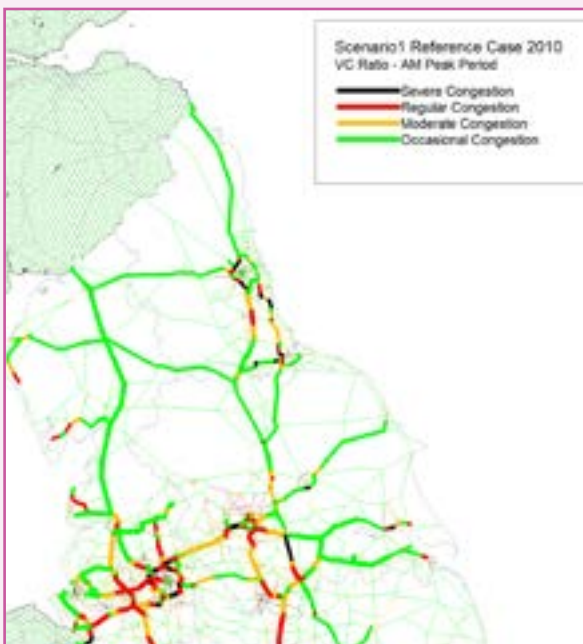
There are only fourteen A roads and one motorway that run east to west across the Pennines in the whole of the north. To put this in context, there are fewer traffic lanes on A roads crossing the Pennines between Sheffield and Scotland than there are on A roads crossing the Thames between Tower Bridge and Chelsea.



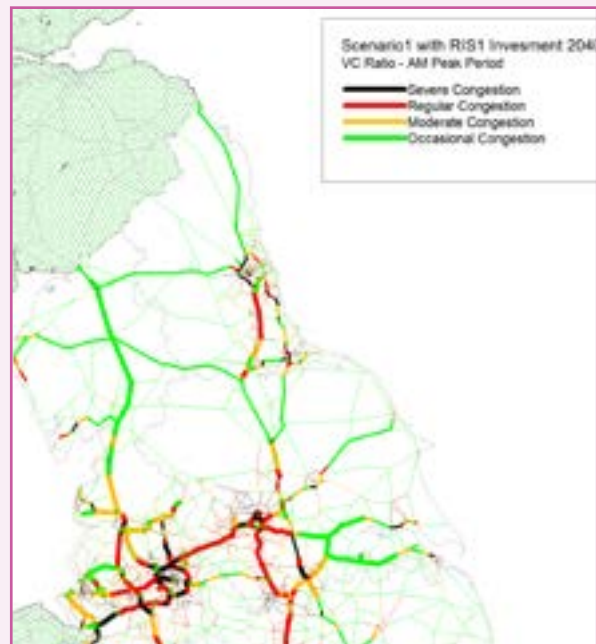
With the exception of the M62, all of these roads are single carriageway, or a mix of single and dual. Indeed the M62 is the only dual carriageway route that runs east-west between Stoke on Trent in the south and Edinburgh in the north – a gap of nearly 200 miles. The M62 carries half of all trans-Pennine road traffic, and two thirds of all freight. As a result, the ability of Yorkshire and the North West to work together is heavily dependent on one road.

Mobile phone data shows that 55,000 vehicles travel between West Yorkshire and Greater Manchester every day.<sup>76</sup> Travel between Greater Manchester and South Yorkshire – which has a similar population and is the same distance away, but where no good-quality road exists, resulting in slow journey times – is only 10,000 vehicles per day.<sup>77</sup> The implication is that the vast majority of potential travel in these cases simply does not happen, because the infrastructure needed to accommodate it does not exist. Improving infrastructure in a national park presents many challenges. For this reason, a trans-Pennine tunnel is under consideration.

**Figure 20 – Congestion experience the SRN in the North**



**Figure 21 – Forecasted Congestion on SRN, 2040**



Source: DfT Road Transport Forecast scenario



4.15 Addressing the gaps in the road network could play an important role in building a stronger northern economy. Advanced manufacturing and energy – some of the prime strengths of the northern economy – have tended to grow where road access was good. This pattern is expected to continue with future developments likely to cluster close to good motorway junctions.<sup>78</sup> The northern powerhouse, if it is to thrive, needs a road network that can deliver.

## Pipeline and plan for the road network in the North

### Development already underway

4.16 The first Road Investment Strategy (RIS 1), covering 2014/15 to 2019/20 made upgrading roads in the North a central theme, with funding committed to 42 schemes in the North of England worth a total of £4.8 bn.<sup>79</sup> As a result a number of proposals within the RIS will address many of the most urgent upgrades needed on the northern road network.

4.17 However, some of the most important roads schemes for the North, identified for delivery in RIS1 will not begin works until the final years of that period, at best. Similarly, a number of important RIS2 schemes are not currently prioritised for early delivery in that period. Given how important road connectivity is to the North, it would provide significant early benefit to bring such schemes forward.

4.18 RIS1 committed to a number of strategically important road schemes in the North, including:<sup>80</sup>

- a significant investment in smart motorways:
  - Controlled and smart motorways covering half of the M60 around Manchester, bringing an extra lane and the latest in route management technology to the busiest road in the North.
  - Smart motorways on the M53 in Birkenhead, plus a new junction on the M56 at Runcorn to provide better access to the new Mersey Gateway bridge.
  - Smart motorways on the M6 through central Lancashire, including the upgrading of junction 22 to address a major congestion hotspot.
  - An extra lane on the M62 across the Pennines, filling the missing link in a smart motorway running from the M6 to the M1.
- Improved access to five major ports across the North, including rebuilt links to the Port of Liverpool.
- Completion of the A1(M) motorway between Leeds and Newcastle.
- Dualling of more of the A1 north of Newcastle, to join up all of the existing sections of dual carriageway as far as Ellingham.
- Rebuilt access to the south of Manchester, with five schemes on the M60, M56, A556 and M6 making the route to the Midlands and the South more reliable.

- Improvements to the strategic road between Manchester and Sheffield, fixing notorious hotspots in places like Mottram and at key pinch-points like the A61 west of the M1.

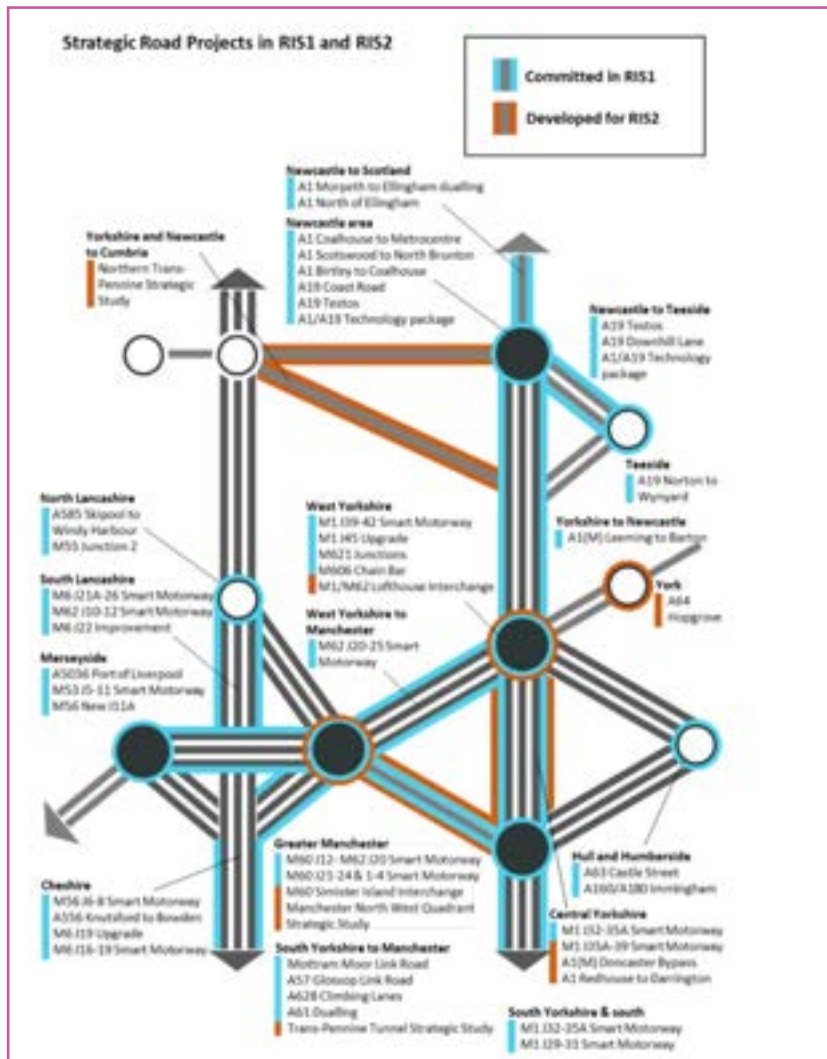
4.19 Alongside this package, RIS1 also identified four further projects, with the potential to transform the areas in which they are located, that needed additional time to develop, but would start work in RIS2.<sup>81</sup> These were:

- Creating a new strategic route to the North East by widening the A1(M) near Doncaster and upgrading the non-motorway stretch in Yorkshire.
- Rebuilding of the outdated Lofthouse and Simister Island interchanges to ease congestion and improve flow between key strategic corridors in the North.
- Upgrading the remainder of the M1 to smart motorway between Sheffield and Leeds and between Nottingham and the M6, making the M1 a four-lane modern motorway throughout.
- Enhancing the A64 around York by grade-separating the remaining junction on the York bypass and examining the case for extending the dual carriageway towards Scarborough.



4.20 The current plan for RIS1 undoubtedly represents an enormous step forwards for the planning of roads investments across the country. However, this report identifies a small number of significant measures for the North which should be protected and prioritised for rapid delivery in order to relieve economically damaging pinch points and provide vital increased capacity, which will help the North prosper.

Figure 22 – Strategic Road Projects in RIS1 and RIS2



## The M62: A Crucial Corridor

4.21 The M62 is the only east-west motorway in the North of England, and is therefore a corridor of vital significance for local, regional and international traffic, linking ports on both coasts and the core cities of the North. Unsurprisingly, it is a very heavily trafficked route, with annual average weekday flows of over 60,000 vehicles per day in each direction, causing poor reliability and considerable congestion.<sup>82</sup> Due to a number of bulk goods generating sites along the route – including logistics warehousing, the Port of Liverpool, the Humber Ports, and Peak District quarries – the M62 carries high levels of freight.<sup>83</sup>



- 4.26 The speed at which smart motorways can be implemented makes these projects particularly attractive. It is the fastest way of creating new trans-Pennine road capacity and environmental impacts are likely to be limited, as the carriageway does not need to be widened to create an extra lane. This appears to be a rapid answer to the immediate needs of development.
- 4.27 Investing in this northern artery will also help to unlock potential wider housing and job growth aspirations, for example in the Leeds City region where current estimates indicate that over 100,000 new homes and 130,000 new jobs will be created by 2031.<sup>86</sup>

**Recommendation eight: On the strategic road network, Highways England should accelerate capacity enhancements to the M62 between Liverpool and Manchester and between Manchester and Leeds. Very substantial capital funding should be brought forwards, so that both schemes can be accelerated, with work beginning between Liverpool and Manchester in Roads Investment Strategy year 2017/2018 – two years ahead of schedule – and work between Manchester and Leeds also significantly fast-tracked.**

**Smart Motorways** have been operational since 1995 and are designed to ease congestion and improve traffic flow without compromising safety. All lane running is the latest evolution in smart motorway design, where extra capacity is added to routes by converting the hard shoulder to a traffic lane and using technology to provide a controlled, intuitive environment. Smart motorway all lane running provides an additional 33% capacity with no reduction in safety at a lower cost and more rapidly than traditional road widening.



## Other investment in strategic road enhancements

- 4.28 In addition to the key east-west M62 link, travellers on other parts of the North's strategic road network are facing increasing congestion and delays. A package of investments across a number of key motorway connections and junctions should therefore be prioritised to ensure that these bottlenecks are addressed.
- 4.29 The smart motorway improvements planned to the M56 (junctions 6-8) are of particular significance. This stretch of motorway provides access to Manchester airport, by far the largest airport in the North with a throughput greater than that of all the other northern airports combined, making it the primary international gateway for passengers to the North.<sup>87</sup>
- 4.30 The M56 experiences flows of over 120,000 vehicles per day,<sup>88</sup> and frequent congestion leading to delays. This presents a serious issue for connections to Manchester airport as well as for commuters into the 'Airport City' enterprise

zone and into Manchester, and for freight journeys to and from west coast ports. Given the levels of growth anticipated in the area, including a doubling of passengers using the airport by 2030, action needs to be taken, and funding should be prioritised to make sure that development work on this scheme, which is at very early stages, is carried out to enable work on the scheme to begin in this Roads Investment Strategy period and to be completed in the early part of the next.

- 4.31 The proposed smart motorway scheme between junctions 35a-39 of the M1 will add much needed additional capacity to a 13 mile stretch between the north of Sheffield and South of Leeds. This route is a major north-south link and forms a vital part of the South Yorkshire road network in an area where significant economic development is anticipated.<sup>89</sup> The Commission therefore wishes to see development of the scheme brought forward to enable rapid delivery during the second Roads Investment Period.
- 4.32 Similarly, the planned modernisation of key strategic interchanges at Simister Island – north of Manchester – and Lofthouse Interchange – to the South of Leeds – is also a priority for the northern network. Improvements to the critical but congested interchange at Simister Island – the interchange for the M60, M62 and M66 – will enable more free flow movements and reduce congestion and delays. Almost 250,000 vehicles drive through the junction every day<sup>90</sup> and average speeds are often below 20mph in peak periods. Substantial commercial and residential development is anticipated in the area, which will impact on performance. The Lofthouse interchange, which connects the M1 with the M62, also experiences delays due to significant traffic flows from both long-distance and local commuter traffic. The scheme has been described as a top priority to support growth in the region as improved flows will allow existing and planned smart motorway works on the M1 and M62 to realise their full potential.<sup>91</sup>
- 4.33 Each of these schemes could have an important immediate impact on the economy of the North, but as planned they may not open to the public until late in RIS2. They should be prioritised for development and delivery.

**Recommendation nine: Development funding should be prioritised for a package of further enhancements to the northern road network, so that these can be completed as early as possible in the next Roads Investment Period. This package should include: upgrades to the M56 (junctions 6-8) around Manchester Airport; the redevelopment of the Lofthouse Interchange and Simister Island junctions; and capacity enhancements to the M1 (35a-39) between Sheffield and Leeds.**

## Longer-term needs

4.34 The pipeline of work established in the Roads Investment Strategy, together with the strategic interventions outlined above, will deliver a much improved northern roads network. In addition, three strategic studies are currently underway which will take a view on longer term options for improved east west trans-Pennine connectivity. These cover:

- **North trans-Pennine Route Study:** which has examined the case for dualling either or both of the A66 and the A69 across the north Pennines. Early evidence suggests that, whilst overall levels of traffic are not high, the two roads play a key role in linking up the eastern and western halves of the North, and the routes are strategically important for freight, in particular the A66 which carries one in every three lorries crossing the Pennines that are not using the M62. Given this emerging picture, there may be a case to be made for adding more capacity.
- **Manchester North-West Quadrant Study:** which takes a multimodal approach to the problem of congestion on the North West Quadrant of the M60, which serves both as Manchester's orbital motorway and a critical part in the cross-Pennine M62. The busiest section, between junctions 12 and 13, carries almost 200,000 vehicles in an average day, equal to some of the busiest sections of the M25 around London. Pressure is expected to increase as Manchester grows, particularly with development focused around the western side of the city. If this section of the M60 comes to a halt, it will have serious implications for Manchester's continued development, as well as for the economy of the North as a whole.
- **Trans-Pennine Tunnel Study:** which is examining whether it is feasible and cost effective to build a tunnel to link South Yorkshire and Greater Manchester. This would significantly improve journeys between these two regions and also provide an additional strategic route across the Pennines, providing enhanced access for freight from the North's major ports to the wider UK market. This could potentially have a significant impact on the economic geography of the North of England.

4.35 An interim report on the trans-Pennine Tunnel was published in November 2015, with an update due in March 2016 (when reports on the other two studies will also be published). Taken together, proposals from the three studies could significantly enhance the strategic road network in the North. The projects, and subsequent follow up work, will need to fully understand the nature of freight and passenger flows to make a full assessment of the potential benefits, and the most effective options for improved transport links, which may include looking at rail as well as road options.





# CONCLUSION

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Transport investment alone will not address the North's economic underperformance, but it is a necessary element of the wider strategy that will be needed to boost productivity, given the potential of poor transport links to act as a barrier to growth.

A number of important decisions will be taken in the period to December 2017 on projects that have potential to substantially enhance inter-city rail connectivity in the North, including proposals to upgrade the Trans-Pennine link between Leeds and Manchester, route and station decisions for the northern phase of HS2 and plans for the redevelopment of Manchester Piccadilly station. If these are taken in an integrated way, aligning short-term actions with an ambitious long-term vision, they can lay the foundations for a transformative HS3 network.

Similarly, action to tackle congestion on the road network in the North should combine strong short-term actions, including the acceleration of major improvements to the key east-west M62 link, with long-term planning for improvements on other strategic corridors.

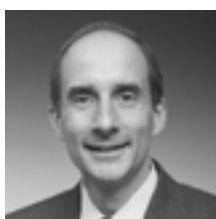
A unique opportunity now exists to rejuvenate the North's transport system and support broader efforts to drive greater northern prosperity. However, if transport projects are conceived of only as stand-alone, incremental developments, it is unlikely that the potential benefits will be fully realised. For this reason, an integrated approach which fully examines the relationship of proposed projects to the wider transport network and economy will be vital.

The ultimate objective should be the development of an integrated, cross-modal transport strategy for the North, setting out prioritised investment plans that align short-term measures with ambitious long-term plans. This strategy should not look at any element of the transport network in isolation, but should look across road and rail and should incorporate plans for inter-city, regional and urban connectivity, as well as links to key international gateways.

**Recommendation eleven: Sufficient funding should be made available by government to support the development of an ambitious cross-modal strategy for northern transport with HS3 at its heart.**

# THE NATIONAL INFRASTRUCTURE COMMISSION

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## Chair

### Lord Andrew Adonis

Lord Andrew Adonis was appointed as chairman of the National Infrastructure Commission on 5 October 2015. He was a member of the independent Armitt Commission, which recommended an independent National Infrastructure Commission in 2013.

Andrew Adonis was formerly the Transport Secretary from 2009 to 2010, Minister of State for Transport from 2008 to 2009 and Minister for Schools from 2005 to 2008. He was Head of the No10 Policy Unit from 2001 to 2005.

## Commissioners



### Sir John Armitt

Sir John Armitt is Chairman of the National Express Group and City & Guilds, Deputy Chairman of the Berkeley Group and a member of the Board of Transport for London, Senior Vice President of the Institution of Civil Engineers and a Fellow of the Royal Academy of Engineering, the Institution of Civil Engineers and City & Guilds of London Institute. He has received honorary doctorates from the universities of Portsmouth, Birmingham, Reading and Warwick and was awarded the CBE in 1996 for his contribution to the rail industry and a knighthood in 2012 for services to engineering and construction.

In September 2013 the Armitt Review, his independent review of long term infrastructure planning in the UK, was published. The review is now Labour Party policy.



### Tim Besley

Tim Besley is School Professor of Economics and Political Science and W. Arthur Lewis Professor of Development Economics at the LSE. He was a co-chair of the LSE growth commission and a member of the IFS's Mirrlees Review panel, and is currently Chair of the Council of Management of the National Institute of Economic and Social Research.



### **Demis Hassabis**

Demis Hassabis was the co-founder and CEO of DeepMind, a neuroscience-inspired AI company, bought by Google in Jan 2014. He is now Vice President of Engineering at Google DeepMind and leads Google's general AI efforts.



### **The Rt Hon Lord Michael Heseltine CH**

The Rt Hon the Lord Heseltine CH was a Member of Parliament from 1966 to 2001. He was a Cabinet Minister in various departments from 1979 to 1986 and 1990 to 1997 and Deputy Prime Minister from 1995 to 1997. He is founder and Chairman of the Haymarket Group, and most recently was appointed by the government as an advisor to the Secretary of State for Communities and Local Growth.



### **Sadie Morgan**

Sadie Morgan BA (HONS), MA (RCA), FRSA is a co-founding director at the award-winning practice, dRMM Architects. She became the youngest and only third ever-female President of the Architectural Association in 2013. In March 2015, Sadie was appointed as Design Chair for High Speed Two (HS2) reporting directly to the Secretary of State.



### **Bridget Rosewell**

Bridget Rosewell OBE, MA, MPhil, FICE is a UK economist, with a track record in advising public and private sector clients on key strategic issues. She is a founder and Senior Adviser of Volterra Partner and a non-executive director of Network Rail and of Ulster Bank. She was Chief Economic Adviser to the Greater London Authority from 2002 to 2012. She has been a member of several Commissions looking at the future of public services, cities, infrastructure and local finance.



### **Sir Paul Ruddock**

Sir Paul Ruddock is Chair of Oxford University Endowment Management and Chair of the Oxford University Investment Committee. Sir Paul was a co-founder of Lansdowne Partners in 1998 and CEO of Lansdowne Partners Limited from 1998 to 2013 when he retired. From May 2007 to October 2015 he was Chair the Board of Trustees of the Victoria & Albert Museum as well as Chairman of the Gilbert Trust for the Arts. He is a Trustee of the Metropolitan Museum of Art, New York and a Fellow of the Society of Antiquaries.

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