

# Initial Integrated Rail Report Strategic Transport Plan Evidence Base

Report by Steer Davis Gleave commissioned by Transport for the North



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**JACOBS**

 **TRANSPORT FOR THE  
NORTH**

Initial Integrated Rail  
Report

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## Contents

<b>Executive Summary.....</b>	<b>i</b>
<b>1 Introduction .....</b>	<b>5</b>
Context .....	5
Purpose of the Report .....	7
Geographic Scope of the Report.....	9
Structure of the Report.....	10
<b>2 Building the Northern Powerhouse .....</b>	<b>11</b>
Economic Challenges .....	11
Transforming the North.....	12
Transport and the Economy .....	14
<b>3 Rail and the North's Economy .....</b>	<b>16</b>
Rail's role in delivering economic activity .....	16
<b>4 Vision and Objectives .....</b>	<b>22</b>
STP Vision & Objectives .....	22
The Contribution of Rail to the Vision .....	22
<b>5 Rail in the North Baseline .....</b>	<b>24</b>
Introduction .....	24
Supply .....	24
Demand .....	35
Conclusion .....	41
<b>6 Rail in the North Horizon Scanning .....</b>	<b>43</b>
Introduction .....	43
Supply .....	43
Demand .....	48
Conclusion .....	56
<b>7 Economic Gaps and Conditional Outputs .....</b>	<b>57</b>
Strategic Gaps .....	57
Review of LTRS Gaps.....	57
Conditional Outputs.....	58

<b>8</b>	<b>Options and Sequencing .....</b>	<b>66</b>
	Scope .....	66
	Identification of Corridors .....	66
	Connectivity Priorities.....	69
<b>9</b>	<b>Next Steps and Implementation.....</b>	<b>3</b>
	Moving Towards a Single Integrated Rail Plan .....	4

## Figures

Figure 1.1: The Strategic Transport Plan and its Evidence Base .....	6
Figure 1.2: Identification of pan-Northern Interventions.....	7
Figure 2.1: The North's Prosperity Gap (in GVA per capita) with the Rest of the UK .....	11
Figure 2.2: Sample Locations of Key Assets of the NPIER Prime Capabilities.....	13
Figure 3.1: Number of rail trips annually (all journey purposes), average for NPIER prime and enabling capabilities .....	18
Figure 4.1: Value added by developing a Single Integrated Rail Plan .....	23
Figure 5.1: The Passenger Rail Network in the North (Schematic).....	26
Figure 5.2: Rail journey times accessing Northern cities.....	30
Figure 5.3: LDHS and Interurban Average Speeds (Trans-Pennine Express, InterCity West Coast, InterCity East Coast, Wales & Borders, Grand Central) .....	33
Figure 5.4: Passenger journeys in the North, 1995/96 – 2014/15 (thousands) .....	35
Figure 5.5: Passenger journeys, TransPennine Express and long distance TOCs .....	36
Figure 5.6: Million gross tonne miles, 2005/06 – 2015/16.....	37
Figure 5.7: Mass of freight goods carried on the rail network (million tonnes), 2005/06 – 2015/16.....	38
Figure 6.1: Vision for NPR Network – Frequencies and Journey Times.....	48
Figure 6.2: Northern Demand Transport Model Scenarios .....	50
Figure 6.3: Difference between 2016 and 2050 with NPIER scenarios - Hourly Rail Freight Paths Required .....	54
Figure 7.1: Strategic freight flows in the North .....	61
Figure 8.1: Strategic Development Corridors .....	67
Figure 8.2: Sample Locations of Key Assets of the NPIER Prime Capabilities.....	67
Figure 9.1: Process towards a Single Integrated Rail Plan.....	4

## Tables

Table 3.1: Rail (heavy rail, light rail, tram and underground) mode share percentages (commuters) (2015) .....	17
Table 5.1: Passenger Rail Operators in the North .....	27
Table 5.2: Selected LDHS and Inter-urban Frequencies .....	28
Table 5.3: Fastest Regular Journey Times and Average Speeds for Selected LDHS and Inter-urban Services.....	30
Table 5.4: Rail passenger numbers and crowding, AM peak weekdays average, 2015 .....	39
Table 6.1: Economic forecasting: dimensions of uncertainty.....	49
Table 6.2: Rail travel demand growth to 2050 (Commuting) .....	51
Table 6.3: Rail travel demand growth to 2050 (Business to Business).....	51
Table 6.4: Rail travel demand growth to 2050 (Other) .....	52
Table 6.5: Route Section Qualitative Freight Analysis (Plain Line Capacity Excluding Junction Capacity Constraints) .....	55
Table 7.1: Rail Conditional Outputs .....	58
Table 8.1: Summary of Strategic Development Corridors .....	68
Table 8.2: Pan-Northern Interventions.....	70

## Executive Summary

Transport for the North (TfN), with its Partners, is currently developing a multi-modal **Strategic Transport Plan** (STP) and accompanying long term **TfN Investment Programme** to support the people and businesses across the North to create a stronger, more diverse and resilient place for people to live, commute, and do business.

The Rail component of the STP will be the Single Integrated Rail Plan (SIRP). The SIRP will bring together the collective rail programmes for the North of England, in accordance with the National Infrastructure Commission's (NIC's) 2016 request to TfN for a single strategy that sets out a programme of enhancement for the whole rail network in the North.

This **Initial Integrated Rail Report (IRR)** is part of the evidence base for the SIRP, and so contributes to the STP. It identifies how the North's rail network will need to develop to facilitate the aspirations for transformational economic growth, as established by the Northern Powerhouse Independent Economic Review (NPIER). It focusses on the corridors that will allow the North to develop as a cohesive and effective economic unit.

This report is grounded in TfN's vision for a transformed North and identifies some of the main challenges to be faced in achieving the desired scale of growth, and the contribution that rail can make to facilitating this growth. Working collaboratively with TfN Partners, this report has:

- Set out the importance of the strategic rail corridors in delivering the transformative economic growth envisaged in NPIER;
- Presented the current rail network in the North, including the service provision and infrastructure available, for both passengers and freight;
- Outlined the conclusions of economic and demand forecasting work under a transformational economic growth scenario, and how this is forecast to affect passenger and freight demand in the North;
- Brought together relevant options currently under development for infrastructure improvements, presented for the first time on a pan-Northern scale;
- Proposed associated outcomes (Conditional Outputs) and performance measures and reviewed the existing evidence base, with recommendations for further work on developing a baseline and the future monitoring of the rail network;
- Taken evidence on future growth from the NPIER, from TfN Partners' Growth Deals and Strategic Economic Plans, and from RN's LTRS, to identify the connectivity requirements to enable transformational economic growth; and
- Set out a portfolio of interventions for subsequent sequencing and further development within the STP.

NPIER identified the following aspirations for a transformed North by 2050:

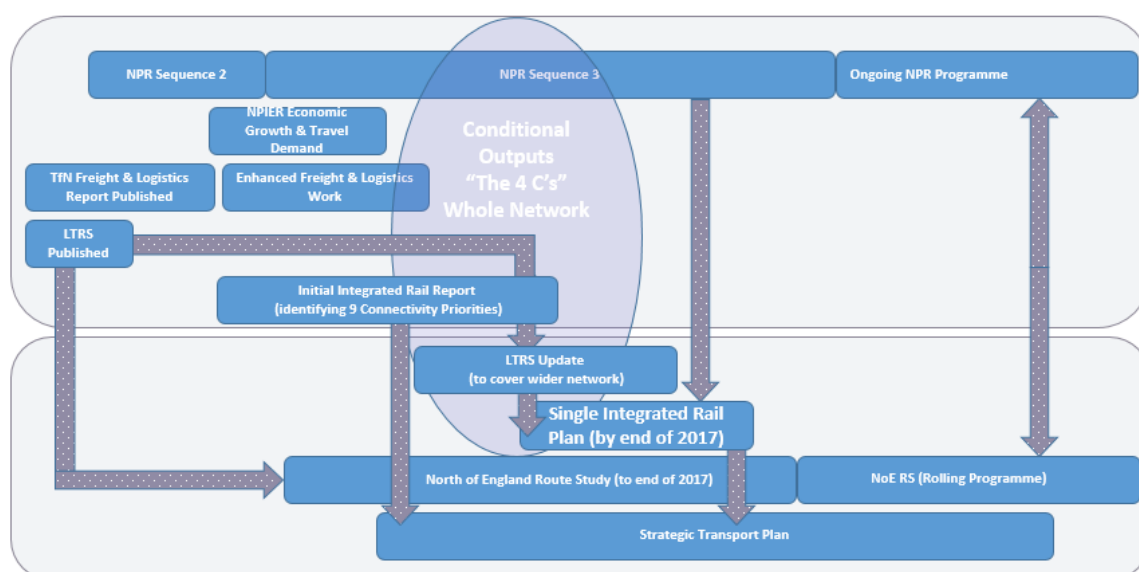
- **GVA 15% (£100 billion) higher than business as usual projections;**
- **Productivity 4% higher; and**
- **850,000 additional jobs.**

At this stage (May 2017), the Initial IRR has achieved the following:

- It identifies nine evidence-based pan-Northern priority corridors, which, in parallel to the Initial Major Roads Report (MRR), will contribute to a portfolio of corridor-based interventions within the STP. The corridors are:

- North – South: Eastern Corridor (North East – Tees Valley – North Yorkshire – Leeds CR – Sheffield CR)
  - North – South: Western Corridor (Cumbria – Lancashire – Cheshire & Warrington)
  - East – West: Lancashire -Greater Manchester - Sheffield City Region (CR)
  - East – West: Liverpool CR – Greater Manchester – Leeds CR – Hull & Humber
  - East – West: Lancashire – North Yorkshire – Leeds CR
  - East – West: Cumbria – North East
  - North – South: Leeds CR – Sheffield CR
  - East – West: Greater Manchester – Cheshire & Warrington – Liverpool CR
  - The West Cumbrian Coast
- As part of a process towards developing the SIRP, it provides evidence that will feed into the updating and expansion of the existing Rail North Long Term Rail Strategy (LTRS), which, alongside the outputs from the Northern Powerhouse Rail (NPR) workstream also being progressed in parallel, will be the core documents contributing to the SIRP; and,
  - It feeds in evidence, and, via the LTRS, assists in addressing Strategic Questions posed as part of Network Rail’s North of England Route Study (NoE RS). This process commenced in January 2017 and is due to report in autumn 2017, then annually on an iterative rolling basis.

This process is summarised below:



Source: TfN

This Initial IRR examines key components of the baseline position. It considers both the supply and demand side of rail in the North. In terms of the rail network and services (“supply”), this evidence includes the mechanisms by which rail services are currently provided, the level of these services (in terms of frequency and speed), fares, and the rolling stock currently used and planned in the immediate future. In terms of the usage of this network and services (“demand”), it includes recent trends in both passenger and freight rail usage, and considers issues of network capacity.

The main emphasis is on those corridors that will support the transformational growth envisaged through the prime and enabling capabilities in the NPIER. Growth within city regions is not the main focus of this report, and will be addressed in separate Rail North/TfN workstreams, as well as by work carried out by Combined and Local Authorities.

The Initial IRR has found that the growth of passenger demand over the last 20 years must be considered alongside identified current shortcomings of supply. There are, for example, inconsistent service frequencies and journey speeds between different sets of key locations in the North: there is room for improvement in both journey times and frequencies between economic centres in the North. The strong growth in passenger demand experienced over the last two decades is forecast to continue, which suggests that there are further benefits to be had from investing in passenger rail and that this in turn will support further economic growth.

The freight market is changing: flows associated with the electricity supply industry and other traditional industries are declining, while there are strong prospects for further growth in inter-modal container traffic. This raises the question of whether the capacity currently allocated to freight is in the right place and is serving the right flows.

Following the establishment of the baseline conditions, a 'horizon scanning' exercise looks at both future supply and demand identified. In relation to future changes in supply, the Initial IRR considers potential journey time improvements, as well as committed infrastructure enhancement schemes. In terms of demand, this report draws upon the results of work undertaken to support the STP, which estimate both passenger and freight demand growth under various scenarios, in line with the prescription set out in the NPIER.

There is a reasonable degree of certainty about the changes in supply that will occur in the short to medium term. In the longer term, HS2 Phases 2a and 2b will involve the provision of new infrastructure in the North, in 2027 and 2033 respectively under current plans. However, while work continues developing the Phase 2a and 2b propositions, only Phase 1 of the scheme (London – Birmingham) is committed at the moment. NPR is under development, and will be further refined by TfN over the remainder of 2017. NPR would also be a long term, transformative infrastructure project in the North.

The demand growth to 2050 projected by TfN's Northern Demand Transport Model is substantial, with strong growth in passenger demand expected in city-region to city-region journeys. Whilst the committed service and infrastructure enhancements will improve the capacity and connectivity offered by the rail network, the scale of growth forecast, especially in commuting between city regions, is likely to require larger scale supply enhancements. The Initial IRR identifies gaps that will require intervention beyond that already proposed or committed by TfN or its partners. The gaps are reviewed at both a strategic level, in order to feed the STP with a series of connectivity priorities along pan-Northern Development Corridors; and, as a means to understand where benefits could be maximised through a process of complementary enhancement and integration across the whole rail network.

The gap analysis has been used to identify Conditional Outputs that will, via the updated LTRS and NPR reports, contribute to a process of defining standards through evidence-based metrics to be brought together within the SIRP by the end of 2017.



The Initial IRR builds upon the gaps that were identified in four key areas in Rail North's LTRS, known as the 'Four Cs':

1. Better **connectivity**
2. Adequate **capacity** for passenger and freight
3. A transformation of quality driven by network **coherence**
4. A more efficient and **cost-effective** railway.

Finally, this Initial IRR identifies strategic corridors that should form the priorities for TfN's further scheme development to address the connectivity gaps. As a consequence, the future schemes identified in this report are generally those of a national or a strategic pan-Northern scale. In some instances, local schemes which have strategic implications elsewhere on the rail network have also been included.

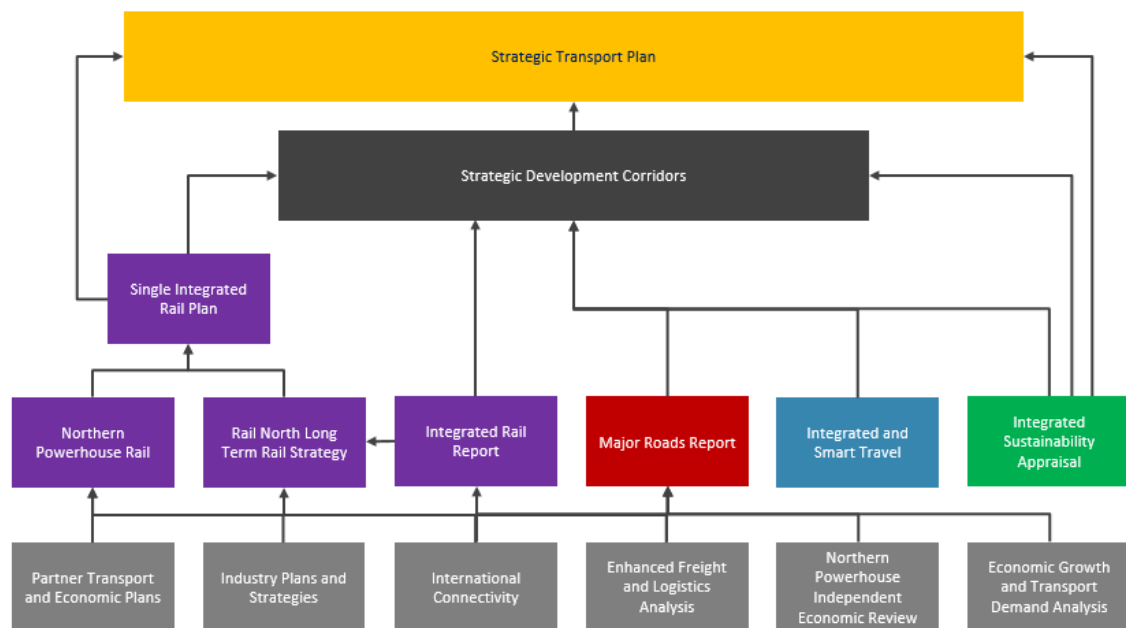
# 1 Introduction

## Context

- 1.1 The success of the UK in the global marketplace, and achieving the ambitions set out in the Government's Industrial Strategy, will be dependent on transforming the economy of the North of England. To date, there has been a persistent economic gap between the North and the national average that necessitates a radical change in the economy of the North, which is home to internationally regarded assets, expertise, research and businesses. These assets are also pan-Northern, highly productive and compete at a national and international scale.
- 1.2 The Northern Powerhouse Independent Economic Review (NPIER), published in June 2016, set out that by 2050, in a transformed economic North:
- **GVA is projected to be 15% (£100 billion) higher than business as usual projections;**
  - **Productivity would be 4% higher; and**
  - **850,000 additional jobs would be created.**
- 1.3 Specifically, the NPIER identified that improving connectivity is key to seizing the economic prize, making the North a more attractive and buoyant marketplace, and, since its publication, significant progress has been made in developing the case for strategic transport investment across the North of England. Transport for the North (TfN), with its Partners, is currently developing a multi-modal **Strategic Transport Plan (STP)** and accompanying long term **TfN Investment Programme** to support the people and businesses across the North to create a stronger, more diverse and resilient place for people to live, commute, and do business.
- 1.4 The STP is guided by TfN's vision to:
- 
- "Improve the frequency, capacity, speed and resilience of the North's transport system to make it easier for people and goods to move throughout the region. In doing so we want to create a globally competitive environment that can sustain economic growth for decades to come."
- 
- 1.5 The STP will aim to cover all aspects of TfN's activities. For roads, that encompasses the North's major road network. For rail, it will cover the entire rail network in the North of England, both long distance and local, for passenger and freight as all constituent parts of the North's rail network contribute to the delivery of the required pan-Northern connectivity.

- 1.6 TfN is working towards the publication of the Draft STP and TfN Investment Programme for public consultation in autumn 2017, alongside the establishment of TfN as the first Sub-National Transport Body in England. The STP, and its supporting evidence including this Report, will be used as a platform with which to agree how the Government, Network Rail (NR), Highways England and High Speed Two (HS2) Ltd work with Northern Partners to deliver investment that can transform the economy of the North.
- 1.7 In developing the STP, TfN has commissioned a significant amount of new evidence, as illustrated in Figure 1.1, and summarised below:
- Economic Growth and Transport Demand Analysis;
  - Integrated Sustainability Appraisal;
  - Initial Integrated Rail Report (IRR);
  - Initial Major Roads Report (MRR);
  - Enhanced Freight and Logistics Analysis; and
  - International Connectivity Independent Commission Report.

Figure 1.1: The Strategic Transport Plan and its Evidence Base



Source: TfN

- 1.8 The Rail component of the STP will be the Single Integrated Rail Plan (SIRP). The SIRP will bring together the collective rail programmes for the North of England, in accordance with the National Infrastructure Commission's (NIC's) 2016 request for a single strategy that sets out a programme of enhancement for the whole rail network in the North.
- 1.9 This **Initial Integrated Rail Report (IRR)** identifies some of the critical ways in which the North's rail network will need to develop to facilitate the aspirations for transformational economic growth, as established by the NPIER, and focussing on the essential corridors that will allow the North to develop as a cohesive and effective economic unit. The aim of this

initial report is to identify a series of connectivity priorities that will inform the STP and the TfN Investment Programme, complementary to more localised strategic interventions, as shown in Figure 1.2.

**Figure 1.2: Identification of pan-Northern connectivity priorities**



Source: TfN

- 1.10 At this stage, this Report necessarily concentrates on rail in isolation, seeks to identify the key corridors that the evidence suggests require interventions to allow the North to function as an efficient and cohesive economic entity. It also serves to complement and expand the evidence base for TfN's (and Rail North's) strategy documents, including the Long Term Rail Strategy (LTRS - which is to be updated) and the outputs of the Northern Powerhouse Rail (NPR) workstreams. The SIRP will bring together the updated LTRS and NPR outputs, and will be supported by evidence in this Initial IRR.
- 1.11 The STP will ensure that the evidence is brought together to develop the long term, multi-modal TfN Investment Programme for the North's pan-Northern strategic transport network. As well as the principal rail strategy documents, this Report should be read in conjunction with the Position Statement on the STP, along with the accompanying Initial MRR, the emerging work on the enhanced Freight and Logistics Analysis and the International Connectivity Commission Report, in order to get a full picture of the evidence base supporting the STP.

### Purpose of the Report

- 1.12 The existing suite of evidence and strategy for rail in the North is currently spread across a number of documents and work programmes. These include:
- Rail North's LTRS
  - Franchise commitments
  - High Speed 2 (HS2)
  - TfN's Northern Powerhouse Rail (NPR) programme
  - TfN's Freight and Logistics work programme
  - Existing Network Rail Route Studies
  - Bespoke work undertaken to establish the baseline position from rail industry data sources
  - The strategic priorities of each of the 11 TfN Local Enterprise Partnership (LEP) geographies, plus the East Midlands

- 1.13 The LTRS was published in September 2015 following approval by Rail North's member authorities (which are largely the same as the TfN Partner Authorities). This strategy has had a tangible influence on the specification of the Northern and Trans Pennine franchises, managed by Rail North, both of which came into operation in April 2016, and include investment programmes which will deliver benefits across the North.
- 1.14 The LTRS pre-dates the NPIER, and so does not fully address the transformation required to redress the economic gap between the North and the national average. The LTRS also needs updating to reflect those aspects that have already been achieved by RN, and various other changes since 2015. It is also intended to broaden the scope of the LTRS to ensure that, when taken together with the NPR outputs, it provides a comprehensive strategy document, and this Initial IRR will form a major component of the evidence base for that update. This work is to take place in Summer 2017.
- 1.15 The Initial IRR draws together the evidence base for the North of England to inform TfN's future approach on rail-related (both passenger and freight) strategic transport investment priorities up to 2050 as part of the STP. At this stage (April 2017), the Initial IRR:
- Identifies a series of evidence-based pan-Northern connectivity priorities, which, in parallel to the Initial MRR, will contribute to a portfolio of corridor-based interventions within the STP. 'Pan-Northern' is defined by the key economic centres within the North, and the key linkages between them and neighbouring areas in the Midlands, Wales, and Scotland;
  - Is part of a process towards developing the SIRP, providing evidence that will feed into the updating and expansion of the existing LTRS, which, alongside the outputs from the NPR workstream being progressed in parallel, will be the core documents contributing to the SIRP;
  - Summarises the high level findings of the Freight & Logistics programme to date. Following completion during summer 2017, this piece will be incorporated into the Single Integrated Rail Plan (SIRP) for publication at the end of 2017. It will also determine future demands (across road and rail) at a Strategic Development Corridor (SDC) level, with the benefits of growth and associated requirements incorporated within a Programme Level Business Case; and,
  - Feeds in evidence, and, via the LTRS, assists in addressing Strategic Questions posed as part of Network Rail's North of England Route Study (NoE RS). This process commenced in January 2017 and is due to report in Autumn 2017, then annually on an iterative rolling basis.
- 1.16 The Initial IRR has been informed by an evidence gathering process that was conducted during Winter 2016/17. This has served to establish a baseline and committed (franchised) position for the rail network relevant to the strategic pan-Northern corridors with which this Report is concerned. Consideration has been given to the evolving TfN programmes for NPR and the updated Freight and Logistics Analysis, as well as the LTRS in its current form.

- 1.17 The priorities identified in this Report have been in part informed by, and are intended to complement, the priorities of each of the 11 Northern Local Enterprise Partnership (LEP) areas (plus the East Midlands), with whom a series of individual consultation sessions has been carried out. It has also had regard to:
- Strategic Economic Plans
  - Local Transport Plans
  - The Rail North Single Investment Plan (SIP) List as submitted by Partners
  - Strategic evidence and feasibility work conducted to support specific interventions
- 1.18 In order to provide a commensurate level of detail with the Initial MRR, and maintain a strategic focus for investment, the Initial IRR document necessarily prioritises strategic corridors and the delivery of transformational change. At this stage, detailed information collected in respect of the wider rail network has been removed from the main body of the report and will form part of the evidence base in moving towards the SIRP, through the update to the LTRS.
- 1.19 The main emphasis is on those corridors that will support the transformational growth envisaged through the prime and enabling capabilities in the NPIER. Growth within city regions is not the main focus of this report, and will be picked up in separate Rail North / TfN workstreams, as well as by work carried out by Combined and Local Authorities. As such, this Initial IRR document is intended to complement evidence in the other strategic documents already in existence, as well as to provide part of the evidence base for the STP, the updated LTRS, and thereby the SIRP.

## Geographic Scope of the Report

- 1.20 This Initial IRR has been developed with input from each of the North's Combined Authorities (CAs) and LEPs, as well as RN's partners in the East Midlands (reflecting the extent of rail services within the Northern and Transpennine franchises). Dialogue has been conducted via monthly "Development Group" sessions encompassing all partners, plus NR and the Department for Transport (DfT). A smaller "Client" group has augmented the process, providing guidance to TfN and its consultant team.
- 1.21 This Report represents evidence gathered independently by the consultant team. It is acknowledged that TfN Partners have developed clear sets of economic, social and environmental objectives, and transport strategies that derive from these are already in place. This Initial IRR is intended to complement these from a pan-Northern and economically-focussed strategic standpoint.
- 1.22 The definition of the report's geographic area and its economic centres has been derived through consultation with the stakeholder groups, building upon the work undertaken leading to the LTRS, as well as through the other evidence analysed. For the purposes of this Initial IRR, there are 56 'Economic Centres' across the North. The identification of these centres allows the report to provide a clear link between the transformative economic growth agenda outlined in this report, and potential rail interventions. The economic centres are identified within Figure 5.1 within the context of the existing rail network.
- 1.23 The focus is placed upon those corridors which the evidence indicates are of importance to the economic cohesiveness and efficient function of the North as required by the prime and

enabling capabilities in the NPIER. In addition, this Initial IRR extends to linkages to areas adjoining the in-scope area (such as North Wales, the Midlands and Southern Scotland).

- 1.24 TfN has undertaken a process of Partner engagement to obtain and verify the stated priorities of each organisation with their published policy documents, and an alignment of work undertaken by Rail North to establish a list of interventions (by area) within the context of strategic policies. However, again it should be noted that this Report is not intended to be a comprehensive representation of all of the rail priorities of TfN's Partners.

## Structure of the Report

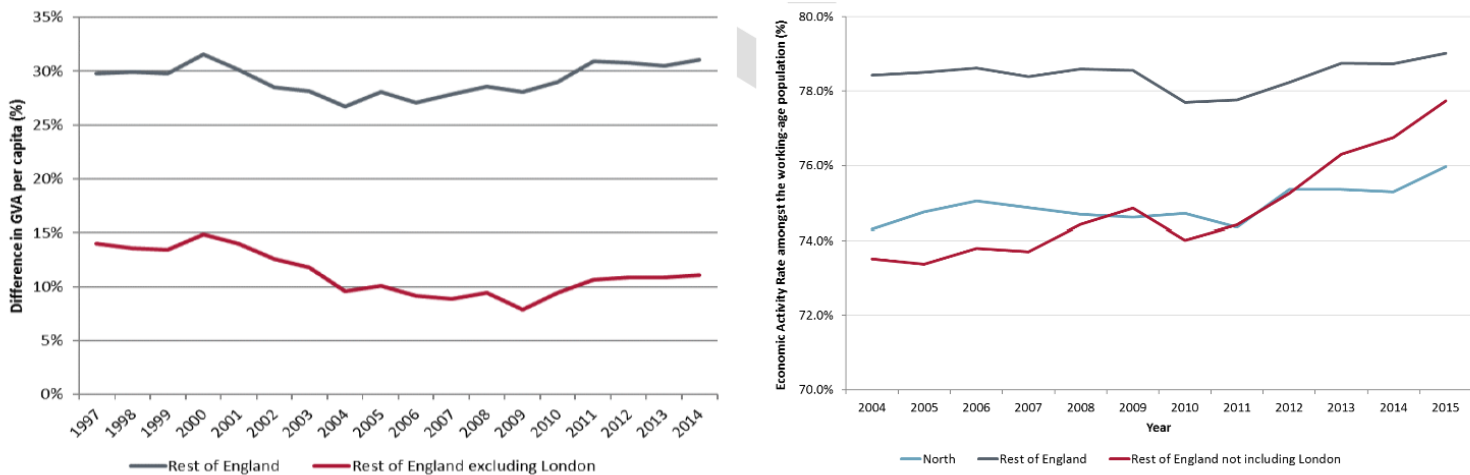
- 1.25 The Initial IRR consists of nine sections, including this introduction. The content of the remaining sections reflects what it seeks to achieve, both for rail and in the wider context of the STP, drawing upon an extensive review of baseline information; gaps in the network emerging from consolidated national and local priorities to inform the 'Pan-Northern' position;
- Section 2 sets out rail's importance in delivering the transformative economic growth envisaged in NPIER
  - Section 3 identifies the specific contribution that rail can make to delivering economic growth
  - Section 4 presents the Vision and Objectives for the STP, and how the Initial IRR will contribute to it, encompassing the various work streams for which TfN is responsible
  - Section 5 presents the baseline position, in terms of supply and demand, across the whole rail network for the north, encompassing the constraints that will serve to limit the scope for growth if not addressed on a transformative basis
  - Section 6 builds upon Section 5 by undertaking a horizon scanning exercise, and considering the likely changes to supply and demand, identifying rail demand within the context of future demand scenarios for growth. The scenarios build upon the NPIER, and provide differentiation between the "Business as Usual" and "Transformational" economic growth position. it also identifies the committed and planned enhancements that will achieve betterment upon the baseline position
  - Section 7 identifies strategic gaps in connectivity that will be created by transformative economic growth, and provides four Conditional Outputs that will be used to measure progress in addressing these gaps
  - Section 8 presents the Initial IRR's Strategic Development Corridors that will be fed into the STP on a sequenced basis in parallel to the Initial MRR.
  - Section 9 concludes the report and provides a summary of appropriate next steps, moving towards the delivery of a Single Integrated Rail Plan by the end of 2017.
- 1.26 The Initial IRR and MRR will consider the pan-Northern connectivity that will be essential to fulfilling those economic outcomes from the NPIER and contributing to a radical change to the economy of the North. The Initial IRR will form part of the basis for updating the LTRS, which, alongside reporting on NPR, will address all other aspects of rail policy for the North of England. The LTRS Update (including evidence from this Initial IRR) and the NPR outputs will together feed into the SIRP, which will constitute the rail component of the STP, where the SIRP will be brought together with work on roads and other modes to form a single comprehensive plan for transport and inform the TfN Long Term Investment Programme.

## 2 Building the Northern Powerhouse

### Economic Challenges

- 2.1 The North of England is home to 16m people (nearly one quarter of the UK population) and 7.2m jobs. It generated an economic output of around £290bn of Gross Value Added (GVA) in 2015, about one fifth of the UK's total. The area has a wealth of high profile and growing businesses, and rich sets of expertise creativity, and assets.
- 2.2 However, there remain persistent gaps in GVA per capita and productivity performance compared to the rest of the UK. For the last 30 years, the North's economic performance (measured as Gross Value Added or GVA) has, on a per capital basis, been consistently about 25% below the average for the rest of England and 10-15% below the average for the rest of England (excluding London)<sup>1</sup>, as shown in Figure 2.1.

Figure 2.1: The North's Prosperity Gap (in GVA per capita) with the Rest of the UK



Source: NPIER

- 2.3 A persistent income gap exists between the North and the national average that necessitates a radical change in the economy of the North. There is:
- a £4,800 per person difference in income between the North and the UK average; and
  - a £22,500 per person difference in income between the North and London.<sup>2</sup>
- 2.4 The NPIER attributes this economic performance gap to two features of the Northern economy:
- **Productivity** – the relatively low productivity of employees; and,
  - **Employment** – the relatively low proportion of working age residents in work.

<sup>1</sup> <http://www.transportfornorth.com/wp-content/uploads/NPIER-Core-Messages.pdf>

<sup>2</sup> <http://www.transportfornorth.com/wp-content/uploads/NPIER-Core-Messages.pdf>

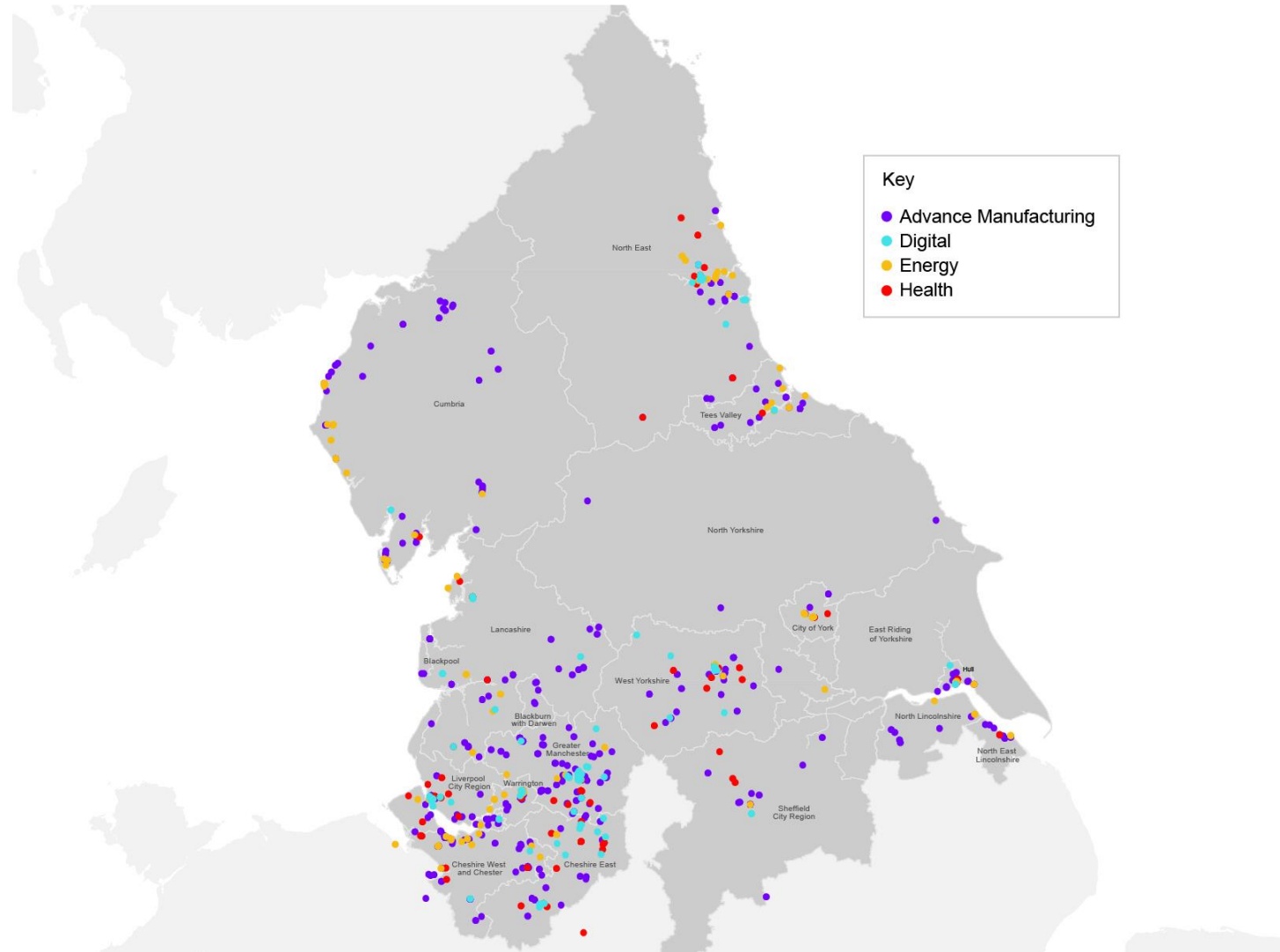


- 2.5 The NPIER also identifies the main factors driving the productivity gap as:
- a lack of high-skilled workers and too great a proportion of low-skilled workers;
  - not enough exploitation of innovation and technology;
  - lower levels of investment;
  - lower levels of enterprise;
  - lack of agglomeration; and
  - sub-optimal transport links and underinvestment in transport.
- 2.6 The rationale for TfN producing an STP is derived from the need to support a transformed economic future for the North, through addressing identified pan-Northern transport connectivity and agglomeration challenges.

### **Transforming the North**

- 2.7 The headlines of a transformed economic future for the North outlined by the NPIER are included in the introduction to this report - a 15% increase in GVA (equivalent to almost £100 billion) compared with business as usual, and creating an additional 850,000 jobs. This will allow the North to narrow the performance gap, in part through the promotion and growth of the North's distinctive offer of four Prime Capabilities (Advanced Manufacturing, Energy, Healthcare innovation and Digital), supported by three Enabling Capabilities (Financial and Professional Services, Logistics, Higher Education). The capabilities are international class assets. They are high skilled, valuable sectors that are genuinely distinctive for the North, highly productive, and can compete on the national and international stages.
- 2.8 These capabilities are located across the North, as illustrated in Figure 2.2

Figure 2.2: Sample Locations of Key Assets of the NPIER Prime Capabilities



2.9 The current contribution of Prime and Enabling Capabilities to the North is:

- 2.1 million jobs;
- over £100 billion in GVA;
- 30% of all jobs in the North; and
- around 35% of total GVA generated by the North.

2.10 TfN is committed to supporting industrial and business growth by promoting the strategic transport and infrastructure required to deliver it, and opening up labour markets to businesses to attract the skills they require. The STP will also support the Government's Industrial Strategy<sup>3</sup>, encouraging trade and inward investment into the North by improving links to the North's ports and airports. This will create an attractive offer for business to invest and be based in the North.

### Transport and the Economy

2.11 There is a direct link between transforming connectivity and allowing the North's economy to thrive. Poor connectivity has been identified by the NPIER as limiting the economic potential of the North. Better transport links lead to greater agglomeration, which helps to link businesses and grow labour markets.

2.12 Transport improvements increase productivity by:

- Attracting and retaining highly skilled workers to live and work in the North;
- Opening up opportunities in the labour market by allowing longer distance commuting trips;
- Providing sufficient capacity to meet long term demand, and to improve resilience and reliability across the network;
- Supporting current investment, and attracting foreign direct investment;
- Helping businesses to collaborate closely, and improve their access to supply chains;
- Reduce operating costs;
- Enhancing trading opportunities;
- Enhancing the quality of life for all residents of the North and therefore making it easier for businesses to attract and retain skilled workers; and,
- Supporting housing growth, industry, and nationally significant infrastructure projects through the movement of construction materials.

2.13 The NPIER set out an achievable trajectory for a transformed northern economy. In doing so, it developed two important forecast scenarios for the North's economy - the business as usual scenario that envisages the economy of the North continuing to grow at its current rate, and a transformational scenario for what would happen if the Northern Powerhouse vision was achieved:

- Business as Usual – This scenario reflects both historical experience and expected UK trends, notably in the performance of sectors of the British economy and in population changes. Business as Usual implies the historic levels of investment continuing into the future for the North.

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<sup>3</sup> <https://www.gov.uk/government/policies/industrial-strategy>

- Transformational – This scenario assumes that progress is made in tackling the wide range of factors that are responsible for the observed performance gap. The transformational scenario will only come about if there are improvements in the transport system. In such a scenario it will be easier for firms and their employees to interact and hence benefit from productivity increases.

2.14 To understand the implications of the transformational scenario for transport demand (as identified by NPIER), TfN has developed a Northern Transport Demand Model, that includes a simulation of the following:

- How economic activity translates into demand for travel across the north; and
- Travel demand for commuting, business to business, and other reasons, between districts, by road and rail, across the north

2.15 The model presents four potential scenarios that reflect where transport interventions have achieved a transformative effect on the economy by 2050. The four scenarios are presented in greater detail within Section 6 of this Initial IRR, alongside the likely demands it would create for both passengers and freight.

## 3 Rail and the North's Economy

### **Rail's role in delivering economic activity**

- 3.1 This Section identifies the specific contribution that rail can make to delivering economic activity within the North of England through improving employment prospects and productivity, within the context of a wider contribution transport can make in closing the performance gap between the North and the rest of England.
- 3.2 Whilst it is not possible to place a value on the direct contribution of rail to the broader "economic prize", rail can play a critical role in matching skilled workers with appropriate employment as a result of its specific characteristics – notably the capability of transporting large numbers of workers into city centre locations without being subject to highway congestion and its associated impacts on reliability. This matching of workers with employment will then accrue broader benefits to the overall quality of life of the North's resident population and visitor economy.
- 3.3 The likely positive impacts of enhanced rail connectivity on the principal journey purposes within the North of England are presented below.

### **Commuting to/from urban centres**

- 3.4 The North has a modal share for rail for commuting of 3.4%, defined both in terms of residence and workplace. This is comparable with most of England outside of London and the South East.
- 3.5 This indicates that, overall, a relatively small proportion of the North's population use rail to commute, especially compared to London and the South East, since much higher levels of commuting are observed there. However, it should be noted that these averages mask wide variation: in and around the main urban centres modal shares are significantly higher, and on certain individual corridors serving, for example, Leeds and Manchester city centres, high rail modal shares can be observed. Nonetheless, the generally low modal shares indicate that there is significant scope for modal shift. This aggregate picture can be seen in Table 3.1:

**Table 3.1: Rail (heavy rail, light rail, tram and underground) mode share percentages (commuters) (2015)**

Region	Workplace	Residence
North East	2.7%	2.9%
North West	3.9%	3.8%
Yorkshire and The Humber	3.0%	2.9%
<b>The North</b>	<b>3.4%</b>	<b>3.4%</b>
East Midlands	1.6%	2.0%
West Midlands	3.0%	3.1%
East of England	2.3%	9.2%
Inner London	58.6%	43.9%
Outer London	14.7%	34.7%
<b>London</b>	<b>43.2%</b>	<b>38.5%</b>
South East	4.0%	9.1%
South West	1.9%	1.8%

Source: Transport Statistics Great Britain (DfT)<sup>4</sup>, Table TSGB0108 and Table TSGB0109

3.6 Transport capacity is key to accommodating large volumes of passengers commuting across the North (as well as passengers commuting into towns and cities in the North from adjacent regions, such as North Wales and the East Midlands) efficiently, affordably, and at the times and frequencies needed. A number of factors need to be considered in defining the role of rail for commuting to/from urban centres. These include the following:

- Improving connectivity to economic centres allows more people to work in city-centre locations where higher-paid jobs are available; it also allows a wider access to potential candidates allowing better matching between skills and jobs.
- The North has some of the most crowded rail services in the country, and rail journey times are often slower than road. Increasing road congestion, along with a lack of attractive alternatives to travel by road, is a factor which has the potential to hinder the North from responding to changes in the global market;
- Increases in city centre employment cannot be accommodated by car travel alone without significant city centre road development. Enhanced public transport can improve travel into economic centres by providing user-friendly, joined up networks, frequent services, light rail and bus options and a smart, multi-modal ticketing system with simplified fares.
- Some economic sectors will benefit from improvements other than city centre access; for example, elements of the Prime and Enabling capabilities identified in the NPIER, such as advanced manufacturing and logistics, are at present highly dependent on road travel and tend to favour locations away from urban centres. Conversely, there are nationally significant infrastructure projects that are highly dependent upon the rail network to deliver the construction phase, and subsequently to provide mass transport for a skilled workforce to a remote location, where road travel is less suitable. A principal example within the Energy sector is the “NuGen” site near Sellafield on the West Cumbrian coast.

<sup>4</sup> <https://www.gov.uk/government/collections/transport-statistics-great-britain>

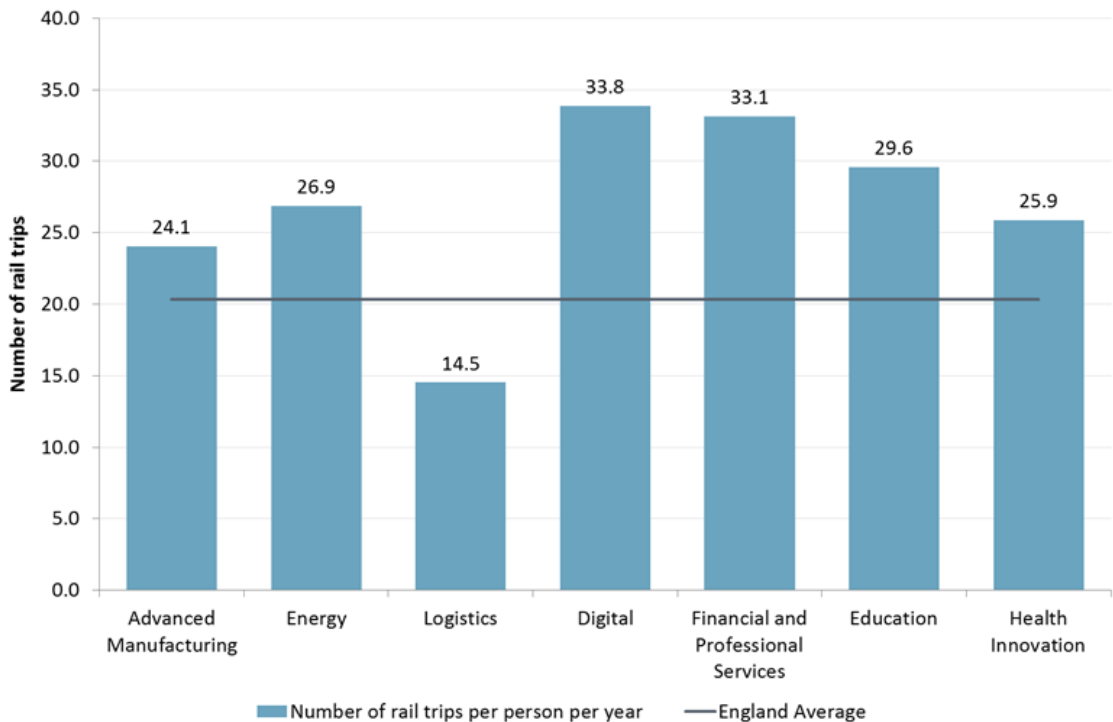
Beyond the main city to city links, rail also has a role in widening the population catchment of the north through improving passenger interchange at key hubs between local and inter-regional service provision, therefore ensuring that the broader network operates in a more coherent fashion, maximising the agglomeration benefits to the wider economy.

- Addressing these issues will require a new and transformational approach to planning and implementing new transport infrastructure. Infrastructure investment should also be accompanied by initiatives to reduce the complexity of fares and ticketing. Smart North is the programme designed to deliver simplified fares, integrated ticketing and improved passenger information across all public transport modes in the North. These proposals will facilitate easier inter-city travel for passengers in the North, while simultaneously making public transport a more appealing option for tourists and leisure travellers.

**Business links within and to/from the North**

3.7 Growth in knowledge intensive jobs in the North such as those in the NPIER prime and enabling capabilities will lead to increased demand for business-to-business travel (as shown in Figure 3.1, six of the seven capabilities identified by NPIER have a higher than average trip rate by rail), which will require increased capacity to accommodate growth. Faster journeys would encourage greater agglomeration between the cities of the North, as well as directly bringing increased productivity and efficiency.

Figure 3.1: Number of rail trips annually (all journey purposes), average for NPIER prime and enabling capabilities



Source: NPR Strategic Case (SDG)

3.8 Better rail connectivity would significantly improve overall inter-city connectivity allowing cities in the North to develop stronger economic links and function more like other major global economic regions, such as the Randstad area of the Netherlands and the Rhine-Ruhr

conurbation in Germany. This will grow labour markets enabling better matching of employee skills and allow more inter-city linkages between businesses. Improved links to London, the East Midlands and the West Midlands, as well as other economic centres, will also allow improved access to the UK's main business centres, which can help to create new market opportunities.

- 3.9 However, improving city centre to city centre transport links will only be successful if local city region public transport grows to match the increased demand. Integrating these transport networks will allow a more user-friendly, co-ordinated, attractive and efficient service.

#### **Northern leisure/tourism economy**

- 3.10 In-bound tourism brings the North around £1.9 billion (GVA) in revenue, with huge potential for more international tourists to be attracted to the many world-class attractions that the North has to offer. Improved access to and from the airports in the North would increase its global connectivity.
- 3.11 The visitor economy is a vital component of local economies across the North, but its value is often dispersed given the prominence of the North's national parks, cultural attractions in the centre of its towns and cities, and rural and coastal attractions. The visitor economy through leisure and tourism has the potential not only to provide GVA and jobs growth, but can also maintain and enhance the Northern population's quality of life, whilst helping retain and attract a skilled and experienced workforce who can maintain and develop these attractions.

#### **Social role – improving quality of life and the attractiveness of the North**

- 3.12 The North's quality of life is an underpinning asset which supports its economy, particularly in providing an attractive place for people to live, work, invest and visit. Rail has an important part to play in supporting improvements to quality of life.
- 3.13 Increasing access to education and training for the population of the North will help to reduce unemployment. It will also help those in low skilled jobs move into higher paid more productive jobs that have a large benefit to the economy, improving access to opportunity and thereby enhancing social inclusion. Effective and affordable public transport is the most efficient means of travel for workers at all skill levels and can be the only option for some people.
- 3.14 Greater utilisation and commercial exploitation of university research and facilities into the North's business will improve the growth and current high reputation of northern universities and research establishments, increasing the generation of skilled workers developed in the North whilst encouraging them to remain there for employment after the completion of their studies. Supporting urban public transport and student-friendly services and ticketing will enable better connectivity between business and higher education. A highly skilled workforce will breed greater levels of innovation allowing the North to become a powerful player in future industry developments.
- 3.15 A strengthened and more prosperous Northern economy is likely to stimulate more housing demand, the location of these developments will have a major impact on future travel patterns and transport demand. Increased commuting demand and longer distance trips will become more pertinent. Consideration of wider factors such as quality of life and personal health and well-being suggest an expansion based on travel other than by car should play a



strong role. In the most economically successful conurbations of Europe, walking and cycling, local public transport and rail are the most attractive combinations of commuting.

### **International connectivity (ports and airports)**

- 3.16 Global connectivity, for people and for goods, is needed to allow the North to realise its specialisation opportunities, better connectivity will allow businesses to meet customers, suppliers and collaborators with greater ease and also improve the North's ability to import and export goods. Rail is relevant here in several ways:
- Foreign investors are more likely to be attracted to locations that are well connected to global markets, with access to a well-qualified workforce. Attracting inward investment from world-leading, international businesses can provide easier and faster access to leading technologies. This will allow the North to be a world leader in transforming business practices to better suit a region that thrives on agglomeration between its well-connected cities. Better travel linkage to Manchester Airport and London, and further development of other Northern airports and ports, will improve accessibility to global transport hubs encouraging new market opportunities to be brought to the North.<sup>5</sup>
  - The North houses four key rail-connected port areas on major estuaries (Humber, Tees, Mersey, and Tyne). In addition, there are several rail-connected sub-regional ports which can play a complementary role and reduce pressure on the major centres. During 2014/15 178 million tonnes of freight was transported through ports in the North, almost 38% of the Great Britain total. A strong asset that the North boasts is a network of inland waterways (such as the Manchester Ship Canal access to Trafford Park, access to Hull via the Humber, etc.), where improving intermodal connectivity is crucial.

### **Freight**

- 3.17 Freight accounts for 9% of the country's GDP and supports every industry with access to goods and services. In the UK, a total of 1.65 billion tonnes of freight are lifted by all modes per annum. A little over a third of freight activity takes place in the North of England. In Britain, rail freight transportation is heavily focussed within the North; in 2014/15 56% of Great Britain's rail freight was transported to, from or within the North. However, a large proportion of the Northern rail freight has historically been related to movements of coal between ports and inland power stations. It was also linked with heavy industry such as the making of steel. These volumes are now falling as the UK pursues a policy to reduce carbon emissions. However, this provides an opportunity to utilise the released rail capacity to the benefit of other commodities, including the transportation of aggregates, which will continue to grow in order to deliver nationally significant infrastructure (road / rail / power generation).
- 3.18 Freight volume in the North of England is disproportionately represented relative to its population: 24% of the total population of Great Britain reside in the North, whilst a third of UK road, rail, distribution centre, and port activity passes through the region. Air freight on the other hand is at a lower level, due to the dominance of Heathrow.

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<sup>5</sup> See [http://www.transportfornorth.com/wp-content/uploads/International-Connectivity-Report\\_websafe.pdf](http://www.transportfornorth.com/wp-content/uploads/International-Connectivity-Report_websafe.pdf)

3.19 The North boasts a wealth of freight assets that grant the North a strong multimodal freight capability. These include:

- The Port of Liverpool operates within the Irish Sea Roll on / Roll off (RoRo) market, and as a deep sea Atlantic container port. The recently completed “Liverpool 2” development with “Post-Panamax” capability has raised the port’s handling capability from 5% of the world’s container fleet to 95%, with an increase in capacity from 700,000 TEUs to 2.2m TEUs. Liverpool has access to the Major and Strategic Road Networks (MRN & SRN) via the A5036 / M57 / M58 to the M6 / M62;
- The Port of Heysham also operates within the Irish Sea Roll on / Roll off (RoRo) market, with access to the Major and Strategic Road Networks (MRN & SRN) via the recently opened “Heysham Link” (A683) and the M6.
- The Ports of Hull, Immingham, Teesport and Tyne operating within the North Sea RoRo and Container markets. All ports also have access to the MRN and SRN via the A63 & M62 (Hull); A160 / A180 & M180; Teesport via the A66 & A19; and Tyne via the A185 & A19. Teesport also has existing intermodal services.
- Further rail connected ports exist in the north serving specific sectors, notably energy production (on and off-shore), including Workington, Barrow, and Hartlepool.
- Three Strategic Rail Freight Interchanges (SRFIs – distribution centres with intermodal terminals) with direct access to the MRN & SRN at Ditton (via the A562 / A557 & M62), Wakefield (M62); and, Selby (A19 & A63), with further sites under development;
- Five further Intermodal Terminals with direct access to the MRN & SRN at Trafford Park (via the A5081 & M60), Leeds (A639 & M621), Garston (A562 / A5300 & M62), Doncaster and Teesport;
- A Strategic Road Network focused on the M62/M60/M56 and A66/69 east-west corridors and the M6 and M1/A1 north-south corridors;
- A strategic rail network principally comprising of the West Coast Main Line, East Coast Main Line and Midland Main Line that connect the North of England to the South and the trans-Pennine routes;
- Links through northern England via the East and West Coast Route between southern England and Scotland; and
- A significant amount of distribution centre capacity.

3.20 Despite these benefits, gaps in connectivity prevail. Of road freight in the North, 80% is domestic traffic, most of which is short haul (on which flows rail at present struggles to compete) which therefore places a heavy burden on the strategic road network. This issue is addressed in the MRR and will be considered further in the LTRS update.

## 4 Vision and Objectives

### STP Vision & Objectives

- 4.1 As identified within the introductory section to this report, the ultimate vision for TfN as a Sub-National Transport Body (STB) is to:

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Improve the frequency, capacity, reliability, speed and resilience of the North's transport system to make it easier for people and goods to move throughout the North. In doing so, we want to create a globally competitive environment that can sustain economic growth for decades to come.

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- 4.2 The STP Vision is supported by a series of pan-Northern Objectives, against which a programme for investment will ultimately be defined on Strategic Development Corridors (see Section 8) to meet the stated vision. The Prime Objective of the STP is identified below:

- Transform economic performance (by):
  - Improving connections between opportunities and people
  - Enhancing the role of freight in the Northern economy
  - Enhancing national and international connectivity
  - Aligning with local investment plans.

- 4.3 The Prime Objective is supported by three Enabling Objectives that will contribute to the growth of the economy, and ensure that policy decisions in the short term can support the Prime Objective towards 2050:

- Increase efficiency, reliability and resilience of the transport system
- Promote and support the built and natural environment
- Improve opportunities across the north

### The Contribution of Rail to the Vision

- 4.4 The NPIER recognised the role of enhanced rail links as a means to facilitate access to the bigger labour markets that support the success of knowledge-based firms; it also stated that in order to be effective they must be... "integrated with city-region local public transport networks, which are joined-up with wider networks, involving frequent rail services, light rail and bus, all supported by smart, multi-modal ticketing."
- 4.5 As stated in the introductory section, the principal purpose of the Initial IRR is to identify a set of pan-Northern connectivity priorities for rail that accord with the STP's wider vision and objectives to deliver a transport network for passengers and freight that fully supports transformative growth. The Report's key output is delivered as a series of Strategic Development Corridors in Section 8 that can ultimately contribute to a portfolio of corridor-based interventions on a commensurate level with the Initial MRR.
- 4.6 The Initial IRR starts a process from which all current programmes for rail in the north of England can be consolidated to accord with the NIC's stated aspiration for a Single Integrated

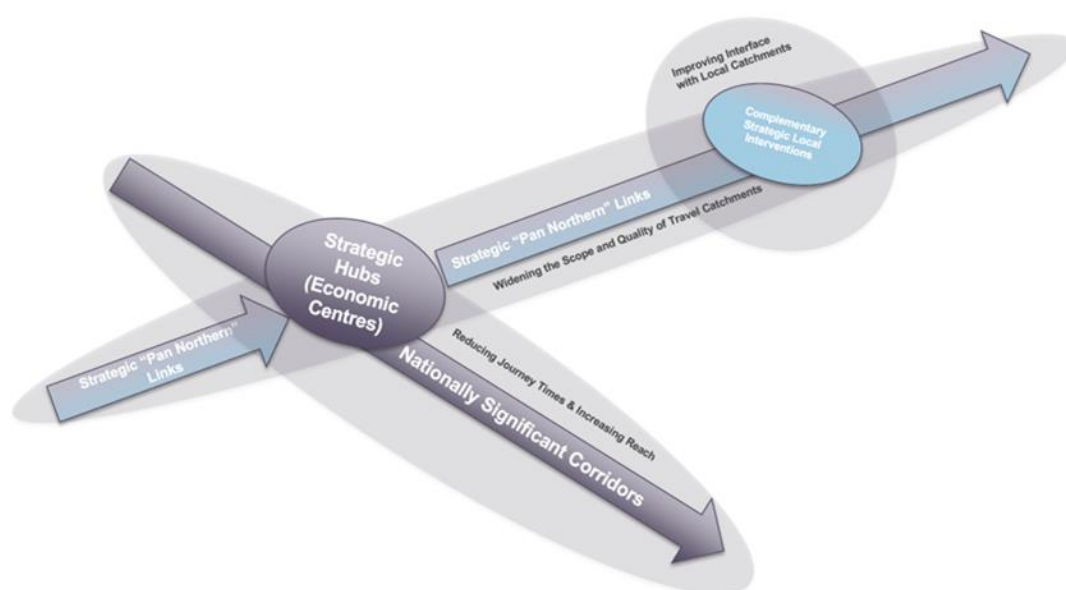
Rail Plan by the end of 2017. The Initial IRR's evidence base encompasses the entire northern rail network, and key cross-border linkages to Scotland, Wales and the Midlands (Section 5); it has informed the identification of gaps in provision, and alongside NPIER scenarios for forecast growth (section 6) has informed the development of four Conditional Outputs (Section 7) that bring together the collective aspirations for passengers and freight.

4.7 The conditional outputs will be refined during 2017 to form a definitive set of policy metrics within a Single Integrated Rail Plan that encompasses and interfaces with the following programmes:

- HS2
- NPR
- TfN's Freight and Logistics work programme
- NR's North of England Route Study
- NR's East Coast Route Study
- Study work from the TfN Strategic Development Corridors (incorporating each element above) on key inter-urban (pan-Northern) corridors
- The progression and expansion of LTRS policy outcomes covering the whole rail network, including Intra-Regional / Intra-urban and rural services, accounting for the stated objectives of partners within the combined TfN and RN geographies.

Figure 4.1 identifies how TfN will bring together the collective evidence base within a Single Integrated Rail Plan, demonstrating where the collected *sum* at a corridor level is far greater than the constituent *parts* in terms of overall benefit. This logic applies both *upwards* to nationally significant schemes such as HS2; but also at a local scale in providing the infrastructure and breadth of service provision upon which schemes (such as new stations) can develop a robust supporting business case.

Figure 4.1: Value added by developing a Single Integrated Rail Plan



Source: TfN

# 5 Rail in the North Baseline

## Introduction

### Purpose of Baseline

- 5.1 To identify corridors for further investigation as part of the push towards a Single Integrated Rail Plan, it is necessary to establish a clear baseline position. This section of the Initial IRR considers both the supply and demand side of rail in the North, with a focus on the current position, but also where instructive on recent trends and known future changes over the short to medium term.
- 5.2 Data has been taken from publicly available sources, in particular the ORR Data Portal and the National Rail Enquiries database, and additional information has been provided by NR for the purposes of this study. Where robust pan-Northern data is not currently available, we have highlighted this to inform subsequent work.
- 5.3 In terms of supply, this section identifies the mechanisms by which rail services are currently provided, the level of these services (in terms of frequency and speed), fares, and the rolling stock currently used and planned in the immediate future. In terms of demand, this section examines recent trends in both passenger and freight rail usage.
- 5.4 Some indicators of the balance of supply and demand are provided here – however there is currently no comprehensive pan-Northern network capacity indicator (including both plain line and junctions) and nor does this section cover on-train crowding in detail, as the available data across the North is yet comprehensive or consistent, although some commentary of the data that is available is provided.
- 5.5 In gathering the data for this report, the whole of the rail network in the North was considered. However, given the pan-Northern focus of this initial IRR, work undertaken to define ‘local’ network issues has been deferred to the update of RN’s LTRS later in 2017.

## Supply

### The Railway Network in the North

- 5.6 The network across the North is complex with many interconnecting links between and within the various conurbations. The passenger services operated over this network can be grouped into four general types:<sup>6</sup>
  - Long Distance High Speed (LDHS) - longer distance services to/from London, Birmingham (and points south) and Scotland;
  - Inter-urban - medium distance services between northern cities serving more important locations en-route;
  - Suburban - shorter distance services radiating from the major centres, serving all, or nearly all, stations en-route; and,

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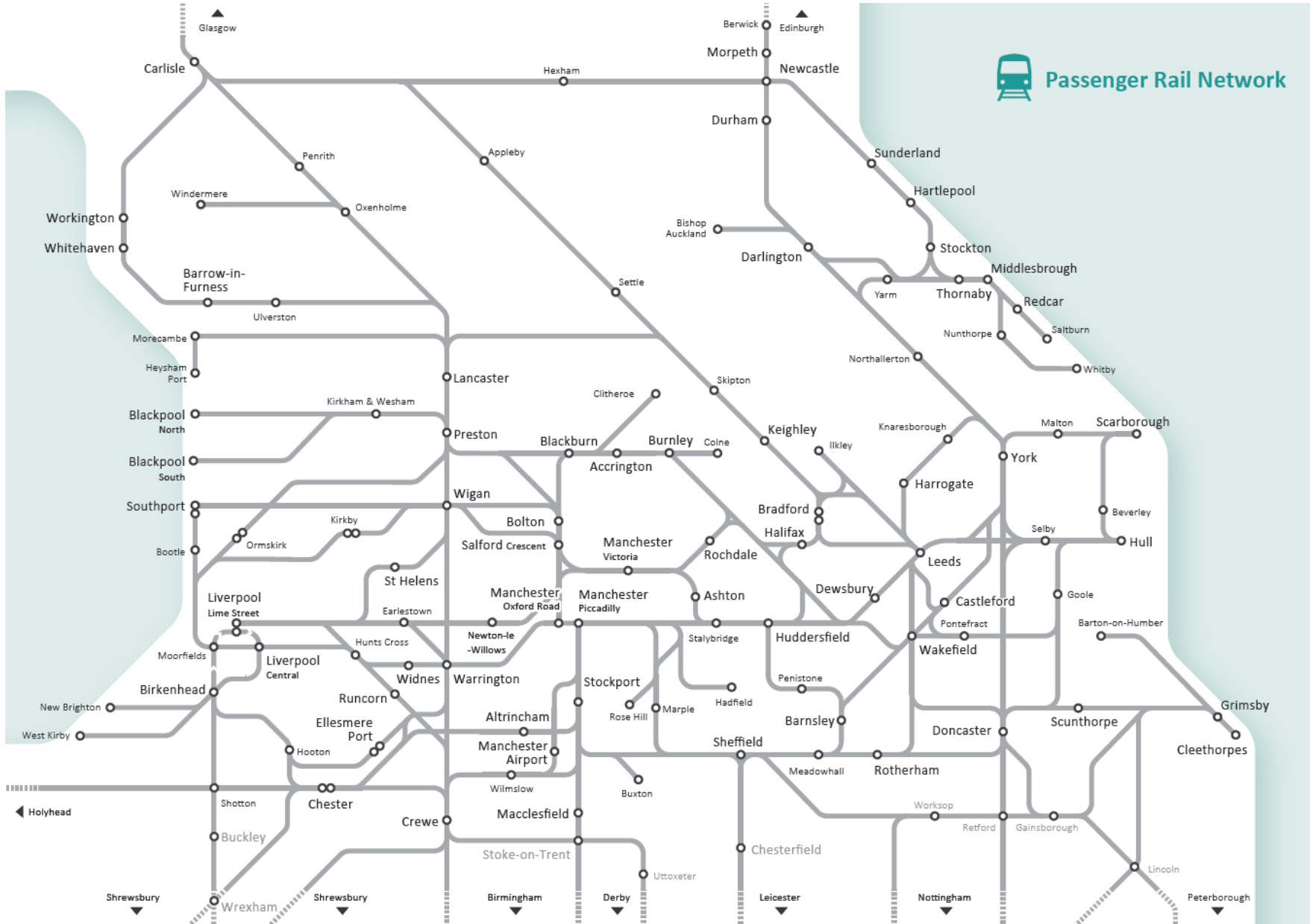
<sup>6</sup> It should be noted that, while the LTRS adopts a slightly different classification, it is broadly comparable with this.

- Local - shorter distance services not serving the major centres, serving all, or nearly all, stations en-route.

5.7 The boundaries between each type are not sharply defined and individual trains sometimes change between the groupings above en route.

5.8 A simplified schematic map showing the network is provided in Figure 5.1:

Figure 5.1: The Passenger Rail Network in the North (Schematic)



## Rail service provision

### Passenger Services

- 5.9 All pan-Northern passenger rail services in the North are provided by privately owned operators. These are operated as franchises or concessions let by the DfT, with the two main northern franchises (Northern and Transpennine Express) jointly managed by the DfT and RN. The next franchise for Wales (which includes some services in the North) is to be let by Transport for Wales on behalf of the Welsh Government. There are two 'open access' operators on the East Coast Main Line (ECML) providing commercial non-franchised services, with licences granted by the ORR. A third open access operator is due to start running on the West Coast Main Line (WCML) in the near future, with a fourth due to run on the ECML as well.
- 5.10 All relevant pan-Northern passenger operators (excluding intra-urban operators) in the North<sup>7</sup> are tabulated below:

**Table 5.1: Passenger Rail Operators in the North**

Franchise / Open Access Operator	Current Franchise / Concession Body
Northern	DfT / RN
Trans-Pennine Express	DfT / RN
Cross Country	DfT
East Midlands	DfT
InterCity East Coast	DfT
InterCity West Coast	DfT
Wales & Borders	DfT (next franchise to be let by TfW)
West Midlands	DfT
Grand Central	Open Access
Hull Trains	Open Access

### Freight Services

- 5.11 All freight services are provided by independent operators running with licences issued by the ORR. Nearly all freight operators are privately owned, though Direct Rail Services (DRS) belongs to the Nuclear Decommissioning Authority and is therefore owned by the state. Most rail freight services are operated commercially, but grants are available to support the use of rail over road transport in some cases. The current major UK rail freight operators are:
- DB Cargo (DBC);
  - Freightliner;
  - GB Railfreight;
  - Direct Rail Services (DRS);
  - Colas; and
  - Devon and Cornwall Railways (DCR).

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<sup>7</sup> Passenger operators that are wholly contained within a local authority area have not been considered as part of this report



- 5.12 Most freight traffic is won after a competitive process, which is often not only between rail freight operators, but also includes other mode options (e.g. road, or maritime).

### Passenger Service Frequencies

- 5.13 On many sections of the rail network there is a mixture of service types (local, suburban, inter-urban, LDHS, freight). Frequencies on LDHS and inter-urban routes radiating from the various city centres typically vary between 1 and 6 trains per hour, depending on the combinations of services using those routes. Selected links are shown in Table 5.2.

**Table 5.2: Selected LDHS and Inter-urban Frequencies<sup>8</sup>**

Between		Off Peak Frequency	High Peak Frequency
Sunderland	York	n/a	1
Blackburn	Manchester	1	2
Blackpool	Leeds	1	1
Carlisle	Newcastle	1	2
Grimsby via Scunthorpe	Sheffield	1	1
Hull	Leeds	1	1
Hull	Manchester	1	1
Hull	Sheffield	1	1
Leeds	Middlesbrough	1	1
Leeds	Scarborough	1	1
Liverpool	Newcastle	1	1
Liverpool	Preston	1	1
Liverpool	Sheffield	1	1
Manchester	Newcastle	1	1
Middlesbrough	Newcastle	1	1
Bradford	Manchester	2	2
Chester	Manchester	2	3
Leeds	Liverpool	2	2
Leeds	Newcastle	2	2
Leeds	Sheffield	2	2
Manchester	Sheffield	2	2
Manchester	Southport	2	3
Newcastle	Sheffield	2	2
Sheffield	York	2	2
Blackpool	Manchester	3	4
Carlisle	Preston	3	3
Crewe	Liverpool	3	3

<sup>8</sup> Excludes stopping trains overtaken en-route. Sunderland – York flow is 2 trains in the interpeak and 1 in the peak period

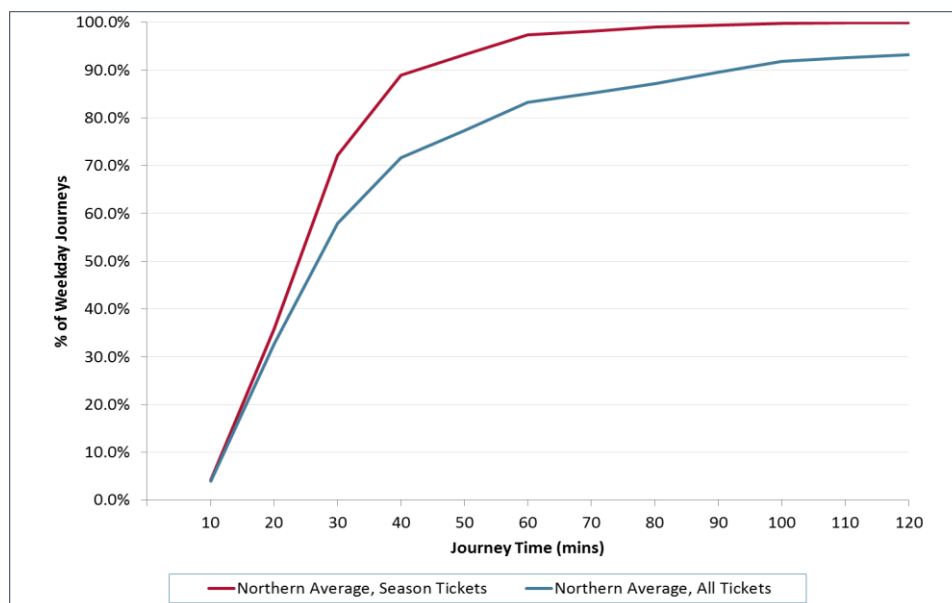
Between		Off Peak Frequency	High Peak Frequency
Crewe	Stockport	3	3
Doncaster	Leeds	3	4
Liverpool	Wigan	3	3
Sheffield	Wakefield	3	3
Crewe	Manchester	4	6
Darlington	Newcastle	4	5
Leeds	York	4	4
Liverpool	Chester	4	4
Darlington	York	5	5
Huddersfield	Manchester	5	5
Leeds	Manchester	5	5
Liverpool	Manchester	5	5
Manchester	Stoke-on-Trent	5	6
Newcastle	York	5	5
Stockport	Stoke-on-Trent	5	5

Source: National Rail Enquiries

### Journey Times and Average Speeds

- 5.14 Rail journey times are a key factor influencing propensity to travel by rail and, consequently, support and encourage economic activity. Figure 5.2 shows the average station to station journey time for passengers accessing five of the largest cities in the North, by time-band.

Figure 5.2: Rail journey times accessing Northern cities<sup>9</sup>



Source: SDG Analysis of MOIRA data

5.15 As can be seen, a large proportion of all trips (>80%), and an even larger proportion of trips with season tickets (>95%), are less than 60 minutes. Season tickets are mostly used for commuting, and Figure 5.2 shows that journeys undertaken with season tickets are generally shorter in duration than the average. Over 70% of season ticket journeys are less than 30 minutes.

5.16 Journey times and speeds in the North vary by service type and route alignment. Times and speeds are constrained by several factors, including:

- The underlying line speed;
- The speed capability of the trains used;
- The number of station calls made;
- Platform occupancy at some stations; and,
- The constraints of scheduling mixed service patterns on each route (as trains cannot generally overtake each other).

5.17 Table 5.3 shows the journey times and average speeds for selected LDHS and inter-urban services:

Table 5.3: Fastest Regular Journey Times and Average Speeds for Selected LDHS and Inter-urban Services<sup>10</sup>

Between		Journey Time (hh:mm)	Average Speed (mph)
Liverpool	Wigan	00:50	23.6
Liverpool	Chester	00:41	25.2

<sup>9</sup> Leeds, Liverpool, Manchester, Newcastle, Sheffield

<sup>10</sup> Excludes stopping trains overtaken en route

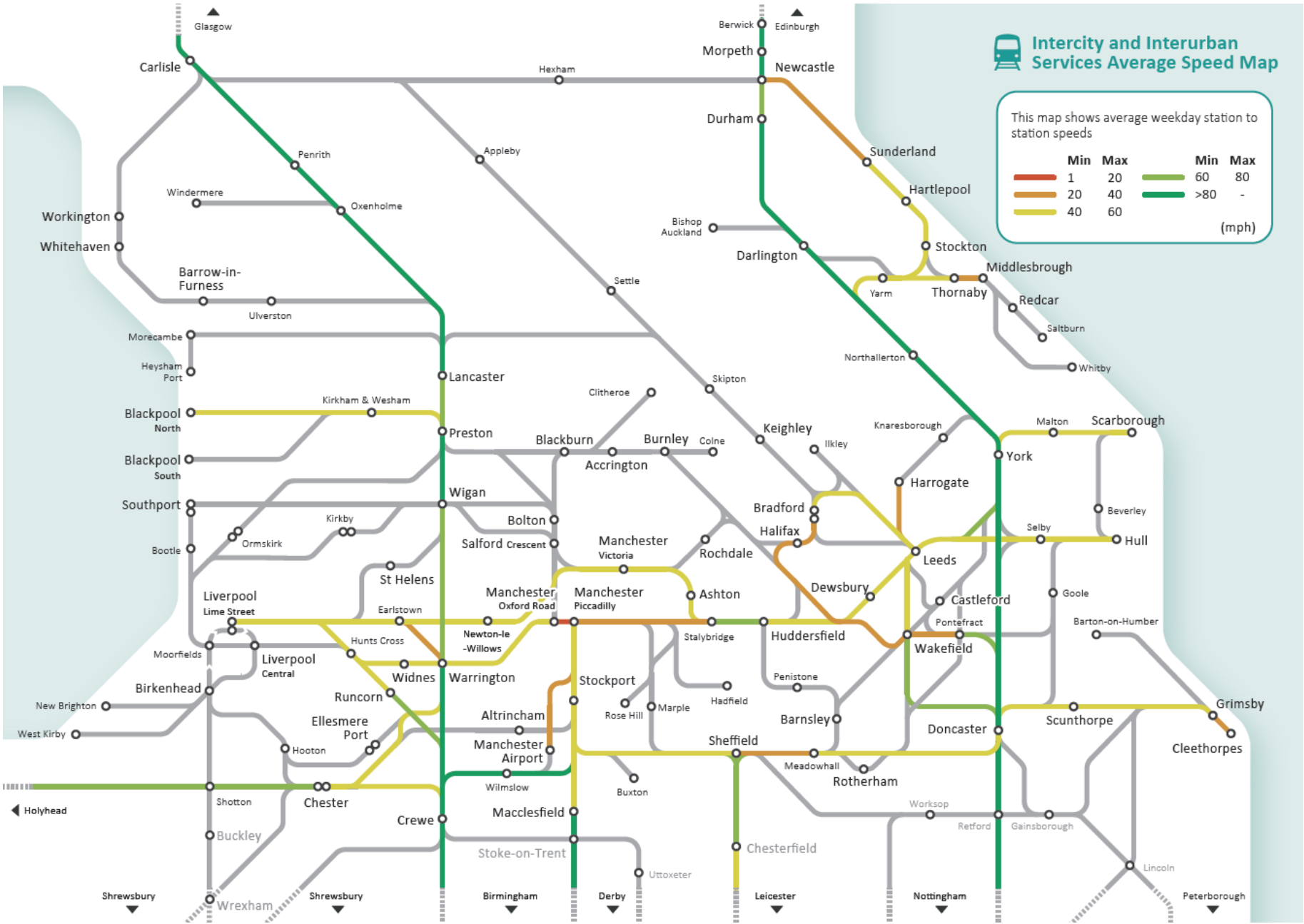
Between		Journey Time (hh:mm)	Average Speed (mph)
Blackburn	Manchester	00:48	30.8
Liverpool	Preston	00:58	36.2
Middlesbrough	Newcastle	01:16	36.9
Blackpool	Leeds	02:10	37.4
Blackpool	Manchester	01:18	37.5
Manchester	Southport	01:13	39.5
Chester	Manchester	01:01	39.6
Bradford	Manchester	00:58	41.6
Hull	Sheffield	01:23	43.0
Liverpool	Manchester	00:48	43.6
Carlisle	Newcastle	01:24	44.1
Liverpool	Sheffield	01:43	44.9
Sunderland	York	01:34	47.0
Grimsby	Sheffield	01:28	46.4
Leeds	Manchester	00:49	48.6
Manchester	Sheffield	00:51	49.5
Hull	Manchester	01:54	49.7
Leeds	Scarborough	01:17	52.6
Hull	Leeds	00:58	53.5
Leeds	Middlesbrough	01:24	54.5
Leeds	Liverpool	01:25	54.7
Huddersfield	Manchester	00:28	55.2
Crewe	Manchester	00:32	58.1
Leeds	Sheffield	00:40	58.1
Sheffield	York	00:52	59.4
Doncaster	Leeds	00:30	59.5
Liverpool	Newcastle	03:00	60.1
Manchester	Newcastle	02:23	62.3
Crewe	Stockport	00:24	62.5
Crewe	Liverpool	00:34	62.6
Darlington	Newcastle	00:33	65.6
Leeds	York	00:23	66.5
Manchester	Stoke-on-Trent	00:33	68.6
Stockport	Stoke-on-Trent	00:28	68.8
Sheffield	Wakefield	00:24	72.0
Newcastle	Sheffield	01:45	74.7
Leeds	Newcastle	01:22	77.2
Newcastle	York	01:00	80.0
Darlington	York	00:32	82.9

Between		Journey Time (hh:mm)	Average Speed (mph)
Carlisle	Preston	01:05	83.1

Source: Network Rail submission, and National Rail Enquiries

- 5.18 For the various LDHS and inter-urban services shown, average speeds vary between 25 and 83 mph. It should be noted that the speeds given are the best regularly achieved, and many services on some routes do not achieve these, while others can be faster.
- 5.19 The average speeds of LDHS and inter-urban services across the North are summarised in Figure 5.3 below:

Figure 5.3: LDHS and Interurban Average Speeds (Trans-Pennine Express, InterCity West Coast, InterCity East Coast, Wales & Borders, Grand Central)



## **Fares**

- 5.20 In common with the arrangements throughout Great Britain, rail fares in the North are generally set by the Train Operating Companies (TOCs), within the parameters established as part of their franchise agreements.
- 5.21 Franchise agreements stipulate certain fares which are regulated by Government (mostly commuter season tickets, long distance off-peak return, and some Anytime fares). Regulated fares are controlled by Government policy, which in recent years has been for fares to rise in line with inflation, as measured by the Retail Price Index (RPI).
- 5.22 In addition to the above, fares for rail travel entirely within a PTE area<sup>11</sup> were historically set by PTEs, and this accounts for a significant proportion of rail travel in the North. Whilst this has, historically, led to lower fares for travel within metropolitan areas (and this pattern endures today), our engagement with Partners for this study has found concerns that there exists a significant fares 'cliff-edge' whereby passengers face markedly higher fares for journeys that cross PTE boundaries than similar journeys which do not. Furthermore, certain areas in the North (such as Hull) have large populations and metropolitan areas, but no historic PTE; concerns were raised by Partners that this has led to an inequitable fares regime across the North.

## **Rolling Stock**

- 5.23 There is a wide variety of rolling stock in use across the North. There are significant changes in the fleet composition planned, which will lead to passenger benefits.
- 5.24 The fleet changes include the introduction of 44 new 5-car trains on the Trans-Pennine Express franchise, and 98 new 2-, 3- and 4-car trains on the Northern franchise. The new trains on the Northern franchise will allow for, amongst others, the complete removal of the class 142 and 144 'Pacer' trains from the North's rail network. Transpennine Express have ordered 44 new 5-car trains from CAF and Hitachi. As part of the renewal programme, it is understood that around 29 Class 185 units will be retained but the rest of the existing fleet will be returned to their leasing companies. Both the Transpennine Express and Northern fleets will end up larger than at present, providing increases in capacity on existing services and allowing the introduction of new services.
- 5.25 Other operators running services through the North will also see changes to their fleets over the next few years:
- Virgin Trains East Coast (VTEC) will replace most of its existing fleet with new Intercity Express Programme (IEP) Hitachi trains;
  - Hull Trains will replace its existing fleet with new Hitachi trains;
  - Grand Central will replace its remaining High Speed Trains (HSTs) with second hand trains from Great Western;
  - The Wales and Borders, London Midland and East Midlands Trains franchises are currently being re-let and may feature changes to fleet composition and size.

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<sup>11</sup> Merseyside PTE, TfGM, South Yorkshire PTE, Tyne and Wear PTE, and West Yorkshire CA

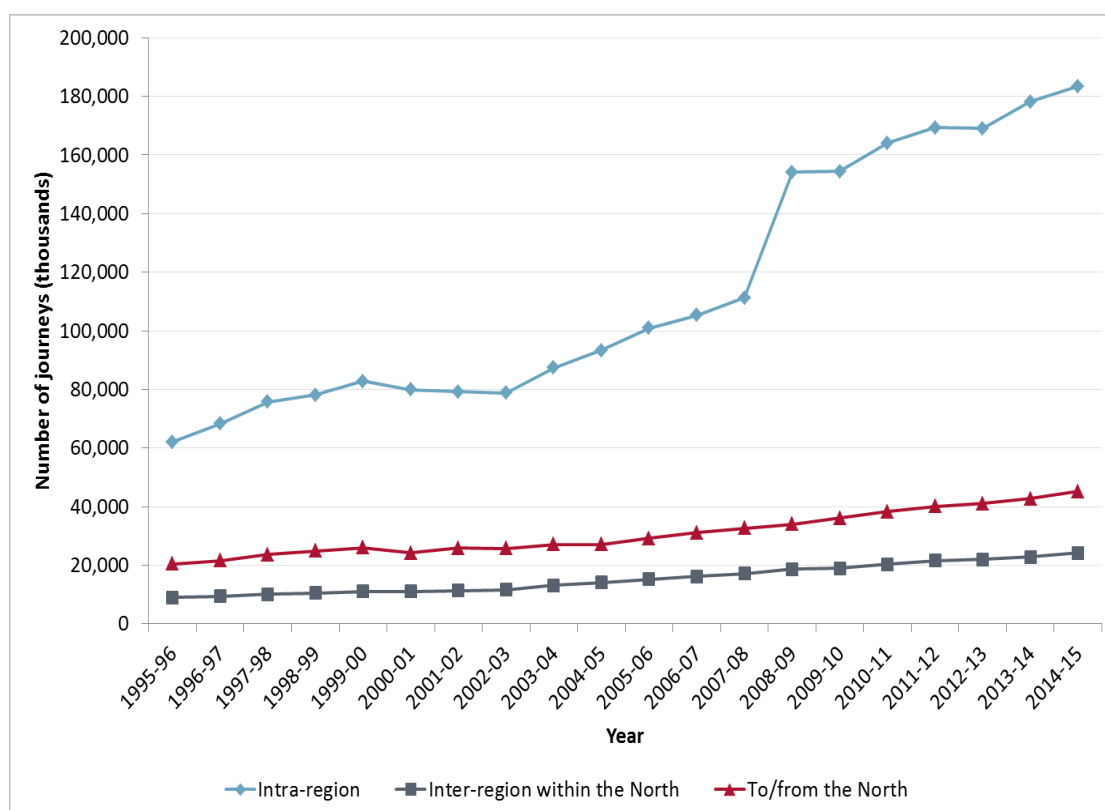
- 5.26 A franchise competition is also envisaged for the West Coast Partnership, comprising the current West Coast Franchise, as well as HS2 services, with the competition due to take place throughout 2017 and the winner being announced in mid-2018. Given the need to provide rolling stock for classic compatible HS2 services, this will result in additional new rolling stock to serve the North.

## Demand

### Recent Trends in Rail Usage

#### Passenger Rail

Figure 5.4: Passenger journeys in the North, 1995/96 – 2014/15 (thousands)



Source: SDG analysis of ORR Data Portal, Tables 15.5, 15.6 and 15.12

- 5.27 Data is published annually by the Office of Rail and Road relating to the number of rail journeys undertaken across the North, across three different categories of journey: intra-region<sup>12</sup> (journeys starting and finishing within one of the three Northern regions: Yorkshire and the Humber, the North East or the North West), inter-region (journeys which cross the

<sup>12</sup> It should be noted that the increase in intra-regional journeys between 2007/08 – 2008/09 was the result of a significant revision to improve the method for estimating rail travel in PTE areas. Since this revised method is considered to be an improvement, it is likely that the values before 2007/08 were significantly understating rail travel of passengers using PTE multi-modal ticket products. ORR quote total growth inclusive of this revision, as can be seen at

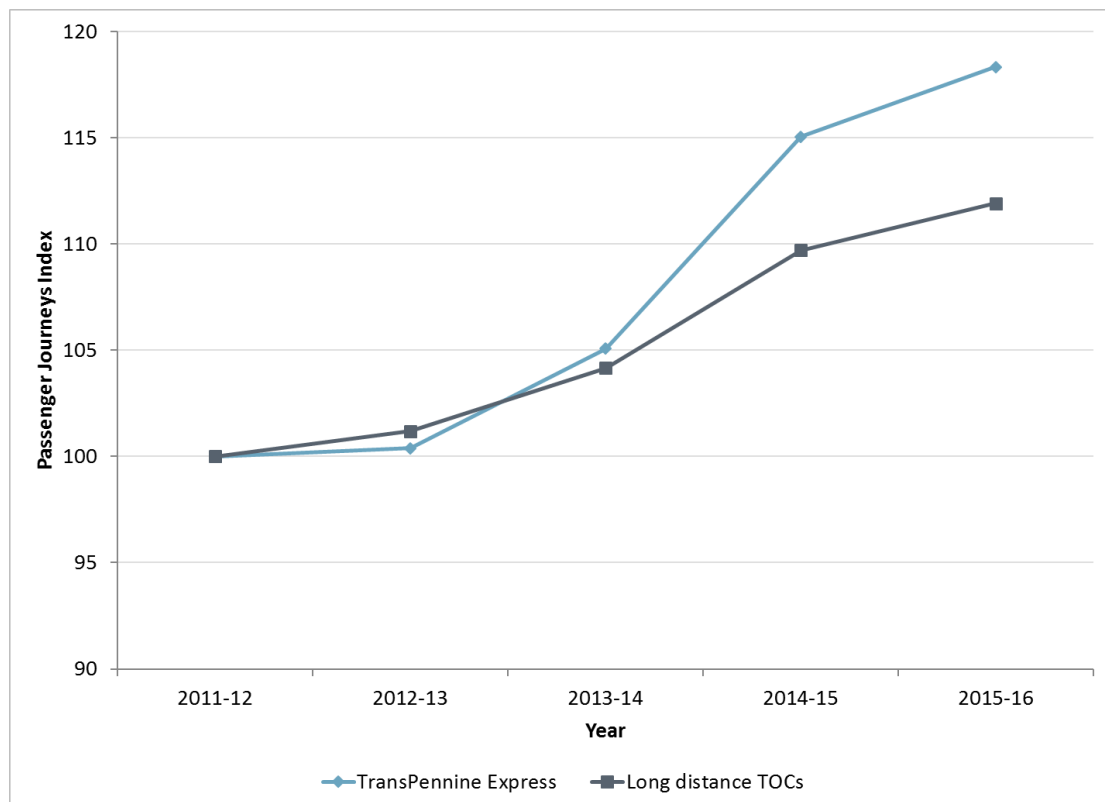
[http://orr.gov.uk/data/assets/pdf\\_file/0003/23952/regional-rail-usage-profiles-2015-16.pdf](http://orr.gov.uk/data/assets/pdf_file/0003/23952/regional-rail-usage-profiles-2015-16.pdf)



boundaries of these three Northern regions but do not start or finish in any region outside of these), and to/from the North (journeys either originating or terminating in a region outside of the North).

- 5.28 As Figure 5.4 demonstrates, the majority of rail transport in the North comprises journeys made within regions rather than between them. All three categories have experienced increases in the numbers of journeys. Intra-regional journeys have grown by 196% (although this includes the change in methodology, and is therefore likely an overestimate), inter-regional journeys have grown by 170%, and journeys to/from the North have grown by 121%. Total demand has increased by 176%.

Figure 5.5: Passenger journeys, TransPennine Express and long distance TOCs



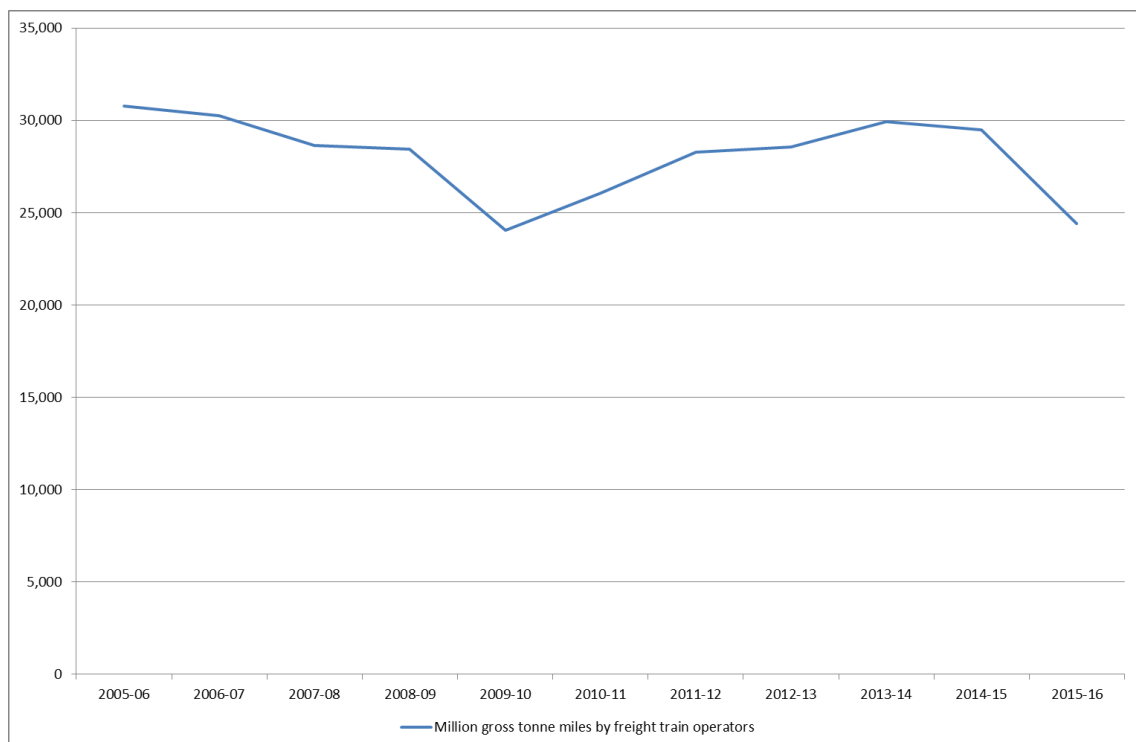
Source: ORR Data Portal, Table 12.12

- 5.29 Figure 5.5 shows changes in passenger rail usage since 2011/12 for TransPennine Express, and for all other UK long distance TOCs. This measure has been presented as a proxy for the change in pan-Northern demand growth, set alongside national trends.
- 5.30 Passenger journeys increase over the 2011/12-2015/16 period, the most rapid growth occurring in 2014/15. The year 2012/13 exhibited the slowest growth, which was lower than that of other long distance TOCs.
- 5.31 Passenger journeys increased by 18.33% for TransPennine Express from 2011/12 to 2015/16, surpassing the wider growth of 11.93% across long distance TOCs nationwide, indicating higher performance of TransPennine Express relative to UK-wide trends.

### Freight

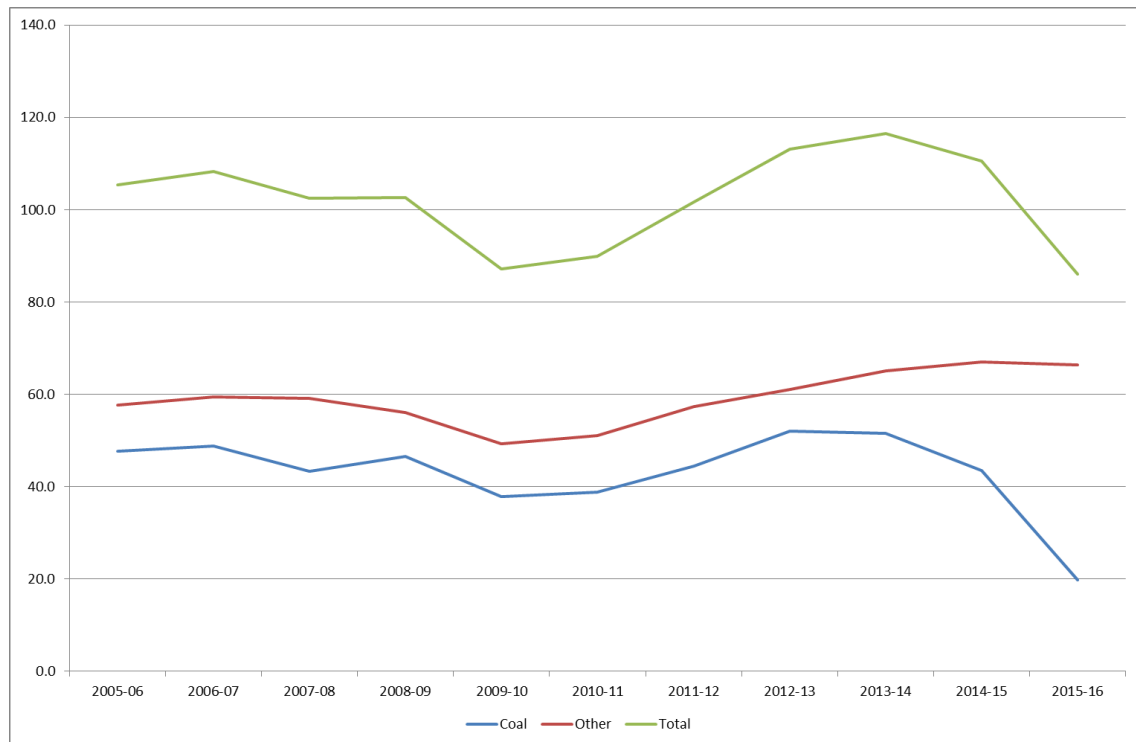
- 5.32 An assessment of rail freight by million gross tonne miles (accounting for distance and quantity), shows that it has remained broadly constant at a national level since 2005/06, although there was a notable dip between 2014/15 and 2015/16. There was a similar dip between 2008/09 and 2009/10, but this was followed by a recovery in subsequent years. This trend is summarised within Figure 5.6.

**Figure 5.6: Million gross tonne miles, 2005/06 – 2015/16**



Source: ORR Data Portal, Table 13.9

Figure 5.7: Mass of freight goods carried on the rail network (million tonnes), 2005/06 – 2015/16



Source: ORR Data Portal, Table 13.6

- 5.33 The analysis presented within the Initial IRR is largely at a national level. This reflects data currently available. Further analysis is under development as part of TfN’s parallel Freight & Logistics Programme which will more clearly differentiate flows by commodity, and identify the type of movement as follows:
- Domestic (to and from the North)
  - Through-traffic (origin and destination outside the North)
  - Imports
  - Exports
- 5.34 As summarised within Figure 1.1, the Freight & Logistics Programme outputs will be incorporated into the Single Integrated Rail Plan (SIRP) for publication at the end of 2017. It will also determine future demands (across road and rail) at a Strategic Development Corridor (SDC) level, with the benefits of growth assigned within a Programme Level Business Case.
- Crowding**
- 5.35 There is limited data available for crowding on rail services in the North, and that which is available is not consistent enough across the North. The data that is available only focuses on five Northern cities (Leeds, Liverpool, Manchester, Newcastle and Sheffield), showing the

proportion of Passengers in Excess of Capacity (PiXC)<sup>13</sup>. The figures given in the DfT's latest release for this measure relates to 2015 and is shown in Table 5.4.

**Table 5.4: Rail passenger numbers and crowding, AM peak weekdays average, 2015**

City	AM Peak Arrivals	AM Peak PiXC
Leeds	26,500	2.2%
Liverpool	21,400	0.0%
Manchester	30,800	3.7%
Newcastle	4,600	0.0%
Sheffield	7,700	1.6%

Source: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/590675/rail-passengers-crowding-2015-revised.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590675/rail-passengers-crowding-2015-revised.pdf)

- 5.36 The figures in Table 5.4 provide some context of the level of crowding in the AM peak in the North, with notable crowding into Leeds, Manchester and Sheffield (compared to a PiXC average for London termini of 5.8%), but this is nonetheless a limited picture. In particular, since DfT's PiXC measure is an average across the entire 3-hour AM Peak (07:00 – 10:00), it will understate the position in the high-peak hour when trains are busiest.
- 5.37 Partners have suggested to us that they have evidence, including from surveys and automated passenger counts, which consistently confirms that the main urban centres in the North have some of the most severe crowding in Britain. Beyond these main centres, there is anecdotal evidence of severe crowding on routes where peak time services are limited, notably where service frequencies compress peak demand into a single service, or where particular destinations generate concentrated demand at specific times (notably large employers, educational institutions and tourist destinations). However, consistent data is lacking; this would need to be addressed in order to evaluate future needs at a network level beyond the timeframe of the existing franchise.
- 5.38 An assessment of crowding in the North is further complicated by the large scale of change in rolling stock provision anticipated in the coming years, which will have a significant impact on the baseline position (both in terms of increasing capacity, and also in terms of driving demand growth).
- 5.39 Is it anticipated that, as part of future work programmes, robust, consistent and comprehensive data on crowding, including load factors<sup>14</sup> at various critical points across the network, will be collected.

<sup>13</sup> PiXC is defined on the basis of the seating capacity of a train, alongside an allowance for standing for journeys of under 20 minutes

<sup>14</sup> The load factor is defined as a percentage, equal to the number of passengers on a service divided by the number of seats available

## Capacity Utilisation

- 5.40 There is no absolute figure for theoretical railway capacity, and it is therefore not possible to define the amount of capacity that is used in a manner which is universally accepted. The International Union of Railways (UIC) notes in its operating leaflet 'UIC Code' that "capacity as such does not exist [and that] railway infrastructure capacity depends on the way it is utilised."
- 5.41 This is because the capacity available is dependent on services being run or planned for a section of railway, as well as the physical characteristics of the railway itself (i.e. the number of running lines, the existence or otherwise of passing loops, signalling, and the capacity of junctions).
- 5.42 Mixed-traffic railways cannot be as efficient as those carrying trains which all travel at the same speed and have the same stopping patterns: on the London Underground, headways (i.e. the time between services) as short as 90 seconds are known, and high-speed trains at headways of only 2-3 minutes are possible on dedicated high-speed routes. Mixed traffic railways, with trains travelling at different speeds (such as LDHS services and local services, or conveying heavy freight), headways become far longer. Four-tracking and overtaking facilities can increase capacity, but are subject to the same overall constraints.
- 5.43 Junctions given rise to conflicts, especially where multiple-track routes join on a flat alignment; there are very few locations in the North where grade-separation is provided. In many locations in the North, these conflicts considerably reduce the usable line capacity from the theoretical levels that the individual lines would otherwise support.
- 5.44 Long headways imposed by the signalling technology are a further limiting factor in many locations. Almost all the North's railway uses conventional fixed block sections; while these vary in form, in every case only one train at a time can be within that block. Some of the blocks on double-track railways can be lengthy due to the distances between signals, and on single-track lines are almost always governed by the distances between passing loops – again often many miles.
- 5.45 The ridership growth of the past two decades and the desire for additional services brings these issues to the fore. An analysis of capacity constraints will need not only to consider current utilisation levels as well as likely future usage: for example, if a line can currently reliably support two trains per hour (even at a high level of utilisation) and there is not likely to be a need to run additional services, then track capacity is not a serious constraint. TfN's future capacity analysis will identify those constraints which have significant impacts on achieving the conditional outputs identified for connectivity and capacity later in this document.
- 5.46 There are currently a number of studies which have been undertaken to investigate track capacity in areas of the North, however it is considered that these have not been undertaken at a pan-Northern level, and do not always consider the impacts of all of the various factors mentioned above. It will be of critical importance to consider these issues in detail in forthcoming work.
- 5.47 Further capacity analysis will form part of the work on the LTRS update and/or the North of England Route Study.

## Conclusion

5.48 As outlined in this section, the supply of rail services in the North is characterised by:

- Inconsistent frequency of service between economic centres, with some journey pairs having a frequency of service of 5 or 6 trains per hour (such as Manchester – Leeds, or Sheffield – Chesterfield), whilst others have as few as 1 train per hour (such as Sheffield – Manchester, or Leeds – Middlesbrough);
- Inconsistent departure times across the hour between economic centres, reducing coherency and opportunities for interchange between services;
- Inconsistent journey speeds, with the fastest speeds on the East Coast Main Line and West Coast Main Line, but significantly slower on many other routes, particularly east-west; and,
- A fleet of rolling stock much of which is in the process of being replaced or refurbished.

5.49 The demand for rail services in the North is characterised by:

- Significant growth in passenger demand over the last 20 years, with growth of 176%<sup>15</sup> in passenger journeys across the North;
- Generally stable demand for rail freight over the last 10 years, although indications of a slowdown more recently arising from the fall in coal traffic;
- Areas with high levels of crowding in the peaks (but overall limited data); and,
- Suggestions of significant network capacity constraints.

5.50 Further observations can be made:

- Strong growth in passenger demand has been experienced over the last two decades, and one of the responses to this is the recent orders for new rolling stock, increasing capacity across the North as well as significantly enhancing journey quality for passengers;
- It is not possible at this stage to accurately project what impact this will have on crowding across the North. Observed high levels of crowding into Manchester, Leeds and Sheffield tell only part of the story, and the passenger demand response to increased capacity and better quality rolling stock may (or may not) be sufficiently catered for by this capacity; if not, this will lead to further future crowding problems;
- Further analysis of track capacity constraints, and development of appropriate interventions, will be needed in the context of the LTRS update and the North of England Route Study;
- There is demand for improvement in journey times and frequencies between many economic centres in the North, and the recent overall strong growth in passenger demand suggests that this may be likely to drive passenger benefits and to support economic growth (although any individual scheme to improve journey times or frequencies would need to be examined on its own merits); and,

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<sup>15</sup> percentage includes the increase in observed demand attributable to change in methodology, explained in footnote 11

- The freight market is changing: flows associated with the electricity supply industry and other traditional industries are declining, while there are strong prospects for further growth in inter-modal container traffic. This raises the question of whether the capacity currently allocated to freight is in the right place and is serving the right flows.

5.51 The freight sector will be analysed in more detail in the updated LTRS.

## 6 Rail in the North Horizon Scanning

### Introduction

#### Purpose of Horizon Scanning

- 6.1 Following the establishment of the baseline conditions in Section 5 of this report, it is important to understand the changes that are likely to apply to these conditions in the future.
- 6.2 This 'horizon scanning' exercise involves assessing the likely changes in the elements of supply and demand outlined in Section 5, and allows for 'gaps' to be identified (where projected supply will not sufficiently meet or address projected demand). The identification of gaps is outlined in Section 7.
- 6.3 As part of this study, we have been able to assess the likely future situation for many (but not all) aspects of supply outlined in Section 5. This section details the committed service enhancements, including frequency enhancements that are planned as part of the current Northern and Transpennine Express franchises. It also considers potential journey time improvements, as well as committed infrastructure enhancement schemes.
- 6.4 In terms of demand, this Initial IRR draws upon the results of work undertaken to support the STP, which estimate both passenger and freight demand growth under various scenarios, in line with the prescription set out in the NPIER.

### Supply

#### Committed and Planned Enhancements – Passenger Services

- 6.5 The winning Northern and TransPennine Express franchise bids (on the basis of which the new Northern Rail and TransPennine Express franchises began in April 2016) included many service enhancements.
- 6.6 First's bid for TransPennine Express includes the following major changes<sup>16</sup> to be implemented by 2020 (as included in the Train Service Requirements as part of the Franchise Agreement):
- Enhanced service levels between Manchester and Leeds (to 6tph);
  - Diversion of Liverpool-Scarborough service via Newton-le-Willows and Manchester Victoria;
  - Extension of Manchester Airport-York service to Newcastle;
  - Diversion of Newcastle/Middlesbrough-Manchester Airport services via Manchester Victoria and Ordsall chord;
  - Extension of Liverpool-Newcastle service to Edinburgh;

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<sup>16</sup> Source - <http://maps.dft.gov.uk/transpennine-express/index.html>



- Diversion of Manchester-Scotland service via Bolton; and,
- New services linking Liverpool with Scotland via Lancaster.

6.7 Arriva's bid for Northern includes the following major changes<sup>17</sup> to be implemented by 2020 (as included in the Train Service Requirements as part of the Franchise Agreement):

- Doubling service levels between Newcastle and Middlesbrough to 2tph;
- Enhanced service levels between Newcastle and Carlisle to 2tph;
- Enhanced service levels between Bishop Auckland and Darlington to 1tph;
- New hourly service between York and Scarborough (making 2tph with TP);
- Enhanced service levels between York and Hull to 1tph;
- Enhanced service levels between Hull and Scarborough to 1tph;
- New hourly service between Leeds and Bridlington (with TP making 3tph Leeds-Selby and 2tph Leeds-Hull);
- Enhanced service levels between Leeds and Harrogate (making 4tph with VTEC);
- Leeds-Nottingham service diverted via Wakefield Westgate to speed it up and linked through from Bradford;
- Direct Leeds – Lincoln service;
- Enhanced service levels between Sheffield and Retford to 2tph enabling speed up of Sheffield-Lincoln service;
- Knottingley-Wakefield Westgate service extended to/from Leeds;
- Enhanced service levels between Bradford and Manchester to 3tph with direct services to Liverpool, Chester and Manchester Airport;
- Enhanced service levels between Manchester and Sheffield to 1tph stopping service (with TP and EMT fast services making 3tph);
- Enhanced service levels between Manchester and Hazel Grove to 4tph and between Manchester and New Mills Newtown to 2tph enabling speed up of Manchester-Buxton service;
- Enhanced service levels between Manchester and Macclesfield to 2tph (with XC and VTWC making 4tph);
- Enhanced service levels between Manchester and Greenbank to 2tph enabling speed up of Manchester-Chester service;
- Enhanced service levels between Manchester and Wigan via Atherton to 4tph;
- Enhanced service levels between Manchester and Blackburn to 2tph;
- Enhanced service levels between Manchester Airport and Barrow/Windermere to 1tph;
- New hourly semi-fast service between Manchester Airport and Liverpool via Warrington Central (making 4tph with EMT);
- New hourly semi-fast service between Liverpool and Bradford via Newton-le-Willows and Manchester Victoria (making 3tph with TP);
- New hourly semi-fast service between Chester and Leeds via Newton-le-Willows and Manchester Victoria;
- Enhanced service levels between Preston and Ormskirk to 1tph; and,
- Enhanced service levels between Barrow and Carlisle.

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<sup>17</sup> Source - <http://maps.dft.gov.uk/northern/index.html>

## Committed and Planned Enhancements – Infrastructure

- 6.8 The following enhancements are either committed (funding has been secured and the work is programmed), or planned (there is an understood scope of work, with outputs broadly defined).

### *Northern Hub*

- 6.9 The Northern Hub is a package of schemes to improve service frequency, passenger capacity and journey times by improving connectivity between economic centres and removing bottlenecks in the Manchester area. Completed enhancements include:

- Manchester Airport 4th platform (providing additional platform capacity allowing longer trains), also known as Work package B completed March 2015;
- Instatement of a west facing bay platform at Rochdale (facilitating removal of stops from fast services allowing faster journey times f),
- Huyton – Roby four tracking Phase 1 (track capacity allowing increased frequency) completed August 2014; and
- Manchester Victoria West and Ordsall Lane Capacity (track capacity allowing increased frequency) also known as Work package A, completed April 2015.

- 6.10 Enhancements under development (not all of which are committed) include:

- Huyton – Roby four tracking Phase 2 (track capacity allowing increased frequency);
- Halton Curve;
- Castlefield Corridor Capacity including platform lengthening at Manchester Oxford Road and two additional through platforms at Manchester Piccadilly (track capacity allowing increased frequency), also known as Work package C;
- Calder Valley line speed and signalling improvements (journey time and capacity / reliability improvements);
- South Trans Pennine (Hope Valley) capacity scheme (track capacity allowing increased frequency);
- South Trans Pennine (Hope Valley) line speed improvements (journey time improvements);
- Ordsall Chord (network capability allowing improved connectivity through Manchester);
- Liverpool Lime Street enhancements (new platform and track capacity allowing increased frequency and platform length allowing longer trains);
- Reinstatement of Bolton Platform 5 (track capacity allowing increased frequency / performance);
- Bolton corridor line speed improvements (journey time improvements); and

### *Completion of North West Electrification*

- 6.11 The North West Electrification programme will electrify more than 350km of railway to enable faster more efficient electric services to operate across the North of England, affecting some of the routes included in the Northern Hub. Completed enhancements include:

- Electrification of Manchester - Newton-le-Willows
- Electrification of Newton-le-Willows / Wigan – Liverpool

- 6.12 Enhancements in development (not all of which are committed) include:
- Electrification of the core routes between Manchester Victoria, Liverpool Lime Street, Preston and Blackpool (including the electrification of Manchester Victoria – Stalybridge);
  - Electrification of the Wigan – Westhoughton – Bolton route; and
  - Electrification of the Oxenholme – Windermere branch.

- 6.13 Assumptions on the scope and timing of North West Electrification and parts of Northern Hub were reflected in the bid timetables developed as part of the recent Northern and TransPennine Express refranchising process.

#### *East Coast Upgrades*

- 6.14 The East Coast Connectivity Fund includes enhancements to the network such as:
- Northallerton to Newcastle freight loops
  - Completion of Platform 0 and bi-directional running at Doncaster
- 6.15 In addition to this, work is currently underway to upgrade the East Coast Main Line (ECML) Power Supply. This will allow for the roll out of the IEP programme, and is intended to increase efficiency and reduce environmental impact.
- 6.16 It is anticipated that further planned enhancements will be outlined in the forthcoming East Coast Route Network Study, due to be published later in 2017.

#### *South Humber Gauge Clearance*

- 6.17 The South Humber Rail Gauge Enhancement Project is a scheme to deliver W12 gauge to the Ports of Grimsby and Immingham. W12 gauge specifically enables high cube refrigerated containers to be transported over the rail network – with W10 gauge being the traditional gauge clearance required for non-temperature controlled containers. The refrigeration units added to the containers require a wider clearance.
- 6.18 There are two bridge structures requiring work and minor track works required to enable W12 to be delivered. Additionally, the increased gauge will ensure moving cars by rail is more attractive to the automotive industry. Over 500,000 cars are imported and exported from the Port of Grimsby causing over 220 transporters per day to enter and leave the port. Modern gauge limits will enhance the business case for companies to invest in the rolling stock required to do this, and if delivered, will reduce vehicle movements and improve air quality at the main junctions at the entrance to the port. The ability to convey W10 and W12 trains (neither of which can currently be accommodated) will transform the ability of South Humberside to convey intermodal containers by rail.
- 6.19 The scheme (originally due to be delivered in December 2015) will now commence in Easter 2018, with delivery expected in financial year 2018/19.

#### *Trans-Pennine Route Upgrade (TRU)*

- 6.20 The Trans-Pennine Route Upgrade (TRU) relates to the upgrade of the route between Stalybridge, York and Selby via Huddersfield and Leeds. The overall scope of the TRU programme is not yet finalised, but the high level outputs are understood to include infrastructure to deliver:

- An enhanced frequency comprising:
  - 4tph fast between Leeds and central Manchester (Huddersfield stops only);
  - 2tph semi fast (Dewsbury, Huddersfield, Stalybridge) services;
  - 2tph local stopping service between Leeds and Huddersfield; and,
  - 2tph local stopping service between Manchester/Stalybridge and Huddersfield.
- Line speeds to facilitate a 40 minute Leeds – Manchester Victoria journey time with 1 intermediate stop and 62 minute York – Manchester Victoria journey time with 2 intermediate stops.

#### *Northern Powerhouse Rail (NPR)*

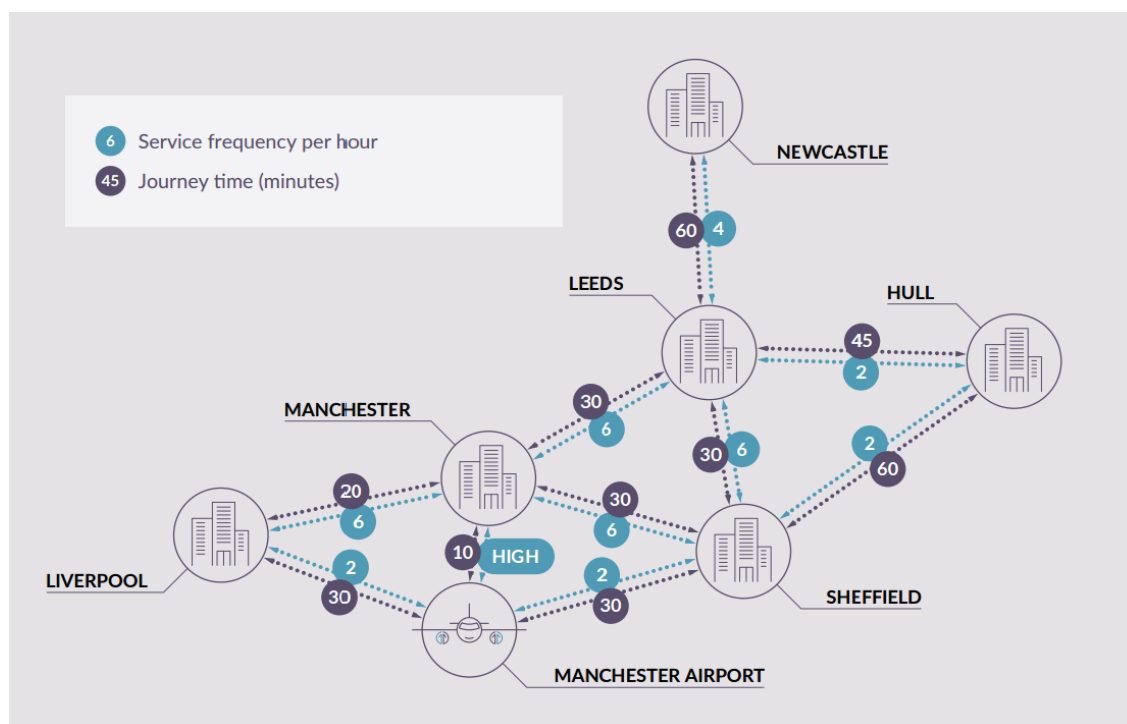
- 6.21 NPR is a key TfN scheme to support transformational economic growth by providing significantly faster journey times and frequencies than today. This will be done using a combination of new routes, including use of HS2 in places, and significantly upgraded sections of existing network. Options are currently being developed to achieve these targets.
- 6.22 NPR is being developed with the stated objective of transforming rail connectivity in northern England. The NPR programme has its origins in the One North prospectus published by Northern Cities in July 2014. One North proposed:

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“A very high quality (fast and frequent) intercity rail network joining the centres of the city regions. This will require a new trans-Pennine route and a faster route to Newcastle to provide the additional capacity and better connectivity we are seeking for the North’s economy. It will deliver direct, fast and frequent access to Manchester Airport for all the North’s city regions to help northern businesses access global markets.”

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- 6.23 The NPR programme has been developed with a definitive remit to ultimately deliver the following:
- The delivery of new and substantially upgraded rail corridors across the North. To release capacity on the existing rail network, which in turn could allow it to be used differently, e.g. for new service patterns, additional local trains or to accommodate more freight traffic;
  - To be fully integrated, to allow the benefits of faster journeys to Northern cities to be spread to those places not directly served by new and upgraded routes by through running. NPR stations will become integrated transport hubs, with co-ordinated rail services which also offer convenient connections to local transport services;
  - To significantly upgrade hub stations, with more platforms and better facilities for all passengers;
  - To mirror HS2 in the integration of NPR within long terms land use planning considerations around station hubs;
  - To drive innovation in rail through the creation of a critical mass for investment in new smart ticketing and information systems which can be used by all rail operators.
- 6.24 The current vision for the NPR network is shown in Figure 6.1:

**Figure 6.1: Vision for NPR Network – Frequencies and Journey Times**

Source: NPR Strategic Case

*HS2 Phase 2a and 2b*

- 6.25 HS2 is a project of national significance, which will create a new 'Y' shaped high speed network from London to Birmingham, with two branches in the North to Crewe, Manchester and the WCML, and to the East Midlands, Sheffield, Leeds and the ECML. Phase 1 of this project (London to Birmingham) is committed.
- 6.26 Phase 2a of the project, which will extend the line as far as Crewe, is currently expected to be complete by 2027. The hybrid bill for this phase is due to be deposited in 2017, with Royal Assent intended for 2019.
- 6.27 Phase 2b of the project will extend the line from Crewe to Manchester Piccadilly via Manchester Airport, with a link to the WCML, as well as from the West Midlands to Leeds via Toton (East Midlands), with a link to the ECML. A spur onto the classic network to serve Sheffield will also be provided. Phase 2b is due to be complete by 2033.

**Demand**

- 6.28 To inform the STP, TfN has developed a Northern Transport Demand Model (NTDM), which contains a series of future scenarios to help understand the scale of transport interventions that are needed to support economic growth in the North. These scenarios are consistent with existing transport models, but reflect a different economic future in which interventions, including transport improvements, have been undertaken to achieve the transformational scenario set out in the NPIER.
- 6.29 It should be noted that the scenarios presented at this stage are suitably high level, and therefore concentrate upon a comparison of demand between the present day (as of 2016) and transformational growth across the north at 2050, using the NPIER capabilities as their basis. Work is underway to develop the NTDM in a manner that adequately incorporates the

work undertaken through the progression of Strategic Economic Plans (SEPs) by individual partners at a LEP / Combined Authority / City Region level. It is also acknowledged that fluctuations will occur of a short to medium term duration, notably associated with the demands of delivering infrastructure, and servicing the energy sector. As such, these elements of growth may not be represented within the 2050 position.

6.30 The transformational scenarios are a dynamic, multi-modal simulation of the following at 2050 levels:

- How economic activity translates into demand for travel across the North; and,
- Travel demand for commuting, business to business, and other reasons, between districts, by road and rail, across the North.

6.31 Four potential alternative but plausible futures for 2050 were developed to test the impact of changes in employment, population and transport infrastructure on longer distance travel between Local Authority Districts in the North of England.

### Future Scenarios

6.32 The four alternatives all reflect futures in which interventions (including the implementation of TfN-sponsored interventions in road, rail and smart travel as well as other policy initiatives/investment) have achieved a transformation in the economy of the North by 2050 whereby levels of employment, productivity and output are more similar to the South East of England than they are today. This means in all four scenarios the future levels and distributions of population and employment are consistent with the Transformational scenario in the NPIER. However, the scenarios set out four potential futures in which transport demand responds differently.

6.33 The dimensions of uncertainty that have been considered are shown in Table 6.1.

**Table 6.1: Economic forecasting: dimensions of uncertainty**

Dimension	Enabling Policy & Plans	Technological & Socio-Cultural Change
Description	Represents the uncertainty in how local planning processes and policies (local government priorities, land-use and development planning, and local transport planning).	Represents uncertainty in how technologies such as autonomous vehicles, alternative fuels and digital connectivity will evolve
Impact on Transport Demand Drivers	<p>The level of future housing development and employment growth that occurs in urban centres as opposed to the suburbs (or urban expansion)</p> <p>The level of improvement achieved in travel conditions (journey times, reliability and travel experience) within local authority districts</p>	<p>The cost of energy (and the consequent effect on travel costs)</p> <p>The capacity and usage of the road network</p> <p>The decision to undertake activities face-to-face or digitally</p>
Summary	Captures the spectrum of outcomes between 'Compact' urban areas and 'Dispersed' urban areas	Captures the spectrum of outcomes between a preference for 'Digital' connection and a more 'Travel Friendly' future

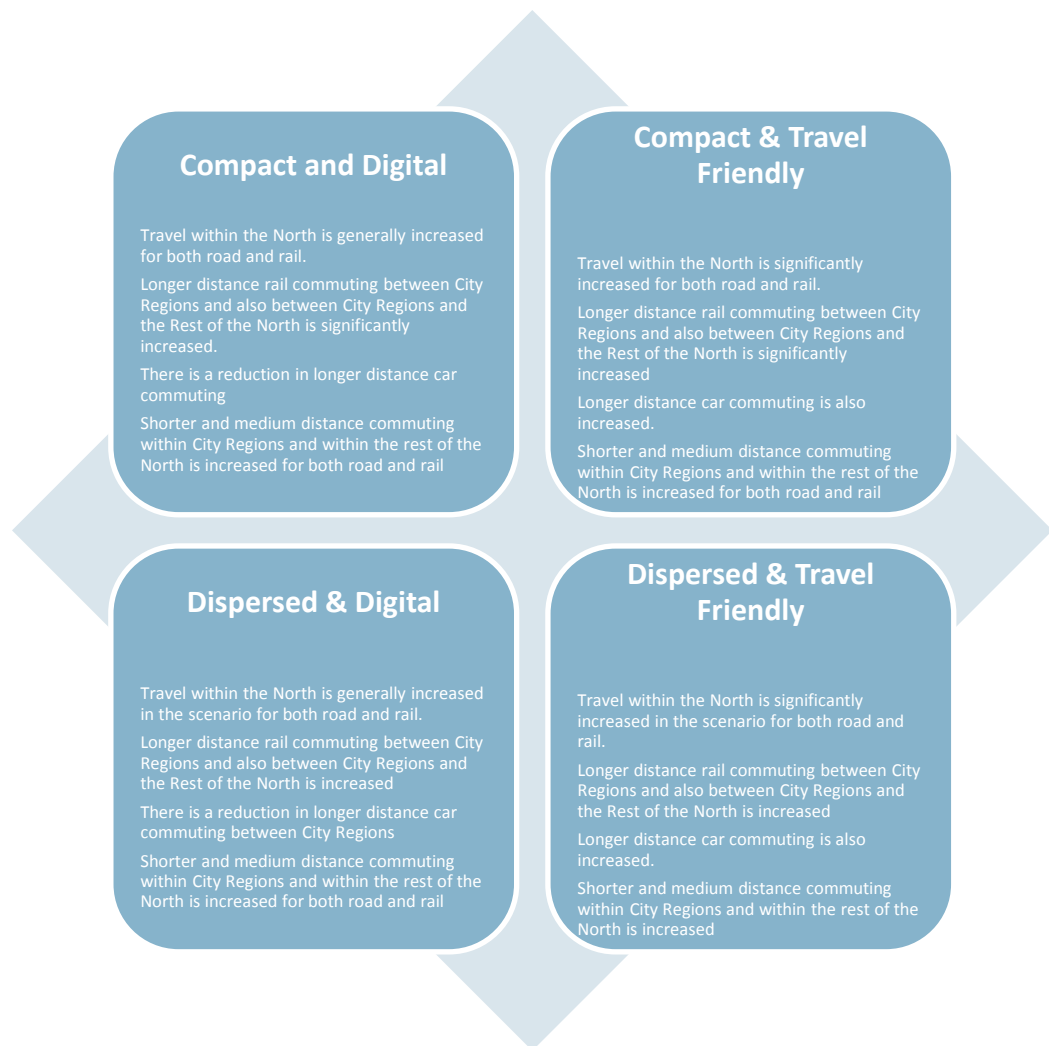
6.34

6.35 The four resulting scenarios represent combinations of the extremes of each dimension:

- **Scenario 1:** Compact and Digital;
- **Scenario 2:** Compact and Travel Friendly;
- **Scenario 3:** Dispersed and Digital; and
- **Scenario 4:** Dispersed and Travel Friendly.

6.36 Each scenario has been tested in the NDTM to show how the volume and pattern of transport demand would respond to the various assumptions in each alternative future. The scenarios are summarised in a schematic in Figure 6.2.

**Figure 6.2: Northern Demand Transport Model Scenarios**



6.37 The Business as Usual scenario is modelled to act as a comparator for these four future scenarios. To model the Business as Usual scenario for commuting, business and other trip purposes by both road and rail the level of transport demand provided by the Department for DfT National Trip End Model has been used (NTEM7). The four alternative futures associated with the Transformational scenario are modelled by including transport demand associated with the additional growth envisaged by NPIER above DfT forecast transport demand.

## Potential Implications for Transport Demand

### Passenger Rail

- 6.38 Testing the future scenarios in the NDTM gave the following results:
- Scenarios 2 and 4 have materially higher growth in road traffic than Scenarios 1 and 3 – and this is principally related to the Technological and Sociocultural Change dimension.
  - In Scenarios 1 and 3, energy prices are high and there is a preference for digital interaction, and this drives down road travel rates – particularly for long distance travel e.g. between City Regions.
  - Scenarios 1 and 2 have materially higher growth in rail usage than Scenarios 3 and 4 – and this is principally related to the Enabling Policy and Plans dimension.
  - In Scenarios 1 and 2 development is centralised and public transport access to urban cores is emphasised; this leads to more and longer distance rail travel, particularly between City Regions.
  - Conversely, in Scenarios 3 and 4 development is dispersed across urban areas and public transport access to urban cores is not emphasised; this leads to less and shorter distance rail travel.
- 6.39 The work done to date on the STP has identified a spatial preference for ‘Compact’ economic growth, i.e. growth focussed in economic centres. There is little or no direct effect that planning policy could have to specifically realise a more ‘Digital’ or ‘Travel Friendly’ future. ‘Compact’ economic growth is therefore considered here, represented by Scenarios 1 and 2.
- 6.40 The outputs of the study for Scenarios 1 and 2, showing forecast demand growth to 2050 for rail, are presented in Table 6.2 to Table 6.4 below:

**Table 6.2: Rail travel demand growth to 2050 (Commuting)**

Travel Demand Growth	Scenario 1:	Scenario 2:
Within City Regions	90%	90%
Within rest of the North	30%	7%
Between City Regions	259%	328%
Between City Regions and the Rest of the North	129%	187%
<b>Total (within the North)</b>	<b>90%</b>	<b>93%</b>
To and from External Zones	-12%	0%
<b>Total</b>	<b>-8%</b>	<b>4%</b>

**Table 6.3: Rail travel demand growth to 2050 (Business to Business)**

Travel Demand Growth	Scenario 1:	Scenario 2:
Within City Regions	9%	15%
Within rest of the North	8%	13%
Between City Regions	1%	19%
Between City Regions and the Rest of the North	1%	16%
<b>Total (within the North)</b>	<b>5%</b>	<b>16%</b>
To and from External Zones	-5%	7%
<b>Total</b>	<b>-3%</b>	<b>9%</b>



**Table 6.4: Rail travel demand growth to 2050 (Other)**

Travel Demand Growth	Scenario 1:	Scenario 2:
Within City Regions	35%	48%
Within rest of the North	2%	13%
Between City Regions	27%	53%
Between City Regions and the Rest of the North	12%	40%
<b>Total (within the North)</b>	<b>27%</b>	<b>42%</b>
<i>To and from External Zones</i>	-6%	1%
<i>Total</i>	<i>0%</i>	<i>9%</i>

Source (all tables above): Northern Demand Transport Model (TfN)

- 6.41 As can be seen, in both scenarios the strongest growth in commuting demand is between city regions (259% and 328% in Scenarios 1 and 2 respectively). For ‘Other’ demand, Scenario 1 sees the strongest growth within city regions (35%) followed by between city regions (27%), whereas Scenario 2 sees the strongest growth between city regions (53%), followed by within city regions (48%). For Business to business demand, Scenario 1 sees limited growth across all categories, with the strongest within city regions (9%); Scenario 2 sees the strongest growth between city regions (19%).
- 6.42 The Northern Transport Demand Model outputs matrices of future demand between district pairs in the North. The results shown in Table 6.2 to Table 6.4 represent aggregations of modelled results at a district-to-district level. These matrices provides the basis for future work, which would apply these demand matrices to the rail network using an assignment model, in order to understand the magnitude of demand changes by route under the various scenarios.
- 6.43 At present, such an analysis has not been undertaken. However, a high level analysis of the demand implications for long distance (defined in this instance as greater than 20 miles) demand under Scenarios 1 and 2 on a corridor by corridor basis has been undertaken to support this report.

#### *Freight*

- 6.44 A quantitative assessment of the impact of variations in rail freight demand between 2016 and 2050 has been undertaken. 2050 demand has been modelled both with and without ‘NPIER growth’ – that is, the transformational economic growth outlined in the NPIER (Section 3). For the purposes of the freight assessment, it is assumed that no infrastructure enhancements have taken place during this period.<sup>18</sup>

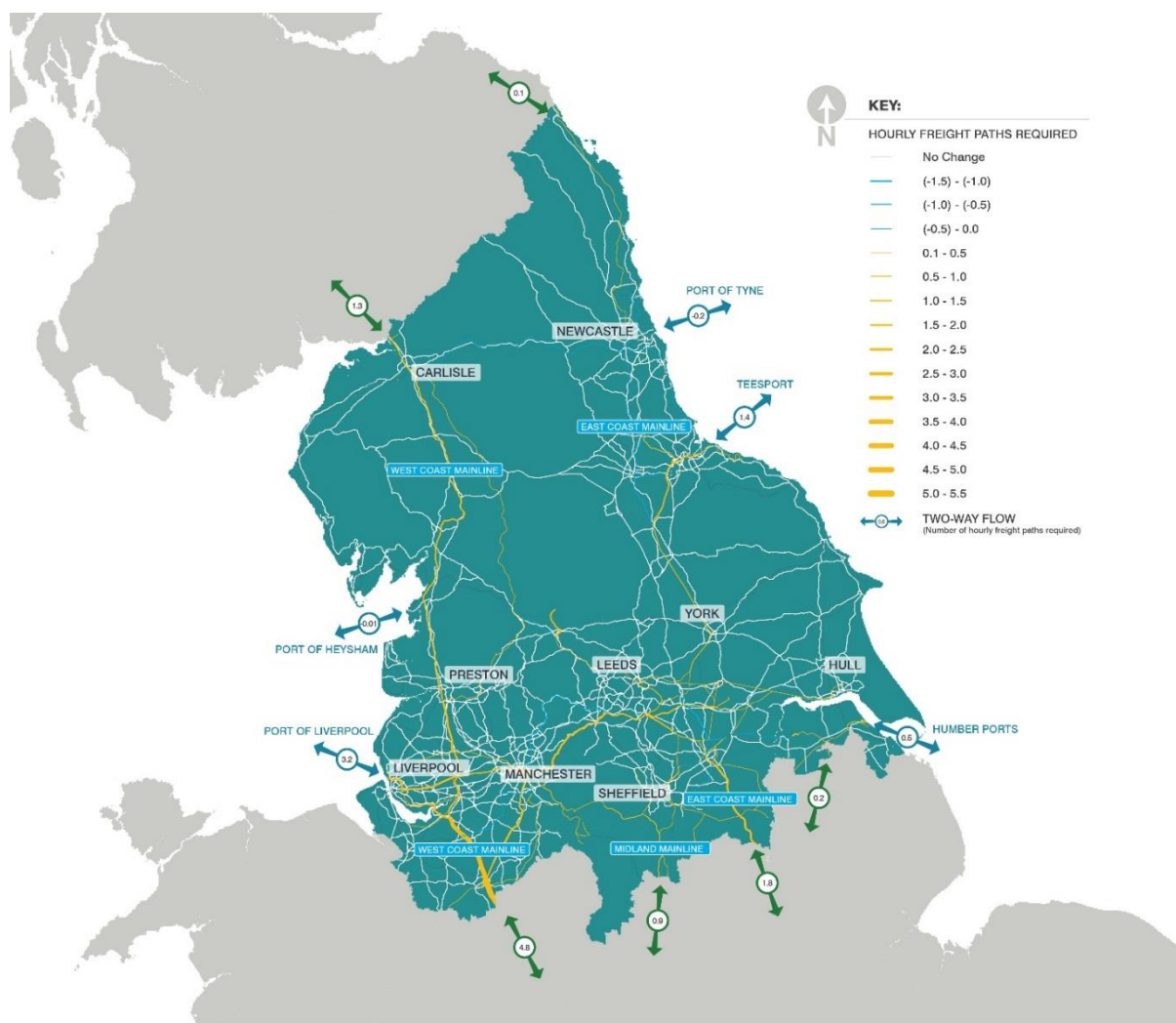
<sup>18</sup> Whilst there are infrastructure enhancements currently under way which may improve the performance of rail freight, including gauge clearance schemes such as South Humber Main Line, the analysis presented here has avoided making assumptions about the outputs of such schemes. This does not materially affect the conclusions of the analysis.

- 6.45 It is considered that the ‘common currency’ of rail paths (as required by both passenger and freight trains) is suitable for use as a means of identification of where network capacity is limited. The analysis is based on the further assumption that current freight paths are ‘protected’ for future use, and will not be converted to passenger paths, or to flex<sup>19</sup> a passenger path to accommodate higher line speeds. A detailed analysis of the opportunities and threats for rail in relevant freight markets has not been undertaken at this stage.
- 6.46 The methodology adopted in this assessment is based on an examination of trunk routes. It allows for a consideration of the consequences of any increases in demand for paths, and the locations on the network in which this demand will be. Further work to review junction capacity limitations and conflicts is required, however, as no suitable pan-Northern evidence exists at the date of this report.
- 6.47 The analysis presents the outputs of the Great Britain Freight Model (GBFM) which shows the routing of freight services on the network in 2016 and 2050 measured in paths per hour, as a total for both directions.
- 6.48 The difference in hourly freight paths required between the 2016 base scenario and the 2050 Do Nothing (with NPIER) scenario is shown in Figure 6.3. Further detail of this analysis, including maps showing the total paths required in 2016 and 2050, as well as the impact that NPIER growth would have on path requirements by 2050, will be included within analysis undertaken as part of the enhanced Freight & Logistics programme.
- 6.49 A significant caveat is required in that, to a far greater extent than passenger services, freight does not ‘care’ which route it travels, and therefore there can be more flexibility as to the nature (route) of a path from a given origin to a given destination. Provided that the journey is economically viable for the operator and attractive to the customer (for example, not made uneconomically viable through circuitous routing), it does not matter what route the train takes. Therefore, if a given section of line is at capacity and may not be capable of easily or economically being upgraded, it may well be more economical to consider upgrading an alternative route. Further analysis within the context of the updated LTRS and North of England Route Study is expected to consider such points.

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<sup>19</sup> ‘Flexing’ a passenger path refers to localised changes to path timings to accommodate other services which may have had a more substantial timing change, leading to conflicts under the timetabling rules

Figure 6.3: Difference between 2016 and 2050 with NPIER scenarios - Hourly Rail Freight Paths Required



Source: Arup

- 6.50 Figure 6.3 shows the growth is strongest along the WCML south of Runcorn (more than five additional paths per hour), with substantial growth also seen on the remainder of the WCML. There is also significant growth, of at least two paths per hour across both directions, along the length of the WCML (including the connections into Liverpool), the ECML south of Doncaster, routes into Manchester, and the trans-Pennine route.

*Qualitative assessment of freight capacity constraints*

- 6.51 A qualitative analysis has been undertaken, based on a comparison between 2016 and 2050 demand for freight paths on individual route sections. The full results of this analysis are included within the enhanced Freight & Logistics Programme. Here, we present only those sections of route where it is considered that the realisation of the freight projections will be difficult to achieve. It should be noted that the analysis is presented on the basis of key origins and destinations, and reflects an unconstrained network based on corridors in their current form and availability. This work will be progressed at a more detailed level through subsequent work within TfN's Strategic Corridors (SDCs), with the benefits of new and improved freight routes considered within a programme level business case up to 2050.
- 6.52 The values in Table 6.5 are the total future path forecasts per hour for both directions – it is assumed that there is a balanced flow with half the traffic in each direction so that 1tph from A-B and returning B-A is recorded as 2 paths.

**Table 6.5: Route Section Qualitative Freight Analysis (Plain Line Capacity Excluding Junction Capacity Constraints)**

Route Section	Tracks	2016	2050	Delta	Comment
Hartford to Weaver Junction	2	5.9	9.2	3.3	This is a significant increase on a double tracked mixed traffic section and so could be difficult to achieve
Crewe to Wilmslow	2	<2	3.1	2.1	This is an already congested route with an intense passenger service on parts of the route and LDHS services on others. This section is likely to be congested
Wilmslow to Slade Lane	2	<2	2.2	1.2	
Slade lane to Ardwick	2	<2	2.9	1.9	
Ardwick to Trafford Park	2	<2	4.9	3.9	
Doncaster to Retford	2	<2	4.6	3.6	This is a high speed two-track section of the ECML and is likely to present a significant constraint in terms of the volume of additional freight paths required; alternative routings may however be available.
Retford to Newark	2	<2	3.1	2.1	
Tapton Junction to Claycross South Junction	2	4.5	5.4	0.9	The moderate increase in freight traffic on these routes could be difficult to achieve due to the volume of passenger traffic.
Clay Cross South Junction to Ambergate	2	<2	2.3	1.3	
Ardwick to Guide Bridge	2	<2	2.4	1.4	This is a congested stretch of track though some sections may be capable of four-tracking
Guide Bridge to Mirfield	2	<2	2.0	1.0	

Source: Arup analysis for TfN

- 6.53 Determination of the capability of individual track sections to handle the forecast volumes of freight and passenger traffic is a function of the signalling capability of the line, the junction conflicts/constraints, and the mix of traffic (types and speed), as well as the number of tracks / loops (as outlined in section 5).
- 6.54 Whilst this initial analysis provides an indication of potential capacity constraints based on the available information, more detailed analysis, on a corridor by corridor basis and including junction capacity constraints, will need to be undertaken alongside analysis of passenger service demand. This will allow for the development of interventions to alleviate constraints.

6.55 Nevertheless, as a result of this initial analysis it has been possible to identify a preliminary list of the most likely areas of conflict between demand for freight paths and passenger paths, based on the currently assumed routings:

- Hartford to Weaver Junction;
- Crewe to Trafford Park;
- Doncaster to Newark;
- Tapton Junction to Ambergate; and,
- Ardwick to Mirfield.

6.56 As noted above, interventions to address these constraints and conflicts need not necessarily be on these sections of line themselves, as alternative routes may be feasible.

## Conclusion

6.57 There is a reasonable degree of certainty about the changes in supply that will occur in the short to medium term, with service changes for the two main North of England rail franchises committed as part of the franchise agreements, and infrastructure projects such as Northern Hub, South Humber Gauge Clearance, and East Coast Upgrades already under way.

6.58 In the longer term, HS2 Phases 2a and 2b will involve the provision of new infrastructure in the North, in 2027 and 2033 respectively according to the current timetable. However, only Phase 1 of the scheme (London – Birmingham) is committed. NPR is under development, and will be further refined by TfN over the remainder of 2017, but would also be a long term, transformative infrastructure project in the North.

6.59 The demand growth projected by the NDTM to 2050 is significant, with the strongest growth in passenger demand expected in city region to city region journeys. Whilst the committed service and infrastructure enhancements will improve the capacity and connectivity offered by the rail network, the scale of growth predicted, especially in commuting between city regions, will likely require larger scale improvements. TRU, NPR and HS2 may offer transformational changes, but further work will be required to understand the routes on which passenger demand growth will be strongest, and whether these projects are sufficient to cater for it.

6.60 Freight demand is also forecast to grow by the NDTM, although this must be considered alongside the baseline position of recent falls in demand. The only scheme underway that specifically caters for freight is the South Humber Gauge Clearance project. Given that most freight routes are on routes shared with passenger traffic, there are likely to be competing demands for capacity.

# 7 Economic Gaps and Conditional Outputs

7.1 This section builds upon the baseline established in Section 5 and the economic forecasts and known commitments outlined in Section 6, and provides a review of gaps that will require intervention beyond that already proposed or committed by TfN or its partners. The gaps are reviewed at both a strategic level, in order to feed the STP with a series of connectivity priorities along pan-Northern Strategic Development Corridors; and, as a means to understand where benefits could be maximised through a process of complementary enhancement and integration across the whole rail network.

7.2 The gap analysis has been used to propose Conditional Outputs through evidence-based metrics, and so define standards that will be brought together within a Single Integrated Rail Plan during the remainder of 2017.

## Strategic Gaps

7.3 Gap analysis is widely used when developing transport strategies. In the context of this Initial IRR, a strategic gap is a statement of how the outputs provided by the North's rail network fall short of what is needed to meet the overall vision and strategic objectives that have been set for it. When identifying these strategic gaps consideration has been given to the outputs delivered by the railway as it is now, as well as the enhancements that are currently committed.

## Review of LTRS Gaps

7.4 The LTRS set out a vision of the North's railway contributing to sustainable economic growth, and also identified that the outputs delivered by the North railway fall short of what is required to meet this vision. A number of strategic gaps were identified that would need to be closed if this vision were to be met in full.

7.5 The LTRS gaps were identified in four key areas, known as the 'Four Cs':

1. Better **connectivity**
2. Adequate **capacity** for passenger and freight
3. A transformation of quality driven by network **coherence**
4. A more efficient and **cost-effective** railway.

7.6 In addition, LTRS identified the role that rail can play in facilitating environmentally sustainable growth.

7.7 The analyses undertaken for this Initial IRR, along with stakeholder engagement, have indicated that the Four Cs structure remains valid and offers a coherent and comprehensive framework within which to develop a set of conditional outputs.

## Conditional Outputs

- 7.8 The Initial IRR is, as part of TfN's vision, seeking to present a set of options and a framework for prioritisation which will deliver transformative economic growth, as set out in the NPIER.
- 7.9 This section outlines conditional outputs for the Initial IRR; these conditional outputs are a description of what would need to be achieved in order to meet the goal of achieving transformative economic growth. They are defined in a manner which is not constrained by considerations such as cost, efficiency, deliverability, or political acceptability: instead, they represent a potential pathway to the desired outcome.
- 7.10 It is therefore important to clearly highlight the 'conditions' associated with the conditional outputs. Schemes which are developed to pursue the conditional outputs must be assessed with reference to:
- Affordability – can schemes be afforded within the transport budget?
  - Value for Money – do schemes represent an efficient use of public funds to deliver benefits?
  - Deliverability – is the organisational capacity to design, build and operate schemes available? Is their delivery technically reasonably practicable?
  - Political acceptability – do schemes take appropriate account of local, regional and national political concerns, in particular with relation to the built and natural environment
- 7.11 In developing the Initial IRR, research and stakeholder engagement were undertaken, driving the development of the conditional outputs. This process allowed for an evidenced approach to be taken, which also has agreement and support from TfN's partner organisations, and has informed updates to Rail North's Single Investment Plan (SIP) list.
- 7.12 The development of conditional outputs was undertaken with a view to generating a small number of measurable conditional outputs, which were of sufficient scope to provide confidence that achieving them would drive the 'transformative economic growth' agenda of the NPIER. It is very important that the outputs are 'tractable', in the sense that they must be measurable in a consistent way using an agreed methodology and which make use of available data and/or software.
- 7.13 Also consistent with the approach established in the LTRS, this Report proposes four conditional outputs for passenger and freight services. These are summarised in Table 7.1:

**Table 7.1: Rail Conditional Outputs**

	Passenger	Freight
Connectivity	To increase the proportionate population catchment within 60 mins / 90 mins of economic centres of the North	To efficiently link industry to markets in terms of reduced journey times and transfer arrangements
Capacity	To reduce crowded minutes on rail services in the North	To provide rail freight capacity in advance of forecast demand such that rail supports the economic growth of relevant markets
Coherence	To deliver a consistent, predictable, easy to use service with appropriate high quality rolling stock	To develop a rail freight network that is suitable for the current and future markets for rail freight in capability terms, and provides a consistent unified system that is easy to understand and access
Cost Effectiveness	To ensure a more cost-effective railway in the North	Efficient transportation of goods in terms of lower unit rates and reduced transit times



7.14 The importance of identifying conditional outputs for both freight and passenger services has driven the establishment of parallel, equivalent conditional outputs in Table 7.1 above. However, it should be noted that the evidence base for freight is at an earlier stage of development than that for passengers: therefore, the conditional outputs developed for freight are of a more high-level nature, and we would expect these to be developed further as part of TfN's 'Enhanced Freight and Logistics Analysis Programme'.

7.15 Each of these conditional outputs is described in greater detail below.

**Connectivity (passengers) – To increase the population catchment within 60 mins / 90 mins of economic centres of the North**

7.16 As noted in Section 3, one of the key requirements for transformational economic growth is improved connectivity, which is essential in order to generate and capitalise on positive agglomeration externalities, thereby increasing productivity (and consequently economic output) in the North.

7.17 Rail contributes to several aspects of connectivity. These include journey times, service frequency, access times, and interchange times. In order to link these as closely as possible to the identified priorities of the NPIER, we have considered these in relation to how much of the population is within reasonable access times of economic centres – i.e. the 'population catchment' of economic centres.

7.18 The NPIER prescription suggests that broader and deeper labour markets are a key factor in delivering transformational economic growth, and we therefore have considered an increase in the population catchment as being a key driver of transformational growth, since it:

- broadens the labour market by bringing a greater proportion of the population of the north within commutable distance of economic centres; and,
- deepens the labour market, because increasing the size of the population catchment will usually also improve the accessibility of economic centres from areas which are already within the commutable catchment, and therefore encourage a greater participation in the labour market.

7.19 The evidence provided in Section 5 shows that there is very limited demand amongst the population of the North for commutes which include rail journeys in excess of 60 minutes, as evidenced by Figure 5.2, which shows that more than 95% of season ticket journeys into Northern cities are less than one hour. Once access and wait time at the station of origin is factored in, this could relate to a total travel time to the desired final station of more than one hour.

7.20 This suggests that the population catchment of economic centres is an area approximately one hour's journey time distant; although this may be slightly greater when access and wait times are factored in.

7.21 Schemes that would be likely to increase the population catchment of economic centres of the North are therefore those which reduce the time taken to access them, as this enlarges the area within a commutable distance. These will include journey time improvements, frequency increases (due to improved interchange opportunities driving reduced waiting time between services), accessibility improvements, and new stations/lines, as well as schemes that would increase and improve journey opportunities through better integration between services.

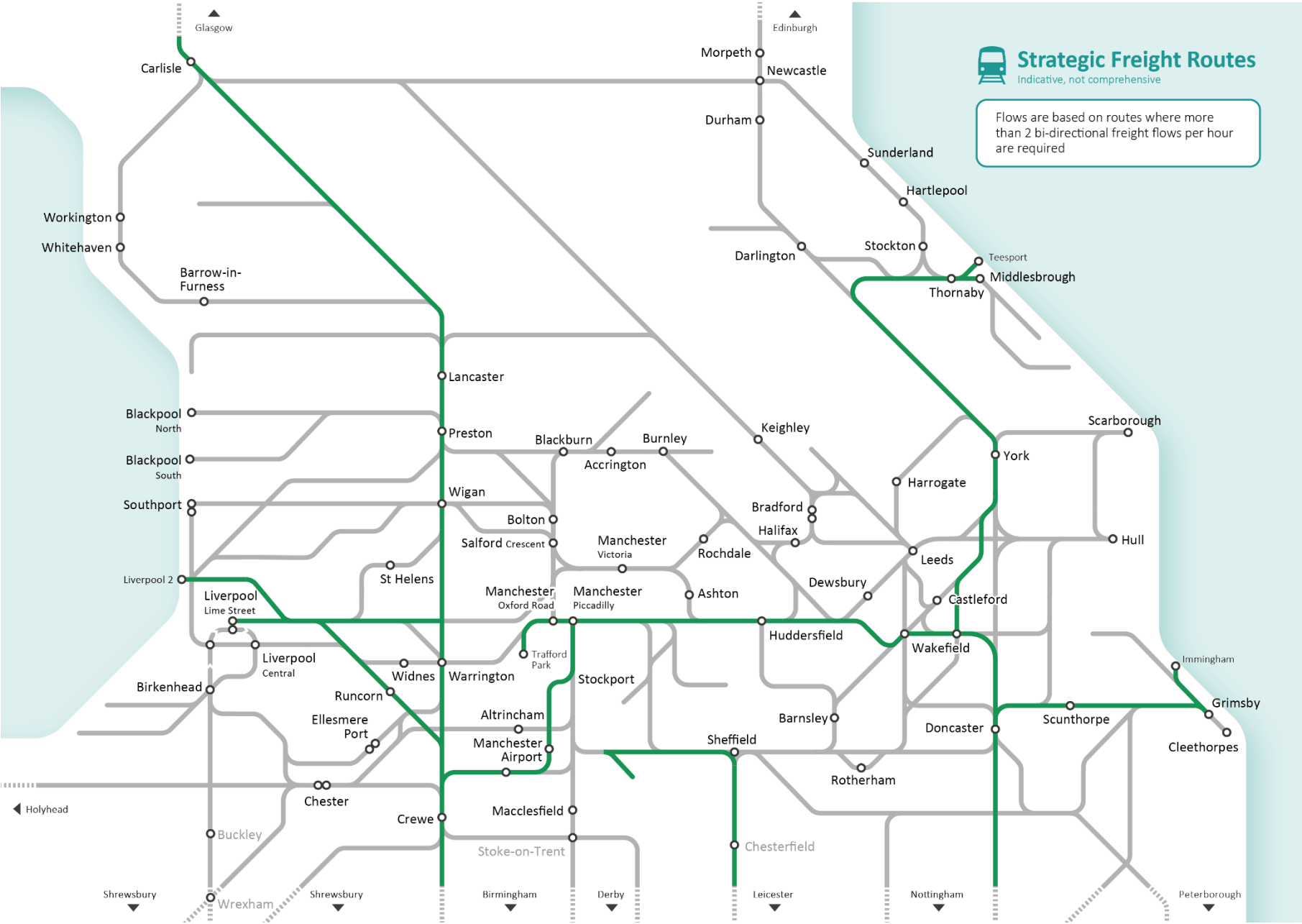


- 7.22 On this basis, a metric of ‘connectivity’ can be defined which links clearly to economic growth, and also allows for an assessment of the scale of investment required to make a transformational change in the breadth and depth of the labour market of the North. We have considered that this metric is best expressed as the proportion of a population (which could be the population of the North, the population of a city region, or even the population of the UK) that can access an economic centre within a defined time band.
- 7.23 To illustrate this conditional output, we have developed three case studies which show how applying a consideration of population catchments illustrate the connectivity impacts of rail schemes. This work will form part of the detailed analysis that will feed into the updating and expansion of the existing LTRS, which, alongside the outputs from the NPR workstream being progressed in parallel, will be the core documents contributing to the SIRP.

**Connectivity (freight) – To efficiently link industry to markets in terms of reduced journey times and transfer arrangements**

- 7.24 As well as passenger services, rail freight services have a key role to play in boosting the Northern economy, as detailed in Section 3 of this report. The role that freight currently plays is outlined in Sections 5 and 6 of this report, noting the significant network constraints faced by the rail freight sector.
- 7.25 In order to improve the economic contribution that rail freight can make to the Northern economy, it is essential that the sector becomes a more competitive provider in some markets. Whilst this is in part the responsibility of the rail freight industry itself, there is also a key role for the public sector to play in terms of investing in the rail network and providing capacity for freight as the industrial basis of the North evolves.
- 7.26 In order to derive a conditional output with respect to the rail freight market, we have drawn upon the research being undertaken in parallel with this project as part of TfN’s Enhanced Freight and Logistics Analysis Programme. This work has identified, at an indicative level, strategic flows, reproduced in Figure 7.1.

Figure 7.1: Strategic freight flows in the North



- 7.27 In order to improve the attractiveness of freight, these flows need to be served by a strategic freight network, which provides for paths with competitive journey times, and with greater reliability. One way of contributing to this goal could include, for example, ensuring that there is a fast trans-Pennine path via Huddersfield available every hour for freight, which would reduce the journey time compared to a freight path routed via the Calder Valley line.
- 7.28 Investing in infrastructure which allows for more freight paths can, in some circumstances, allow for less circuitous routes to be used than those which are currently available, and would therefore improve journey times (due to the reduced distance travelled), cost, and reliability (by reducing the amount of potential conflicting movements). As such, the map should be taken as indicative and not comprehensive. A more detailed analysis of future freight strategy and requirements will form part of the LTRS update, and is expected to clarify strategies on how the North's economic hubs should be linked by rail freight, and how the various markets it may serve in future are expected to evolve.
- 7.29 The freight conditional outputs in this report are still at an early stage of development, and it is anticipated that they will be further refined as part of TfN's 'Enhanced Freight and Logistics Analysis Programme'.

#### **Capacity (passengers) – To reduce crowded minutes on rail services in the North**

- 7.30 Section 5 of this report noted that, according to the limited data available, services into some cities in the North currently suffer from significant crowding. Section 6 of this report highlighted the projected increase in rail demand that will be realised in the period to 2050. Taking these two points together highlights the requirement for adequate capacity in the rail network to transport the volumes of passengers that will be required to deliver transformative economic growth.
- 7.31 Crowded minutes are an expression of the amount of discomfort passengers experience due to crowding, and for how long this level of discomfort is experienced. Crowded minutes are calculated on the basis that passengers begin to suffer discomfort at a load factor of 70%, and that this discomfort becomes more severe at higher load factors. The severity of the discomfort is multiplied by the time for which it is felt to give the total crowded minutes.
- 7.32 The issues of capacity, measured in this case by crowded minutes, is important because the scale of increase in demand that is projected in Section 5 of this document cannot be accommodated without additional capacity. In a worst case scenario, failure to provide the required capacity may 'crowd people off' the rail network – i.e. passengers will choose not to travel by rail (and potentially not travel at all), having a direct negative effect on the economic performance of the North. Even moderate levels of crowding will have a negative impact with regards to rail offering an attractive product which encourages the kind of movement with and between economic centres that is associated with economic growth.
- 7.33 Reducing crowded minutes whilst at the same time catering for demand growth represents a stretching target, since this by definition requires an increase in capacity of more than the increase in demand.

- 7.34 The two primary ways in which increased capacity can be delivered is via longer trains, and via more frequent services. In many cases, being able to deliver either of these will require investment in infrastructure as well as rolling stock (for example, for platform lengthening). Therefore, assessing whether schemes deliver the opportunity for the North to face lower fewer crowded minutes as part of this conditional output will help to prioritise schemes that unlock the potential for transformational economic growth in the North.

**Capacity (freight) – To provide rail freight capacity in advance of forecast demand such that rail supports the economic growth of relevant markets**

- 7.35 Section 6 set out the forecast increase in paths required for rail freight, under both ‘Business as Usual’ and ‘NPIER’ growth assumptions. In both cases, a substantial number of new paths will be required for freight, and this increase in demand will need to be realised alongside increased demand for passenger services.
- 7.36 It will be important, therefore, to draw upon the forecast demand for freight paths and to plan for these when specifying future capacity upgrades for the network as a whole. As noted above, it is anticipated that the Freight Conditional Outputs will be further refined as part of TfN’s ‘Enhanced Freight and Logistics Analysis Programme’.

**Coherence (passengers) – To deliver a consistent, predictable, easy to use service with appropriate high quality rolling stock**

- 7.37 The coherence of the rail network is a key factor in encouraging passengers to use the network. Perceptions of non-users of the nature of rail travel must be improved in order to encourage the use of rail. The requirement for services to be coherent includes the need for them to be:
- **Consistent** – with services that can be used in the same way throughout the North, giving confidence to the passenger that their expectations will be met and that the product will be delivered in a satisfactory manner;
  - **Predictable** – with, as far as possible, services that are on time, without cancellations, and formed of the correct number of coaches;
  - **Integrated** – with timetables optimised for convenient and reliable connections and a fares/ticketing policy that encourages this;
  - **Easy to use** – with access for all passengers across the network, ticketing that is transparent and understandable, efficient interchange, and facilities at stations that allow passengers to understand the network clearly; and,
  - **Appropriate, high quality rolling stock** – which is designed for the routes it serves (for example, specific rolling stock for use on airport services with extra luggage room).
- 7.38 Delivering a railway which is coherent in this manner will be an important driver of encouraging passengers to switch from using their cars to using rail services. Public perception is fundamental to realising the benefits of coherence; it is therefore proposed that the most tractable method for measuring the coherence of the network is by analysing responses to transport surveys.
- 7.39 The National Travel Survey is undertaken every year by the DfT, and this offers an important starting point in understanding why people choose to travel, and what affects their choices.
- 7.40 In order to target a more coherent railway in the North, the responses to the National Travel Survey amongst both rail users and non-users need to be considered.

**Coherence (freight) – To develop a rail freight network that complements the characteristics of the road network and provides a consistent unified system that is easy to understand and access**

- 7.41 As suggested in Section 5 of this document, rail freight is increasingly focussed on the intermodal sector, transporting standardised container units. Rail at present only has a competitive advantage in transporting large volumes over significant distances without being subject to highway congestion, and potentially at low cost. However, containers will normally need to be distributed from intermodal freight terminals by HGVs, and it is therefore essential that the process of HGVs accessing intermodal terminals and undertaking the ‘last mile’ distribution is coherent – in particular that it is consistent and easy to understand. Other sectors of rail freight (such as oil, steel, nuclear, or aggregates) may have dedicated terminals on their customers’ premises, but are constrained by the limits of the reach of the rail network.
- 7.42 If this coherence is achieved, and confidence is built amongst hauliers that rail can form an important part of their businesses, rail freight will be able to grow and play an increasingly important part in the market, driving economic growth in a more environmentally friendly manner than transport by road. Further work will be undertaken by TfN to more fully explore the metrics by which such coherence could be measured in terms of rail freight. As noted above, it is anticipated that the Freight Conditional Outputs will be further refined as part of TfN’s ‘Enhanced Freight and Logistics Analysis Programme’.

**Cost-effectiveness (passengers) – To ensure a more cost-effective railway in the North**

- 7.43 The railway in the North has historically been a high subsidy railway – but this is changing. The current TransPennine Express franchise will pay a premium for the first time in the history of the franchise, and the subsidy for the current Northern franchise is lower than it has been in the past. Overall, it is expected that by the end of the current franchises the aggregate position of the two franchises will be premium rather than subsidy.
- 7.44 However, in order to promote further opportunities for investing in rail in the North to support the Northern economy, the future railway must be as cost-effective as possible. This will encourage investment in the North of England rail network, since Government will be investing in a railway which delivers returns to the exchequer in the form of comparable economic, social and/or environmental outcomes for a lower cost, or better outcomes for the same cost.
- 7.45 Targeting cost effectiveness, including ‘investing to save’ such as through capital schemes like electrification or re-signalling, should be considered in terms of three two main metrics:
- **reduced operating costs per vehicle-km:** targeting this metric encourages the use of more efficient rolling stock and better working practices to drive down the cost of the provision of services; and,
  - **reduced operating costs per passenger km; and increased revenue per passenger-km:** targeting these metrics encourages the efficient use of existing provision, with more journeys encouraged in quieter times to therefore reduce the expenditure per passenger on the railway, and increase the amount of farebox revenue from the provision of services, particularly in the off-peak, allied to more effective revenue protection measures.

**Cost-effectiveness (freight) – Efficient transportation of goods in terms of lower unit rates and reduced transit times**

- 7.46 Cost effectiveness for freight is of key importance to a sector with, at present, tight margins. Therefore, in order to contribute to economic growth, the rail freight sector needs to be able to provide effective competition to established, efficient road based freight.
- 7.47 In order to make freight cost-effective, the network needs to be able to transport goods quickly and at low cost. Since the rail freight sector is operated on a competitive basis without direct subsidy<sup>20</sup>, there is limited scope in the short term for the public sector to reduce operating costs directly, with the exception of altering the structure under which track access payments are set. However, through capital investment (for example in electrification, linespeed improvements, gauge enhancements or increases to permissible train lengths) reductions in operating costs for rail freight operators could be achieved.
- 7.48 However, all of the other three conditional outputs will contribute to reducing costs: improved connectivity will reduce transit times, increased capacity could lead to reduced journey times and lower unit costs, and improved coherence will reduce the total cost of intermodal freight. As noted above, it is anticipated that the Freight Conditional Outputs will be further refined as part of TfN's 'Enhanced Freight and Logistics Analysis Programme'.

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<sup>20</sup> Subsidy exists in the track access mechanisms current paid by FOCs, and through Network Rail's direct grants.

## 8 Options and Sequencing

### Scope

- 8.1 The role of the Initial IRR is to provide a framework that allows the STP to establish a series of connectivity priorities to support the Transformational economic growth set out in the NPIER.
- 8.2 The schemes included in this Initial IRR are generally those of a national scale or a strategic pan-Northern scale. In some instances, local schemes which have strategic implications elsewhere on the rail network have also been included.

### Identification of Corridors

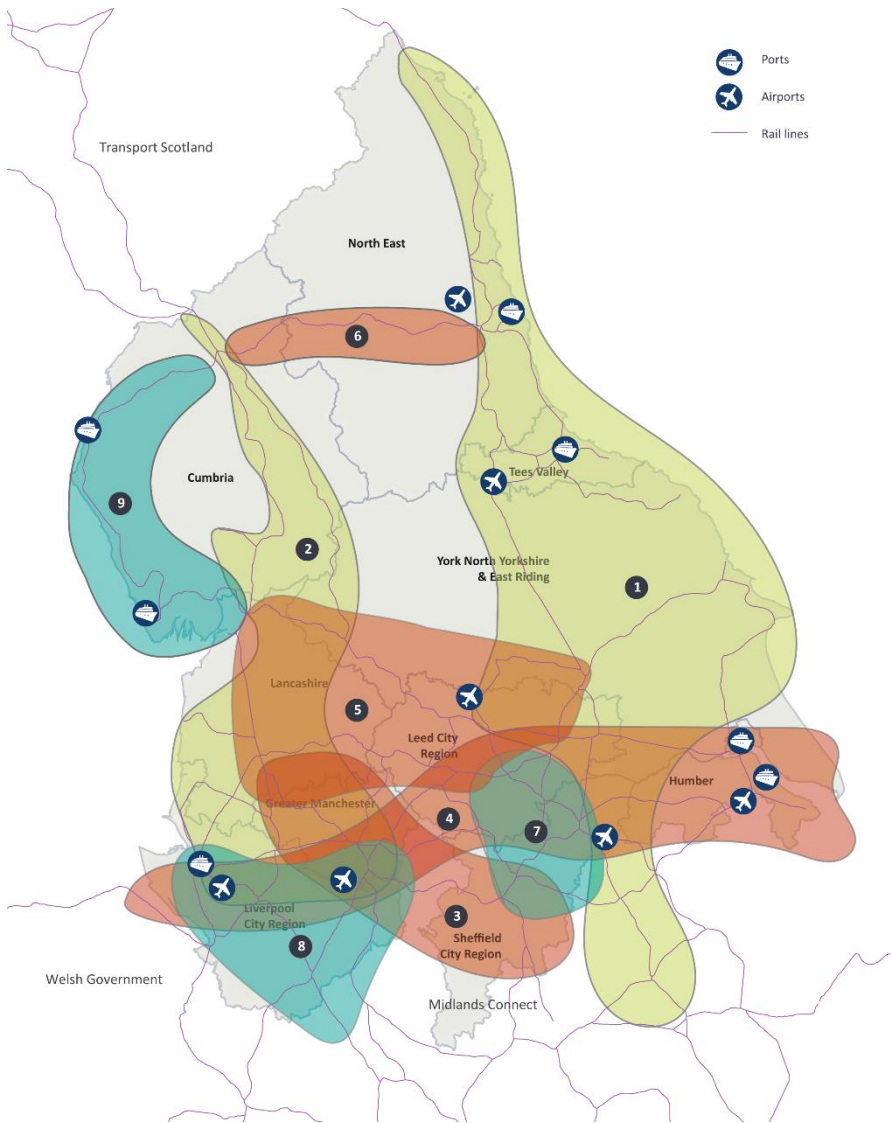
- 8.3 In order to provide a coherent narrative for change as part of this Initial IRR, and in a format which allows for comparison with the MRR, we have considered the schemes provided to us by partners on the basis of broad corridor / theme interventions.
- 8.4 In general, the broad routes a corridor can follow on the rail network are pre-determined by the existing rail infrastructure.<sup>21</sup> We have worked within the general constraint of the existing rail network to consider how to structure corridors that would broadly tie together the identified key assets of the NPIER Prime Capabilities shown in Figure 8.2.
- 8.5 The broad corridors developed in support of this report are shown in Figure 8.1 alongside the spatial distribution of the Prime Capabilities.

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<sup>21</sup> The exception to this is in the instance of new lines being proposed. In order to allow for the potential that further work identifies a case for investing in new lines, the corridors have been identified at a network-wide level, covering all current existing lines. Where such existing lines do not appear to provide satisfactory solutions to address economic or social priorities, the requirement to consider new lines along new corridors could then be pursued.

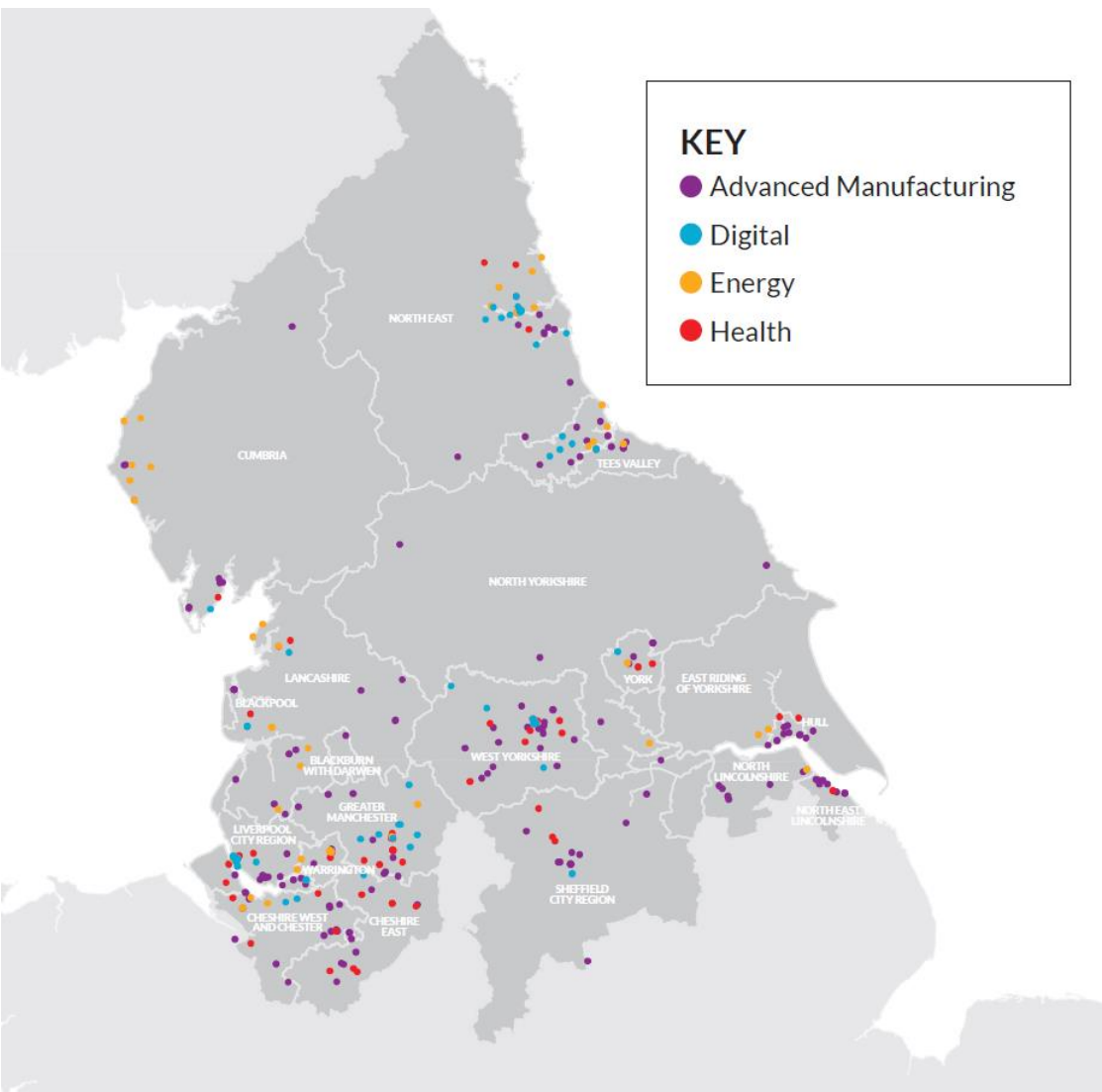


Figure 8.1: Strategic Development Corridors



Source: NPIER

Figure 8.2: Sample Locations of Key Assets of the NPIER Prime Capabilities





## 8.6 Table 8.1 details these corridors, and the rationale for their inclusion in this analysis.

**Table 8.1: Summary of Strategic Development Corridors**

Corridor	Pan-Northern
1. North-South (Eastern Corridor - North East – Tees Valley – North Yorkshire – Leeds CR – Sheffield CR)	This broad corridor connects the North East and Tees Valley with Hull & Humber, Leeds City Region (CR), Sheffield CR, Greater Manchester, and areas outside of the North. There are significant clusters of all four 'Prime Capabilities' in the North East and Tees Valley, and a corridor that links these regions to most of the west of the North is therefore vital.
2. North-South (Western Corridor - Cumbria – Lancashire – Cheshire & Warrington))	Serves the key role of connecting Lancashire and Cumbria with Greater Manchester, Liverpool CR and Cheshire & Potteries, as well as connecting western city regions with Scotland. Lancashire is home to many Advanced Manufacturing assets, as is south east Cumbria. This corridor connects these assets to key markets and other Advanced Manufacturing hubs in Liverpool CR and Greater Manchester.
3. East-West (Lancs - GM - Sheffield CR)	As well as connecting Lancashire with Greater Manchester and Greater Manchester with Sheffield CR, has the potential to connect Lancashire and Sheffield CR across Manchester. All three regions have strong Advanced Manufacturing assets.
4. East-West (Liverpool - Hull & Humber)	Directly connects four city regions, and also provides connections from neighbouring city regions, such as Lancashire, Sheffield CR and North Yorkshire, with city regions along the corridor. All four Prime Capabilities are represented along the full corridor, although Digital is mostly focussed in the centre of the Corridor in Manchester and Leeds.
5. East-West (Lancs - N Yorks / Leeds CR)	Connects key economic centres in Lancashire and Leeds CR, as well as potentially Lancashire with North Yorkshire. There are Advanced Manufacturing assets in all three city regions, and this corridor would also help to provide access between the Energy clusters in Cumbria and Leeds CR / North Yorkshire
6. East-West (Cumbria - North East)	Northernmost East-West connection, allowing for journeys between the west (Cumbria / Lancashire) and east (NE and Tees Valley). There are large clusters of Energy assets in Cumbria, the North East and the Tees Valley, and this is the only rail corridor that can efficiently link these.
7. Leeds CR - Sheffield CR	Two large city regions containing many economic centres, with rail links that are currently uncompetitive (in terms of journey time) with the parallel road corridor. There are strong clusters of Prime Capability clusters in Sheffield CR and Leeds CR, focussed both within Leeds and Sheffield, and also in the industrialised towns and cities between these two cities.
8. Cheshire & Potteries - Liverpool CR / GM	Connects significant population and economic centres in Cheshire and Potteries with Liverpool and Manchester, as well as providing gateway to West Midlands and London. There are particularly large clusters of Health and Advanced Manufacturing throughout all three city regions, as well as Energy and Digital assets. The extant rail network connects many of these sites.
9. West Cumbria Coast	Key potential for provision of Energy for the North, with strong transport links to the wider North key to delivering 'energy coast' projects. Also picks up Advanced Manufacturing assets in Furness. The corridor plays a significantly different role to the North-South (Western Corridor) corridor, and therefore is considered separately.

## Connectivity Priorities

- 8.7 The list of connectivity priorities considered by this report is shown in Table 8.2. As well as the priorities, it includes a summary of the identified demand growth in passenger and freight by strategic corridor (outlined in Section 6).
- 8.8 The schemes presented in this section are organised by corridor (as outlined above) and, where schemes are not corridor specific, by theme. This follows consultation with TfN Partner organisations, who provided detailed lists of schemes and priorities for their areas to inform this report. The limits to the scope of this Report (as discussed in chapter 1) should be noted: it is not intended that all rail interventions supported by partners should be covered by this report.
- 8.9 Connectivity priorities have been identified in three broad groups:
- Schemes which are already under construction or which are committed (i.e. funding is in place);
  - Schemes which are defined, and therefore likely to proceed once funding is secured; and,
  - Priorities identified by TfN partners, which present a range of possible interventions of national or pan-Northern significance, selected on the basis of their relevance to the conditional outputs and scope set out in this report.

**Table 8.2: Pan-Northern Interventions**

Corridor / Theme	NPIER / NTDM Gaps	Under Construction or Committed	Potential Future Connectivity Interventions
1. North-South (Eastern Corridor - North East – Tees Valley – North Yorkshire – Leeds CR – Sheffield CR)	Significant demand growth on this corridor forecast by NTDM. Lack of diversionary / alternative routes to ECML. Projected significant freight demand growth	Doncaster Capacity ECML Power Supply Upgrade	The eastern leg of HS2 Phase 2b would provide some additional connectivity on this corridor, especially if complementary schemes to upgrade major stations due to be served by HS2 services are pursued (for example at Newcastle, York and Darlington). The longer term position of the ECML is defined within Network Rail's East Coast Route Study, which looks at the requirements along the corridor (all lines) within the context of HS2, and emerging plans for NPR that include enhancements between the North East / Tees Valley and York / Leeds / Hull. Other schemes that could be pursued to increase capacity and connectivity include the Newark Flyover, upgrades to the Northallerton – Eaglescliffe line, Tyne Valley and Durham Coast, and potential line reopenings such as Harrogate – Ripon, Ashington – Blyth, and the Leamside Line. The upgrade to Middlesbrough and Sunderland stations is also considered within the context of its ongoing role as an important hubs.
2. North-South (Western Corridor - Cumbria – Lancashire – Cheshire & Warrington))	Significant demand growth on this corridor forecast by NTDM. Projected significant freight demand growth	Completion of Northern Hub Completion of North West Electrification	The completion of Northern Hub, North West Electrification and HS2 is expected to encourage investment in upgrading stations, which could boost capacity and connectivity. NPR may include services along this corridor which link into the core NPR network. Linespeed and capacity upgrades along the corridor, including on branch lines, would help meet the gaps and benefit NPIER Prime Capability assets. Need to delivery additional paths North of Preston to due to lack of capacity.
3. East-West (Lancs - GM - Sheffield CR)	Moderate demand growth forecast. Lack of connectivity between points north-west of Manchester and Sheffield CR. Significant freight flows on Hope Valley line	Completion of Northern Hub Completion of North West Electrification	There are strong local aspirations to improve connectivity and capacity along the Hope Valley line, which is the main route linking Sheffield CR and the East Midlands with Greater Manchester and Lancashire. Such improvements could potentially be delivered by, or alongside, the NPR programme.
4. East-West (Liverpool - Hull & Humber)	Significant demand growth forecast along entire corridor. Requirement for additional freight paths between Leeds - Manchester, and continuing significant freight demand on South Humber Main Line.	Completion of Northern Hub Calder Valley Upgrade	The Trans-Pennine Route Upgrade is under development, and would increase capacity and reduce journey times between Manchester and Leeds, leading to benefits along the full length of this corridor. The proposals for NPR also include longer term capacity and connectivity enhancements which will help to address the significant growth along this corridor. Other potential priorities could include enhancements to the Calder Valley line, the CLC line, routes between Sheffield and Hull, and the South Humber Main Line, as well as the development of Leeds station into the 'Yorkshire Hub'.

Corridor / Theme	NPIER / NTDM Gaps	Under Construction or Committed	Potential Future Connectivity Interventions
5. East-West (Lancs - N Yorks / Leeds CR)	Significant demand growth forecast between Lancs and Leeds CR / North Yorks. Current poor service provision and lack of plans for investment on main Preston - Leeds route	Calder Valley Upgrade	The key route currently connecting communities in East Lancashire and West Yorkshire between Preston – Todmorden could be developed in terms of improved connectivity and/or capacity.
6. East-West (Cumbria - North East)	Moderate demand growth forecast from a low base. Potential for increasing the catchment of Newcastle and wider NE / Tees Valley to include parts of Northumberland and Cumbria.		The lack of alternative East-West routes in the north of the region suggests that, if connectivity between northern city-regions in the east and west is to be improved, investment would need to focus on the Tyne Valley line. Carlisle station upgrades, supported locally, could help improve connectivity.
7. Leeds CR - Sheffield CR	Largest forecast demand growth of any city region pair. Current poor provision, with slow connections.		HS2 Phase 2b eastern leg would involve HS2 services terminating at an expanded Leeds station, with local aspirations to develop the station as the 'Yorkshire Hub'. Fast connections between Sheffield and Leeds are envisaged, but further scheme development is anticipated regarding this, potentially as part of the NPR programme. Local aspirations to develop the Hallam Line and Dearne Valley line to better exploit the opportunities of HS2/NPR could also boost connectivity between the two city regions.
8. Cheshire & Potteries - Liverpool CR / Greater Manchester	Significant demand growth forecast between Cheshire and GM, as well as routes beyond Manchester. Largest growth in freight demand forecast on WCML north of Crewe.		HS2 Phase 2a will create an HS2 hub at Crewe, with associated connectivity benefits. HS2 Phase 2b will drive a significant growth in capacity and connectivity between Crewe and Manchester, and NPR may link into this, potentially with a high speed connection to Liverpool over and above HS2 classic compatible services.

Corridor / Theme	NPIER / NTDM Gaps	Under Construction or Committed	Potential Future Connectivity Interventions
9. West Cumbria Coast	Rail freight will play a crucial role in the delivery and operation of a range of major developments including the new Moorside power station, Sellafield and a new coking coal mining proposal amongst other. Enhancements would also support labour force mobility as the line links a large number of settlements and employment sites engaged in advanced manufacturing and energy activities. Would be required to facilitate construction in the short to medium term, therefore not represented explicitly in the 2050 modelling horizon.		Improved capacity and speed on line needed to support delivery and operation of major investments. Enhanced integration between the WCML and west and south Cumbria also would support agglomeration by increasing workforce and supply chain access.
Transcends North	Limited evidence available from NTDM, but clear strategic case for strong links to neighbouring regions. Strong freight demand growth on flows running through the North (i.e. Anglo-Scottish)	HS2 Phase 1 MML Electrification ECML upgrade Completion of Northern Hub Completion of North West Electrification Halton Curve	HS2 Phase 2a and 2b would both deliver significant improvements in connectivity and capacity between the North and the East and West Midlands. Other locally supported priorities, such as upgrading the Erewash Valley line and Derby station could also contribute to this.
International Connectivity	Strong push in NPIER for better international connectivity to allow the North to realise its specialisation opportunities	Completion of Northern Hub Leeds/Bradford Airport station	Connectivity to Manchester Airport would be boosted by HS2 Phase 2b and NPR, whilst there are also aspirations to create rail links to Doncaster Sheffield Airport, Liverpool John Lennon Airport, and improve access to Newcastle Airport. Improvements to connections to ports, including for rail freight, are also strongly supported by many local partners.

Corridor / Theme	NPIER / NTDM Gaps	Under Construction or Committed	Potential Future Connectivity Interventions
Strategic Freight Network	Freight demand growth forecast throughout the North, with strongest demand forecasts on WCML (especially south of Runcorn and north of Preston), ECML south of Northallerton, Northallerton - Teesport, South Humber Main Line, Trans-Pennine routes	South Humber Gauge Clearance	Several schemes are in development by NR, with support from local partners. As well as provisions for freight in TRU, W12 gauge clearance schemes and freight capacity enhancement schemes would help to deliver a strategic freight network.

## Development of connectivity priorities

8.10 The presentation of connectivity priorities in this section is intended to inform the STP, which will consider the impact of rail and road schemes over a horizon to 2050.

8.11 Many schemes are already under construction or committed. However, the priorities set out by the STP will provide a context in which to push forward the development of schemes, potentially including those outlined in Table 8.2, and this will allow a sequencing exercise to be undertaken.

### *NPR Network Development*

8.12 TfN is currently developing proposals for NPR, which is intended to meet many of the longer term connectivity and capacity requirements of, in particular, inter-city travel in the North.

8.13 NPR represents a scheme of national scale, and is identified across several corridors in Table 8.2. It is currently anticipated that the scheme will be broadly defined over a similar timescale to the development of the STP, and we have therefore included it as a 'defined' scheme. At present, NPR is still under development, with the following aspects under consideration:

- Liverpool Station - a number of design concepts;
- Newcastle Station
- Liverpool to Manchester Route- 2 options (direct new line independent of HS2; New line linking into HS2 via Manchester Airport);
- Manchester Station - route interface with HS2 only;
- Manchester to Leeds Route – 3 options (New central option route that could also link to Sheffield, via the Calder Valley and via Diggle with potential stop at Bradford/Huddersfield);
- Leeds station - a design concept for NPR at the station;
- Leeds to Newcastle Route- 2 options (via HS2 to ECML and onto ECML direct off classic network) and line upgrades in collaboration with the rail industry planning process;
- Sheffield to Leeds Route – Upgraded classic connection from Sheffield Midland to HS2, with classic network upgrade following on if required;
- Sheffield to Manchester/Manchester Airport Route – 2 options – new central option, line upgrade in collaboration with the rail industry planning process;
- Leeds to Hull Route – upgrade in collaboration with the rail industry planning process; and,
- Sheffield to Hull Route - upgrade in collaboration with the rail industry planning process.

8.14 In 2017/18, TfN will:

- Identify interfaces with HS2 Phase 2B to allow single options decisions and inclusion in the HS2 Phase 2B Hybrid Bill in Summer 2017;
- Work with the DfT, Network Rail and HS2 Ltd to identify a number of feasible engineering options that will either deliver, or move substantially towards meeting, the conditional outputs for the NPR network; and,
- Progress work on defined Strategic Development Corridors (SDCs) as a means to identify preferred options to meet future demands within a Programme Level Business Case

8.15 On the basis of the high level conditional outputs set for NPR, we have undertaken an analysis of the connectivity implications of its introduction, in line with the connectivity conditional output described in Section 7.

*Smart*

- 8.16 TfN is currently developing the Smart North programme, which will deliver proposals for integrated ticketing across the North. This is a key scheme for addressing the coherence of the Network. Its conclusions will be further reflected in the LTRS update and the Single Integrated Rail Plan.



## 9 Next Steps and Implementation

- 9.1 This report forms a part of the evidence that makes the case for action and investment in the North's transport system, based on the economic opportunities for both the North and the UK's economy by reference to the critical strategic corridors within the North. There is a direct link between transforming connectivity and allowing the North's economy to thrive. The importance of our transport system to the transformation of our economic performance is well understood, and underlines the primary function of TfN. With the right investment in transport, skills and innovation, the NPIER identified that by 2050 the North's economy could generate an additional £97 billion in economic benefits and provide 850,000 extra jobs.
- 9.2 To achieve the shared vision of the Northern Powerhouse and the Government's Industrial Strategy, sustained and targeted investment is needed in the North's transport network. The long term investment programme will be set out in the STP. Its realisation will play a critical role in creating the conditions in which the people and businesses of the North thrive.
- 9.3 As outlined in the introduction, the Initial IRR draws together the evidence base for the North of England to inform TfN's future approach on rail-related (both passenger and freight) strategic transport investment priorities up to 2050 as part of the STP. It is positioned within a wider suite of documents that will feed into the STP, presenting the opportunity to expand upon work that has been undertaken in relation to rail alone and address the complex demands of travel across the north of England on a multi-modal basis.
- 9.4 Working collaboratively with TfN Partners, this report has:
- Set out the importance of the strategic rail corridors in delivering the transformative economic growth envisaged in NPIER;
  - Presented the current rail network in the North, including the service provision and infrastructure available, for both passengers and freight;
  - Outlined the conclusions of economic and demand forecasting work under a transformational economic growth scenario, and how this is forecast to affect passenger and freight demand in the North;
  - Brought together relevant options currently under development for infrastructure improvements, presented for the first time on a pan-Northern scale;
  - Proposed associated outcomes (Conditional Outputs) and performance measures and reviewed the existing evidence base, with recommendations for further work on developing a baseline and the future monitoring of the rail network;
  - Taken evidence on future growth from the NPIER, from TfN Partners' Growth Deals and Strategic Economic Plans, and from RN's LTRS, to identify the connectivity requirements to enable transformational economic growth; and
  - Set out a portfolio of interventions for subsequent sequencing and further development within the STP.
- 9.5 The Initial IRR and MRR, taken together, provide a portfolio of interventions by corridor that will become a single sequenced set of interventions to assist in defining TfN's investment priorities for the STP up to 2050. As a 'single voice' acting on behalf of City Regions and LEPs across the North for the first time, the interventions in TfN's STP will be those which are fundamental to the joint ambition of TfN and Government for the Northern Powerhouse to deliver a step change in economic growth.

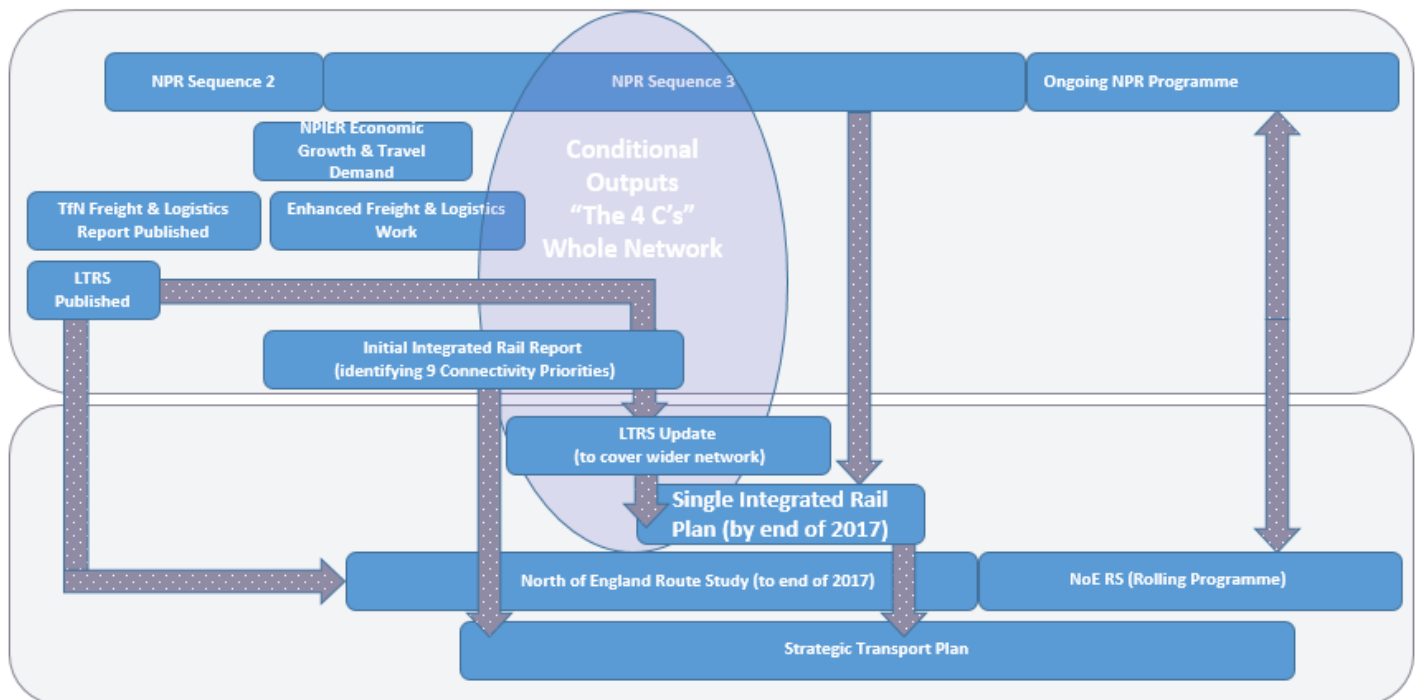
## Moving Towards a Single Integrated Rail Plan

9.6 The SIRP will be progressed using evidence from this Initial IRR, bringing together the outputs from a number of ongoing programmes by the end of 2017 including

- HS2
- NPR
- TfN's Enhanced Freight and Logistics Analysis
- Further development work from the TfN Strategic Development Corridors (incorporating each element above)
- The updating and expansion of LTRS covering the whole northern rail network, informed by the Conditional Outputs from the Initial IRR

9.7 This process will both inform, and be informed by Network Rail's North of England Route Study (NoE RS), which will be progressed concurrently towards Autumn 2017. This process is summarised within Figure 9.1 below:

Figure 9.1: Process towards a Single Integrated Rail Plan



Source: TfN

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Driving economic growth in the North



The Integrated Rail Report is the result of collaboration between Transport for the North, National and Local Partners, and appointed independent consultants working on the evidence base to support development of the Strategic Transport Plan.