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Burnley – Colne – Skipton railway: Conditional Outputs Statement

Executive Summary

The purpose of this document is to consider what transport purposes a potential rail link between Burnley, Colne and Skipton could potentially serve, in order to place such a scheme in the correct context in transport terms. These purposes are the “conditional outputs” that it might be expected to deliver. An attempt has also been made to prioritise the conditional outputs, particularly those relating to passenger transport. The intention is that, on this basis, future work can focus not only on one specific scheme, but can weigh up the effectiveness of alternative schemes in delivering the conditional outputs identified, including via business-case appraisals for differing schemes. It is also recommended that future work should explore further the value of delivering these conditional outputs – in other words, the scale of benefits that might be expected from providing the types of connectivity that could be delivered either by a rail link between East Lancashire and West Yorkshire via Colne and Skipton or, possibly, by one or more alternative schemes.

The purpose of this document is not to attempt to estimate the likely usage of any such rail link, and therefore no demand forecasting has been carried-out, only comparison of potential passenger flow strengths and consideration of likely future freight markets. As such, it makes no comment on the viability or feasibility of a Burnley – Colne – Skipton railway, nor indeed that of any other option to deliver some or all of the conditional outputs identified.

The conditional outputs cover both passenger and freight connectivity, and have reference to existing strategy documents, such as those produced by local authorities in Lancashire, North Yorkshire, Greater Manchester and the Leeds City Region, as well as Rail North and Transport for The North, plus Network Rail. The development of a prioritised set of conditional outputs as summarised in this report is, in this way, intended to build upon the objectives of those bodies.

The passenger connectivity conditional outputs have been analysed by reference to the Rail North Long-Term Rail Strategy “Interconnected Matrix” towns and cities, with the addition of:

- Manchester Airport, reflecting its strategic importance;
- Nelson-Colne, reflecting its importance as a population and employment centre with differing connectivity needs and issues from Burnley; and
- Skipton-Keighley, reflecting similar factors to Nelson-Colne, capturing the population and economy of the Aire Valley corridor.

The development and prioritisation of conditional outputs has regard to what the proposed rail route might deliver to the links between locations in that matrix, in terms of:

- Improved journey times (focusing on the target of rail journeys faster than off-peak car journeys);
- Providing direct connections where current none exists (or reducing interchange); and
- Providing additional opportunities to travelling (i.e. reducing effective service headways, focusing on the target of two opportunities to travel per hour).

These elements have then been scored and weighted by reference to a measure of the potential scale of each flow identified as potentially in scope.

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The following passenger linkages were identified as priority conditional outputs relevant to the proposed rail link (note that the location pairs are non-directional – purely as a convention, locations to the west and south appear in the left-hand columns and those to the east and north to the right):

Very high priority:

Location (W/S)	Location (E/N)
Blackburn	Leeds
Blackburn	Skipton-Keighley
Bolton	Bradford
Bolton	Leeds
Bolton	Skipton-Keighley
Burnley	Leeds
Burnley	Skipton-Keighley
Manchester	Skipton-Keighley
Nelson-Colne	Bradford
Nelson-Colne	Leeds
Nelson-Colne	Skipton-Keighley
Preston	Leeds
Preston	Skipton-Keighley

High priority:

Location (W/S)	Location (E/N)
Blackburn	Bradford
Blackburn	Sheffield
Blackburn	Wakefield
Blackpool	Leeds
Blackpool	Skipton-Keighley
Bolton	Hull
Bolton	Wakefield
Burnley	Bradford
Burnley	Sheffield
Burnley	Wakefield
Manchester Airport	Skipton-Keighley
Nelson-Colne	Sheffield
Nelson-Colne	Wakefield
Nelson-Colne	York
Preston	Bradford
Preston	Hull
Preston	Wakefield
Wigan	Skipton-Keighley

Because of the different nature of passenger and freight movements, less attempt has been made at specificity in relation to freight in terms of specific origins and destinations; the critical factors identified as conditional outputs for freight are trans-Pennine paths for trains which:

- Are attractive in transit-time terms – enabling for example travel from a west-coast port such as Liverpool to an east-coast port such as Immingham/Hull/Tees Port within four hours;
- Allow economic train tonnages and lengths;
- Accommodate the maximum current freight loading-gauge (W12) – enabling the carriage of 9'6" containers; and
- Are resilient and reliable.

It is considered reasonable to suppose that a Burnley – Colne – Skipton railway could potentially provide two such paths per standard daytime hour, if supported by the relevant infrastructure capacity and capability on the rest of the network, and this is therefore the relevant conditional output.

While this report is only intended as one part of the strategic case for improved linkages along the Preston - Burnley - Colne - Skipton - Leeds corridor, it is clear that the conditional outputs that it has identified underline the very wide variety of transport linkages to which it could potentially be relevant – in other words, the variety of the transport 'questions' to which improved rail connectivity might potentially be one answer. This does not mean necessarily that there is a strong case, either strategically or economically, for specifically providing a rail link between Colne and Skipton, but rather that when considering the case for doing so, options relevant to all of the conditional outputs should be considered. The conditional outputs identified in this report include:

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- Strategic passenger connectivity: improved rail journey times and additional direct journey opportunities on critical east-west linkages which have been identified by local authorities and Rail North as priorities;
- Passenger connectivity to/from Airedale and to/from East Lancashire: radically better access from the Keighley/Skipton corridor towards Lancashire and Greater Manchester (including its airport), and from the Burnley/Nelson/Colne conurbation towards the economic hubs of Leeds and Bradford;
- Strategic freight: the imperative of providing robust and attractive east-west trans-Pennine freight paths on which the North's economy depends, while not compromising the ability of the passenger rail network to grow in line with the strategies of stakeholders.

alongside the additional bonus of providing enhanced local connectivity directly between East Lancashire and Airedale. This being the case, it is clear that further consideration of the case for a through rail link on the Preston - Burnley - Colne - Skipton - Leeds corridor needs to take place in the context of strategic transport planning, in order to ensure that all of the conditional outputs identified in this report are considered. This in turn means that such a proposed rail link should be considered alongside other options to fulfil those conditional outputs, as opposed to purely considering the case for a railway from Colne to Skipton in isolation.

It is recommended that further work be carried out to:

- Understand better the scale of economic, social and environmental benefits that could be captured by delivering the passenger and freight connectivity improvements that the conditional outputs imply, including the strategic linkages identified – in the context of wider strategic work, in particular that of Transport For The North;
- Generate options, costed at an outline level, that would deliver the prioritised conditional outputs, in line with that economic work;
- Appraise the business cases for the options identified in line with current WebTAG standards – this would include generating demand and revenue forecasts covering both passenger and freight usage, and would be expected to have regard to technical issues such as the operating implications on the wider rail network.

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1. Introduction

1.1. Purpose of this study

This report sets out proposed Conditional Outputs relevant to the potential reopening of the (Burnley –) Colne – Skipton railway line. The conditional outputs are a set of outcomes, in terms of linkages for both passenger and freight transport, to which the proposed line could be relevant, and against which the proposal should be assessed, together with alternative options to achieve the same outcomes. The conditional outputs have therefore been developed without considering affordability, deliverability or the adoption of specific infrastructure, nor do they imply a business case for any measures to fulfil them.

This report, however, attempts to prioritise, at a high level, the conditional outputs in terms of passenger travel, by reference to factors including the potential flow size of a given origin-destination pair and the extent of the benefits that the proposed rail link might bring to each. The conditional outputs have been developed by reference to existing strategic objectives, particularly (but not only) the Rail North Long-Term Rail Strategy (LTRS), and are designed to contribute to these outcomes.

For freight, an attempt has been made to arrive at a reasonable estimation of the types and volume of traffic that might require to make use of the broad corridors in question, in particular across the Pennines, in order to show the extent to which freight flows could also be conditional outputs relevant to this line: in other words, the conditional outputs for freight are corridor-level flows which could reasonably travel by this route if subsequent work showed that doing so would provide capacity, shipping time or other benefits.

It is for subsequent stages of work to consider the design, operational feasibility and cost implications of fulfilling these conditional outputs, as well as carrying out demand and revenue forecasting work; these components will then enable preferred options to be identified and a Department for Transport (WebTAG)-compliant outline business case to be developed. There is also likely to be a case for work to investigate further the scale of the wider economic, social and environmental benefits that fulfilling some or all of the conditional outputs might bring.

The timing of this work is partly driven by the forthcoming Network Rail North of England Route Study, on which work is expected to commence in 2016: the intention is that the findings of this report will feed into the Route Study, which could then take forward any recommendations implied by this work, as appropriate. This report is also being developed in parallel with Transport for The North's work developing strategies for future connectivity across the North, and is intended to inform it.

1.2. Context

The east-west transport corridor linking Central Lancashire with North Yorkshire and the Leeds City Region – focused on the M65 and A59 and parallel rail routes including the 'Calder Valley' line linking Preston, Blackburn and Burnley with Bradford and Leeds via Hebden Bridge – is not covered by any of the Department for Transport-led studies announced in the Road Investment Strategy in December 2014, as none of the Trans-Pennine routes within it is part of the Strategic Road Network. Road links in this corridor tend to follow historic routes dictated by topography rather than travel demand; most are poorly aligned and unsuitable for carrying large volumes of traffic, particularly heavy goods vehicles. Mainline rail links are likewise constrained by topography, with resulting low line-speeds having a significant impact on journey times. Both are of a much lower quality than those further south that link Liverpool and Manchester with Leeds, Sheffield and the Humber ports. Consequently, there is a strong perception locally that the transport network hinders the efficient movement of

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people and goods, and that this poor connectivity is having a negative impact on economic development and regeneration, particularly in East Lancashire. Several long-standing aspirations for improved connectivity by both road and rail currently exist and a number of schemes have been considered in the past.

Linking Preston, Blackburn, Accrington and Burnley with Halifax, Bradford and Leeds via Hebden Bridge, the 'Calder Valley' line is a twin-track railway supporting a regular-interval hourly cross-Pennine limited-stop service between Blackpool North and York, and a regular-interval hourly all-stations stopping service between Blackpool South and Colne, both operated by Northern Rail. The route is severely constrained in places by topography, with resulting low line speeds having a significant impact on journey times, typically over 70 minutes for the journey between Burnley and Leeds. Capacity is also constrained by the mix of traffic and stopping patterns, although freight traffic on the route east of Blackburn is very limited at present; the quality of the infrastructure also limits speeds.

The branch from Gannow Junction east of Rose Grove to Burnley Central, Nelson and Colne is single-track, though was historically twin-track, and combines with the single-track branch between Kirkham and Blackpool South to limit timetable reliability and flexibility for the Blackpool South to Colne stopping service, the performance of which continues to be an issue; it also prevents the operation of more frequent trains at either end of this service. Trains take around 70 minutes to complete the journey between Preston and Colne, operated predominantly by diesel-powered 'Pacer' rail buses introduced in the mid-1980s.

In Lancashire, the 'Calder Valley' line has benefited from a number of recent improvements, including an upgrade of Burnley Manchester Road station and the introduction of a new direct train service between Blackburn, Accrington, Rose Grove, Burnley (Manchester Road) and Manchester Victoria via Todmorden and Rochdale in May 2015. However, the East Lancashire Rail Connectivity Study¹ identified a number of deficiencies, including:

- Slow journey times, especially on the 'Copy Pit' section between Burnley Manchester Road and Todmorden used by the train services between Blackpool North and York and the new service between Blackburn, Burnley and Manchester;
- Poor reliability due to the long single-track sections traversed by the Blackpool South to Colne stopping service;
- Capacity constraints, with longer trains required to meet growing demand; and
- Low service frequencies and poor rolling stock

All of the above make rail a less attractive mode of travel. It is, for example, almost as quick to travel between Preston and Leeds with a change in Manchester as by the much more direct 'Calder Valley' through service. The report of the North of England Electrification Task Force² has included the full 'Calder Valley' route, including to Burnley and Preston, as a Tier One scheme with a recommendation for implementation in the next Rail Industry Control Period (CP6 2019 to 2024). Electrification could enable a transformational change to city region connectivity in the corridor, and for East Lancashire in particular, but only if accompanied by speed, capacity and frequency improvements. The scope to deliver these over the Copy Pit route is not at present clear.

¹ East Lancashire Rail Connectivity Study Stage 3: Conditional Output Statement, Jacobs UK Limited for Lancashire County Council, April 2015

² Northern Sparks, Report of the North of England Electrification Task Force, March 2015

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The Colne branch previously continued to Skipton as a through route, but passenger services ceased in January 1970 and the track was removed. However, the trackbed of the former twin-track line remains more or less intact, and if reinstated could enable services on the branch to continue through to Skipton and possibly to Leeds along the electrified Airedale Line, thereby significantly reducing journey times between Nelson and Colne and Leeds. It should be noted, however, that a new link may or may not use part or all of the historic trackbed.

At the north-east end of the historic route, the twin-track line from Skipton to Leeds and Bradford was heavily modified between the late 1990s and early 2000s, and now carries modern electric trains four times an hour on stopping services, supplemented by occasional diesel services working through to Leeds from Carlisle or Morecambe/Lancaster and a daily direct return train from Skipton to London; the line also carries significant amounts of freight from Carlisle towards West Yorkshire, though recently there has been a downturn in coal traffic. Notably, since modernisation of the Airedale (and Wharfedale) lines, passenger use has grown strongly, with rail achieving high modal shares for commuting into Leeds in particular and demand firm at off-peak times. However, this success means that the Skipton – Leeds/Bradford route is fairly capacity-constrained. Parts of the route, particularly to the east of Shipley, were historically four-track.

There is considerable stakeholder interest, particularly in the East Lancashire and Airedale areas, in the possibility of reopening the Colne to Skipton railway line, including from a number of transport campaign groups³. Several studies have already been carried out to examine aspects of the potential reopening of the line, including feasibility appraisals and demand analyses⁴. However, the need has been identified to carry out a fuller, more strategic assessment of the transport case which may exist for the scheme. The critical first step is to carry out an assessment of the transport purposes to which the scheme might potentially be relevant. These purposes are the conditional outputs. Doing this will enable the performance of the scheme to be assessed against a common set of criteria in comparison with other schemes which may serve some or all of the same transport purposes. Such other schemes might, by way of example, include upgrades to existing rail routes, other modes of transport or other transport corridors.

It will also enable an informed view to be taken as to the extent to which the proposed rail link should be regarded as primarily a local transport scheme, or would constitute a strategic link of pan-northern significance.

³ Such as Campaign For Better Transport (see <http://www.bettertransport.org.uk/re-opening-rail-lines#nw>) and Railfuture (<http://railfuture.org.uk/Missing+Links>), as well as the group dedicated to this specific campaign, SELRAP (<http://selrap.org.uk/>).

⁴ Including: *Future of the Skipton-Colne Railway Formation*, Steer Davies Gleave, 2003; *Re-opening of the Skipton to Colne Railway*, JMP, 2007; and *SELRAP: Skipton to Colne Rail Link*, Arup, 2013

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2. Study area and scope

2.1. Locations in scope

Because of the differing natures of passenger and freight transport, the geographical scope of the conditional outputs of relevance to the proposed rail link is different as between the two.

2.1.1. Passenger travel

For passenger travel, the starting point has been the LTRS “interconnected urban matrix” of towns and cities across the north. The filtering process identified those links between matrix towns and cities to which the Colne – Skipton link might potentially be relevant, and these links were then passed through into the further analysis which enabled relevant conditional outputs to be identified and prioritised. In the chart below, those location pairs considered appropriate for further analysis are marked with a “1” and shaded green. The others, unshaded and marked with a “0”, were assumed to be links to which it was less likely that a journey might logically use the proposed rail link.

In addition to the “LTRS interconnected urban matrix” towns and cities, certain further locations were added:

- Manchester Airport, because of its strategic importance across much of the North;
- Nelson-Colne, to allow current and potential connectivity at locations directly adjacent to the proposed line to be considered on a consistent basis and so inform the development of the conditional outputs – “Nelson-Colne” encompasses the area of both these towns plus Brierfield and the immediate surrounds, recognising that while this area has close links to Burnley, it has different present-day linkages in transport (particularly rail) terms;
- Skipton-Keighley, again to allow current and potential connectivity at locations directly adjacent to the proposed line to be considered on a consistent basis and so inform the development of the conditional outputs – “Skipton-Keighley” refers to an area of Airedale which for the purposes of this study can logically be considered together, as the area enjoys similar transport links and would relate to the proposed new rail corridor (as to existing rail corridors) in a similar manner.

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line, they would therefore be assumed to be in scope in any event, and therefore do not require further consideration at this early filtering stage. Such flows would, however, clearly need to be included in demand forecasts produced for assessing the business case for such a link.

While it is likely that any reopening of Colne – Skipton would be likely also to entail the upgrading of the existing Gannow Junction – Colne branch, any journeys which would be made without using the section of line north of Colne (such as a journey from Nelson to Preston) are not considered relevant as conditional outputs, because they could be satisfied without reopening anything north of Colne. Equally, it is also likely that infrastructure interventions along the Aire Valley (and particularly approaching Leeds station) might be required in order to ensure that any future additional traffic resulting from reinstatement of Colne – Skipton does not have a detrimental impact on the capacity, punctuality or reliability of the existing network; however such interventions are not part of the scope of this study, and any journeys that would only use the network east of Skipton are not therefore considered relevant to this report. Analysis of such impacts will need to be considered in future work.

Further details of the filtering and assessment of potential conditional outputs are given in section 4.

2.1.2. Freight transport

The assumption at present is that it is relatively unlikely in the short-to-medium term that rail freight would be generated at or attracted to any locations specifically on the Gannow Junction – Colne – Skipton section itself, given the current nature of economic activity in the area. Therefore freight conditional outputs have been generated by reference to the wider strategic requirements of industry and in understanding the current freight constraints across the Pennines. It is difficult, because of the nature of rail freight in Britain, to make meaningful long-term predictions for the specific origins and destinations of freight flows, as opposed to the areas in which they are likely to have their origins and destinations. This is because the nature of rail freight in Britain at present is that it is dependent on a relatively small number of commodity types and of customers, whose decisions can have far-reaching impacts on the freight network operated and are often very difficult to predict meaningfully in the medium-to-long term. As such, the conditional outputs generated relate primarily to east-west (and vice versa) train paths across the Pennines generally, rather than by reference to specific flows. This reflects the relevant wider railway geography and the most likely strategic need for additional and/or better freight paths on the network. This issue is also highlighted in the work Network Rail have done as part of their Long-Term Planning Process – Freight Market Study.

On this basis, it is assumed that the potential geographical scope for freight conditional outputs relevant to Colne – Skipton would be east-west (and vice versa) flows in the area approximately bounded by:

- Carlisle: freight between Scotland and the east side of the Pennines would be more likely to use other routes such as Carlisle – Settle
- Cheshire: freight currently using the Hope Valley might use the line, but that currently using the cross-country axes south of Stoke-on-Trent/Crewe would be less likely to
- Tyneside: analogous reasoning to Carlisle – freight between locations north of Tyneside and the west side of the country would be less likely logically to be routed via this corridor
- Retford: analogous to Cheshire, on the basis that east-west freight currently using axes south of the Hope Valley is less likely to be in scope

It is clear that within this area there are key flows for freight to and from ports, supplies to power generators, transport of aggregates, and in the longer term link to the various Strategic Rail Freight

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Interchanges (SRFI) identified in the Department for Transport - Strategic rail freight interchange policy guidance issued in November 2011.

There are clear opportunities for freight across the Pennines in the future, including:

- The opening of Liverpool Gateway port where 95% of the world's ships will be able to dock provides opportunities for freight to be distributed across the North and relieve north – south capacity. Tees Port is also looking to develop its intermodal business with smaller ships serving northern continental Europe.
- The need from the power generators for a resilient and reliable supply chain has meant that biomass in particular is now being carried across the Pennines to give access from both the East and West Coast, particularly to Drax.
- Intermodal (containers) is the fastest-growing rail freight market and yet little of this traverses the Pennines; there would appear to be issues with gauge clearance, train length and potentially weight.
- A faster route across the Pennines for freight could potentially lead to a move away from the UK Channel and northern continental ports e.g. Rotterdam, with shipping time being saved by the use of ports such as Liverpool on the west coast of Britain for larger vessels and onward transport by rail and/or in smaller ships.

Freight flows assumed in scope include:

- Intermodal traffic to, from and between ports;
- Supplies to power generators (including coal, biomass, oil, nuclear and other fuels);
- Domestic intermodal; and
- Aggregates

However, a holistic overview has been taken that has regard to these flows but does not ignore the possibility of other types of freight also developing.

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3. Strategic objectives

3.1. Overall objectives

3.1.1. Rail North Long-Term Rail Strategy

The LTRS is based on a Vision encompassing:

- i) Better **connectivity**, with quicker door-to-door journeys delivered through faster services, more frequent and punctual, and new services where the demand and business case justifies them;*
- ii) Adequate provision of **capacity**, both on-train so that passengers do not experience overcrowding and on-track so additional demand for economically worthwhile passenger and freight movements can be accommodated;*
- iii) A transformation of quality, with the creation of a user-friendly network. We want nothing less than the visible marketing **coherence** of the London Underground delivered over the North's wide geography. This needs to be applied to a sophisticated network mix that has defined categories of train services as well as many routes that will be planned to operate together as a single whole, as an explicit alternative to car use across the North;*
- iv) A more efficient and **cost-effective** railway. As use of the North's rail services grows, costs per passengers carried need to fall; the key to achieving this is investment.*

The first two of these elements are those most directly relevant to this study: conditional outputs should be developed and prioritised according to their ability to contribute to:

- Enhancing connectivity in terms of journey times, service frequency and direct linkages; and
- Providing capacity where it is needed, in terms of the volume of train capacity provided and the service frequencies that the connectivity objectives will drive.

Analogous objectives apply to freight as well as passenger transport:

- Attractive paths for freight trains in terms of transit time and loading;
- Line capacity and capability in terms of the number of paths provided, and the ability to accommodate the train lengths and loading gauges that freight shippers desire.

The LTRS continues, showing how:

The economy of the North will be stimulated through improved connectivity:

- Better rail services between the North's major centres can help create larger markets for business sectors that are expected to grow most quickly as the economy recovers;*
- Better services for commuters can help stimulate a return to the pre-recession expansion of the North's major town and city centres as hubs for economic activity and increase opportunities for accessing work, avoiding wasteful congestion and over-crowding and improving productivity;*
- Better connections to international gateways (ports, airports and the Channel Tunnel) can help support the accessibility of northern businesses to international markets and create more opportunities for business start-ups and existing businesses to grow their activities in the North of England;*
- Better connections between areas of economic disadvantage and areas of economic opportunity;*
- Better connections between the North's major town and cities and its coastal resorts, for example Southport, Blackpool, Morecambe, Scarborough and Cleethorpes;*

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- *Better connections between the North's major towns and cities and more rural parts of the North including National Parks and Areas of Outstanding Natural Beauty;*
- *Better connections within and between the North's more rural areas that will help maintain communities through providing access not just to jobs, but also other important services (e.g. tertiary education, health), as well as supporting the visitor economy;*
- *Better connections with London and major centres across the rest of Great Britain, some of which can be delivered through high-speed rail, will help re-balance the economy away from the South East and further stimulate development and impact on key northern economic sectors, including tourism;*
- *Better access to ports and freight terminals with a network that has sufficient capacity for growth and is gauge-cleared for 9'6" container traffic; and*
- *Better connectivity and integration between rail and other modes of transport, including light rail and metro networks, buses, walking and cycling supported by comprehensive park and ride provision in appropriate locations.*

These objectives have directly informed the identification and prioritisation of the conditional outputs set out later in this document.

The LTRS also identifies the advantages to economies of bringing residential areas (labour-market pools) within a commuting range of one hour of principal employment hubs. While the value of bringing additional areas into this radius is not directly applied as such in the development of conditional outputs, because the scope of this study does not cover the analysis of specific journey purposes, meeting this criterion is likely to be highly relevant to the economic case for meeting the conditional outputs identified, a matter likely to form the focus of subsequent work.

3.1.2. Transport for the North – “Northern Powerhouse Rail”

Building on work carried out previously for One North, Transport for The North is currently developing proposals for step-change improvements in passenger and freight transport linkages as a tool to improve the overall economic performance of the North of England, allied to the development of the concept of the “Northern Powerhouse”. While work is at a fairly early stage, expected to report in 2016, TfN’s work encompasses all land transport, but includes a clear emphasis on rail.

In the context of rail, TfN’s work is examining the case for transformational changes in linkages between six major cities (Newcastle, Hull, Leeds, Sheffield, Manchester and Liverpool) plus Manchester Airport, beyond what is committed under current programmes such as the Northern Hub and Trans-Pennine electrification. However, TfN acknowledges that for the transport network to deliver its full potential and for economic opportunity to be spread equitably around the North, the transport offer must be comprehensive and coordinated. TfN’s work will therefore also include other centres, including those beyond the metropolitan areas: both links between these centres and links from them to the metropolitan hubs. It will also encompass principles for local connectivity, to ensure that the future transport network provides and truly integrated and attractive door-to-door transport offer that will allow access to economic opportunity in a socially inclusive and sustainable manner.

In this way, it is likely that the ‘direction of travel’ for TfN’s emerging rail strategy will be consistent with the principles and approaches set out in Rail North’s existing Long-Term Rail Strategy, as described above and as used as the basis for the analysis in this report of conditional outputs relevant to a potential Colne – Skipton rail corridor.

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3.1.3. Yorkshire Rail Network Study and West Yorkshire's Rail Plan 7

WYCA⁵, together with partners in the Leeds and Sheffield City Regions, commissioned the Yorkshire Rail Network Study – Conditional Output Statement, published in February 2012. The study identified up to £12bn of potential economic benefits that could be realised by enhancing the rail network in the two city regions. These enhancements identified a range of journey-time and frequency improvements that, taken together, would have transformational effects on the quality and consistency of the rail passenger offer across the regions. It also emphasised the importance of making provision for growth in rail freight, both that resulting from increased economic activity and from modal shift from road transport. While primarily focusing on enhancing existing links within and between the two regions, the YRNS also identified strong benefits from enhancing connectivity with neighbouring regions, particularly Greater Manchester and Lancashire.

In the context of West Yorkshire and the wider Leeds City Region, the YRNS conditional outputs formed the basis of WYCA's Rail Plan 7. Specific targets included a minimum service frequency of two trains per hour on all local routes, and improved interurban connectivity which implies greater frequencies than operate at present on a number of routes, including the Calder Valley and Copy Pit routes. The journey time target was set at 75% of the journey time for an uncongested car trip, in order to ensure the rail journey is truly competitive on a door-to-door basis.

While progress has been made in achieving some of these conditional outputs, it is notable that many have yet to be met, including the target of four trains per hour on the Calder Valley between Bradford and Manchester, and two trains per hour between Leeds/Bradford and East/Central Lancashire. It is possible that provision of these levels of connectivity could potentially, on present infrastructure, give rise to conflicts, such as between trains passing along the Calder Valley line to/from Manchester, those between Manchester and East Lancashire via Todmorden, and those between West Yorkshire and Lancashire via the Copy Pit line. Growing rail freight could exacerbate such conflicts at many locations – or, conversely, the increased demand for track capacity for increased passenger services could hamper the growth in rail freight, an issue which is understood to arise elsewhere on the network such as over the Diggle Trans-Pennine line. Such issues could be relevant to the case for a rail link between Colne and Skipton.

3.1.4. North Yorkshire transport strategy

North Yorkshire's County Council at the end of October 2015 published its Strategic Transport Prospectus, with transport objectives including the objective of ensuring that all parts of North Yorkshire benefit from and contribute to the success of the "Northern Powerhouse".

The Strategic Priorities in that document which are most relevant to this theme are:

- Improving east – west connectivity (including Trans-Pennine links)
- Improving access to high-speed and conventional rail
- Improving long-distance connectivity to the north and south

To address these priorities North Yorkshire County Council has identified a series of rail and road improvements, some of which are large-scale and expensive. The Council is therefore investigating additional funding sources.

⁵ The two studies referred to in this section were produced by the predecessor body, the West Yorkshire Passenger Transport Executive, also known as Metro.

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The North Yorkshire County Council Local Transport Plan 4 (“LTP4” – the draft of which was subject to a consultation in November 2015, with a view to its adoption by February 2016) builds on the Strategic Transport Prospectus. Within the draft LTP4 there is a section on rail line reopenings:

The County Council supports, in principle, proposals for rail reopening in the County, on identified routes such as Skipton to Colne and Harrogate to Ripon / Northallerton.

In the past many line re-openings were considered to be “local schemes” and therefore required local funding. The Council will only actively support opportunities for line re-openings where these are demonstrated as being of national or pan-North-of-England importance. National or pan-North strategic importance will be assessed on the basis of the contribution to network resilience, improved strategic connectivity, the delivery of greater capacity or improved rail freight opportunities.

In all cases North Yorkshire County Council will only work with railway industry and local stakeholders where there is common agreement to develop a proposal.

In the York, North Yorkshire and East Riding Local Enterprise Partnership’s Strategic Economic Plan there is a priority on improving East – West connectivity, and a scheme to provide a rail link between Colne and Skipton would fit within that priority.⁶

3.1.5. East Lancashire Highways and Transport Masterplan

As noted in section 1.2 above, the East Lancashire Rail Connectivity Study identified significant issues with the current rail services provided in the study area, including limited connectivity, slow journey times, poor frequencies, low levels of reliability, poor-quality rolling stock and inadequate capacity.

The East Lancashire Rail Connectivity Study concluded that if future economic circumstances dictate that connectivity between East Lancashire and Leeds should be further enhanced to the point where capacity on the Calder Valley line becomes a constraining factor, consideration of alternative options between Burnley and Leeds may become necessary. Any alternative options would need to demonstrate that they would deliver value for money.

3.1.6. Greater Manchester transport strategy

Transport for Greater Manchester is currently developing its 2040 vision and supporting Transport Strategy. This document sets out the vision for “world-class connections that support long-term, sustainable economic growth and access to opportunity for all”. This features four key elements, being:

- Supporting sustainable economic growth;
- Improving quality of life for all;
- Protecting our environment; and
- Developing an innovative city-region.

In developing this vision transport provision reference has been made a series of spatial “themes” with each mode of transport assessed as to its ability to support these “themes”. The “themes” are:

- A globally connected city – linkages to Atlantic Gateway/Liverpool Ports and Manchester Airport;

⁶ See <http://www.businessinspiredgrowth.com/corpdocs/strategic-economic-plan-part-1/>.

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- Delivering better city-to-city links - encompassing cities across the North of England;
- Getting in and around the regional centre – access into Manchester city centre;
- Travel across the wider city region – linkages between the town and key centres of employment in the Greater Manchester area;
- Connected neighbourhoods – access of a more local nature, including to stations.

With respect to Skipton-Colne reopening, the provision of new, fast connections to Manchester Airport, which this route could provide, clearly meets the globally connected “theme”. Diversion of freight to use the Skipton-Colne route could permit additional passenger services between Manchester and West Yorkshire via the Calder Valley line, both meeting the city-to-city link “theme” and also supporting access to skills for employers based in and around the Greater Manchester centre.

3.1.7. Network Rail strategic planning

Network Rail’s strategic planning is now carried out under its LTPP (Long-Term Planning Process), encompassing Market Studies examining future trends in specific sectors of rail demand, and Route Studies applying the findings of the Market Studies, together with other evidence, to develop specific strategies for specific sections of the rail system.

The passenger-sector Market Studies⁷ were primarily focused on longer-distance intercity / interregional flows and on the suburban flows into the largest cities outside London, and therefore their coverage of regional rail as a whole is not comprehensive. The North of England Route Study is only expected to be produced in 2016 – indeed, as noted above, one of the purposes of this report is to inform Network Rail’s work in the context of this Route Study, including aiding the decision as to whether further development work should take place on a proposed reinstatement of Colne – Skipton.

The overall strategic goals of the two relevant passenger-sector Market Studies are split into four ‘overall goals’ common to both, with consequent secondary goals then set out, some of which are specific to each of the two market sectors⁸:

Table 2: Goals identified in Network Rail Market Studies

Strategic goal ↓	Secondary goal	
	Long-Distance	Regional Urban
Enabling Economic Growth	<ul style="list-style-type: none"> - by providing sufficient capacity for people travelling to take part in economically productive activities - by improving business-to-business connectivity - by improving connectivity to/from the retail, leisure and tourism sectors of the economy 	<ul style="list-style-type: none"> - by providing sufficient capacity for employers to access the labour pool - by improving access to workers for businesses. - by improving connectivity to/from the retail, leisure and tourism sectors of the economy
Reducing carbon and the transport sector’s impact on the environment	<ul style="list-style-type: none"> - by directly reducing the environmental impact of rail - by reducing the use of less carbon-efficient modes of transport 	

⁷ Clearly the London & South-East Market Study is not relevant here.

⁸ Strategic goals are not set out in the same explicit manner in the Freight Market Study.

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<p>Improving the quality of life for communities and individuals</p>	<ul style="list-style-type: none"> - by connecting communities - by providing access to social infrastructure such as educational establishments and major leisure venues - by reducing road congestion 	<ul style="list-style-type: none"> - by improving access to employment and training opportunities - by providing sufficient capacity for workers to access employment - by connecting communities - by providing access to social infrastructure such as educational establishments and major leisure venues - by reducing road congestion.
<p>Improving affordability and value for money for Government and other funders</p>	<ul style="list-style-type: none"> - by meeting other outputs in an affordable way - by directly reducing whole-industry subsidy 	<ul style="list-style-type: none"> - by meeting other outputs in an affordable and value for money way - by directly reducing whole-industry subsidy - by improving the value for money for passengers and taxpayers

The 2013 Freight Market Study produced forecasts up to 2043 for freight flows, and these have been used to inform the development of freight conditional outputs in this document. Its approach involved the consultation of essential industry stakeholders and industrial/economic analysis, in order to arrive at forecasts for future years under a variety of scenarios, in terms of the likely requirements that freight shipping would place on the rail network.

3.2. Developing specific targets to guide conditional outputs

3.2.1. Journey time targets

It is well recognised that, for public transport to be competitive with car travel and achieve significant modal shift, it must offer door-to-door journey times that are at least as good as car travel. Because of the need for access to and egress from the public transport network, that will generally translate into point-to-point journey times by train (or bus) that are markedly faster than the car journey. For this reason, the Northern Hub Phase 1 Study⁹ and the Yorkshire Rail Network Study (YRNS)¹⁰ have previously suggested that rail journey times that are 25% quicker than car represent a suitable target – though one which will in many cases be challenging. For rail to be competitive not only at peak times and over the most congested routes, the comparator car journey time should be the off-peak (uncongested) road journey.

For the purposes of the generation of conditional outputs for this study, potentially relevant passenger journey linkages have therefore been prioritised on a scoring system which has regard to the extent to which the proposed rail link could contribute to achieving – or moving towards – this target. This means that, although all improvements in rail journey times will be relevant, those which move the rail journey time close to the target and/or enable rail to ‘beat’ the car journey time will have a greater weighting than those where even the improved rail journey will still be markedly slower than a car journey.

⁹ reference

¹⁰ reference

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Journey time targets for freight are different. They vary by the commodity carried; for some traffic types, such as coal or biomass for electricity generation, the critical factor is not so much the speed of the journey as such but the ability to make efficient use of assets (such as locomotives, crews and wagons) by achieving cycle times (i.e. journeys A to B and back to A) that are optimal. Other types of traffic, such as post/parcels, supermarket traffic and much intermodal freight, is of itself time-critical, so point-to-point speed will be important. These varying factors have been reflected in the conditional outputs developed for freight.

3.2.2. Frequency targets

The LTRS calculates the economic benefits of moving to a uniform minimum frequency of two trains per hour across the North to be worth some £116m per year in GVA terms (2025 values). Given this significant value, and the prevalence in the study area of passenger train services that at present only operate hourly (less in some cases), the scope to enhance frequencies where rail already provides a service is a factor which has been incorporated into the prioritisation of conditional outputs.

For freight, the “frequency” issue is primarily one of providing sufficient daily paths to accommodate forecast flows, at times when they are needed (it is unlikely, for example, to be acceptable to industry and therefore to operators for trans-Pennine paths only to be available overnight).

3.2.3. Interchange

The requirement for passengers to change trains to complete their journeys is often perceived as a negative factor in itself, beyond the direct impact on actual journey time, particularly where timetables, ticketing and station facilities are poorly designed for the purpose.¹¹ Therefore the ability for a given journey to be completed without interchange – or with fewer changes of train than at present – is also taken into account in the prioritisation of conditional outputs.

Interchange, obviously, does not have a direct equivalent for rail freight, other than the wider issue of rail freight being most competitive where transshipment between modes is unnecessary, one which is beyond the scope of this document.

¹¹ See, for example, *Passenger Demand Forecasting Handbook*, ATOC, 2013 -Table B4.8.

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4. Methodology for developing conditional outputs

4.1. Guiding principles for conditional outputs

4.1.1. Passenger travel

The LTRS states that, for the towns and cities listed in the Interconnected Urban Matrix:

The rail network should provide in-vehicle rail journey times for services between these centres that are quicker than the off-peak car journey time. The minimum frequency journey should be two trains per hour. Where possible direct connections should be available to at least the five largest cities, and where interchange is necessary the connection time should be minimised.

Notably, the Yorkshire Rail Network Study adopts similar principles, setting a general journey-time target for rail of 75% of the off-peak car journey times between important regional and sub-regional centres. However, while this is a target to aim for in considering design options, this does not mean that if this target were not met the location pair would not be worthy of inclusion as part of any future service specification or timetable, particularly where the solution offers a marked improvement over the present public transport offer and/or comes close to reaching this target. This would be assessed further in the context of the further development of the business case for interventions on the corridors in question.

All of these elements are reflected in the prioritisation methodology for passenger conditional outputs, as set out in this section.

4.1.2. Freight transport

The guiding principles for the derivation of conditional outputs for freight transport are concerned with the quantum of train paths expected to be required in coming decades on corridors that are in the geographic scope of those proposed line, particularly trans-Pennine flows. This has regard to tonnages, speed, time of day, loading-gauge and axle-weight. These have been guided by review of the relevant strategic evidence, including Network Rail and other planning strategies, and by engagement with major stakeholders in the rail freight sector (including freight operators and customers).

4.1.3. Application to Colne – Skipton corridor

The strategic targets discussed above are largely applicable across the North. Their relevance to the study area is underlined by seeing them in the context of the particular transport issues pertaining here, including:

- Poor east-west connectivity by both rail and road north of the M62 / Diggle rail line corridor, with:
 - No complete motorway or dual-carriageway standard route crossing the Pennines north of the M62, with many A-roads being narrow and taking circuitous routes through many built-up areas, leading to slow journey times and exacerbating road congestion and negative environmental consequences, and
 - Calder Valley and Copy Pit rail lines suffering limited capacity, poor journey times, performance and service frequencies, crowding and substandard rolling stock – as a consequence, the rail links between West Yorkshire and East/Central Lancashire fall far short of LTRS or YRNS targets;

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- Limited capacity for rail freight across the Pennines as a whole, with a shortage of attractive freight train paths constraining the ability of the sector to grow;
- Poor public transport connectivity between the Burnley / Colne area and Airedale, with bus journey times uncompetitive with car travel and few direct connections from these areas to destinations further afield – this constrains access to employment opportunities and employers’ access to labour markets;
- Low modal shares for public transport for regional and interurban journeys through much of the region, with the exception of journeys which involve direct and fast train services into the principal centres such as Manchester and Leeds;
- Doubtful acceptability of a solution involving substantial new road infrastructure, particularly in light of the environmentally sensitive areas through which any new or significantly upgraded route would have to pass.

In the context of these factors and in keeping with the guiding principles set out above, it is evident from the existing transport strategies of the bodies identified, and in particular North Yorkshire County Council, Lancashire County Council, Transport for Greater Manchester and West Yorkshire Combined Authority, that overall priorities relevant to these conditional outputs are:

1. East-West passenger linkages
2. Trans-Pennine freight connectivity
3. Access to Manchester Airport

4.2. Passenger transport

4.2.1. Filtering location pairs for prioritisation

As described in section 2.1, the locations potentially in scope were established on the basis of the LTRS Interconnected Urban Matrix, modified to include Manchester Airport and also the Nelson-Colne area plus the Airedale (Skipton-Keighley) area. The next step was to identify linkages (i.e. pairs of locations within that matrix) which were potentially relevant to the (Gannow Junction –) Colne – Skipton corridor, i.e. in scope. Location pairs were included at this stage if the journey might possibly be made using the corridor with a reasonably acceptable journey time (see below for assumptions on journey times), regardless of whether this would in fact be the optimal route in terms of directness or journey time – these factors would be brought in at the prioritisation stage.¹²

Journeys were assumed potentially in scope if there was a potentially credible journey not only directly from origin to destination via the corridor, but also involving interchange (such as to the east at Leeds or York), where the journey is still moderately direct. Any journey, however, which was assumed to require two or more changes of train was assumed to be out of scope as it would not be attractive for the types of interurban journey under consideration.

The location-pairs found in this way to be potentially in scope were then assessed as set out below, and a score derived in order to rank them. As explained that score had regard to the extent to which the potential journey would be improved under the do-something scenario (i.e. with the new rail link), and the extent to which that improvement would make rail genuinely competitive as against car travel, with the score then weighted according to how significant a flow there was likely to be between the two locations concerned.

¹² It should be noted that while the terms “origin”, “destination” and “O-D pair” appear in this report, to refer to potential journeys, unless otherwise stated the journeys identified are not directional: they are location pairs and do not distinguish which end of the journey is the origin and which the destination.

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4.2.2. Service assumptions: do-minimum and do-something

The scenarios assumed are:

- **Do-Minimum:** Rail network geography as at present, but with modernisation on existing routes, including electrification of the Calder Valley, Copy Pit and East Lancashire lines and some incremental line speed improvements, with services in scope being provided by semi-fast services with high-performance rolling-stock¹³ running at frequencies similar to today's. In some cases, performance allowances and differences between the working timetable and the public timetable¹⁴ have been taken out, in order not artificially to understate what the do-minimum infrastructure could be capable of providing without significant investment beyond that understood to be committed at present. Some improvements to interchange have been assumed (see below). As such, this is not a "do-nothing" scenario, and many journey times are slightly better than most currently provided.
- **Do-Something:** As above, but with an additional railway provided between Gannow Junction and Skipton via Colne providing an hourly service over the line, extended to the east and west to several possible locations. Assumed journey times were based on high-performance trains and a high-quality infrastructure between Gannow Junction and Skipton. To the east, possibilities were assumed to include Leeds, Bradford Forster Square, York and Hull; to the west, it was assumed trains might run to Preston, Manchester (either main station), Manchester Airport, Blackpool North or Barrow-in-Furness, stopping at principal stations on a semi-fast service pattern. It should be emphasised that it does not appear likely that services would in reality ever be provided to all of these places: the purpose of assuming direct services was to enable a comparison of the merits of connecting different pairs of locations, to aid in their ranking. Locations in scope but assumed *not* to have direct services using the line were:
 - Barnsley
 - Harrogate
 - Wakefield
 - Darlington
 - Doncaster
 - Durham
 - Hartlepool
 - Middlesbrough
 - Sunderland

Nonetheless, journeys to/from these locations remained in scope on the basis that a logical journey to/from certain other in-scope locations might be reasonably attractive using the line, with only one interchange.

It can be seen that both do-minimum and do-something scenarios assume journey times beyond the Burnley – Skipton corridor which are faster than those provided at present: this is deliberate, as it is not expected that the wider railway will remain static, and the effect is to ensure that neither scenario is artificially advantaged or disadvantaged.

For both do-minimum and do-something scenarios, interchange (where necessary to complete a journey) has been assumed to be "semi-optimised". This means that the assumption has been made

¹³ Such trains may well be electric in both do-minimum and do-something scenarios, but this is not an assumption inherent to the modelling.

¹⁴ Colloquially known as "charter minutes".

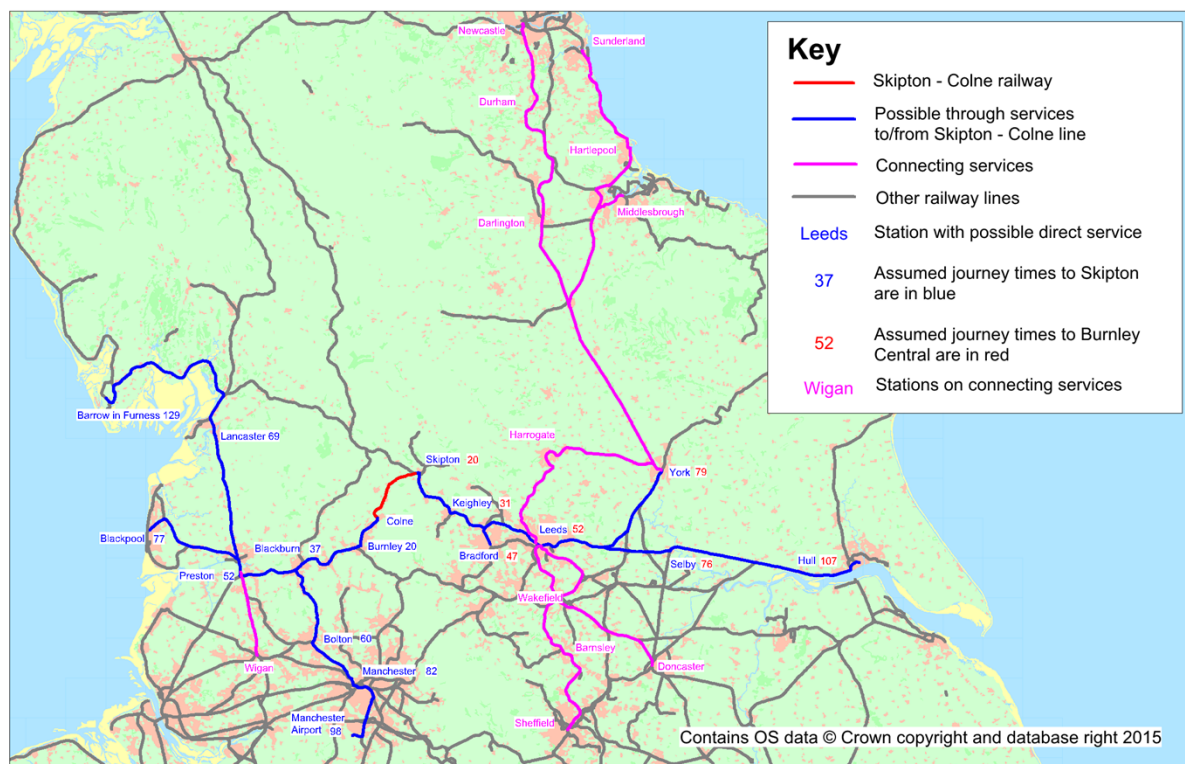
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that not every connection will be perfect, i.e. a full *Integraler Taktfahrplan*¹⁵ approach is not introduced with all services connecting optimally at interchange nodes, but poor connections and 'near-misses' that abound on the current network are reduced. Again, this has been done in order to avoid overstating the advantages of the do-something in journey-time terms, and to recognise that more could be done to improve many indirect journeys under the do-minimum scenario. The assumption applied has been that interchanges add 15 minutes to journey time: not optimal connections, but reasonably attractive.

Details of the specific journey-time assumptions for do-minimum and do-something appear in the Appendix. They are summarised on the map below, which shows:

- Possible direct services which might use the link, as assumed for the purposes of conditional output identification;
- Locations which might be accessible with no more than one interchange from those using the link; and
- The journey times which have been assumed for assessment and prioritisation purposes: the values are in minutes, westwards from Skipton or eastwards from Burnley. These make allowance for assumed station dwell times, and so the assumed through journey times can be obtained by addition (subtracting 20 minutes to avoid double-counting): for example Hull – Blackpool would be $107 + 77 - 20 = 164$ minutes.

Figure 1: Assumed "Do-Something" connectivity



¹⁵ The German term (used here as there is no satisfactory English equivalent) refers to a comprehensive timetable built around strict clock face principles applied between connecting nodes which are just less than one hour or half-an-hour apart, with trains arriving just before the whole hour (and half hour where services are frequent), and departing just after. The result is that trains all 'meet' one another and convenient connections can be made every hour or half-hour, unlocking additional connectivity. The Integraler Taktfahrplan approach is practised comprehensively in the Netherlands, Switzerland and Czech Republic.

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It will be noted that the do-something service assumptions are, for the reasons outlined above, a “high water mark” of possible direct connectivity, in order to identify the *potential* usefulness of the proposed link. It is for that reason that the possibility of a more basic rail connection in the form of a simple shuttle between Skipton and Colne (or indeed Burnley or elsewhere) has not been assumed: if that were so assumed, then clearly any journey other than one between those locations would involve at least one interchange, meaning that the attractiveness of the journey would be markedly less. The adoption of these assumptions in the do-something scenario should not, of course, be taken to mean that in practice the provision of such a basic shuttle service has been ruled out, nor that any of the services implied by the above assumptions would actually be provided: this would be a matter for subsequent demand, operations and cost modelling.

4.2.3. Assessing location pairs: extent of improvement with the proposed new link

For all of the location pairs identified as potentially relevant to the route, assessment was carried out of the extent to which a possible service operating via Colne – Skipton might:

- Provide a **more direct journey** in terms of avoiding, or reducing, the need to change trains;
- Give a **faster journey time** than possible at present by rail; and/or
- Provide **additional opportunities to travel** (i.e. a greater frequency) than currently offered.

In each case, the magnitude of the change between the assumed “do-minimum” and “do-something” situations was assessed, and the location pair scored according to whether the do-something scenario represented, as against the do-minimum:

- A negligible, or a negative change (i.e. do-something was no improvement or was worse than the do-minimum);
- A slight improvement;
- A significant improvement;
- A transformational change (such as opening up a journey opportunity that would not previously have been realistic by rail).

Details of the specific scoring mechanism, and thresholds for each, appear in the Appendix. Journey time, interchange and opportunities to travel were all weighted equally in the scoring matrix.

4.2.4. Assessing location pairs: competitiveness with car travel

It is possible that in some cases, provision of the new rail service assumed under the do-something scenario could lead to a rail offer which is markedly better than the present-day (or do-minimum) service – but is still actually not particularly competitive as against rail’s main competitor, the car. Therefore an additional factor was applied to the scoring matrix, to assess the extent to which providing the proposed new service would mean that the rail journey time would approach not only car journey times but also the more ambitious target journey times set in the LTRS/YRNS. The LTRS/YRNS target is for station-to-station rail journey times to be no more than 75% of the uncongested, off-peak car journey time – a target which, notably, few current rail services achieve for location pairs in the scope of this study.

It is clear that rail can become reasonably competitive without fully reaching this target, and moderately so even when the journey time is about the same as the off-peak car journey, because of factors like the variability of car journey times, slower peak car journeys, and the attraction of the ability for passenger to make use of rail travel time. However, where rail’s journey time is much slower than the equivalent car journey, it will struggle to obtain market share. Therefore the scoring

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mechanism weighted heavily those location pairs where the do-something journey-time came close to (or exceeded) the LTRS/YRNS target; weighted moderately heavily those where the do-something achieved a marked improvement in rail's competitiveness even if the target was not met; but weighted much less heavily those location pairs where the do-something might represent an improved journey time, but one that was still not particularly competitive with the car.

4.2.5. Assessing location pairs: weighting by flow strength

The above steps would produce a measure of the extent to which rail services between any two in-scope locations would be improved under the do-something scenario, and the extent to which doing so would make rail competitive with car. However, it was clearly necessary to have some measure of how large that flow would be: if there would be a radical improvement in rail's offer on a journey that few people would in fact make, then clearly that location pair should be weighted less heavily than a logical journey between two sizable places with a close interrelationship.

Because it is assumed that the provision of rail services from Lancashire to West Yorkshire via Colne and Skipton would have a transformational effect, it was not appropriate to weight location pairs by how strong the rail flows now are between them: it would be expected that such services would significantly change patterns of rail use, both by encouraging modal shift (primarily from car) and by opening up new travel opportunities and changing the way in which places relate to one another.

The intention was to consider what travel one might expect between the location pairs in scope, regardless of what mode it might use now or in future. Therefore, for the purposes of this high-level ranking exercise, a "first-principles" approach was taken, involving the production of a simple "gravity model". A gravity model is so called because it assumes that demand to travel between any two places increases in proportion to their size (in this case, measured by population and the number of jobs in each of the two locations), but decreases with the distance between them (most transport modelling has it decay with the square of the distance, again a close analogy to Newton's analysis of gravity). In producing this simple model, deliberately no other factors were taken into account, because the purpose was to assess simply the extent to which two places in the in-scope matrix might be expected to generate and attract travel. This deliberately did not have reference to what transport is currently provided between the two places (because the purpose was to consider underlying travel demand that could emerge if transport were improved); nor to the historic factors which mean that some places relate more to some places than to others, regardless of distance (because these factors can change over time). Distance was calculated simply by reference to crow-fly separation, plus a fixed 'deviation factor' to reflect the fact that real-world travel by any mode is never quite direct.

The model, in the same way, does not distinguish between origins and destinations (it is, in other words, non-directional); nor does it distinguish by journey purpose: these are matters that would need to be considered in the context of more detailed demand modelling if this scheme should be taken forward.

Manchester Airport is clearly a special case, as travel to/from this location is obviously not primarily driven by its catchment population, nor to a large extent by the number of jobs in the area, but by connecting with flights. In order to assess and rank the airport in a fashion consistent with the other locations considered, it was adjusted by reference to the station's current relative busyness in comparison with other major town and city stations, and essentially treated as though it were a town, with artificial dummy population and jobs figures generated in order to avoid it being suppressed in the rankings.

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Because the purpose of the model was solely to rank the location pairs relative to one another, and not to predict actual absolute numbers of journeys, there was no need to calibrate the gravity model. As such the “numbers” the model generated were only meaningful as factors by which to adjust the ranking scores. It should also be noted that this analysis does not attempt to identify specific journey purposes: it will be for future work to identify the specific benefits that new transport opportunities would offer to commuting (including access to education), business and leisure/personal business travel.

4.2.6. Additional potentially relevant factors

Any future work to analyse the potential use of a Colne – Skipton rail link, including demand forecasts and therefore business case development, should also have regard to other factors beyond those taken into account in the identification and prioritisation of conditional outputs, such as:

- Predicted population and employment growth in the study area, including any specific “hot-spots” identified;
- Significant business trip ends, i.e. identifying specific generators/attractors of business journeys as opposed to predictions of travel generally based on the levels of population and employment in the locations in scope;
- Specific development opportunities around existing stations, where an enhancement of the rail service with new connectivity and/or more attractive services would assist open up new opportunities;
- Background growth in travel behaviour:
 - Travel in corridors identified as relevant to this study (by all modes); and
 - Background growth in demand for rail, where a service already exists (relevant to identifying capacity pressure on existing corridors but also to the level of potential demand for new rail connectivity).

In addition, several of the locations under consideration are likely to assume greater importance by virtue of becoming HS2 hubs. Travel to and from locations “off the map” (such as London) has not been included in the weighting of location pairs considered in this report, but will clearly need to be included in demand-forecasting work. In this context, access to and from HS2 at Leeds, Manchester, Preston and (to a lesser extent to/from the study area) York will be of particular relevance. In practice, such considerations would tend to increase further the relative importance of the conditional outputs that provide improved links between East/Central Lancashire plus the Craven area and Leeds, Preston and Manchester, which are already identified as important. In addition, the committed Northern Hub improvements will improve the range of journey options (either direct or with a single interchange) under both “do-minimum” and “do-something” scenarios.

While all of these factors will be relevant to the case for the proposed line, they are not considered specifically at this stage. This reflects the purpose of this work being solely to identify and prioritise the types of journey to which the link could be relevant, i.e. identifying the transport problems to which the line might provide a potential solution – as opposed to seeking to evaluate actual levels and types of demand, economic benefits or revenue. These are matters for subsequent study in the context of business-case development.

4.3. Freight transport

The approach adopted to generate appropriate conditional outputs for freight transport was, for the reasons set out in previous chapters, quite different.

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As has been discussed, the critical driver of any potential freight use of the proposed Colne – Skipton rail link is assumed to be the need for sufficient trans-Pennine freight capacity which:

- Enables a sufficient quantity of trains to run daily at a variety of times that suit operators and customers;
- Enables those trains to run in paths which enable reasonable journey times, so that out-and-back trips are efficient and excessive resources (trains and crews) are not required – and any time-sensitive freight achieves a competitive origin-to-destination journey time;
- Accommodates trains which are efficient for operators in terms of axle-weight and loading-gauge (so enabling large and fully-loaded wagons), as well as train-length.

As has been noted, attractive freight paths are difficult to achieve over routes that are steeply graded (limiting train weight and/or speed), are congested with other traffic (such as frequent fast passenger trains needing to overtake), have short passing loops (limiting train lengths) or weak structure (limiting axle-weights), have restricted loading-gauges (so cannot for example accommodate full-size containers on conventional wagons), and/or are circuitous – many of these factors apply to the existing trans-Pennine rail corridors to a greater or lesser extent.

Therefore the assessment of relevant conditional outputs for freight involved the following steps:

1. Assessment of current freight usage on the main trans-Pennine corridors: not only trains that currently run regularly, but all available freight train paths – using resources such as the Realtime Trains website;
2. Assessment of future trans-Pennine rail freight capacity under committed schemes, such as enhancements committed by Network Rail during Control Period 5 (2014-2019) – the principal source of evidence was the North of England Programmes Indicative Train Service Specification;
3. Review of existing long-term planning documents, in particular Network Rail’s Freight Market Study, for forecasts of future freight flows in scope;
4. Obtaining other evidence of present and future freight markets, the nature of the requirements these imply, and the constraints that the network places on their growth – particularly by direct consultation with freight operators and customers;
5. A gap-analysis to assess the extent to which the network will provide not only the quantum of trans-Pennine train paths in the assumed future year, but would provide paths allowing the journey times, capacity and other characteristics sought by operators and customers;
6. Assessment of the extent to which the “gaps” identified by the above process could potentially be addressed by the Colne-Skipton rail link.

The gaps identified by this process formed the freight conditional outputs. No attempt has been made to rank these as was done for passenger travel. This is because the freight conditional outputs are far more generic in nature and cannot be meaningfully broken down into specific origins and destinations – nor would it be particularly useful to do so, as the point of relevance to potential functions of a railway between Colne and Skipton is the extent to which it could accommodate freight that needs to cross the Pennines, and the number and general nature of these trains (speed, weight), not where they happen to originate or have their destinations.

4.4. Other factors not considered at this stage

Additional factors that clearly will become relevant if this scheme is developed further, whether as matters supporting the case for its progression or as issues to be addressed, include the following:

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- Line and network capacity: the need to ensure that the interfaces between future use of the potential Gannow Junction – Colne – Skipton railway and the wider system are workable would also need to be considered alongside its potential to offer additional network capacity. This includes matters such as capacity along the Aire Valley corridor from Skipton towards Leeds/Bradford, and in Lancashire/Greater Manchester.
- Performance impacts and network resilience: this includes the impact of additional passenger and freight trains both at the interfaces with the existing network, and more widely within that network, as well as the performance and resilience characteristics of any new sections of line. While the need to maintain network resilience and performance (along with any potential additional value of new links for diversionary purposes) is identified as a conditional output (see section 6.3 below), detailed consideration of such impacts, whether positive or negative, is for subsequent stages of study.
- Areas targeted for economic growth: an acknowledged limitation of the model applied to identify high-priority conditional outputs for passenger transport in particular is that it is based on present-day population and employment data. While we consider that this is likely to be sufficient for reasonably robust identification of the most important conditional outputs, future work should identify locations within the study area which are expected to be the targets of future growth, such as under LEPs' Strategic Economic Plans. We are aware that in many cases SEPs have targeted for employment and housing growth locations which are well placed to take advantage of the rail network. These factors should be incorporated into demand and revenue modelling, as well as the wider assessments of the strategic case for providing the linkages which have been identified in this report.

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5. Conclusion: Emerging conditional outputs

5.1. Passenger flows

5.1.1. Priority conditional outputs

Applying the methodology described in chapter 4 to rank the potentially relevant origin-destination pairs showed the following to be the most significant conditional outputs, taking all the factors described into consideration:

Table 3: Location pairs with Very High priority

Location (W/S)	Location (E/N)	Type	
Blackburn	Leeds	EW	VERY HIGH PRIORITY
Blackburn	Skipton-Keighley	AM	
Bolton	Bradford	EW	
Bolton	Leeds	CA	
Bolton	Skipton-Keighley	AM	
Burnley	Leeds	CA	
Burnley	Skipton-Keighley	LC	
Manchester	Skipton-Keighley	AM	
Nelson-Colne	Bradford	CY	
Nelson-Colne	Leeds	CY	
Nelson-Colne	Skipton-Keighley	LC	
Preston	Leeds	EW	
Preston	Skipton-Keighley	AM	

Table 4: Location pairs with High priority

Location (W/S)	Location (E/N)	Type	
Blackburn	Bradford	CA	HIGH PRIORITY
Blackburn	Sheffield	EW	
Blackburn	Wakefield	EW	
Blackpool	Leeds	EW	
Blackpool	Skipton-Keighley	AM	
Bolton	Hull	CA	
Bolton	Wakefield	CA	
Burnley	Bradford	EW	
Burnley	Sheffield	EW	
Burnley	Wakefield	EW	
Manchester Airport	Skipton-Keighley	AM	
Nelson-Colne	Sheffield	CY	
Nelson-Colne	Wakefield	CY	
Nelson-Colne	York	CY	
Preston	Bradford	CA	
Preston	Hull	EW	
Preston	Wakefield	EW	
Wigan	Skipton-Keighley	AM	

As noted above, the flows are not directional and therefore the locations are both origins and destinations; purely for consistency, locations to the south/west of the Colne-Skipton corridor are given in the left-hand column, and those to the north/east to the right. Within each priority 'band', the location pairs are simply listed in alphabetical order: we have not attempted a full ranking as we consider that the methodology applied would not be robust enough to give such a high level of accuracy – nor is it required in order to identify the highest-priority location pairs as suitable conditional outputs for further analysis.

The flows can be broken down into five main categories (the "Type" entries listed above):

- **EW:** "East-West Connectivity" – journeys between centres on either side of the Pennines where the new route brings significant connectivity advantages in terms of journey time and/or direct journeys, as well as additional opportunities to travel (where the offer via the new route is markedly better, the historic route may cease to be competitive).
- **CY:** "Nelson-Colne to/from Yorkshire" – flows between the Nelson-Colne area (immediate catchment of the proposed line) and the major centres in Yorkshire, particularly Leeds and Bradford, using the new line plus continuing over existing routes.
- **AM:** "Airedale to/from Greater Manchester/Lancashire" – flows between the Keighley-Skipton area (immediate catchment of the proposed line) and the major centres in the Greater

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Manchester area, above all Manchester itself but also central/west Lancashire, using the new line plus continuing over existing routes.

- **LC:** “Local flows” – i.e. journeys primarily on the new section of line itself and not (or not significantly) using the existing rail network.
- **CA:** “East-West Capacity” – journeys which would not become markedly faster with the new link, but it would provide a competitive journey time and additional opportunities to travel, as a supplement to services using the existing routes.

5.1.2. Analysis of emerging findings

While the analysis suggests that several of the most important flows to form conditional outputs are those which have origin or destination directly on the proposed rail link itself, including the flow along the length of the new link itself (Nelson-Colne to/from Skipton-Airedale), it is important to emphasise that the zoning means that the Airedale zone includes the whole area between Keighley and Skipton, which has a population of over 100,000 and plays host to some 44,000 jobs, and similarly the Nelson-Colne area contains some 94,000 inhabitants and 38,000 jobs. As such, the area concerned is a larger area including the catchments of stations not only at Skipton and Colne. Therefore the importance given to such flows reflects the “mass” (population and jobs) in the two areas, their proximity to one another, and also the extent to which provision of a fast (rail) link between the two would not only provide a transformational change in the public transport offer but would also provide a link with potential to be significantly faster than driving.

A word of caution is appropriate here: the gravity model used, while reasonable purely for the purpose of identifying potentially relevant conditional outputs, is a simplistic model in many respects: in particular, by calibrating journeys in relation to a “mass” measure which is purely population plus employment, it does not really differentiate between places which are primarily *generators* of travel (typically population centres and dormitory settlements) and those that are mainly *attractors* of journeys (classically, major commercial centres attracting commuting, business and leisure flows). At present, particularly in rail/public transport terms, it could be argued that the Nelson-Colne area and the Airedale area, while having significant employment, are nonetheless primarily generators of travel rather than attractors (especially in terms of the areas around stations where rail journeys might be expected to have their destinations). This being the case, it is arguable that the modelling might slightly overstate the importance of the Nelson-Colne – Skipton-Keighley location pair. These more detailed factors would be picked up in more detailed demand modelling, such as would be carried out in business case development. Nonetheless, we consider that it remains reasonable to assume that there would be significant travel between the two zones; that a fair proportion would be able to take advantage of a rail link between them – and therefore that linking this location pair is a sensible conditional output amongst the others identified.

Other potential flows to which the scoring matrix gives prominence are those from these same two areas over the new line and then to major centres “on the other side of the hill” (in either direction), particularly Nelson-Colne to/from Leeds and Bradford, and to a lesser extent Wakefield and Sheffield; and similarly between Skipton-Keighley and Manchester, Burnley, Preston or Bolton, as well as to Manchester Airport. This appears entirely logical: this reflects the benefits of linking a sizeable catchment population with a major commercial centre – and appears intuitively correct in terms of the likelihood of journeys generated from places close to the proposed new link to these centres. It also reflects the magnitude of the journey-time benefits that the link is assumed to provide for such journeys, again not only in public-transport terms but (in most cases) in terms of real competitiveness with car travel.

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It should however be noted that there are some examples of location pairs that the model identifies as important, where there is in fact little or no actual benefit in pure journey-time terms (type “CA” as shown above). These are situations where the flow is likely to be large, and the provision of an *additional* journey opportunity with a journey time that is similar to that in the do-minimum would improve the service offer and be competitive with car travel, particularly in the context of targets such as in LTRS and YRNS for a general minimum twice-hourly service on interurban and regional routes. (While not directly modelled, it may be that in such instances this would be one way, though rarely the only way, of providing additional train capacity in the context of crowding and background demand growth.)

The only flow to Manchester Airport which would appear to form a conditional output to be given priority is that from the Skipton-Keighley area. This reflects the fact that it is the only zone from which a journey to the airport would be significantly improved – potentially both in pure journey-time terms and in terms of the elimination of interchange. It is worth adding that the model identified this location pair as “high priority” rather than “very high”, but the model does not include bespoke modelling of travel demand to the airport, so it is possible that its importance may be understated. In any event, the model nonetheless confirms that it is a pertinent flow to be analysed further.

Finally in this regard, it is again important to emphasise that the identification of the conditional output location pairs does not preclude the inclusion of other journey pairs as part of an ultimate timetable which might use the proposed rail corridor: the purpose of this report is only to identify the key pairs on which examination of potential infrastructure and service options should focus. In developing a business case for any infrastructure scheme in the future, it would be expected that the additional value that can be realised from enabling other journey pairs to the core ones will be explored as part of the process of business case optimisation. This would, for example, include local travel, longer-distance journeys to/from locations ‘off the map’ for the purposes of this report, plus other locations not covered such as to/from smaller centres. Consequently, other pairs not identified as conditional outputs, particularly where they generate significantly more benefit and revenue relative to the incremental cost of enabling them, could well form part of the ultimate specification of any infrastructure scheme for which a business case is ultimately developed.

5.2. Freight flows

Our review of the evidence and consultation with key stakeholders suggest that the following appear to be appropriate conditional outputs for freight along the Burnley – Colne – Skipton corridor:

- A minimum of two train paths an hour (these paths may only be fully available off-peak);
- The ability to travel from west coast ports to east coast ports in a maximum of 4 hours (e.g. Liverpool / Manchester – Hull / Immingham / Teesside);
- Sufficiently good rail paths to enable efficient asset utilisation for the operators (this is linked to transit time);
- Routes cleared to enable the routes to carry the larger, 9’ 6” containers preferred by the international shipping industry;
- A resilient and reliable network (see also next section).

As noted above, these outputs are considered particularly relevant to likely future requirements for the following traffic types:

- Intermodal traffic to, from and between ports;
- Fuels for electricity generation (and in some cases removal of its waste and byproducts);

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- Domestic intermodal traffic;
- Aggregates.

5.3. Other conditional outputs

In addition to the specific conditional outputs set out above, it is also appropriate to identify wider network characteristics that the transport system needs to provide, and which should therefore also form conditional outputs for any rail solution. These are relevant to both passenger and freight operation, and include:

- **Resilience:** The transport links provided should be reasonably robust in terms not only of their physical infrastructure design (such as to withstand extreme weather conditions), but should also be operationally robust in terms of the ability to limit the impact of perturbations, such as delays elsewhere on the rail network, and to recover from such disruption.
- **Diversions route:** There is significant potential value in providing routes which duplicate existing links and so provide alternatives which can be used either at times of planned disruptions (such as during a engineers' possession on the Calder Valley line) or to maintain links at times of unplanned perturbation; this is clearly connected to the issue of 'resilience' identified above, but relates to that of the wider network.
- **Performance:** Any new rail services provided (both passenger and freight) should be compatible with punctuality and reliability levels that are at least as good as the baseline targets that have been set for Network Rail and existing train operators for the periods in question (such as Control Periods 5 and 6), mindful that in future the current PPM regime may be supplemented or replaced by more accurate measures of delays and their impact on passenger journeys and freight shipping.

5.4. Interpreting these results

While this report is only intended as one part of the strategic case for improved linkages along the Burnley – Colne – Skipton corridor, it is clear that the conditional outputs that it has identified underline the very wide variety of transport linkages to which it could potentially be relevant – in other words, the variety of the transport 'questions' to which improved rail connectivity might potentially be one answer. This does not mean necessarily that there is a strong case, either strategically or economically, for specifically providing a rail link between Colne and Skipton, but rather that when considering the case for doing so, options relevant to all of the conditional outputs should be considered. The conditional outputs identified in this report include:

- Strategic passenger connectivity: improved rail journey times and additional direct journey opportunities on critical east-west linkages which have been identified by local authorities and Rail North as priorities;
- Passenger connectivity to/from Airedale and to/from East Lancashire: radically better access from the Keighley/Skipton corridor towards Lancashire and Greater Manchester (including its airport), and from the Burnley/Nelson/Colne conurbation towards the economic hubs of West Yorkshire;
- Strategic freight: the imperative of providing robust and attractive east-west trans-Pennine freight paths on which the North's economy depends, while not compromising the ability of the passenger rail network to grow in line with the strategies of stakeholders.

alongside the additional bonus of providing enhanced local connectivity directly between East Lancashire and Airedale. This being the case, it is clear that further consideration of the case for a

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through rail link on the Gannow Junction – Burnley Central – Colne – Skipton – Airedale corridor needs to take place in the context of strategic transport planning, in order to ensure that all of the conditional outputs identified in this report are considered. This in turn means that such a proposed rail link should be considered alongside other options to fulfil those conditional outputs, as opposed to purely considering the case for a railway from Colne to Skipton in isolation.

In terms of passenger transport, what these results present is a set of important location-to-location passenger journey opportunities that have been assessed as likely to offer significant economic benefits, and therefore would be likely to drive demand and revenue. While we have made no attempt to posit a service specification, it is likely that many of the location-pairs would combine together to form the basis of a future service specification – but this is clearly highly dependent on the solution ultimately selected. The service provided would then be moulded by the requirement to meet, or to approach as closely as possible, the targets identified for journey-time (by reference to uncongested car journey times) and for frequency (two attractive opportunities to travel per hour).

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6. Next steps: further work required

We have identified that the wide variety of conditional outputs relevant to the corridor and its proposed rail link mean that further analysis needs to take place in the wider strategic context, rather than merely analysing the economic case of one proposed rail link and purely examining local benefits and costs. As such, it is likely that further analysis would need to be taken forward under the aegis of the strategic planning of Transport for The North and/or Rail North, possibly in the Rail, Local Strategic Connectivity and/or Freight workstreams. To secure this would require the collective support of Lancashire and North Yorkshire County Councils and the West Yorkshire Combined Authority as a minimum.

This report has not purported to assess the business case for a railway between Colne and Skipton. Clearly, for any scheme to be taken forward, this, in the form of a standard WebTAG-compliant socio-economic appraisal, will be required.

In addition, however, there may well be a case for an additional piece of work which places the conditional outputs identified into their wider economic context – and in particular identifies the wider economic benefits that would arise if the conditional outputs were to be satisfied. This would entail going beyond standard WebTAG appraisal, and might include, for example, an assessment of the GDP/GVA benefits of providing the passenger and freight linkages identified, the numbers of jobs that would be created, the additional tax revenues that would accrue, effects on access to jobs/education/training, modal shift benefits, and so on. This would also enable a more accurate prioritisation and ranking of the conditional outputs identified in terms of their actual economic value, and so aid in the assessment of options to fulfil the conditional outputs.

We have also highlighted that the identification of conditional outputs in this report did not take direct account of growth areas identified in SEPs and other relevant planning documents. We recommend that future work should do this in the context of the proposed work set out above on economic benefits, and that any business-case appraisal should have full regard to such plans.

Prior to any development of the business case for specific interventions, based on a standard WebTAG-compliant benefit-cost ratio and wider appraisal, it will clearly be necessary to generate specific options to fulfil the conditional outputs – i.e. actual schemes. Generating these options needs to include the assessment – at an appropriate level of accuracy to this stage¹⁶ – of the likely capital and operating costs involved. This would set out the assumed infrastructure provided under each scheme, and the associated train service and other resource requirements. We would expect that these schemes would include, but not be limited to, those involving the reinstatement of a railway between Colne and Skipton. It seems likely that other options relevant to many of the strategic conditional outputs might include, for example, upgrading existing rail corridors such as the Copy Pit and Calder Valley lines; in the context of local connectivity, they may well include non-rail public transport such as upgraded bus services. There is also an argument that improved road-based connectivity (car for passenger outputs, lorry for freight) would also be an option to be included, though noting that doing so may conflict with some strategic goals of partner authorities and of Rail North/Transport for the North, and the political/public acceptability of major new road schemes may be open to question.

We have identified that generation and appraisal of rail-based options to satisfy the conditional outputs for passenger and freight connectivity needs to consider the wider network impacts (both positive and negative) that each would entail, such as, in the case of a Colne – Skipton scheme, any

¹⁶ We would expect this to correspond to Network Rail GRIP 1 or 2.

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requirements for complementary infrastructure south of Colne or east of Skipton. This includes wider network capacity, performance and resilience impacts. It will take into account capacity work which is already committed and be informed by other existing aspirations for infrastructure capacity/capability enhancements, such as for example those required to deliver the conditional outputs of the Yorkshire Rail Network Study and of the East Lancashire Rail Connectivity Study. Particularly in the case of freight, it should also include a cross-corridor analysis of what the “do-minimum” network is expected to be able provide once committed Control Period 5 projects have been delivered, in terms of capacity (number of paths, tonnages, lengths, route availability), and capability (speed, loading gauge), focusing in particular on trans-Pennine corridors. Such analysis would then inform the gap analysis which is then required in terms of the freight capability/capacity which we have identified in this report as conditional outputs – and therefore inform the generation of interventions such as new rail infrastructure to address those gaps, including potentially, but not limited to, the proposed Colne-Skipton link.

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Appendices

A: Assumed journey times (do-minimum and do-something)

B: Full list of passenger location pairs ranked by tier

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Appendix A: Assumed journey times (do-minimum and do-something)

Appendix A: Sectional journey times assumed for conditional output assessment purposes (passenger connectivity)

- Notes:
 1. These times include allowance for station dwell times so can be added together to deduce assumed journey times for a through journey
 2. See also list of assumptions set out in main report

Do-minimum

Core service assumed:

York	00:27
Leeds	00:09
New Pudsey	00:09
Bradford Int.	00:11
Halifax	00:13
Hebden Bridge	00:17
Burnley Manc Rd	00:09
Accrington	00:08
Blackburn	00:15
Preston	00:25
Blackpool North	

Extra journey times for locations not directly served:

Location	Via	Extra JT
Newcastle	Leeds	01:25
Durham	Leeds	01:10
Darlington	Leeds	00:51
Sunderland	York	01:40
Hartlepool	York	01:10
Middlesbrough	Leeds	01:22
Barnsley	Leeds	00:32
Hull	Leeds	00:54
Wakefield	Leeds	00:35
Doncaster	Leeds	00:11
Sheffield	Leeds	00:30
Bolton	Manchester	00:23
Manchester Airport	Manchester	00:16
Wigan	Manchester	00:28

Allowance for interchange 15 minutes

Other assumed journey times:

From/to	To/from	JT	Route assumed
Manchester	Leeds	00:44	Diggle
Manchester	York	01:11	Diggle
Lancaster	Leeds	02:07	Carnforth
Lancaster	York	02:32	Manchester
Barrow-in-Furness	Leeds	02:50	Manchester or Carnforth
Manchester	Bradford	00:50	Calder
Skipton	Bradford	00:36	Shipley

Do-something

Possible service assumed:

Bradford FS	00:07	York	00:27
		Leeds	00:12
		Shipley	
		Bingley	00:04
		Keighley	00:05
		Skipton	00:11
		Burnley Central	00:20
		Accrington	00:09
		Blackburn	00:08
		Preston	00:15
		Blackpool North	00:25
		Lancaster	01:00
		Barrow-in-Furness*	00:16
		Manchester Airport	
		Bolton	00:23
		Manchester Piccadilly	00:22

* Note that intermediate stops between Lancaster and Barrow are not shown, as they are not relevant locations to the location matrix used in this study, but stops equivalent to current semi-fast services along this route are assumed

Extra journey times for locations not directly served:

Location	Via	Extra JT
Newcastle	Leeds	01:25
Durham	Leeds	01:10
Darlington	Leeds	00:51
Sunderland	York	01:40
Hartlepool	York	01:10
Middlesbrough	Leeds	01:22
Barnsley	Leeds	00:32
Hull	Leeds	00:54
Wakefield	Leeds	00:35
Doncaster	Leeds	00:11
Sheffield	Leeds	00:30
Wigan	Preston	00:50
		00:13

Allowance for interchange 15 minutes

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Appendix B: Full list of passenger location pairs ranked by tier

Location (W/S)	Location (E/N)	
Blackburn	Leeds	VERY HIGH PRIORITY
Blackburn	Skipton-Keighley	
Bolton	Bradford	
Bolton	Leeds	
Bolton	Skipton-Keighley	
Burnley	Leeds	
Burnley	Skipton-Keighley	
Manchester	Skipton-Keighley	
Nelson-Colne	Bradford	
Nelson-Colne	Leeds	
Nelson-Colne	Skipton-Keighley	
Preston	Leeds	
Preston	Skipton-Keighley	

Location (W/S)	Location (E/N)	
Blackburn	Bradford	HIGH PRIORITY
Blackburn	Sheffield	
Blackburn	Wakefield	
Blackpool	Leeds	
Blackpool	Skipton-Keighley	
Bolton	Hull	
Bolton	Wakefield	
Burnley	Bradford	
Burnley	Sheffield	
Burnley	Wakefield	
Manchester Airport	Skipton-Keighley	
Nelson-Colne	Sheffield	
Nelson-Colne	Wakefield	
Nelson-Colne	York	
Preston	Bradford	
Preston	Hull	
Preston	Wakefield	
Wigan	Skipton-Keighley	

Location (W/S)	Location (E/N)	
Barrow-in-Furness	Bradford	Medium priority
Barrow-in-Furness	Leeds	
Blackburn	Barnsley	
Blackburn	Doncaster	
Blackburn	Harrogate	
Blackburn	Hull	
Blackburn	Newcastle	
Blackburn	York	
Blackpool	Bradford	
Blackpool	Newcastle	
Blackpool	Wakefield	
Bolton	Harrogate	
Bolton	York	
Burnley	Barnsley	
Burnley	Doncaster	
Burnley	Harrogate	
Burnley	Hull	
Burnley	Newcastle	
Nelson-Colne	Barnsley	
Nelson-Colne	Doncaster	
Nelson-Colne	Harrogate	
Nelson-Colne	Hull	
Nelson-Colne	Newcastle	
Preston	Barnsley	
Preston	Doncaster	
Preston	Harrogate	
Preston	Newcastle	
Preston	York	
Wigan	Bradford	

Location (W/S)	Location (E/N)	
Barrow-in-Furness	Barnsley	Low Priority
Barrow-in-Furness	Harrogate	
Barrow-in-Furness	Hull	
Barrow-in-Furness	Skipton-Keighley	
Barrow-in-Furness	Wakefield	
Barrow-in-Furness	York	
Blackburn	Darlington	
Blackburn	Durham	
Blackburn	Hartlepool	
Blackburn	Middlesbrough	
Blackburn	Sunderland	
Blackpool	Barnsley	
Blackpool	Darlington	
Blackpool	Doncaster	
Blackpool	Durham	
Blackpool	Harrogate	
Blackpool	Hartlepool	
Blackpool	Hull	
Blackpool	Middlesbrough	
Blackpool	Sunderland	
Blackpool	York	
Bolton	Darlington	
Bolton	Durham	
Bolton	Hartlepool	
Bolton	Newcastle	
Bolton	Sunderland	
Burnley	Darlington	
Burnley	Durham	
Burnley	Hartlepool	
Burnley	Middlesbrough	
Burnley	Sunderland	
Burnley	York	
Nelson-Colne	Darlington	
Nelson-Colne	Durham	
Nelson-Colne	Hartlepool	
Nelson-Colne	Middlesbrough	
Nelson-Colne	Sunderland	
Preston	Darlington	
Preston	Durham	
Preston	Hartlepool	
Preston	Middlesbrough	
Preston	Sunderland	
Wigan	Hull	

Location (W/S)	Location (E/N)	
Blackburn	Cleethorpes	Non-priority
Blackburn	Grimsby	
Blackburn	Scunthorpe	
Bolton	Middlesbrough	
Manchester	Bradford	
Manchester	Leeds	
Manchester Airport	Bradford	
Manchester Airport	Leeds	
Preston	Scunthorpe	
Preston	Sheffield	
Wigan	Harrogate	
Wigan	Leeds	
Wigan	York	

Note:

The "Non-priority" location pairs shown above are those which, whilst in scope, were found by analysis not to offer either a faster journey time via a Colne-Skipton link than do minimum services would provide, nor to provide a similar journey time and therefore an additional opportunity to travel. In other words, the relevant journey would always be faster by another route, and therefore should not form a conditional output for a Colne-Skipton railway.