How to accommodate forecast growth on the Cheshire Line Committee (CLC) corridor?

Railway investment choices

October 2019
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Part A  Executive Summary

We are pleased to present an assessment of some possible investment choices for the Cheshire Lines Committee (CLC) corridor between Liverpool and Manchester via Warrington Central. These choices are presented to understand which interventions may be required to meet future growth forecasts on the CLC corridor by 2026, 2033 and 2043. This work has been completed as part of the Continuous Modular Strategic Planning (CMSP) approach adopted under the Long-Term Planning Process (LTPP). Industry partners have participated in the study. This collaborative approach has helped to identify some possible investment choices to accommodate forecast growth.

The CLC corridor supports several functions, including commuting flows into and out of Liverpool and Manchester city centres and Warrington. It also provides connectivity beyond the North West to South Yorkshire, the East Midlands and beyond. Over the last seven years, there has been an increase of 55% in passenger numbers using the route throughout the day which compares with 25% growth across the UK1. Peak services east of Warrington to and from Manchester are overcrowded, whilst service reliability is poor. There are only four trains per hour (tph) east of Hunts Cross towards Manchester, but the timetable structure is very rigidly defined. This structure is determined by:

- The number of intermediate stations which stopping trains serve given the journey time differences compared with the semi-fast services;
- Long signalling headways covering specific parts of the route,
- Lack of intermediate overtaking opportunities;
- Significant scope for importing delays from and into the Castlefield corridor at Manchester, Hope Valley and elsewhere.

The rail industry faces a major challenge in the future to support the forecast demand growth, whilst the capacity constraints arising from the current timetable structure would make the introduction of extra trains challenging. Part of that challenge is to optimise current network assets, whilst accommodating the franchise commitments using both the CLC route and elsewhere. Network Rail has worked collaboratively with rail industry colleagues to consider the investment choices that may be required to support this forecast growth between 2024 and 2043.

Since the development of the original report, the economic appraisal results have been updated to reflect some alternative assumptions on capital and operating costs. Whilst these revisions have improved the results, the updated value for money assessment is still not sufficient to demonstrate a ‘good’ case (with a benefit cost ratio above 2.0). This outcome demonstrates the challenges associated with developing a robust business case for train lengthening, particularly when the extra rolling stock capacity is only required for a short period each day.

In the short term, forthcoming franchise changes (when the East Midland Railway service gets transitioned to either the Northern or TransPennine Express franchises) could deliver further capacity improvements. The existing Class 158s are expected to be replaced with alternative rolling stock with higher capacities, whilst the ongoing rolling stock cascade could increase capacity for local services.

In preparing this report, feedback from stakeholders has subsequently highlighted that challenges affecting the CLC route are wider than simply developing solutions to alleviate overcrowding. Whilst additional rolling stock may deliver some modest supplementary benefits including slightly shorter dwell times at stations during the peak periods, a more comprehensive package of interventions is required.

Whilst Network Rail investigated the interventions required to cater for future growth along the CLC line, a similar report was prepared by AECOM on behalf of Merseytravel, Warrington Borough Council and Transport for Greater Manchester. This package of suggested interventions offered a stronger economic business case as a result of its broader remit. Feedback from the Industry Planning Advisory Group has recommended that the latter concept be further developed.

The proposed package of interventions from AECOM

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1 Passenger journeys by sector Table 12.6 2017-18, ORR, MOIRA 2018 for Northern stopping services
comprises a revised local service with separate portions from Liverpool to Birchwood and from the new station at Warrington West to Manchester Oxford Road. Splitting the local services into two portions could enable the following:

- Introduction of a more reliable semi-fast service between Liverpool and Manchester with more flexible timings;
- Better service frequencies to the intermediate stations, providing an opportunity to grow the market;
- In the medium term, the opportunities to introduce rolling stock capable of achieving faster journey times should be considered, especially for local services;
- Furthermore, the internal configuration of this rolling stock could be designed to suit the characteristics of short distance journeys.

Additional infrastructure would need to be provided in the Warrington West and Birchwood areas to support the proposed service patterns. These changes could also help to grow the passenger market in the interim, potentially strengthening the case for further investment.

Whilst the options described above provide a short to medium term opportunity for the CLC route, it is recognised that further capacity interventions are still required in the longer term. The interface with the Merseyrail network in the Hunts Cross area and approaching Liverpool Lime Street provides a more complex issue, for example. Adding in the interaction with other services east of Castlefield Junction, and the differences between the service frequencies creates a significant limit on the number of services in operation along the corridor.

There are similar issues at the Manchester end of the corridor too, since the frequencies are lower compared with the Metrolink services. Connectivity issues approaching Manchester may need to be addressed more urgently (compared with the Liverpool end of the route) given the higher current passenger usage and greater forecast growth. Any interventions will be limited by platform lengths at Manchester Oxford Road and use of the Castlefield corridor.

Determining whether there would be sufficient capacity until the introduction of Northern Powerhouse Rail (NPR) is key, since NPR could offer the option for passengers travelling between Liverpool, Warrington and Manchester to switch onto the new services. This diversion of these longer distance passengers onto other trains could release capacity for users joining services at other CLC stations.

This study recommends therefore the progression of the report prepared by AECOM, and the pursuit of their recommended interventions required to drive connectivity along the CLC Corridor. A Strategic Outline Business Case (SOBC) should be developed. It is also recommended that further investigation into potential interventions that seek to address future capacity issues along the rail corridor takes place.
Part B  The Long Term Planning Process and Continuous Modular Strategic Planning

What is the Long Term Planning Process?
The Long Term Planning Process is designed to facilitate the strategic planning of the rail network. It is a Network Rail Licence Condition to effectively plan the future of the network. This process takes into account the views of all industry stakeholders and incorporates these when identifying how rail can support the forecast growth over the next 25 years. Additionally, it enables passenger and freight operators to have the confidence they need to take their own strategic decisions in planning for their future services. The findings from the Study that answers the CMSP question also help to inform potential funders (Government, Transport for the North, and third parties), and franchising authorities of the potential choices that they may wish to make in terms of investment in the network and the services running.

What is Continuous Modular Strategic Planning?
Continuous Modular Strategic Planning (CMSP) is a workstream initiated in response to the outputs of the Shaw report. This recommended that the industry should create route-based enhancement plans that:

- Support the needs of devolved route businesses;
- Focus explicitly on the needs of passengers and freight end-users;
- Engage operators to represent the voice of those customers.

CMSP puts passenger and freight end users at the heart of the process. It also better addresses the Route’s business needs, and feeds into refranchising, capacity allocation, development and delivery, and the Sale of Access rights processes. It employs a more effective and focussed means of consultation and provides more granular, targeted market insight.

Figure 1 illustrates this process.

- **Identify/Review** the list of strategic questions – The rail industry identifies the strategic questions they would like to answer within a geographical boundary;
- **Prioritise** – The governance group review and prioritise the questions to be answered using a scoring matrix which provides transparency and fairness across the industry;
- **Define** – The strategic question is defined to ensure that it captures the issues to be addressed;
- **Agree resources/programme and governance** – The strategic question lead is allocated and resource across the industry is identified to ensure fair representation opportunity at all planned working groups;
- **Undertake work** – The strategic question is answered in collaboration with all stakeholders;
- **Write report** – The strategic question lead drafts the report, following the outputs from the work;
- **Review** – All industry partners review the draft report and provide commentary or proposed amendments;
- **Publish** – The document is amended accordingly and, once approved, is published. Findings are integrated with other workstreams including other CMSP questions, plus HS2 and NPR outputs.

Figure 1: Summary of the CMSP process

**How to accommodate forecast growth on the Cheshire Line Committee (CLC) corridor?**
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Study Aims and Objectives

Context for the Strategic Question

In early 2017 key industry stakeholders were invited by Network Rail to attend a series of workshops to generate a list of strategic questions to be considered as part of the North of England Route Study (NoERS). The four rail corridors around Greater Manchester identified in tranche 1 of the strategic question prioritisation were Bolton, Stockport, Cheshire Lines Committee (CLC) and Hadfield / Glossop.

The strategic questions to be answered were:

- **SQ-GMC-C-003**: What interventions are required to meet future growth on the Bolton corridor by 2026, 2033 and 2043?
- **SQ-GMC-C-006**: What interventions are required to meet future growth on the Stockport corridor by 2026, 2033 and 2043?
- **SQ-GMC-C-004**: What interventions are required to meet future growth on the CLC corridor by 2026, 2033 and 2043?
- **SQ-GMC-C-005**: What interventions are required to meet future growth on the Hadfield / Glossop corridor by 2026, 2033 and 2043?

These four key corridors into Manchester have been selected for the following reasons:

- Interventions will be required to meet passenger and freight growth by 2026, 2033 and 2043;
- Some of the corridors are being considered as part of NPR/HS2 and this provides integration with existing work streams;
- Existing reports/evidence have already been undertaken and show that some interventions may be required by the end of the franchise periods;
- They have been identified as priorities by potential funders and have a key interest from stakeholders;
- Outputs from this corridor analysis is needed to inform wider transport strategies and plans for the North of England.

It should be noted that the Study question was modified at the beginning of the CMSP process in order to better reflect current franchise lifecycles. The question being answered instead became: “What interventions are required to meet future growth on the CLC corridor by 2024, 2033 and 2043?”

Study Governance

Figure 2 illustrates the governance arrangements that provides oversight to the technical staff responsible for completing the work. In addition to Network Rail, there is also representation on this governance group from:

- Transport authorities: Department for Transport and Transport for the North, Liverpool City Region Combined Authority, Transport for Greater Manchester and Warrington Borough Council;
- Operators: East Midlands Trains, Northern Railway;

The purpose of this group is to offer oversight and direction to the project team undertaking the technical work.

![Governance arrangements for CMSP](image-url)
Part C  Today’s Railway

Rail in the North West
The extensive rail network serving the North West of England supports passenger journeys between the main economic centres. Manchester and Liverpool are two of the largest and most influential cities in the North West, and the movement of passengers into and out of these hubs is crucial to the economic performance of area.

There are over 200,000 passenger journeys to / from Manchester city centre every day. This has grown dramatically in the last 20 years, with the number of passengers more than doubling between 2001 and 2011, and continuing to grow since. Of those passengers travelling into the centre on a typical weekday in 2016, about one third were travelling in the peak period between 07.00 and 09.59, this highlights the strain that the network is put under for a relatively short period each day.

Crowding issues in peak periods continue to be a major issue across rail corridors into Manchester. For journeys into Manchester city centre in 2017, 4.3% of train passengers were required to stand for more than 20 minutes with a 2.2% affected during the PM peak. This was the third highest percentage of any city in the country (after London, 5.4%, and Cambridge, 4.8%). In total, 15% of passengers were required to stand, which represents a 4% increase versus 2010. Since 2010, AM peak overcrowding issues affecting Manchester have deteriorated as the number of extra passengers using the network vastly outstrips the additional supply of seats available (10,400 passengers vs 6,700 seats). Manchester Piccadilly, Manchester Oxford Road and Manchester Victoria are the main Manchester city centre stations (note though that Manchester Victoria can’t be accessed from the CLC line). Manchester Piccadilly represents an all-important hub for the North, with passengers travelling to, from and through Manchester from cities that include Liverpool, Leeds and Sheffield. CLC services to / from Liverpool start and terminate at the high level platforms at Lime Street. About 55% of journeys between the North West and other regions start / end in Greater Manchester.

In Liverpool, there were 124,000 trips per day into the city centre in 2016. This total includes Merseyrail as well as the high level platforms at Lime Street. Of this, 20,000 trips were made in the AM peak plus a further 22,000 journeys during the PM peak. According to the Department for Transport measure PiXC, there were no crowding issues affecting services in 2016. This is explained by the introduction of a greater number of seats versus the change in passenger numbers using rail to Liverpool during the AM peak.

Geographical boundaries for the CLC study
The geographical boundaries defined for the CLC corridor are shown in Figure 3. The boundaries agreed for the purposes of the capacity modelling analysis were Edge Hill East Junction in Liverpool to Trafford Park West Junction in Manchester. The following feeder corridors were identified to inform the analysis (note that a “feeder corridor” can be identified as being a heavy rail line that has direct connections with the main route under investigation and whose performance will therefore directly impact that of the main corridor):

- Liverpool Lime St to Edge Hill;
- Manchester Oxford Road to Trafford Park;
- Southport to Hunts Cross.

Merseyrail services between Southport and Hunts Cross are represented as a feeder corridor. Several other operators operate via the feeder routes including Virgin Trains, TransPennine Express, London North Western, Transport for Wales and Cross Country. Examples of other services using these routes include trains from Sheffield or Manchester Airport via the CLC, Transport for Wales (TfW) from Chester, Llandudno or South Wales, Cross Country (the southern approach to Manchester Piccadilly), London North Western (Birmingham trains on the approach to Liverpool Lime Street), Virgin Trains (approaches to Liverpool and Manchester) and TransPennine Express (trains from Manchester Airport via the Ordsall Chord).

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2. Rail passenger numbers and crowding on weekdays in major cities in England and Wales 2017, Department for Transport, July 2018
The boundaries described above took account of the interface with several workstreams comprising current studies, reports covering the network at Liverpool Lime Street and Manchester Oxford Road, Manchester Piccadilly plus analysis of the Castlefield corridor by other stakeholders such as Transport for the North, HS2 Ltd and Network Rail. Liverpool Lime Street station is excluded from this analysis since it already forms part of the scope of work being completed as part of Northern Powerhouse Rail.

There are 21 intermediate stations shown in Figure 3 between Liverpool Lime Street and Manchester Oxford Road. The busiest five stations are Liverpool South Parkway (2,247,382), Warrington Central (1,764,022), Birchwood (687,758), Widnes (493,902) and Urmston (375,410). The five least busy stations are Humphrey Park (3,486), Glazebrook (45,432), Chassen Road (49,210), Trafford Park (54,870) and West Allerton (101,296). Liverpool Lime Street, Manchester Oxford Road and Manchester Piccadilly stations are outside the core corridor, but are used by 16.0m, 8.56m and 27.7m passengers per year respectively.
Demand during the high peak

The Study investigates demand during the high peak hour (between 08.00 and 08.59), because the worst overcrowding issues generally occur within this period. At other times of the day, for example, shoulder peak periods (07.00-07.59 or 09.00-09.59) or the PM peak (16.00-16.59), passenger numbers are typically lower. During the AM peak hour, nearly 3,500 passengers arrived at Manchester Oxford Road, although there were less than 650 arrivals at Liverpool Lime Street in the opposite direction in the same period. Analysis of journey patterns to Manchester for other time periods indicates that the number of arrivals between 07.00 and 08.00 is about 40% lower versus the total for 08.00-09.00, whilst the total between 09.00 and 10.00 was 50% lower than the high peak hour.

CLC service patterns

There are currently two passenger operators who run on the core CLC corridor during the high peak hour. These are as follows:

- Northern: 3tph comprising one semi-fast and two stopping trains;
- East Midlands: one semi-fast train per hour.

The service pattern for these services, including stops at intermediate stations, is shown in Figure 4. The Northern semi-fast train isn’t extended to Manchester Airport in the high peak hour, as the extra peak TfW service means there is insufficient capacity. Instead of Manchester Oxford Road, the stopping trains were expected to be extended to Manchester Piccadilly and beyond as part of the Northern franchise agreement, but capacity constraints elsewhere have prevented this outcome. Outside the high peak hour, Trafford Park, Humphrey Park and Glazebrook are only served by trains every two hours, whilst Sankey, Padgate, Halewood and Hunts Cross only get an hourly service.

Freight also operates over parts of the corridor, particularly at the eastern end of the route from the Trafford Park area eastwards. Most of these freight trains then extend towards Crewe and to the south.

Wider connectivity

The central Manchester stations perform several roles, they connect commuters to employment and allow passengers to interchange and travel between key cities in the North and across the UK for business and leisure. Liverpool Lime Street station and Liverpool South Parkway offer access to the Merseyrail network, with interchange onto the Wirral and Northern Lines.

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3 Passenger station counts for 2016, Department for Transport

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Figure 4: Summary of existing CLC service patterns – high peak hour
Northern and TransPennine Express franchise changes

In May 2018, as part of the franchise commitments affecting TransPennine Express and Northern, a number of services were changed. The hourly TPE service was transferred from the CLC route onto the Chat Moss Line between Liverpool and Manchester Victoria. A new hourly Northern train between Liverpool Lime Street and Manchester Airport via Manchester Piccadilly then replaced the TPE service.

The service changes affecting the CLC route described above mean the number of journeys using this route between 2011 and 2018 are not directly comparable (the 2018 timetable changes resulted in no trains travelling east of Manchester). However, the number of passengers using the mix of semi-fast and stopping trains west of Manchester increased by 30% according to the Department for Transport’s Annual Rail Statistics.

Table 2: Baseline services to central Manchester (08.00-08.59)

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>Rolling stock</th>
<th>Seats</th>
<th>Standing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liverpool Lime Street</td>
<td>Manchester Oxford Road (semi-fast)</td>
<td>4-car Class 195</td>
<td>248</td>
<td>194</td>
<td>442</td>
</tr>
<tr>
<td>Liverpool Lime Street</td>
<td>Norwich (semi-fast)</td>
<td>4-car Class 158</td>
<td>314</td>
<td>142</td>
<td>456</td>
</tr>
<tr>
<td>Warrington Central</td>
<td>Manchester Oxford Road</td>
<td>4-car Class 150</td>
<td>248</td>
<td>160</td>
<td>408</td>
</tr>
<tr>
<td>Liverpool Lime Street</td>
<td>Manchester Oxford Road</td>
<td>4-car Class 150</td>
<td>248</td>
<td>160</td>
<td>408</td>
</tr>
</tbody>
</table>

Source: Office of Rail and Road (2018), Estimated passenger journeys 2017/18. www.nationalrail.co.uk, observed / proposed rolling stock formations.

Rolling stock

Northern currently operates Class 150 or 156 units on the CLC route, whilst some Class 14X units are deployed on stopping services. However, the latter are due to be replaced by the end of 2019 or early 2020. East Midlands Trains operates Class 158s.

The rolling stock formations, along with the seated and standing capacities are shown in Table 2. This information has been used to inform the crowding analysis for each station, in conjunction with the demand analysis for individual services discussed above.

For the purposes of the Study, a 4-car Class 195 is assumed for the Liverpool to Manchester Airport service. This rolling stock is expected to be operating prior to the December 2019 timetable change and these services will be branded as ‘Northern Connect’. The capacity offered by these units still represents a reduction of 50 seats compared with the 6-car Class 185s operated by TransPennine Express prior to May 2018.
Infrastructure Capability

The CLC route is an important two track railway, but there are a number of factors which contribute to the inflexible current timetable structure:

- Numerous intermediate stations which leads to journey time differences between the stopping and semi-fast services rather than consistent journey times between stations for all trains;
- Lengthy signalling headways, particularly the absolute block section between Warrington and Glazebrook;
- Lack of intermediate passing opportunities. Trains terminate at Warrington Central and Hunts Cross but the only passing loop is in the westbound direction at Glazebrook. This is infrequently used since the signalling capability means the train being passed would need to spend 10 minutes in the loop;
- Interface with the currently capacity constrained Castlefield corridor which limits the number of terminating and through trains from the CLC route. In contrast with many other routes serving Manchester, there are no alternative routes that could be used to divert the CLC services;
- Scope for importing delays from the Hope Valley and beyond;
- Relatively short turnrounds, for example, the East Midlands Trains service has a turnaround time at Liverpool Lime Street of just 21 minutes, despite a journey time of over five hours.

This infrastructure capability leads to a requirement for one stopping service to depart Liverpool or Manchester immediately behind a semi-fast train. This allows the former train to reach its terminus before the next semi-fast train (which departed about 30 minutes later) catches up. These constraints prevent some of the smaller stations being better served.

Analysis by Network Rail shows that the Warrington to Manchester and Warrington to Liverpool sections are responsible for some of the largest delays affecting routes in northern England. The section between Warrington and Manchester was the second most delayed route overall, with average delays of 4.2 minutes per service. The Warrington to Liverpool section incurs delays of nearly 3 minutes per service, significantly above other regional routes across the North of England. Westbound trains are more affected by these delays, largely owing to the potential for delays on the inbound journey to Liverpool from the East Midlands or East Anglia.

The core section of the CLC route is not electrified and currently relies on diesel trains. Only the feeder sections between Trafford Park and Manchester Oxford Road, Liverpool Lime Street and Liverpool South Parkway are electrified (both 25kV AC overhead), whilst the Merseyrail corridor to Hunts Cross is electrified to 750V DC third rail.

Many stations on this route remain in their original form as first constructed, and analysis by AECOM indicates that the facilities at several intermediate stations are ‘poor’ or ‘very poor’. Stations listed in this category include West Allerton, Widnes, Sankey, Padgate, Chassen Road, Humphrey Park and Trafford Park.

Infrastructure renewals have been completed in the Liverpool South Parkway area, whilst Trafford Park re-signalling is scheduled to be completed by 2024 (the end of Control Period 6). Further information regarding the infrastructure characteristics and capabilities can be found in Network Rail’s LNW Route Specification document. Figure 5 illustrates some of the main characteristics of the existing CLC route.

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5 Developing a strategic plan for the CLC Route, June 2017, A report by AECOM on behalf of Merseytravel, Transport for Greater Manchester and Warrington Borough Council
**Load factor analysis**

Critical load and city count data collected in autumn 2016 on behalf of the Department for Transport (DfT) was examined for the high peak period 08.00-08.59. This dataset was calibrated against MOIRA\(^6\) demand profiles for trips crossing a cordon into Manchester city centre. Initial data analysis confirmed that the arrivals into, or departures from, Manchester were significantly higher than the totals to / from the next biggest cities, Liverpool or Warrington Central. The remainder of this analysis therefore focuses on the load factor analysis to Manchester, since this forms the busiest part of the journey.

These passenger counts were compared to current capacity on each station arc given current rolling stock on a service-by-service basis, in order to show the quantum of seated and standing passengers on each corridor into central Manchester (and therefore how “busy” the corridor is at each station along it). Passenger capacity is aggregated and averaged over all services on the corridor, therefore the relative load factors of individual services is not represented. This information is presented in an aggregate format to maintain the commercial confidentiality of the data.

The route sections in Figure 6 with lines shown as light green to dark green have sufficient seating capacity for the actual number of passengers, whilst the route sections shown as amber, red, purple or black have standing passengers. Route sections shown in black have more than three standing passengers per square metre. The Department for Transport (DfT) peak crowding standards specify that passengers travelling more than 20 minutes should have an expectation of a seat and standing densities should not routinely exceed more than 2.2 passengers per square metre, or 4 passengers per square metre when the train interior is specifically configured for short distance ‘Metro’ commuting. Figure 6 illustrates that there is up to one passenger / m2 standing on average from Birchwood towards Manchester, which increases to 1-2 passengers / m2 east of Urmston in the high peak.

Figure 6 indicates that increased passenger capacity is needed into central Manchester during the high peak hour. This accounts for the varying service types in operation along the line (semi-fast and stopping). Any passengers boarding at Birchwood in the high peak hour is likely to fall outside the 20-minute standing journey time threshold.

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**Figure 6: Load factor analysis to Manchester (08.00-08.59, 2016)**

6 MOIRA is a forecasting tool used by the Department for Transport, train operators and others to assess the impact of service changes on journeys and revenue. The software includes an estimate of the arrival profile for each station to enable revenue to be allocated to different operators. Recent versions of the software (MOIRA 2) incorporate a number of updates, including the capability to model crowding.
Part D  Factors influencing change

There are clear stakeholder ambitions across the study area to accelerate forecast economic growth through targeted investment in transformational transport projects. These stakeholders include Local Transport Authorities, Local Enterprise Partnerships and sub-national transport bodies.

**Warrington West New Station**
Bespoke analysis has been completed for the CLC corridor which includes the generative impacts on demand of the new Warrington West station, plus abstraction from adjacent stations. Data provided by AECOM as shown in Table 3 based on all three Northern services per hour calling at the station was used to adjust the forecasts. Since then, timetable planning work for a December 2019 timetable change has indicated that only 2tph could be served, and that total demand (in this analysis) would be reduced by 23%.

Sankey is located to the west of the proposed Warrington West station and it is envisaged that service levels to the former station would be reduced to a very small number of trains per day to accommodate the services stopping at the new station.

The inclusion of the above demand forecasts would supplement the current usage of the CLC route, with exogenous growth overlaid to represent the additional traffic expected to be generated by the new station. Forecasts have also been revised to reflect the abstraction of some passengers from the CLC to the Chat Moss route in response to service improvements on the latter corridor.

**Table 3: Passenger forecasts for Warrington West**

<table>
<thead>
<tr>
<th>Year</th>
<th>Warrington West Station Demand ('000s)</th>
<th>Other impacts ('000's)</th>
<th>Net total ('000's)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local catchment</td>
<td>P&amp;R</td>
<td>Inbound</td>
</tr>
<tr>
<td>2024</td>
<td>247</td>
<td>397</td>
<td>146</td>
</tr>
<tr>
<td>2030</td>
<td>286</td>
<td>419</td>
<td>162</td>
</tr>
</tbody>
</table>

Source: AECOM

**East Midlands Trains Franchise Replacement**
In April 2019, the Department for Transport announced the decision to split the Liverpool to Norwich services at Nottingham from December 2021. The services covering the western part of the route between Liverpool and Nottingham will be subject to a separate tendering competition, possibly involving the current operators of Northern and TransPennine Express. Details of the revised service proposals, including rolling stock assumptions, are yet to be confirmed. The new franchise proposals could alter the rolling stock capacities assumed in the “Do Minimum” scenario of this Study, possibly introducing some rolling stock with higher seating capacities which would help to address the overcrowding issues.

**Freight**
The main freight traffic generator served by this corridor is the container terminal at Trafford Park. There is a significant increase in rail-freight traffic forecast on the routes to and from Trafford Park, rising from 13tpd to 26tpd by 2043. It is assumed that hourly path would be sufficient to accommodate the future level of demand, with the balance of any paths operating overnight.

Transport for the North (TfN) has yet to publish their aspirational strategy for freight. This strategy may lead to an increased level of traffic to/from Trafford Park. Capacity on the CLC route and the adjacent Castlefield corridor therefore needs to be reviewed to determine future infrastructure scope.

**Economic drivers**
The economy generated by the Greater Manchester City Region is amongst the largest in England, accounting for £59.5 billion of gross value added (GVA) in 2015\(^1\). This accounts for nearly 40% of GVA in the North West. The GVA for Liverpool City Region for the same year was £29.5bn\(^2\), whilst the total for the Cheshire and Warrington area accounted for a further £28bn. Between 2005 and 2015, GVA increased by about 30%, with the total for Cheshire and Warrington increasing by nearly 40% over the same period. Such periods of economic growth have significant impacts on the demand for the railway.

\(^1\) Office for National Statistics, GVA release 2016
\(^2\) Office for National Statistics, GVA release 2016
Northern Powerhouse Independent Economic Review (NPIER) data has also been examined to illustrate the forecast change in population, employment and GVA per capita for Liverpool, Manchester and Warrington Districts for the ‘business as usual’ (BAU) and ‘transformational’ growth scenarios. Data for Warrington has been included as it represents a possible Other Significant Economic Centre (OSEC).

A 25% increase is forecast for Warrington and Manchester in the NPIER business as usual (BAU) scenario, along with a 35% change in the ‘transformational’ scenario between 2015 and 2050. It should be noted though that there is insufficient detail within these forecasts to determine whether an express, semi-fast or local service pattern would be better supported by these forecasts.

The percentage change for Liverpool is smaller when compared with Warrington and Manchester, particularly for the BAU scenario. Liverpool has the most ambitious employment forecasts to 2050 specified in the NPIER, with a 35% increase in the transformational scenario versus 2015. The percentage of jobs located in both Manchester and Warrington is forecast to rise by 29% over the same period in the most ambitious scenario. These forecasts demonstrate the potential for huge economic growth that it’s believed the North could achieve during the next 10 to 20 years.

The Study will account for these economic drivers by revising employment forecasts that form a part of the input assumptions used in the Economic Analysis. This will be especially relevant in the more transformational economic scenarios and will help to define the potential intervention options proposed.

**High Speed 2 (HS2)**

In 2009 the government commenced an assessment of the case for a second high speed line in the UK. A Y-shaped route from London to Birmingham with branches to Manchester and Leeds was proposed. Phase 1 will deliver a new route between London and the West Midlands, whilst Phase 2a would extend the route north to Crewe. Phase 2b is planned to continue the route from Crewe to Manchester, and also includes the construction of the eastern leg from the West Midlands to Leeds. As part of this strategic question, the impact of the proposed HS2 network has been included.

The intention of HS2 is to improve journey times and connectivity between the North and South of the country in order to support economic growth. Whilst the direct impact on the CLC corridor of HS2 may be limited, the corridor’s role in connecting passengers between the two hubs at Liverpool Lime Street and Manchester Piccadilly is expected to grow as the scheme advances.

A public consultation commenced in June 2019 for a 12 week period to review possible modifications to Phase 2b, notably the passive provision for two future grade-separated junctions. The first junction (Figure 7) would allow the future use of the HS2 line into Manchester as part of Northern Powerhouse Rail (NPR), for services between Manchester, Warrington and Liverpool; whilst the second would also allow HS2 services between London and Liverpool to use future NPR infrastructure.

**Northern Powerhouse Rail (NPR)**

Major investment is proposed for the railway in the North of England. This includes the following schemes:

- Northern Hub;
- Trans-Pennine Route Upgrade programmes;
- improvements to the East and West Coast Main Lines;
- proposed new HS2 Ltd infrastructure.

This programme is part of the Northern Transport Strategy: a multi-modal strategy aimed at enabling the Northern Powerhouse vision. The Northern Powerhouse Rail (NPR) Programme aims to enable the transformation of rail journeys between the city centres of the six main Northern Powerhouse cities – Liverpool, Manchester, Sheffield, Leeds, Hull and Newcastle – and Manchester Airport, by 2043.

This transformational change is defined as significant reductions in journey time, coupled with increases in frequency and capacity for passenger services. The NPR network could also offer potential to provide much improved connectivity for Other Significant Economic Centres (OSECs), which includes Warrington. Warrington could be served by a town centre or a parkway station. NPR could also enable released capacity on the existing network for freight or other local services.

The NPR programme is currently at the Strategic Outline Business Case (SOBC) stage. Network Rail (NR) is working in partnership with Transport for the North and the Department for Transport to develop the costs and test operational feasibility which builds on previous work to provide input to the SOBC. As part of this work, concepts and options are being developed and tested for the route between Liverpool and Manchester (including Manchester Airport), with a number of options potentially involving service changes affecting the CLC corridor. This could include extensions to the

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3 Revised NPIER District and Regional Analysis _NPR, Cambridge Econometrics

4 See https://www.gov.uk/government/consultations/hs2-phase-2b-design-refinement-consultation
Merseyrail network. Furthermore, a new NPR / HS2 station serving Liverpool or Merseyrail could also be introduced. The emerging vision for the NPR network is shown in Figure 7.

Figure 7: Emerging vision for the NPR network

![Emerging vision for the NPR network](image)

The introduction of a high-speed rail link in 2033 and the ambitions for Northern Powerhouse Rail (NPR) will be transformational for passengers and the economy. HS2 is estimated to create 40,000 new jobs, 13,000 new homes and commercial developments in the Greater Manchester area. Similarly, NPR will reshape travel across the North and act as a catalyst for change in towns and cities across the regions. This presents an opportunity to consider options for delivering future capacity and connectivity across the area, in a way that maximises the benefits of this major investment on the classic rail network.

From a Liverpool City Region perspective, HS2 is expected to generate a further £15bn in economic growth, support the construction of 11,000 new homes and the creation of 24,000 new jobs. In addition, up to 3.6m new visitors could be attracted to the city region.

The potential impacts of High Speed 2 (HS2) and Northern Powerhouse Rail (NPR) have not been considered in detail in this study at this stage. As both schemes are developed, further work would need to be considered to assess the impact on future demand and the use of the corridor. It’s possible that the introduction of NPR services between Liverpool and Manchester, via a potential Other Significant Economic Centre (OSEC) at Warrington (either with a town centre or a parkway station) could abstract further trips from the CLC as a result of the faster journey times on offer.

Digital Railway

The Digital Railway Programme is a benefits-driven, cross-industry change programme enabled by technology which will facilitate the delivery of systems, technology, business and people change in an integrated way. The rail industry is developing business cases across the network to see what benefits Digital Railway can bring. The industry has not built a business case for Digital Railway on the CLC corridor and the options that have been developed are future proofed for Digital Rail but do not provide the answer for future growth up to 2043.

Further details are available at: https://www.networkrail.co.uk/our-railway-upgrade-plan/digital-railway/digital-railway-strategy/

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5 [https://assets.contentful.com/nv7y93df4jq/DSHdSL1zec4a8A0cCw/706c82c74735677df2704a93c5ee9ab0/17-1687_HS2_Growth_Strategy_Summary.pdf](https://assets.contentful.com/nv7y93df4jq/DSHdSL1zec4a8A0cCw/706c82c74735677df2704a93c5ee9ab0/17-1687_HS2_Growth_Strategy_Summary.pdf)

6 Liverpool City Region Combined Authority, June 2019, Combined Authority Transport Plan – Facilitating inclusive economy
Part E  Impact of future year growth

Forecasts

In order to assess the need for potential future interventions on the railway, forecast growth scenarios have been produced for 2024, 2033 and 2043. These used inputs from the Passenger Demand Forecasting Handbook (PDFH) v6.0 assumptions for all specified future years in accordance with agreed Network Rail and DfT guidance.

Two sensitivity tests were applied to capture the more localised forecasted growth:

- Inclusion of an overlay onto the Network Rail/DfT methodology which reflects more ambitious employment assumptions;
- Growth forecasts prepared by Transport for Greater Manchester.

Growth rates used to calculate future year demand are shown below.

The differences in the growth forecasts are driven by a difference in employment and population forecasts used by the 3 Specifiers.

As previously noted, only services via Manchester Oxford Road are included in the load factor and crowding analysis, as this was identified as the principal constraint along the CLC corridor. Trains into Liverpool Lime Street or the Merseyrail network are not analysed. However, the interaction with the Merseyrail services between Hunts Cross and Liverpool South Parkway, plus other trains using the high level platforms at Liverpool Lime Street and Liverpool South Parkway are considered as part of the supplementary capacity analysis.

Please note that a journey time of 20 minutes is currently assumed by the Department of Transport as being the acceptable duration for standing passengers.

<table>
<thead>
<tr>
<th>Specifier</th>
<th>2024</th>
<th>2033</th>
<th>2043</th>
</tr>
</thead>
<tbody>
<tr>
<td>DfT WebTAG</td>
<td>12%</td>
<td>26%</td>
<td>43%</td>
</tr>
<tr>
<td>System Operator (NR)</td>
<td>25%</td>
<td>42%</td>
<td>63%</td>
</tr>
<tr>
<td>TfGM - CLC</td>
<td>31%</td>
<td>65%</td>
<td></td>
</tr>
</tbody>
</table>

2024 forecasts

Figure 8 below illustrates the impacts to demand along the CLC corridor of applying the forecast growth for 2024 to the base year of 2016. Note that there is expected to be some passenger abstraction to the Chat Moss route from the CLC. This abstraction would result from introducing a third fast hourly service on the Chat Moss route, assuming suitable train paths can be identified to support an hourly service from the Calder Valley Line to Liverpool.

The crowding issues are forecast to worsen by 2024 when compared to 2016. Even in the lowest growth scenario (DfT WebTAG), there continues to be a passenger capacity issue which will need to be addressed. In this scenario, three of the four services arriving in Manchester would be affected by this forecast overcrowding, with the number of passengers exceeding the theoretical total capacity of each unit. Typically, passengers would stand from stations as far west as Warrington Central towards Manchester in the high peak hour. The forecasted overcrowding is exaggerated further in the Transport for Greater Manchester (TfGM) growth scenario.

2033 and 2043 forecasts

There are no committed timetable changes between 2024 and 2043, but exogenous growth still occurs, and no additional rolling stock is assumed. Consequently, the level of crowding deteriorates further by 2033 and 2043, as shown in Figures 9 and 10 below.

By 2033, there are over two passengers standing per metre square from Irlam, with 1-2 passengers standing per square metre upon arrival at Irlam. The diagrams show insufficient seats for all passengers boarding east of Warrington Central. The likely journey times from Warrington Central (even on the semi-fast trains) would fall outside of the 20-minute journey time boundary and therefore exceeds the...
current Department for Transport standard. With 2-3 passengers per square metre standing by 2033, this level of crowding may prevent some passengers being able to board their preferred service. These issues could be further exacerbated in the event of service disruption.

The forecast crowding issues deteriorate further by 2043 as shown in Figure 10. East of Humphrey Park, more than three passengers per square metre are expected to be standing, with crowding level of 2-3 passengers per metre square extending beyond Irlam to Birchwood by 2043. There would be insufficient seats for passengers boarding at stations east of Sankey towards Manchester.

**Summary of demand forecasting**

The CLC corridor is already affected by overcrowding, with passengers on some high peak trains having to stand for more than 20 minutes when travelling to central Manchester. The forecast exogenous growth is expected to exacerbate the crowding, even if the most cautious growth scenario is assumed. By 2043 if the System Operator (Network Rail) growth rate is achieved, some passengers would be standing from Sankey. With journey times taking over 40 minutes to Manchester, this would contravene crowding guidance.

**Figure 8: Forecast high peak arrivals to Manchester (2024), SO growth**

<table>
<thead>
<tr>
<th>Colour</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREY</td>
<td>No direct service to central Manchester during the high peak hour</td>
</tr>
<tr>
<td>LIGHT GREEN</td>
<td>Up to 70% of seats occupied on average</td>
</tr>
<tr>
<td>GREEN</td>
<td>Between 70% and 85% of seats occupied on average</td>
</tr>
<tr>
<td>DARK GREEN</td>
<td>Between 85% and 100% of seats occupied on average</td>
</tr>
<tr>
<td>AMBER</td>
<td>Passengers standing, up to 1 passenger per square metre on average</td>
</tr>
<tr>
<td>RED</td>
<td>Passengers standing, between 1 and 2 passengers per square metre on average</td>
</tr>
<tr>
<td>PURPLE</td>
<td>Passengers standing, between 2 and 3 passengers per square metre on average</td>
</tr>
<tr>
<td>BLACK</td>
<td>Passengers standing, over 3 passengers per square metre on average</td>
</tr>
</tbody>
</table>

< > Indicates the most heavily loaded direction of travel shown for orbital services

Based upon a map designed by Andrew Smithers © 2017 www.projectmapping.co.uk and reproduced with permission.
Figure 9: Forecast high peak arrivals to Manchester (2033), SO growth

Figure 10: Forecast high peak arrivals to Manchester (2043), SO growth
Identifying Interventions

The analysis presented in Figures 8-10 indicates interventions will be required to address the worsening overcrowding between 2024 and 2043. A ‘Do Nothing’ scenario was discounted, since it would not tackle the problem.

The Study has confined its proposed potential interventions exclusively to those that address the CMSP question posed, that is, the accommodation of forecast growth along the corridor. Interventions that deliver faster journey times and/or more resilient performance are achieved as a secondary impact only.

Three themes have been proposed to tackle the forecast overcrowding:

- train lengthening to extend some or all of the 4-car formations to 6-car sets;
- introduction of new services, for example, peak shuttles between Warrington and Manchester. However, the analysis does not consider the wider network capacity implications arising from this proposals, since the number of trains via the Castlefield corridor is subject to review as part of a separate study;
- introduction of units that have alternative seating layouts to increase total capacity even though the number of carriages is unchanged.

An Alternative Study

In addition to these Network Rail developed options, the outputs from a separate consultancy (AECOM) study that was completed on behalf of Merseytravel, Transport for Greater Manchester and Warrington Borough Council, have also been reviewed. This study also produced a detailed understanding of the rail market to inform the development of a rail strategy through to 2026. Several options were developed and then sifted to identify the optimal option.

The preferred option emerging from the AECOM report assumed the stopping services would be split into two, with trains from Liverpool terminating at Birchwood. Similarly, the Manchester portions would terminate at Warrington West. The existing semi-fast trains in this specification would be unchanged. The characteristics of this option were then modelled by Network Rail.

Assumptions

For the proposals that demonstrate the strongest economic appraisal, detailed timetabling and performance modelling was then required to further verify the emerging conclusions. For strategic interventions to be developed as part of this study, a number of assumptions and risks were identified and recorded in the Risk and Assumptions log.
Part G  Options and advice for funders

Service options and initial appraisal results

The Study used the growth forecasts detailed previously, and for each scenario a high level value for money assessment was produced for a series of potential interventions proposed. The results of these assessments were Benefit/Cost Ratios (BCR) that enable comparisons to be drawn between the proposed interventions.

The BCR places a value against the expected benefits and costs being delivered by a proposed intervention. Note that all benefits and costs are discounted to a 2010 price base. Incremental revenue and standard transport benefits were calculated, with journey time savings arising from the improved frequencies and / or crowding relief. The change in operating costs and the indicative capital costs with the appropriate level of optimism bias were also included. A suggested delivery timeframe for these interventions was also considered.

It should be noted that these assessments are based on System Operator (Network Rail) demand forecasts which are generally higher than DfT’s WebTAG forecasts that form the basis of the central case in any DfT investment decision.

The following section will detail the various potential intervention options explored by the Study and their relative BCRs.

Option 2 assumed that all trains along the corridor are lengthened to 6-cars. This will require platform lengthening at selected intermediate stations. With the agreement of the relevant train operators, trains calling at stations with a low footfall would adopt selective door opening (SDO)\(^1\), instead of assuming platform lengthening is required at all stations. Table 5 summarises the underlying assumptions for Option 2, whilst Table 6 presents the results of the value for money assessment.

\(^1\) Selective Door Opening (or SDO) is a mechanism employed primarily on trains that allows the driver or conductor/guard to open the doors of a train separately and is usually utilized where the platform is shorter than the train.

<table>
<thead>
<tr>
<th>Table 5: Option 2 interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme</strong></td>
</tr>
<tr>
<td>Summary of interventions</td>
</tr>
<tr>
<td>Output assessment</td>
</tr>
<tr>
<td>Indicative capital costs</td>
</tr>
<tr>
<td>Operating costs</td>
</tr>
<tr>
<td>Prioritisation assessment</td>
</tr>
</tbody>
</table>

Note: Warrington West station is assumed to be constructed with platforms to accommodate 6-car trains

<table>
<thead>
<tr>
<th>Table 6: Initial appraisal: Option 2a – Train Lengthening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Option</strong></td>
</tr>
<tr>
<td>2a</td>
</tr>
<tr>
<td>2a S1</td>
</tr>
<tr>
<td>2a S2</td>
</tr>
<tr>
<td>2a S3</td>
</tr>
<tr>
<td>2a S4</td>
</tr>
<tr>
<td>2a S5</td>
</tr>
</tbody>
</table>
The incremental operating costs have been calculated using relatively conservative assumptions. It is anticipated that train operators affected by these changes would work closely with the DfT and funders during the next re-franchising process to understand and identify the operational requirement, and costs of lengthening services to accommodate demand. It is possible that a more efficient use of rolling stock would be in place as part of the franchise plans. It has been assumed that services that operate between 07.00 and 09.00 will already be operating as 4 or 6-car formations in the baseline.

The primary aim of Option 2 is to increase passenger capacity to address overcrowding, but this will be sensitive to the incremental operating costs. It is unusual for these types of scheme to achieve a high value for money benefit cost ratio, particularly at this stage of development. The capacity benefit from these extra units would only be needed for a limited number of services each day, whilst the levels of optimism bias ² applied to operating costs at this early stage development increase total costs.

The value for money of the scheme ranges from ‘poor’ to ‘good’. A number of economic appraisals were completed to assess the impact of different assumptions regarding platform lengthening, plus the calculation of benefits. The latter was calculated for an one hour or three hour period, with the revenue and benefits considering trips towards Manchester or journeys in both directions. This variance indicates there are opportunities to strengthen the business case above ‘poor’, but this only achieved by adopting the most favourable set of assumptions.

Table 7: Option 3 interventions

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of interventions</td>
<td>Block sections converted to 4 min headways (Hunts Cross-Hough Green &amp; Glazebrook-Birchwood); turnback at Warrington Central</td>
</tr>
<tr>
<td>Output assessment</td>
<td>Allows for an additional 1tph between Warrington Central and (note that interventions at Manchester Oxford Road are outside the scope of this study and require further testing)</td>
</tr>
<tr>
<td>Indicative capital costs</td>
<td>£20m – £50m</td>
</tr>
<tr>
<td>Operating costs</td>
<td>Included</td>
</tr>
<tr>
<td>Prioritisation assessment</td>
<td>Considered for delivery by 2024 to meet forecast demand, but 2033 is more realistic due to nature of interventions required</td>
</tr>
</tbody>
</table>

Note: Warrington West station is assumed to be constructed with platforms to accommodate 6-car trains

Table 8: Initial appraisal: Option 3 – Extra services

<table>
<thead>
<tr>
<th>Option</th>
<th>Option description</th>
<th>BCR</th>
<th>VfM Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning 3 hour peak only, return</td>
<td>0.25</td>
<td>Poor</td>
</tr>
<tr>
<td>3 S1</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning &amp; evening peak, return</td>
<td>0.61</td>
<td>Poor</td>
</tr>
<tr>
<td>3 S4</td>
<td>Additional 1 tph WAC-MCO via the CLC, return all day services</td>
<td>0.83</td>
<td>Poor</td>
</tr>
<tr>
<td>3 S5</td>
<td>Additional 1 tph WAC-MCO via the CLC, return all day services, OPEX leasing costs reduced by 25%</td>
<td>1.00</td>
<td>Low</td>
</tr>
<tr>
<td>3 S6</td>
<td>Additional 1 tph WAC-MCO via the CLC, return all day services, OPEX leasing costs reduced by 25%, CAPEX reduced by 25%</td>
<td>1.18</td>
<td>Low</td>
</tr>
</tbody>
</table>

² Adjustments applied to a project’s costs to reflect the risk of over-optimism in appraisals.

Initial appraisal results: Option 3 – Additional peak service from Warrington to Manchester Oxford Road

An additional four-car service between Warrington Central and Manchester Oxford Road has also been tested as an alternative to train lengthening on this corridor. The additional service would provide more seats for passengers travelling to central Manchester, whilst the extra journey opportunities will reduce Generalised Journey Times from stations east of Warrington Central.

As network utilisation is high on this corridor however, this extra service would require some supplementary infrastructure in order to run including reduced signalling headways between Hunt’s Cross and Hough Green, plus Birchwood to Glazebrook, whilst a new turnback at Warrington Central would be required, as shown in Table 7. Possible interventions beyond Castlefield corridor have not been considered.

Whilst this intervention may be more effective than Option 2 at targeting the busiest route section on the CLC between Warrington and Manchester, the value for money case for the sub-options considered within option 3 is weaker, generating either ‘poor’ or ‘low’ value for money assessments.
Initial appraisal results: Option 4a – Option 2 + Option 3

Options 2 or 3 in isolation would not provide sufficient capacity to cater for the forecast demand post 2033. Option 4 combines both of these options and has therefore been tested as a possible longer-term strategy.

Table 9 describes the interventions required. The scheme costs are higher compared to Options 2 and 3, which reflects the more comprehensive scope of interventions required.

With the exception of Option 4a S6 which generates a ‘medium’ value for money case, the appraisal results for the other options is either ‘poor’ or ‘low’. This result has been driven by the higher capital costs assumed.

Assessment of strategic alternatives

To supplement options 2-4 which tested the impact of train lengthening and/or the introduction of a new hourly shuttle between Warrington Central and Manchester Oxford Road, a strategic alternative has been considered.

Table 9: Option 4 interventions

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of interventions</td>
<td>Platform extension to 6-car at: West Allerton, Flixton, Padgate, Edge Hill, Hough Green, Irlam, Urmston, Widnes, Birchwood, Hunts Cross, Warrington Central, Liverpool South Parkway. Block sections converted to 4 minute headways (Hunts Cross-Hough Green &amp; Glazebrook-Birchwood). Turnback at Warrington Central</td>
</tr>
<tr>
<td>Output assessment</td>
<td>Provides platform lengths which would support train lengthening to 6-car services and allows for an additional 1tph between Warrington Central. Interventions at Manchester Oxford Road are outside the scope of this study and require further testing in the future</td>
</tr>
<tr>
<td>Indicative capital costs</td>
<td>£50m – £100m</td>
</tr>
<tr>
<td>Operating costs</td>
<td>Included</td>
</tr>
<tr>
<td>Prioritisation assessment</td>
<td>Considered for delivery by 2033 to meet forecast demand, but some interventions will be required by 2024</td>
</tr>
</tbody>
</table>

Note: Warrington West station is assumed to be constructed with platforms to accommodate 6-car trains

Table 10: Initial appraisal: Option 4a – Train Lengthening and Extra Services

<table>
<thead>
<tr>
<th>Option</th>
<th>Option description</th>
<th>BCR</th>
<th>VfM Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a 2+3</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning 3 hour peak only, return. All high peak services lengthened, one way</td>
<td>0.54</td>
<td>Poor</td>
</tr>
<tr>
<td>4a 51  (2a+3S1)</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning &amp; evening peak, return. All high peak services lengthened, one way</td>
<td>0.75</td>
<td>Poor</td>
</tr>
<tr>
<td>Option 4a S4  (2aS4+3S4)</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak trains lengthened, return</td>
<td>1.32</td>
<td>Low</td>
</tr>
<tr>
<td>Option 4a S5  (2aS5+3S5)</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak services lengthened, return. Lower CAPEX due to reduction in platform lengthening scope</td>
<td>1.43</td>
<td>Low</td>
</tr>
<tr>
<td>Option 4a S6  (2aS6+3S6)</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak services lengthened, return, lower CAPEX due to reduction in platform lengthening scope, 25% reduction in OPEX leasing costs</td>
<td>1.65</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Option 5 looks at the case for improving connectivity for passengers along the CLC corridor by splitting the Liverpool Lime Street to Manchester Oxford Road services in the baseline into separate services. This proposal would be consistent with stakeholder aspirations, with the stopping trains split into two portions comprising Warrington West to Manchester Oxford Road and Birchwood to Liverpool Lime Street.

There is a service overlap between Birchwood and Warrington West which would provide higher frequencies for passengers between these stations. However, this option does not provide any additional capacity into central Manchester stations.

The incremental operating costs have been included in the appraisal resulting from the increased rolling stock mileage, but the initial analysis completed indicates the revised train service pattern could be operated without requiring extra units.
Table 11: Option 5 interventions

<table>
<thead>
<tr>
<th>Theme</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of interventions</td>
<td>Block sections converted to 4 min headways (Hunts Cross-Hough Green &amp; Glazebrook - Birchwood). New crossover at Warrington West. Additional loop and turnback at Warrington West. New crossover at Birchwood.</td>
</tr>
<tr>
<td>Output assessment</td>
<td>Improved reliability from increased timetable flexibility. Higher frequencies for passengers between Warrington West and Birchwood.</td>
</tr>
<tr>
<td>Indicative capital costs</td>
<td>£50m – £100m</td>
</tr>
<tr>
<td>Operating costs</td>
<td>Included</td>
</tr>
<tr>
<td>Prioritisation assessment</td>
<td>2033</td>
</tr>
</tbody>
</table>

Note: Warrington West station is assumed to be constructed with platforms to accommodate 6-car trains.

Table 10: Initial appraisal: Option 4a – Train Lengthening and Extra Services

<table>
<thead>
<tr>
<th>Option</th>
<th>Option description</th>
<th>BCR</th>
<th>VfM Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>4a 2+3</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning 3 hour peak only, return. All high peak services lengthened, one way</td>
<td>0.54</td>
<td>Poor</td>
</tr>
<tr>
<td>4a S1</td>
<td>Additional 1 tph WAC-MCO via the CLC, morning &amp; evening peak, return. All high peak services lengthened, one way</td>
<td>0.75</td>
<td>Poor</td>
</tr>
<tr>
<td>Option 4a</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak trains lengthened, return</td>
<td>1.32</td>
<td>Low</td>
</tr>
<tr>
<td>Option 4a</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak services lengthened, return, Lower CAPEX due to reduction in platform lengthening scope</td>
<td>1.43</td>
<td>Low</td>
</tr>
<tr>
<td>Option 4a</td>
<td>Additional 1 tph WAC-MCO, all day, all 3-hour peak services lengthened, return, lower CAPEX due to reduction in platform lengthening scope, 25% reduction in OPEX leasing costs</td>
<td>1.65</td>
<td>Medium</td>
</tr>
</tbody>
</table>

The AECOM report commissioned by Merseytravel, Warrington BC and TfGM has produced a business case. The business case demonstrates that the alternative proposition described could generate a benefit cost ratio above 2.0. However, to do so, this assumes the following:

- a new station at Warrington West;
- faster journey times achieved by different types of rolling stock;
- alternative growth forecasting scenarios;
- calculation of benefits across the day, rather than just a peak hour or peak period.

The initial analysis produced by the consultants demonstrated that the economic appraisal could generate significantly better results compared with the majority of the scenarios tested by Network Rail.

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3 “Developing a Medium Term Strategic Plan for Cheshire Lines Committee ‘CLC’ Rail Line (Liverpool-Warrington-Manchester), Option 4b Further Assessment” (November 2018),
Part H  Emerging Strategic Advice

Summary and conclusions
The Study has demonstrated that there is a strategic case for addressing the current overcrowding issues affecting the CLC corridor given the buoyant economic characteristics of the catchments served between Liverpool and Manchester via Warrington. In addition to the current loadings during the peak periods, substantial growth is also forecast which will further exacerbate these issues.

It should be noted that the scope of the CMSP question, confirmed with stakeholders for this corridor, was confined to addressing the overcrowding issues, rather than addressing a more holistic set of pre-existing constraints which include (but are not limited to) connectivity gaps and unreliable performance.

In response to these overcrowding issues, a number of options were developed, comprising a mixture of train lengthening and the introduction of additional shuttles between Warrington and Manchester which would address the busiest sections of the CLC corridor. However, in spite of applying optimistic growth scenarios and reducing the scope of platform lengthening works needed to support the longer trains, the economic appraisal results produced for these service proposals was weak.

Analysis indicated that the weak economic performance was primarily driven by the relatively short daily requirement for extra capacity, more specifically for the high peak hour trains towards Manchester in the morning and the return direction in the evening.

This analysis took account of the current baseline services operated by Northern and East Midlands Railway and their relative rolling stock capacities. However, there may be scope to deliver some further capacity improvements in the short terms when the semi-fast trains towards Nottingham transition from EMR to either the Northern or TransPennine Express franchise in 2021. Furthermore, the replacement of Class 14X units with other diesel trains could also boost capacity but further improvements will still be required to fully accommodate forecast growth.

An alternative outcome
The proposal drawn up by AECOM on behalf of Merseytravel, Warrington Borough Council and Transport for Greater Manchester, that was developed in parallel with this CMSP work, has suggested that in order to accommodate growth along the line and simultaneously improve connectivity, the following interventions could be introduced: the local trains could be split into two portions, one from Liverpool to Birchwood and the other from Warrington West to Manchester Oxford Road. It also suggests that the retention of the existing semi-fast trains could generate a stronger economic case with better value for money.

This proposal could potentially deliver a number of benefits:
- Facilitate the operation of more reliable services by introducing a service pattern which offers greater flexibility;
- Improve connectivity to and from all intermediate stations which would avoid the operation of skip/stop services;
- Introduce alternative rolling stock with the capability of delivering faster journey times, with the incremental revenue and economic benefits making a substantial contribution to the stronger economic appraisal.

Next steps
Consultation with the North West Industry Planning Advisory Group led to a recommendation to consider this alternative option in more detail. Further feasibility work will enable these proposals to be refined and the potential benefits assessed in more detail.

This more detailed analysis will also need to be informed by considering the following:
- capacity issues at Liverpool Lime Street and the overlap with the Merseyrail services in the Hunts Cross area;
- possible service changes affecting the Castlefield corridor that will affect the approach to Manchester Oxford Road.

Whilst this Merseytravel / Warrington / TfGM study could deliver a package of short to medium term interventions that would help alleviate some current issues along the line, other interventions will still be required to support longer term forecast growth and address connectivity shortfalls. The alternative proposal wouldn’t deliver any additional capacity into Liverpool or Manchester, and continued passenger growth will reinforce the requirement for additional interventions, even if rolling stock is introduced with...
higher capacities. Furthermore, the frequency at each end of the CLC corridor falls below the frequencies on the Merseyrail or Manchester Metrolink networks.

In response to these shortfalls, the feasibility of other interventions should be considered. For example, the longer term interventions could comprise extensions of the Merseyrail network beyond Hunts Cross towards Warrington at the western end, or the introduction of Metrolink style services at the eastern end approaching Manchester. Further work is required to assess the technical feasibility of these proposals, and to determine the affordability and value for money case of the proposals.

**Final commentary**

In short, this Study recommends therefore the progression of the report prepared by AECOM, and the pursuit of their recommended interventions required to drive connectivity along the CLC Corridor, by producing a Strategic Outline Business Case (SOBC). There is also a recommendation to include further investigation into potential interventions that seek to address future capacity issues along the rail corridor.