

## How can forecast growth and partners' aspirations be accommodated in the Leeds Area up to 2043?

### Continuous Modular Strategic Planning

April 2020



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# 01 Foreword

The Leeds Area Continuous Modular Strategic Planning study forms part of the railway industry's Long Term Planning Process covering the medium to long term planning horizon.

To secure long term sustainable growth for the Leeds Area, and to support economic, social and environmental objectives, investment in the railway is vital. Rail provides a competitive, efficient and reliable journey offer whether it be between the cities, providing local connections between towns and villages, or facilitating freight. In an environment with increasing demand for mobility, it is vital that rail adapts to changing demands to provide an attractive and accessible network that supports Britain.

This study has examined the impact of increased demand for rail services in the medium and long term starting from a baseline of today's railway. It also considers the impact of major programmes such as Transpennine Route Upgrade, High Speed 2 and Northern Powerhouse Rail alongside the plans of bodies such as Transport for the North and their Long Term Rail Strategy.

This holistic approach to assessment of the needs of the railway in the Leeds Area to cater for growth and connectivity has included a mixture of service-based,

operational and infrastructure options that put passenger and freight users first. Network Rail has worked collaboratively across the industry with stakeholders to provide a choice for funders of future options to deliver a safe, reliable and efficient railway to drive economic growth in the Leeds Area to support a versatile and competitive North of England.

## 02 Executive Summary

This study examines the following Strategic Question as part of the Continuous Modular Strategic Planning (CMSP) approach to rail industry planning:

### **How can forecast growth and partners' aspirations be accommodated in the Leeds Area up to 2043?**

It sets out recommended railway investment packages for the medium and long term under a range of growth scenarios. The overarching Strategic Question is supported by fifteen sub questions which have been developed collaboratively with the Leeds Area Strategic Question Working Group, consisting of stakeholders and partners, to provide a clear approach to strategic planning in the Leeds Area.

The study identifies a series of infrastructure and operational interventions to accommodate forecast growth in the Leeds Area. It should be noted that the interventions identified are indicative solutions; other solutions may be identified during further development work. Should the development of interventions be progressed and a Strategic Outline Business Case (SOBC) be produced, a full option selection exercise will be carried out.

The key constraints identified in the study area are:

- Platform capacity at Leeds Station
- Constraints on the western and eastern approaches to Leeds Station
- Platform lengths across the study area
- Line capacity constraints between Armley Junction and Springs Junction
- Platform capacity constraints at Bradford Forster Square and Castleford

Growing passenger numbers also put pressure on pedestrian capacity at Leeds Station which is insufficient in the medium and long term with the key areas of constraint identified as:

- Gate Lines
- Vertical circulation to Platforms
- Constraints around Platform 17

It should be noted that the ongoing Leeds Existing Station Programme (LESP) is developing interventions to address pedestrian capacity constraints and movements across the station identified in collaboration with this study.

The impact of both High Speed 2 (HS2) and Transport for the North's major rail programme Northern Powerhouse Rail (NPR) in the Leeds Area have been considered by the study. As it is envisaged that HS2 services will arrive at new platforms without interfacing infrastructure there will not be an impact on the conclusions drawn regarding platform and track capacity in the existing station. There will be a pedestrian link between the existing station and new HS2 platforms and it is anticipated that there will be changes in passenger flows. Altered passenger flows are especially expected between the existing station platforms used for London bound services and the new HS2 platforms. These anticipated changes have been considered as part of the pedestrian and circulation analysis.

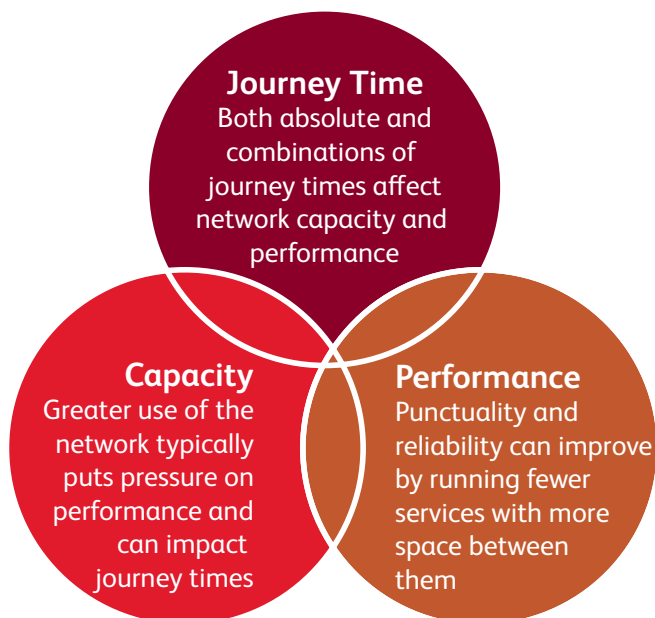
As part of the analysis undertaken, this study has demonstrated that interventions identified for the Leeds Area Strategic Question provide sufficient capacity for the quantum of services expected as part of NPR and enable 200m long NPR trains to be accommodated in Leeds Station. It is important to note however that the analysis has only considered NPR within the study area and the wider network operational considerations are being examined by TfN separately within their programme for NPR.

Outline engineering designs have been produced to understand the deliverability of identified interventions and indicative order of magnitude costs produced. This paves the way for options to be further developed in line with the Rail Network Enhancements Pipeline (RNEP) process.

The recommendations in this study have been developed in line with findings from the National Rail Passenger Survey (NRPS) and in line with Network Rail's commitment to put passengers and freight users first. Recommendations have been made through discussions with stakeholders and the Working Group to deliver a collective view on how to deliver future passenger and freight services in the Leeds Area to support growth to 2043. As rail industry strategic planning evolves, it is important that this study is taken into account to ensure a consistent and robust plan for the future network.

# 03 Continuous Modular Strategic Planning in the Leeds Area

As part of Network Rail's Long Term Planning Process<sup>1</sup> (LTTP), Strategic Questions provide the rail industry with an evidence-based view of the rail network for the medium and long-term planning horizon. Strategic Questions provide an agile, responsive and focused view of the strategic priorities for the network that meet the needs of customers and funders by identifying the future capacity requirements and opportunities for rail investment to stimulate economic growth. As a collaborative approach, Service Specifiers, Train Operators, Local and Sub-National Transport Bodies, Local Enterprise Partnerships and other functions of Network Rail work holistically to develop investment choices to accommodate future economic growth.



As the railway network becomes increasingly busy, making the best use of train, track and station capacity is a key challenge for the industry. It is therefore important to understand how service patterns, journey times and operational performance all impact the ability of the rail network to deliver an efficient, competitive and reliable railway. The coordinating role of the Network Rail System Operator balances these requirements and the different outputs that the network can deliver to provide options to increase capacity in a way that is affordable and provides value for money. In an environment in which land-use, transport and economic development are increasingly devolved to local decision makers, Network Rail has developed the Strategic Question process to work

<sup>1</sup> <https://www.networkrail.co.uk/running-the-railway/long-term-planning>

closely with stakeholders to identify priorities for the rail network at a local and national level.

In the Leeds Area, the railway network will see a significant improvement in offer over the coming years with more services and new trains further complemented by the Transpennine Route Upgrade (TRU). Increasing demand for passenger and freight services across Leeds and the North of England, as well as the transformational growth agenda of HS2 and TfN have made the Leeds Area a priority for strategic planning over the medium to long-term. Cognisance has been taken of emerging workstreams looking at the shorter term in the Leeds Area and also similar work regarding the surrounding cities of Sheffield, Hull, York and Newcastle to produce a coordinated approach for the future strategic direction of the rail network.

To deliver an inclusive and holistic rail strategy for the Leeds Area, an effective governance structure was developed. A high level of autonomy was provided for the Working Group to contribute, review and provide endorsement of the study, it included Service Specifiers, Train Operators, Local Authorities and Local Enterprise Partnerships. An additional layer of oversight was provided through the CMSP Governance Group with members including the Rail Delivery Group, Sub-National Transport Bodies and other functions of Network Rail to endorse the work undertaken by the Working Group. National governance was provided through the System Long Term Governance Group to ensure consistency across the industry for a comprehensive and credible strategy for the future growth in the Leeds Area. The governance structure is set out as follows:

### **System Long Term Governance Group**

Providing national oversight and ensuring consistency across Strategic Planning.

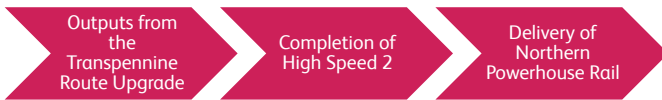
### **CMSP Governance Group**

Approval of remit and outputs - representation of Train and Freight Operators, Rail Delivery Group, Department for Transport, Transport for the North and other Network Rail functions.

### **Leeds Area Working Group**

Develop, review and endorse the remit and undertake technical work – Train and Freight Operators, Department for Transport, Transport for the North, West Yorkshire Combined Authority, Local Authorities, Network Rail.

Future passenger and freight growth in the Leeds Area was prioritised by stakeholders to cover three configuration states up to 2043 as follows:



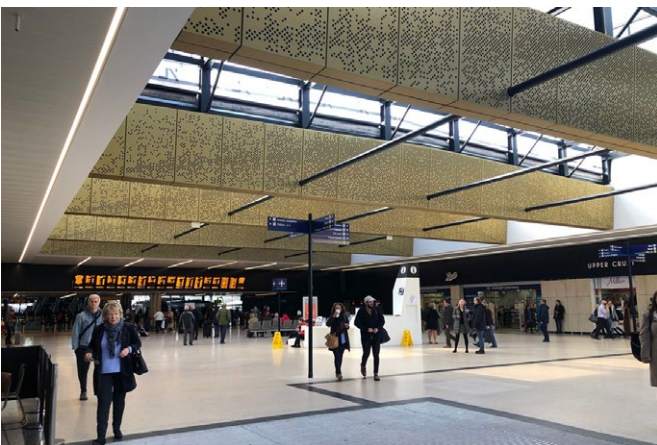
To ensure a clear approach for the study, the following remit was agreed in accordance with the governance structure to deliver a set of railway investment choices:

A suite of investment choices, which offer value for money, is required to accommodate passenger growth in the medium and long-term for the Leeds Area. These choices should focus on areas identified as challenging from analysis of growth scenarios. Appropriate demand growth sensitivities should be tested to understand how this may impact the value for money of various options.

The investment choices identified should include options for accommodating the Transpennine Route Upgrade, High Speed 2 and Northern Powerhouse Rail aspirations; options for journey time, capacity and frequency improvements in response to the LTPP conditional outputs; and options around the amount of capacity assumed to be available to freight.

In line with the Strategic Question approach for CMSP, an overarching principal question was established to encompass the problem statement by stakeholders as follows:

**How can forecast growth and partners' aspirations be accommodated in the Leeds Area up to 2043?**



A further sub-set of questions were identified by the Working Group to answer the overall Strategic Question as follows:

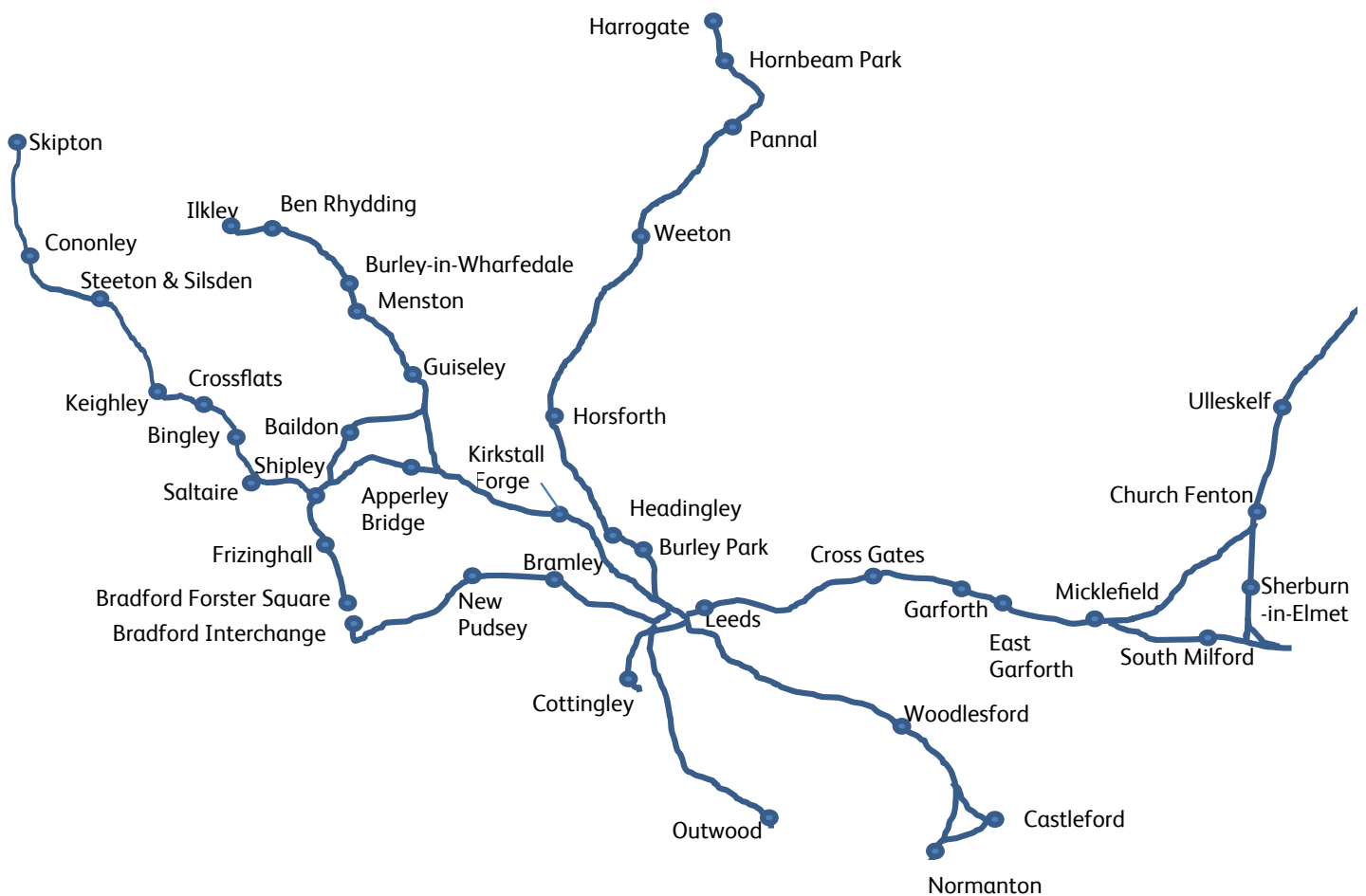
- What are the interventions to improve the Harrogate Line corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the Leeds North West corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the East of Leeds corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the Wakefield Westgate (ECML) corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the Five Towns (Castleford) corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the Calder Valley corridor comprising of Capacity, Connectivity, and Journey Times?
- What are the interventions to improve the Huddersfield Line corridor comprising of Capacity, Connectivity, and Journey Times?
- How can the Leeds Area accommodate forecast freight growth?
- What are the Platform requirements at Leeds Station to support future growth?
- What are the resulting pedestrian capacity requirements?
- What are the impacts of High Speed 2 interventions in the Leeds Area?
- What are the impacts of Northern Powerhouse Rail interventions in the Leeds Area?
- How can future operational service aspirations at Neville Hill Depot be accommodated in the Leeds Area?
- When are track, platform and rolling stock capacity on all lines into Leeds Station no longer able to meet forecast demand, and what are the options to respond to this?
- What are the Safety, Sustainability, Reliability, Performance and Resilience issues for the Leeds Area?

# 04 Leeds Area Strategic Context

The railways in the Leeds Area converge from a number of corridors at Leeds Station with services operating both through the station and terminating at the station.

The geographic scope of the Leeds Area Strategic Question has been developed in collaboration with the Working Group and is shown in Figure 1.

**Figure 1: Geographic scope of study**



### 4.01 Existing Services

Passenger services in Leeds are provided by five train operators, connecting Leeds to London, Plymouth and Aberdeen, as well as more local destinations including Bradford, Lancaster, Hull, Manchester, York and Sheffield.

Freight services in the area include:

- Aggregate and cement flows from north of Skipton and the Peak District through Leeds Station to Hunslet East Goods Yard
- Gypsum flows from the Woodlesford Corridor, across Whitehall Junction to Skipton and beyond
- Scrap metal from Shipley across Whitehall Junction to the Woodlesford Corridor

Freight services are accommodated alongside passenger services as a mixed traffic railway.

The Neville Hill Train Maintenance Depot (TMD), Harrogate Sidings, Skipton Sidings, and Holbeck Depot are in the study area, although are not being directly assessed through this study as they are being considered as part of the wider Depot and Stabling strategy. Empty Coaching Stock (ECS) services which use these locations are also not included (though a

sensitivity test covering ECS moves between Leeds Station and Neville Hill TMD has been carried out).

### 4.02 Stations

There are forty two stations in the study area. The largest of these, Leeds, had over thirty million passenger entries and exist per annum and over three million passenger interchanges in the year 2018-2019<sup>1</sup>.

### 4.03 Study Outputs

The interventions presented in this document outline ways in which the existing infrastructure could be enhanced to accommodate future demand and promote economic growth in the Leeds Area. However, it is important to note that only a high level of analysis has been carried out at this stage, in a complex system such as the railway network, further development work may identify alternative options. Therefore, this report outlines one possible option that could deliver the outputs required. Through the Rail Network Enhancements Pipeline<sup>2</sup> process, further development as part of the business case will further refine options to deliver the most optimal solution.

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1 <https://dataportal.orr.gov.uk/station-usage>

2 <https://www.gov.uk/government/publications/rail-network-enhancements-pipeline>



# 05 Future Train Services

## 5.01 Transpennine Route Upgrade Service Outcomes

The Transpennine Route Upgrade (TRU) is a major programme to increase capacity and deliver a high performing and reliable railway on the Manchester to Leeds and York route. As part of the emerging outputs of the programme, two additional services are envisaged. One operating all stations between Huddersfield and Leeds and one between Manchester Piccadilly and Hull via Leeds. With the nominal completion date for the TRU programme in mid to late 2020s, inclusion of these services provides a credible baseline for forecasting future growth to 2043.

## 5.02 Transport for the North Long Term Rail Strategy Connectivity

TfN published their Strategic Transport Plan in January 2019 setting their vision to 2050 of transport priorities required to drive economic growth across the North. A key element of the delivery of this strategy is a high-quality railway network to improve productivity and enable economic growth through a set of desirable minimum standards as part of their Long Term Rail Strategy (LTRS). The step-change in connectivity, encompassing frequency and journey time, set out in the LTRS forms part of each geographic route corridor's sub-question alongside the capacity requirements to meet future passenger growth. Working in partnership with TfN, the gaps from the Desirable Minimum Standards relating to connectivity were identified and highlighted the need for an additional service from Leeds to Sheffield via Castleford and Barnsley.

## 5.03 Baseline Service Specification

The service structure in the Leeds Area has been taken alongside the emerging TRU outputs and the proposed new stations in West Yorkshire to form the baseline service specification for this study. It is important to note that this baseline service specification is a higher level of service than currently running on the network. Rolling stock assumptions for each scenario have been developed through industry collaboration based on existing and planned formations to provide a representative baseline. In all scenarios, an hourly freight path across Whitehall Junction from Armley to Stourton has been provided.



# 06 Delivering Long Term Growth

## 6.01 Defining Future Growth Scenarios

The rail network plays a key role in driving economic growth across the country connecting people to jobs and delivering goods to markets. A high-quality railway network likewise encourages modal shift, reducing road congestion, carbon emissions and improving air quality. It is therefore important that the strategic direction of the railway is properly planned to deliver a versatile and growing economy.

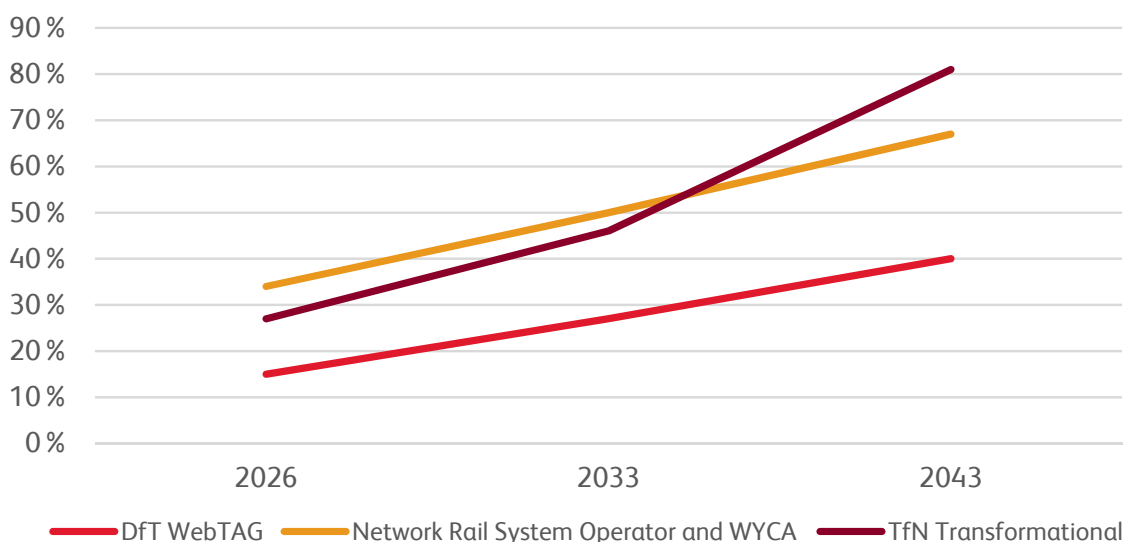
To inform the long term strategic plan for the railway in the Leeds Area an assessment of future rail growth on the corridors into Leeds has been undertaken for three time periods as agreed by the Working Group. Existing levels of demand were examined with exogenous background growth and the endogenous effects of timetable change up to 2026 applied to build up demand forecasts. Following stakeholder input, a range of economic forecasts from the Department for Transport, Network Rail System Operator and West Yorkshire Combined Authority, and Transport for the North have been modelled to provide a comprehensive view of rail demand for the agreed 2026, 2033 and 2043 scenarios. In line with industry agreed forecasting, the latest economic outlook on population, housing and job growth has been included with further assessment of the Local Plan for each Local Authority to inform the development of options to address capacity gaps.

The analysis focusses on morning peak (08:00–08:59) arrivals into Leeds Station which was used as it is the busiest sustained period of demand. Passenger capacity is aggregated and averaged across all services on the corridors to indicate areas where sufficient

capacity is not provided, this enables the development of potential capacity solutions for the medium to long term on a corridor level, rather than focussing on the existing issues on a service-by-service basis.

The passenger demand forecasts for the next 25 years in the Leeds Area are provided in Figure 2 and show the variance between the growth models. The impact of HS2 has not been specifically included in passenger demand forecasts for the Leeds Area. Similarly, the impact of NPR has not been explicitly examined as part of this study, however, the TfN transformational growth scenario captures ‘a broad estimate of the potential scale and nature of impacts arising from connectivity improvements’, arguably achieved through large scale interventions such as NPR. Some of the service options developed as part of this study enable connectivity benefits which will also serve outbound passengers travelling to other key regions and cities, the capacity constraints for such passengers will be addressed in the appropriate Strategic Question Study.

**Figure 2: Passenger demand growth forecasts for the Leeds Area**



## 6.02 Rail Freight Growth

Existing freight flows in the Leeds Area were examined to develop a representative service pattern for the baseline service specification. Assessment of existing flows, stakeholder input, and Freight Market Study Rail Forecasts<sup>1</sup> have identified the need to provide an hourly freight path across Whitehall Junction from Armley to Stourton. The freight path through Leeds Station to Hunslet East is not anticipated to run in the peak hour and as such has not been assessed within this study. As the freight market develops in the future, consideration of how freight operates across Leeds should be examined to ensure that the railway delivers a high performing and efficient network that puts the needs of passengers and freight users first.

## 6.03 National Rail Passenger Survey

The NRPS<sup>2</sup> provides a network-wide picture of satisfaction with the railway. The Spring 2019 survey, the most up to date at the time of this study, included more than thirty thousand passengers providing a valuable insight for the medium to long-term strategic plan of the network. The overall national journey satisfaction for rail passengers was 83% (an improvement of 3% from the previous year) with the key drivers of satisfaction identified as punctuality, train cleanliness, frequency, length of journey and lack of overcrowding. In West Yorkshire, satisfaction with the frequency of trains on the route fell by 7% to 73% between the Spring 2018 and Spring 2019 surveys (76% nationally) satisfaction with reliability fell by 15% to 62% (77% nationally) and satisfaction with the level of crowding fell by 9% to 59% (72% nationally).

The consideration of the drivers of passenger satisfaction in the strategic planning process allows Network Rail to consider how solutions can be identified that put passengers first, seeking opportunities to deliver both economic growth and improve satisfaction with the rail network.

## 6.04 Growth forecasts for 2026, 2033 and 2043

The growth forecasts developed for the Leeds Area were applied to the baseline service specification to identify areas where insufficient passenger capacity was provided. The maps presented show the passenger capacity forecast in each time period in relation to the baseline service specification. To provide sufficient capacity, the Working Group agreed on three Indicative Train Service Specifications (ITSS) to represent each time period. These have been developed using a

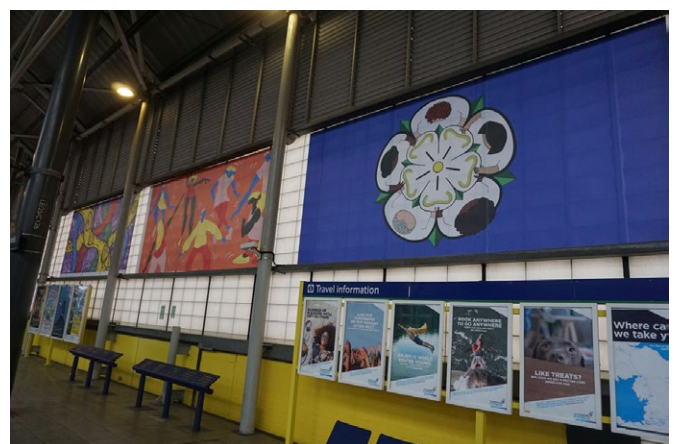
1 <https://cdn.networkrail.co.uk/wp-content/uploads/2019/08/Rail-freight-forecasts-scenarios-for-2033-and-2043.pdf>

2 <http://d3cez36w5wymj.cloudfront.net/wp-content/uploads/2019/06/27081642/National-Rail-Passenger-Survey-Main-Report-Spring-2019.pdf>

combination of lengthening existing services and provision of additional services which duplicate the existing services in the baseline. The capacity maps show direct 'limited stop' services as dashed lines on the Transpennine corridor at the request of stakeholders. Services have not been split on other corridors as the capacity differences were not considered to be as pronounced.

Proposed new stations at Thorpe Park and White Rose have been included in the analysis of future demand with the proposed new station at Elland sitting outside the study area not being included. At the time of study, data was not available to understand the impact of the proposed new Leeds Bradford Airport Station, this new station would need to be assessed in future stages of development. Future stages of development should also consider altered demand as a result of future policy changes.

Further development of the options would also consider alternative ways to provide the required increase in capacity, which could include higher capacity rolling stock or lengthening existing services. For this study, the Working Group agreed in accordance with DfT guidelines that for journeys of twenty minutes or less it is considered acceptable to have some standing passengers (up to 1 passenger per square metre on average).

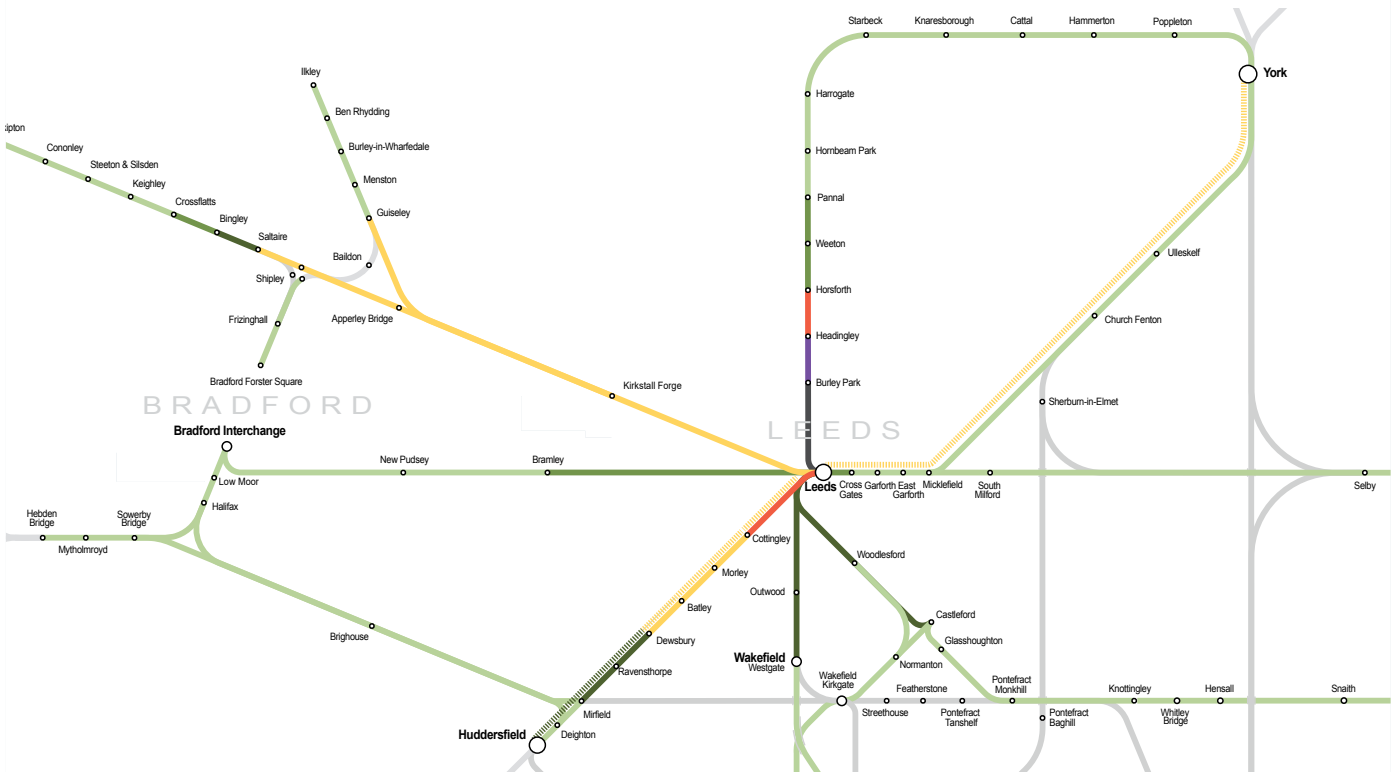


### 6.05 Growth forecasts to 2026

The capacity constraints under the 2026 Network Rail System Operator and West Yorkshire Combined Authority growth scenario are shown in Figure 3.



**Figure 3: High Peak (08:00-08:59) arrivals into Leeds 2026 NR SO and WYCA growth**



GREY	No direct service to central Leeds during the high peak hour/out of scope
LIGHT GREEN	Up to 70% of seats occupied on average
GREEN	Between 70% and 85% of seats occupied on average
DARK GREEN	Between 85% and 100% of seats occupied on average
AMBER	Passengers standing, up to 1 passenger per square metre on average
RED	Passengers standing, between 1 and 2 passengers per square metre on average
PURPLE	Passengers standing, between 2 and 3 passengers per square metre on average
BLACK	Passengers standing, over 3 passengers per square metre on average

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

Based upon a map designed by Andrew Smithers  
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Capacity constraints can be seen on the Harrogate corridor, Five Towns (Castleford) corridor, and Huddersfield corridor. These constraints have been overcome by making the following additions and alterations to the baseline indicative train service specification:

- Train lengthening of existing services Leeds – Harrogate/Knaresborough/York
- Additional service Leeds - Harrogate
- Additional service Leeds – Southport via Dewsbury
- Additional service Leeds – Sheffield via Castleford (achieving TfN LTRS)

### 6.06 Growth forecasts to 2033

The capacity constraints under the 2033 Network Rail System Operator and West Yorkshire Combined Authority growth scenario are shown in Figure 4.



Figure 4: High Peak (08:00-08:59) arrivals into Leeds 2033 NR SO and WYCA growth



GREY	No direct service to central Leeds during the high peak hour/out of scope
LIGHT GREEN	Up to 70% of seats occupied on average
GREEN	Between 70% and 85% of seats occupied on average
DARK GREEN	Between 85% and 100% of seats occupied on average
AMBER	Passengers standing, up to 1 passenger per square metre on average
RED	Passengers standing, between 1 and 2 passengers per square metre on average
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< > Indicates the most heavily loaded direction of travel shown for orbital services

Capacity constraints are forecast on the Harrogate corridor, Leeds North West corridor, East of Leeds corridor, and Huddersfield corridor. These constraints have been overcome by making the following additions and alterations to the 2026 indicative train service specification as follows:

- Additional service Leeds - Skipton
- Service extension to create Huddersfield – Leeds – York

### 6.07 Growth forecasts for 2043

The capacity constraints under the 2043 Transport for the North Transformational growth scenario are shown in Figure 5.



Figure 5: High Peak (08:00-08:59) arrivals into Leeds 2043 TfN Transformational growth



GREY	No direct service to central Leeds during the high peak hour/out of scope
LIGHT GREEN	Up to 70 % of seats occupied on average
GREEN	Between 70 % and 85 % of seats occupied on average
DARK GREEN	Between 85 % and 100 % of seats occupied on average
AMBER	Passengers standing, up to 1 passenger per square metre on average
RED	Passengers standing, between 1 and 2 passengers per square metre on average
PURPLE	Passengers standing, between 2 and 3 passengers per square metre on average
BLACK	Passengers standing, over 3 passengers per square metre on average

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

Capacity constraints are forecast on the Harrogate corridor, Leeds North West corridor, Huddersfield corridor, Wakefield corridor and East of Leeds corridor. These constraints have been overcome by making the following additions and alterations to the 2033 indicative train service specification as follows:

- Additional service Huddersfield – Leeds
- Additional service Huddersfield – York
- Additional service Leeds – Doncaster via Wakefield Westgate
- Additional service Leeds – Harrogate
- Additional service Leeds – Skipton
- Additional service Leeds – Ilkley

# 07 Leeds Station Pedestrian Capacity

With increasing demand leading to more passengers using Leeds Station, the existing station infrastructure was assessed to ensure that the station could accommodate forecast growth.

## 7.01 Pedestrian Capacity Analysis – Methodology

Assessment of the platforms, walk-ways, overbridges and concourse at Leeds Station has been undertaken to ascertain if the existing infrastructure delivers acceptable levels of crowding and provides compliant platform clearance times. The analysis has used a validated, dynamic pedestrian simulation model to assess the AM Peak (07:00–10:00) and PM Peak (16:00–19:00). The pedestrian modelling assessment utilised platform plans based on the train service specifications developed to accommodate future passenger growth as part of this study. The assessment for 2043 included the assumption that a new overbridge (aligned to Leeds Existing Station Programme) will be built at Leeds Station to test whether this provides sufficient capacity for the highest growth scenario.



## 7.02 Pedestrian Capacity Analysis – Findings

The analysis has found that Leeds Station does not have sufficient pedestrian capacity to accommodate forecast demand from the 2026 baseline onwards. There are minimal differences in the capability of the station to accommodate demand in the three scenarios, with the same interventions being required for each. Table 1 outlines key pedestrian capacity constraints as follows:

**Table 1: Leeds Station Pedestrian Capacity Constraints and Recommendations**

Constraint	Recommendations for 2026 - 2043	Notes
<b>Vertical Circulation</b>	Doubling of vertical circulation to Platforms 9-17. As there is insufficient platform space to provide enough vertical circulation capacity between the existing West Bridge and platforms, it would be necessary to either extend the existing East Bridge or build an additional overbridge.	Vertical circulation options, with associated overbridges, have been developed and costed as part of the Leeds Existing Station Programme.
<b>Gate Lines</b>	Additional gate lines (minimum of 8). The location where these gates will be required is currently uncertain and depends on the extent and speed of South Bank development.	Options for additional gate lines have been developed and costed as part of the Leeds Existing Station Programme.
<b>Southern Entrance</b>	Additional entry capability to the south to accommodate passenger growth in the South Bank.	Options for the Southern Entrance have been developed and costed as part of the Leeds Existing Station Programme.
<b>Platform 14</b>	Examine opportunities to maximise platform space, e.g. by removing the east facing Platform 14.	Under the tested service specifications Platform 14 is not utilised. A decision is required regarding whether to maintain the platform for improved operational flexibility (under this scenario a platform extension of 12m would be required) or remove the platform for improved pedestrian capacity.
<b>Platform 17</b>	Increase platform circulation or decrease services using the platform.	Currently Platform 17 has eight arrivals / departures per hour. Under the tested scenarios in this study this is reduced as other platforms are utilised.  One of the recommended interventions as a result of this study is to extend Platform 17 and add a new 'G' line. Should this option progress, any opportunity to further improve pedestrian flow constraints on the platform should be explored.

In conjunction with the rail industry's strategic planning process, the Leeds Existing Station Programme (LESP) is being developed with partners across the rail industry to identify commercial and pedestrian capacity interventions at Leeds Station.

As LESP utilises the growth scenarios from this study, in addition to analysing HS2 and NPR scenarios, to identify pedestrian capacity recommendations it provides a suitable vehicle for the further development of these interventions.





## 08 Options to Deliver Forecast Growth

The impact of increased services and service lengthening on capacity has been assessed for each of the three selected service specifications to identify areas of constraint, as outlined in Figure 6.

The identified constraints were assessed with stakeholders to produce a set of interventions that provide the required capacity to accommodate future train services. These interventions are one potential solution to the constraint, should the development of interventions be progressed further, a full option selection exercise should be carried out.

A series of interventions, both infrastructure and operational changes, have been proposed to overcome the constraints identified. The recommended infrastructure interventions have been taken forward to produce outline designs and order of magnitude costs. This provides an indicative scale of cost which would be apportioned to the expected benefit to understand the viability of each intervention. The costs have been categorised using a low, medium, high and very high approach as follows:

**Low: Up to £5m**

**Medium: £5-50m**

**High: >£50m**

**Very High: >£250m**

Platform lengthening works are required across the area (54 platforms require lengthening at 29 stations), due to the large number these have not been designed or costed. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required at stations in the study area.

Some capacity constraints can be resolved by operational changes which would be required in addition to the infrastructure interventions outlined in Table 2. These changes would enable a reduction in planning space between trains and more efficient operation of the railway. Further development would be required to understand the current infrastructure and signalling capability in the area and the deliverability of these changes in addition to any trade-offs between performance, capacity and journey times. These changes may require infrastructure interventions or opportunities based on interventions from Digital Railway proposals. There are four Timetable Planning Rule changes required in 2026 and a further six in 2043. If these changes cannot be achieved, further interventions are likely to be required.

**Figure 6: Identified network constraints for future growth.**

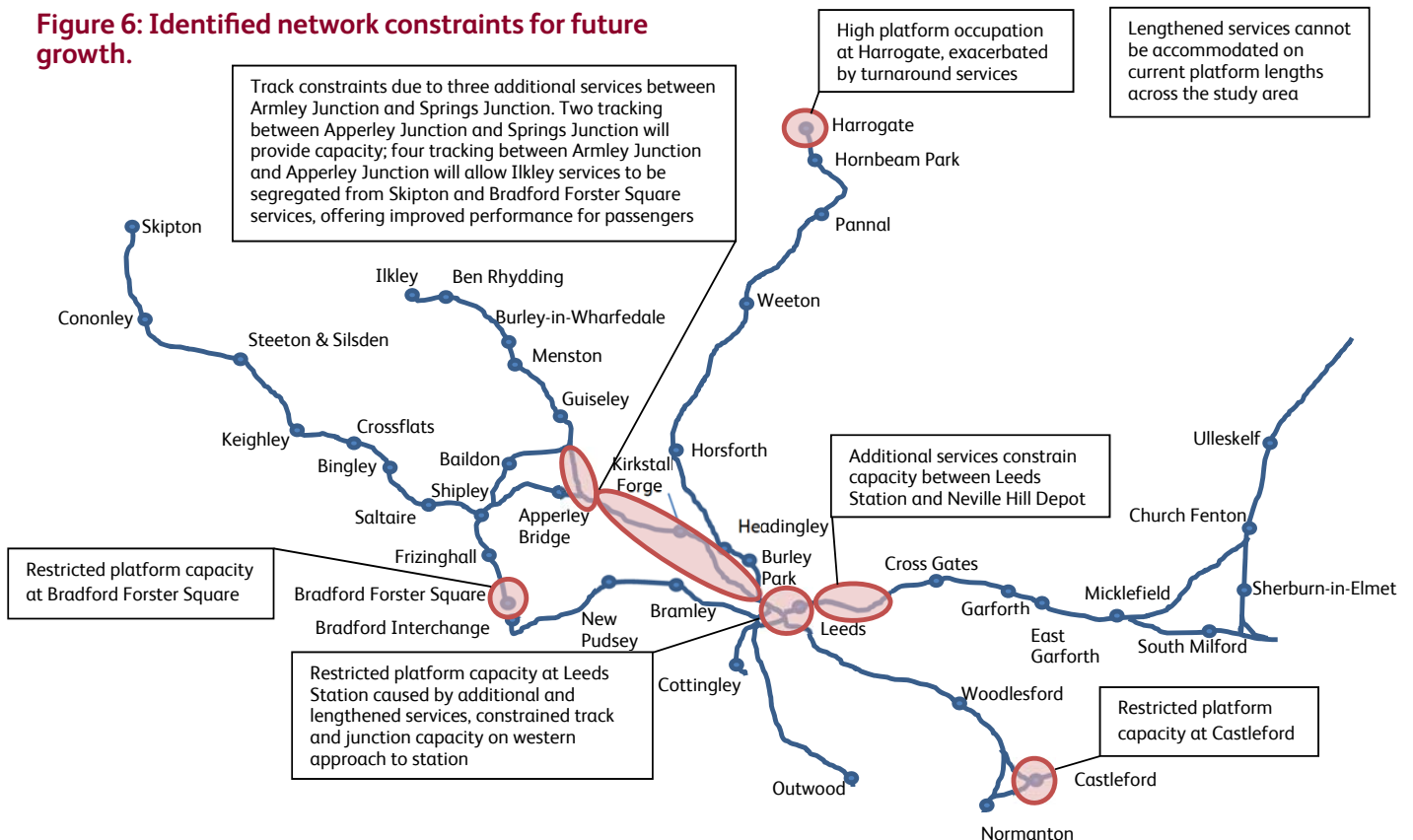


Table 2: Summary of Options to Deliver Economic Growth in the Leeds Area

Geographic Scope	Constraint	Intervention Option	Benefit	Cost	Required for ITSS		
					2026	2033	2043
<b>Unlocking constraints on the Harrogate Line Corridor</b>	Limited platform capacity to turnaround 2 x 5-Car Class 800 services from London King's Cross – Harrogate at Harrogate Station.	Improve access to the siding to the north of Harrogate Platform 3 from the main line utilising a facing crossover at the south end to provide direct access for services from Leeds to stop at Platform 3 and pull into the siding.	This will enable London King's Cross to Harrogate services to turn round without restricting capacity at Harrogate Station for other services. This intervention is in the process of being developed through the RNEP process.	N/A	✓	✓	✓
<b>Delivering sufficient track and platform capacity on the Leeds North West Corridor</b>	High number of trains at Armley Junction and northern approach lines to Leeds Station platforms is amplified by additional services. This exceeds the current capability of the infrastructure at Armley Junction and on the approaches to Leeds Station.	Reconfigure Armley Junction either as Flat Junction (a) or	New X and Y lines and revised Armley Junction layout would allow segregation of Harrogate and Shipley line services on the approach to Leeds.	High (a)			
		Grade Separated Junction (b). Install new X and Y lines to the north of the A and B lines between Armley Junction and Leeds Station.	A grade separated Armley Junction would provide more flexibility across the junction as conflicting crossing moves would be eliminated. This would offer more train paths for future growth and offer better performance.	High (b)	✗	✓	✓
	High utilisation between Springs Junction and Armley Junction is exacerbated by additional services causing constraints on line and junction capacity.	Two track the current single line between Springs Junction and Apperley Junction.	Double tracking the current single track section of track between Apperley Junction and Springs Junction would enable parallel moves across the junction and allow an improved headway across the new double section of track.	High	✓	✓	✓
		Four track the current two track line between Apperley Junction and Armley Junction.	Four tracking between Apperley Junction and Armley Junction will allow services to Ilkley to be segregated from services to Skipton and Bradford Forster Square, offering improved performance for passengers.	Very High	✗	✗	✓
Restricted platform capacity at Bradford Forster Square.	Extend Platform 3 to 160m.	An extension of Platform 3 at Bradford Forster Square to enable 6 car units to turn round would improve operational flexibility, performance and reduce overcrowding as raised in the NRPS.	Medium	✓	✓	✓	
<b>Enabling sufficient track capacity on the East of Leeds Corridor</b>	Constrained line capacity between Leeds Station and Neville Hill Depot.	Four track the current two track section between Leeds Station and Neville Hill Depot.	With additional services East of Leeds to meet forecast growth this section of track becomes increasingly constrained. This is further exacerbated by the sensitivity test requested by the Working Group to understand the impact of five ECS moves to the East of Leeds. To accommodate this two extra tracks to enable ECS moves between Leeds Station and Neville Hill Depot segregating passenger services are required. This would improve performance and provide a more reliable railway. This is one option to overcome constraints East of Leeds, however, further analysis would be required on this complex corridor to deliver the most appropriate outcome. Alternative options include changes to the depot and stabling strategy for the Region.	Very High	✗	✓	✓
<b>Delivering sufficient platform and track capacity on the Five Towns Corridor</b>	Restricted platform capacity at Castleford Station.	Reinstate Platform 2 at Castleford.	Reinstatement of Platform 2 would provide additional platform capacity at the station. As part of the work to provide appropriate diversionary routes for TRU the reinstatement of the platform is being considered and there are potential synergies to align to forecast growth.	N/A	✓	✓	✓

Key: ✓ Incidates an intervention required to accommodate the relevant years ITSS. ✗ Indicates an intervention not required to accommodate the relevant years ITSS

Table 2: Summary of Options to Deliver Economic Growth in the Leeds Area

Geographic Scope	Constraint	Intervention Option	Benefit	Cost	Required for ITSS		
					2026	2033	2043
Delivering sufficient platform and track capacity on the Five Towns Corridor	Restricted platform capacity at Castleford Station.	Reconfigure track layout to include a crossover as close as possible to Castleford Station.	An additional crossover on the Cutsyke line would enable services to use Platform 2 to turn round and reduce the dependency on Platform 1, this would be used by two trains per hour. There are potential synergies with TRU diversionary routes work to enable a legacy that puts passengers first.	Medium	✓	✓	✓
Providing sufficient platform and track capacity at Leeds Station	Restricted platform capacity at Leeds Station caused by additional and lengthened services.	Reconfigure track layout on approach to Platforms 13 to 17 and lengthen Platforms 13 and 17 to 150m.	Lengthening Platforms 13 and 17 to 150m would enable the platforms to be used by 6 Car services arriving at the station from the E and F lines. This would help to alleviate high capacity usage on Platform 15 in the modelled scenarios. Reconfiguration of the approaches to Platform 13 and 17 is linked to the recommendation of an additional 'G line' on the southern side of Leeds Station.	P13 – Medium P17 – Medium	✓	✓	✓
		Lengthen Platform 7 to 97m.	This would enable terminating 4 Car services from the east of Leeds to use Platform 7.	Low	✓	✓	✓
		Install an additional platform 'Platform -1' to the north of Platform 0.	This would enable the additional quantum and length of services from the Leeds North West and Harrogate corridors to be accommodated in Leeds Station. The option design for this study has included passive provision for a Platform -2.	Medium	✗	✗	✓
	Constrained approach to Platforms 15-17.	Install an additional 'G' line between Platform 17 and Leeds West junction, directly linking to the Five Towns Corridor.	This would enable parallel moves into Platforms 15-17, improving operational flexibility.	High	✓	✓	✓
		Reinstate Farnley Viaduct connecting new 'G' and 'H' lines to the Huddersfield line.	This would enable services departing and arriving at the high numbered platforms at Leeds Station to be connected to the Huddersfield lines. Benefits of connecting with Huddersfield lines include avoiding the constraints of Whitehall Junction, Leeds West Junction and Copley Hill Junction, as well as enabling separation of Transpennine services (which also provides future proofing for potential NPR proposals). This would improve performance and operational flexibility.	High	✗	✗	✓
	Constrained approach to Platform 5.	Reconfigure Switches and Crossings on approach to Platform 5.	This would improve operational flexibility and allow services to arrive into Platform 5 from lines C and D. In turn this would free Platform 12 and allow eastbound services to use Platform 12, subsequently freeing up Platform 15 for longer terminating services.	Medium	✗	✓	✓
Accommodating increased service lengths across the study area through platform Lengthening	A total of 54 platforms across 29 stations in the study area will be too short to fully accommodate future train service lengths (excluding the platform lengthening required at Leeds Station).	Platform extensions would allow for longer trains to be fully accommodated in Platforms. Whilst Selective Door Opening is an option for some services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required at stations in the study area.	Longer trains accommodated in platforms would put the passenger first and improve the journey experience. The provision of more seats will reduce crowding which has been identified as a key driver of satisfaction in the National Rail Passenger Survey.	N/A	✓	✓	✓
Providing sufficient traction power to support future services in the Leeds Area	Existing traction power supply does not have enough capability for additional services proposed.	Delivering additional traction power supply in the Leeds Area.	Suitable network capability to ensure electric traction and train voltages are compliant across the Leeds Area.	N/A	✓	✓	✓

Key: ✓ Incidates an intervention required to accommodate the relevant years ITSS. ✗ Indicates an intervention not required to accommodate the relevant years ITSS

## 09 Other Considerations

Further considerations when developing a strategy for the medium to long-term in the Leeds Area include level crossing risks, other ways to achieve capacity, interaction with High Speed 2 and Northern Powerhouse Rail and traction power supply.

### 9.01 Level Crossings

Any changes to services across the study area would need to be fully assessed for their level crossing impact prior to implementation. In particular, the Leeds Area Safety, Performance, Reliability and Sustainability Baseline identified existing concerns with level crossings on the line between Keighley and Skipton. This stretch of line accounted for 70% of level crossing incidents in the study area. This should be considered in conjunction with the recommendations from this study which highlight the need for an additional two trains on the line by 2043.

### 9.02 Achieving Capacity Through Service Lengthening

In general the service specifications for future growth proposed in this study are based on 6 Car service formations. This approach was agreed by the Working Group and aligns to concerns with service frequency raised in the West Yorkshire results from the NRPS.

An alternative way to provide the required increase in passenger capacity would be to lengthen existing services or use alternative rolling stock.

### 9.03 High Speed 2 and Northern Powerhouse Rail Impact

To understand the impact of HS2 and NPR on the study conclusions, the services on individual corridors under the 2043 ITSS has been compared to the HS2 and NPR service specifications at the time of the analysis.

It is proposed that HS2 services will arrive at new platforms without interfacing infrastructure and therefore will not have an impact on the conclusions drawn about platform and track capacity in the existing station. However, there will be pedestrian connectivity and passenger interchange between the new HS2 platforms and the existing station platforms. The new HS2 service may impact demand on the Leeds – London King’s Cross services, which are likely to be increasingly used for shorter connecting journeys.

This study has assumed that on corridors where NPR contains an equal number or fewer services compared to the study, the interventions recommended will provide sufficient capacity for the quantum of NPR services. This was found to be the case on all corridors, demonstrating that interventions identified in this

study provide sufficient capacity for the quantum of services being developed for NPR.

To ensure that NPR services can be accommodated at Leeds Station, analysis was carried out to assess whether the six 150m services from Manchester to Leeds examined in this study can be accommodated at the station as 200m services as envisaged under NPR. The analysis found that the interventions identified in the Leeds Area Strategic Question enable 200m long NPR trains to be accommodated in Leeds Station.

It is important to note that this analysis has examined the NPR service specification in the Leeds Area only and as part of NPR’s continual development the NPR workstream will identify interventions required to accommodate the full NPR network.

### 9.04 Power Supply

A separate workstream identified a series of Power Supply upgrades and electrification works required to enable the DfT 2026 growth scenario (15% growth) to be supported in the Leeds Area. As each of the scenarios in this study have a higher forecast growth (34%, 50% and 81%) and quantum of services in comparison, it is assumed that these upgrades would be required as a minimum, with the potential that further interventions would be required to deliver the study ITSSs in full. Consequences of inadequate power supply include:

- Slower train acceleration and associated increases in Sectional Running Times
- Potentially unable to compliantly operate full services during an outage of a Feeder Station
- Train voltages potentially non-compliant at times
- Increased use of alternative power such as diesel and associated environmental consequences

Any future work in developing Power Supply interventions should be considered alongside the national Traction Decarbonisation Network Strategy currently being developed.



# 10 Recommendations

The Leeds Area Strategic Question study has identified a series of challenges and opportunities to deliver the medium to long term growth anticipated in the Leeds Area.

## 10.01 Recommendations from the Leeds Area Strategic Question

The assessments carried out as part of this study have identified a number of challenges and opportunities to deliver future train services in the Leeds Area. The future train service structure, with the additional capacity it provides, will drive the need for infrastructure interventions and changes to operational rules to deliver a reliable and high performing railway to support the forecast growth in the Leeds Area through to 2043.

In line with the Strategic Question approach, a number of sub-questions were identified to provide an additional level of detail for the study. A summary of the conclusions for these sub-strategic questions are presented in Table 3.

Table 3: Summary for each Sub-Strategic Question	
Sub-Strategic Question	Summary
What are the interventions to improve the Harrogate Line corridor comprising Capacity, Connectivity and Journey times?	<p>Assessment of passenger growth forecasts into Leeds have identified overcrowding and capacity constraints on this corridor from 2026. In order to overcome this, train lengthening and an additional service (with a further service by 2043) were identified. No further service alterations are required to meet the conditional connectivity outputs of TfN's LTRS on this corridor.</p> <p>Capacity Analysis found that these lengthened and additional services cause capacity constraints in the Armley Junction area, the northern approach lines to Leeds Station, and at Harrogate Station.</p> <p>Platforms at all stations along the line are too short for the proposed services. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required. Further intervention development on the Harrogate corridor will require more work to confirm the rolling stock utilised. Additional work will also be required to confirm the impact of the proposed new Leeds Bradford Airport station on this corridor.</p> <p>Whilst there is the potential that journey time improvements could assist in providing additional capacity on this section, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>
What are the interventions to improve the Leeds North West corridor comprising Capacity, Connectivity and Journey times?	<p>Assessment of passenger growth forecasts into Leeds have identified overcrowding and capacity constraints on this corridor from 2026. In order to overcome this, three additional services were added by 2043 (Leeds – Skipton x 2, Leeds – Ilkley x 1). No further service alterations are required to meet the conditional connectivity outputs of TfN's LTRS on this corridor.</p> <p>Capacity Analysis found that these additional services cause capacity constraints in the Armley Junction area, the northern approach lines to Leeds Station and line capacity between Springs Junction and Armley Junction. Springs Junction to Apperley Junction sees capacity constraints in 2026, and Apperley Junction to Armley Junction sees capacity constraints in 2043. In-between these recommendations the corridor will be affected by the recommended reconfiguration of Armley Junction and two new lines (X and Y) to the north of A line on the approach to Leeds Station in 2033.</p> <p>There are platform constraints at Bradford Forster Square and across the majority of the Leeds North West corridor. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required.</p> <p>Whilst there is the potential that journey time improvements could assist in providing additional capacity on this section, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>

Table 3: Summary for each Sub-Strategic Question

Sub-Strategic Question	Summary
<p>What are the interventions to improve the East of Leeds corridor comprising Capacity, Connectivity and Journey times?</p>	<p>Assessment of passenger growth forecasts into Leeds have identified overcrowding and capacity constraints on this corridor from 2033 on non-stopping services. In order to overcome this, one new service, and one service extension were added (new service: Huddersfield – York; extension Huddersfield – Leeds through to York). No further service alterations are required to meet the conditional connectivity outputs of TfN’s LTRS on this corridor.</p> <p>The two additional services further exacerbate existing issues East of Leeds. On top of this, a sensitivity test was requested by the Working Group to understand the impact of five ECS moves to the East of Leeds. This identified a constraint in this section of track which would need to be overcome in order to provide a high performing and reliable railway for passengers.</p> <p>There are third party plans to build a new station on this corridor at Thorpe Park. This has been included in the study with services either stopping at Thorpe Park or Garforth.</p> <p>Platform lengths have been identified as a constraint on this corridor at Church Fenton. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required.</p> <p>Whilst there is the potential that journey time improvements could assist in providing additional capacity and reliability on this section, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>
<p>What are the interventions to improve the Wakefield Westgate (ECML) corridor comprising Capacity, Connectivity and Journey times?</p>	<p>Assessment of passenger growth forecasts into Leeds have identified overcrowding and capacity constraints on this corridor from 2043. In order to overcome this an additional service was added (Doncaster – Leeds). This additional service did not cause any capacity constraints on the corridor within the study area.</p> <p>Platform lengths have been identified as a constraint at Outwood on this corridor. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required.</p> <p>Whilst there is the potential that journey time improvements could assist in providing additional reliability on this corridor, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>
<p>What are the interventions to improve the Five Towns (Castleford) corridor comprising Capacity, Connectivity and Journey times?</p>	<p>Assessment of passenger growth forecasts into Leeds (based on the baseline service specification, which contains a higher level of services than is running today) did not identify any capacity constraints on this corridor. However, in order to meet the conditional outputs from the TfN LTRS, an additional service was required and has been added (Leeds - Sheffield via Castleford and Barnsley). Capacity Analysis has found that the additional service causes capacity constraints at Castleford station.</p> <p>Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required.</p> <p>Whilst there is the potential that journey time improvements could assist in providing improved reliability on this section, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>
<p>What are the interventions to improve the Calder Valley corridor comprising Capacity, Connectivity and Journey times?</p>	<p>Assessment of passenger growth forecasts into Leeds (based on the baseline ITSS, which contains a higher level of services than is running today) did not identify any capacity constraints on this corridor. In addition, no service alterations are required to meet the conditional connectivity outputs of TfN’s LTRS on this corridor.</p> <p>Capacity Analysis of the baseline ITSS has identified constraints with platform lengths at Bramley on this corridor. Platform extensions would allow for longer trains to be accommodated in platforms completely. Whilst Selective Door Opening is an option for longer services, operational considerations would need to be assessed to identify the most appropriate solution to deliver the additional capacity required. A new station is proposed at Elland, which is outside of this study area and has not been included as part of this analysis.</p> <p>Whilst there is the potential that journey time improvements could assist in providing improved reliability on this section, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>

**Table 3: Summary for each Sub-Strategic Question**

Sub-Strategic Question	Summary
<p>What are the interventions to improve the Huddersfield Line corridor comprising Capacity, Connectivity and Journey times?</p>	<p>Assessment of passenger growth forecasts into Leeds have identified overcrowding and capacity constraints on this corridor from 2026. In order to overcome these, three new services have been added (Leeds - Southport, Huddersfield – York and Huddersfield – Leeds). No further service alterations are required to meet the conditional connectivity outputs of TfN's LTRS on this corridor.</p> <p>Capacity Analysis has found that these additional services cause platform capacity constraints at Cottingley. There are plans to open a new station in the area – White Rose – which should be considered holistically alongside interventions at Cottingley.</p> <p>Whilst there is the potential that journey time improvements could assist in providing improved capacity and reliability on this corridor, further assessment of the service pattern and railway constraints would need to be undertaken. TfN continues to work with the industry to identify and develop potential journey time improvement schemes, however the options for this corridor are not at a sufficient level of maturity to be considered in this study.</p>
<p>How can the Leeds Area accommodate forecast freight growth?</p>	<p>Existing freight flows in the Leeds Area were examined to develop a representative service pattern for the baseline ITSS. Assessment of existing flows, stakeholder input, and Freight Market Study Rail Forecasts<sup>1</sup> highlighted the need to provide an hourly freight path across Whitehall Junction. The freight path through Leeds Station to Hunslet East is not anticipated to run in the peak hour, and as such has not been assessed in this study.</p>
<p>What are the Platform requirements at Leeds Station to support future growth?</p>	<p>Capacity Analysis recommends lengthening Platforms 7, 13 and 17 at Leeds Station, as well as the recommendation for an additional platform to the north of the station.</p>
<p>What are the resulting pedestrian capacity requirements?</p>	<p>Leeds Station is forecast to suffer significant impacts from passenger congestion from 2026. There are minimal differences in the interventions required to overcome capacity constraints in the three scenarios examined in the study, the recommendations are:</p> <ul style="list-style-type: none"> <li>• Doubling of vertical circulation to Platforms 9-17 required via either extending the East Bridge or building a new bridge</li> <li>• Eight additional gate lines required</li> <li>• Additional entry capability to the south to accommodate passenger growth from the Leeds South Bank</li> <li>• Platform 17 is congested, and either infrastructure or operational interventions are required to address this</li> <li>• Opportunities to maximise platform space, e.g. by removing Platform 14, should also be explored.</li> </ul> <p>In addition, the Leeds Safety, Sustainability, Reliability and Performance baseline identified safety issues at the station, especially in the following areas:</p> <ul style="list-style-type: none"> <li>• High numbers of slips, trips and falls</li> <li>• Safety incidents concentrated on the West Overbridge, escalators, ticket barriers and Platform 1</li> </ul> <p>These findings should be considered in the development of any interventions to accommodate pedestrian capacity. As the Leeds Existing Station Programme utilises the growth scenarios from this study, in addition to analysing HS2 and NPR scenarios, to identify pedestrian capacity recommendations it provides the most suitable vehicle for the further development of these interventions.</p>
<p>What are the impacts of High Speed 2 interventions in the Leeds Area?</p>	<p>It is proposed that HS2 services will arrive at new platforms without interfacing infrastructure and therefore will not have an impact on the conclusions drawn about platform and track capacity in the existing Leeds Station.</p> <p>There will be pedestrian connectivity between the existing station and new HS2 platforms and it is anticipated that there will be alterations in passenger flows from the platforms where existing London bound services depart to the new HS2 tracks, these have been considered as part of the pedestrian capacity analysis utilised by the Leeds Existing Station Programme.</p>
<p>What are the impacts of Northern Powerhouse Rail interventions in the Leeds Area?</p>	<p>Analysis has concluded that interventions identified for this study provide sufficient capacity for the quantum of services in the NPR service specification. 200m long NPR style trains are also able to be accommodated in Leeds Station under the study recommendations. It is important to note that this analysis has examined the NPR service specification in the Leeds Area only, and as part of NPR's continual development, the NPR workstream will identify interventions required to accommodate the full NPR network.</p>

<sup>1</sup> <https://cdn.networkrail.co.uk/wp-content/uploads/2019/08/Rail-freight-forecasts-scenarios-for-2033-and-2043.pdf>

Table 3: Summary for each Sub-Strategic Question	
Sub-Strategic Question	Summary
How can future operational service aspirations at Neville Hill Depot be accommodated in the Leeds Area?	<p>The impact of two additional services East of Leeds was assessed, which further exacerbates existing issues between Leeds Station and Neville Hill Depot. In addition, a sensitivity test was requested by the Working Group to understand the impact of five additional Empty Coaching Stock moves between Leeds Station and Neville Hill. This was found to cause further capacity constraints in the area.</p> <p>Further analysis would be required on this complex corridor to identify the optimal option to overcome these constraints, which may include changes to the Depot and Stabling strategy for the Region.</p>
When are track, platform and rolling stock capacity on all lines into Leeds Station no longer able to meet forecast demand, and what are the options to respond to this?	<p>In the medium to long term, track, platform, power supply and rolling stock capacity on corridors to Leeds are no longer able to meet forecast demand from 2026. This report has detailed issues by individual corridors, and identified indicative recommendations to overcome these constraints.</p>
What are the Safety, Sustainability, Reliability, Performance and Resilience issues for the Leeds Area?	<p>As part of this study, a Leeds Area Safety, Sustainability, Reliability and Performance baseline has been produced. This has identified a series of locations where issues currently exist. The most pertinent to this study are:</p> <ul style="list-style-type: none"> <li>• Leeds Station – high number of signalling and track faults, and slips, trips and falls (specifically surrounding escalators and the west overbridge)</li> <li>• Keighley – high number of asset / tool / train incidents</li> <li>• Kirkstall Junction – high number of trespass incidents</li> <li>• Keighley to Skipton – high number of Level Crossing incidents</li> </ul> <p>The resolution of these issues should be considered at the same time any intervention is progressed in the relevant area.</p> <p>Additionally, Network Rail’s development of a Traction Decarbonisation Network Strategy will give clear recommendations for traction decarbonisation in the Leeds Area.</p>





# 11 Next Steps for the Industry

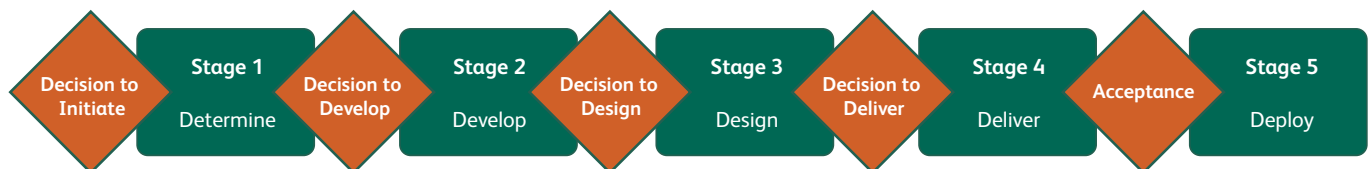
This study has identified a number of potential enhancements to deliver forecast rail growth in the Leeds Area. The options presented are investment choices for potential funders to be considered for development and delivery. Where appropriate, schemes should look for synergies with identified future renewals to put the passenger and freight user first to minimise disruption and ensure value for money.

If Central Government funding is sought, the development of the schemes should align to the Rail Network Enhancements Pipeline (RNEP) process, established to create a rolling programme of enhancements. The decision points for investment in the railway are supported by the established Five Case Model for business cases ensuring value for money throughout the lifecycle. Figure 7 illustrates the stages of the RNEP process and identifies where the key decisions for enhancement schemes take place. The first stage of the process, the 'Decision to Initiate' stage, is the

establishment of the case for intervention and progresses to the development of a Strategic Outline Business Case. This would form the next stage in developing options for the Leeds Area, entering the potential interventions into the pipeline. Should the next stage, a 'Decision to Develop', be jointly agreed further development through the pipeline and business case cycle would be undertaken toward a 'Decision to Design' and 'Decision to Deliver' where the focus would move toward implementing the enhancement and realising the benefits.

The recommendations from this study have been developed collaboratively with a number of stakeholders to deliver a collective view on what is required to deliver future train services in the Leeds Area to support economic growth to 2043. Network Rail will continue to work with funders to refine credible options that meet the needs of passengers and freight users, drive social and economic benefits, and fit with the long term needs of the rail network in the Leeds Area.

**Figure 7: Illustration of the Rail Network Enhancements Pipeline process**



# 12 Conclusions

## How can forecast growth and partners aspirations be accommodated in the Leeds Area up to 2043?

The study has worked collaboratively with stakeholders to agree a set of growth scenarios and associated service specifications covering the medium and long term. Analysis has been carried out to understand the implications of this forecast growth on track capacity in the study area and pedestrian flows at Leeds Station. The findings have highlighted that the forecast growth scenarios cannot be accommodated on the baseline infrastructure.

Key areas identified as constraints are platform capacity at Leeds, Bradford Forster Square and Castleford stations, constraints on both the western and eastern approaches to Leeds Station, Platform lengths across the study area and line capacity constraints between Armley Junction and Springs Junction. Pedestrian capacity at Leeds Station is found to be insufficient from 2026 with key areas identified as constraints at the gate lines, vertical circulation to Platforms and constraints around Platform 17. Power Supply is also a constraint in the Leeds Area, with a series of recommended power supply and electrification upgrades identified.

The study has provided potential solutions to these constraints, in the form of infrastructure and operational interventions. The infrastructure solutions have been developed to an outline design and order of magnitude cost to provide a series of interventions. It is recommended that these are further progressed through the Rail Network Enhancements Pipeline process.

The study has provided an overview of the impact of the High Speed 2 and Northern Powerhouse Rail programmes on the conclusions, as well as considerations surrounding power supply and level crossings. The findings from the Leeds Area Safety, Performance, Reliability and Sustainability baseline have been highlighted for consideration at locations where interventions would be required.

As the rail industry long term strategic planning evolves, it is important that these findings are taken into account to ensure a consistent and robust plan for the future network that puts passengers and freight users first whilst supporting Network Rail's strategic objectives.



# Appendix A Key Assumptions and Exclusions

- The study was based on an unconstrained localised model of the network and the implications of alterations to service times on the wider network have not been assessed at this stage. It is recommended that the implications on the wider network are considered in future developments and once these are understood, further interventions may be required.
- The study uses a suite of service specifications developed with industry advice and endorsed through the Leeds Area Strategic Question Working Group.
- The baseline infrastructure modelled was that of May 2019 plus the Leeds Station Capacity Project interventions of Platform 0 and adjustments to some platform lengths.
- The rolling stock in the baseline service specification was developed in conjunction with Train Operators and industry stakeholders in 2019, and have been used to assess seats per vehicle, traction power and car lengths.
- Services have generally been assumed to follow existing service patterns.
- Empty Coaching Stock moves have not been assessed as part of the capacity analysis modelling, though a sensitivity test has been included.
- A Leeds Area Depot and Stabling Strategy has not been assessed as part of this study.
- The study has assumed that platforms at Leeds Station are not used for the berthing of units for extended daytime occupancy.
- The potential impact on maintenance regimes, maintenance access, performance and operations from additional services or infrastructure has not been considered.
- The study has focussed on capacity and economic growth, the national Traction Decarbonisation Network Strategy, which is being developed, should be taken account of should interventions be progressed.
- The study assumes that on corridors where the NPR service specification contains an equal number or fewer services compared to the study, the interventions recommended by the study will provide sufficient capacity for the quantum of NPR services.
- The study is based on forecasts and analysis which took place prior to the COVID-19 pandemic. At the time of publication, the long-term impacts of COVID-19 on rail demand are not known. The rail industry continually reviews and updates strategic advice, and Network Rail will work with funders to ensure the rail network continues to support society and the economy in the long term.



# Appendix B Glossary

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Abbreviation	Definition
DfT	Department for Transport
ECS	Empty Coaching Stock
HS2	High Speed 2
ITSS	Indicative Train Service Specification
LESP	Leeds Existing Station Programme
LTPP	Long Term Planning Process
LTRS	Long Term Rail Strategy
NPR	Northern Powerhouse Rail
NRPS	National Rail Passenger Survey
RDG	Rail Delivery Group
RIRG	Route Investment Review Group
RNEP	Rail Network Enhancements Pipeline
SOBC	Strategic Outline Business Case
TfN	Transport for the North
TMD	Train Maintenance Depot
TPR	Timetable Planning Rule
TRU	Transpennine Route Upgrade
WYCA	West Yorkshire Combined Authority

